National Institute for Health and Care Excellence

Final version

Low back pain and sciatica in over 16s: assessment and management

Assessment and non-invasive treatments

NICE guideline NG59

Methods, evidence and recommendations

November 2016

Final, 2016

Developed by the National Guideline Centre,
Hosted by the Royal College of Physicians

Disclaimer
Healthcare professionals are expected to take NICE clinical guidelines fully into account when exercising their clinical judgement. However, the guidance does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of each patient, in consultation with the patient and, where appropriate, their guardian or carer.

ISBN
978-1-4731-2188-1

Contents

Guideline Development Group members

Name	Role
Babak Arvin	Consultant Neurosurgeon, Queens Hospital
Ian Bernstein	Musculoskeletal Physician and General Practitioner, London North West Healthcare NHS Trust and Gordon House Surgery
Suzanne Blowey	Consultant Nurse Chronic Pain, Derriford Hospital, Plymouth (from November 2014)
Patrick Hill	Honorary Consultant Psychologist, Pain Services Royal United Hospitals Bath NHS Foundation Trust and Taunton and Somerset NHS Foundation Trust
Mark Mason	Patient representative
Wendy Menon	Patient representative (until January 2015)
Gary MacFarlane	Chair (clinical) in Epidemiology, University of Aberdeen
Neil O'Connell	Senior Lecturer, Department of Clinical Sciences, College of Health and Life Sciences; Institute of Environment, Health and Societies, Brunel University London
Diana Robinson	Patient representative (from February 2015)
Philip Sell	Consultant Orthopaedic Surgeon, University Hospitals of Leicester NHS Trust and Nottingham University Hospitals NHS Trust
Simon Somerville	General Practitioner with Special Interest in Musculoskeletal Medicine, Park Medical Centre, Leek, Staffordshire
Helen Taylor	Nurse Specialist, Pain Management Solutions (until September 2014)
Steven Vogel	Vice Principal (Research), British School of Osteopathy
David Walsh	Honorary Consultant Rheumatologist, Sherwood Forest Hospitals NHS Foundation Trust
Stephen Ward (Chair)	Consultant in Pain Medicine, Brighton and Sussex University Hospitals NHS Trust
Chris Wells	Consultant in Pain Medicine, Liverpool and President, European Pain Federation (EFIC)

NGC technical team members

Name	Role
Kim Archer	Project Manager (until May 2014)
Kate Ashmore	Document Editor/Process Assistant (from April 2015 until June 2015, and from May 2016)
Ella Barber	Research Fellow (from October 2014 until February 2015)
Mikaela Bartlett	Document Editor/Process Assistant (from June 2015 until May 2016)
Emma Brockis	Health Economist (from November 2015)
Sophie Carlisle	Research Fellow (from November 2015)
Serena Carville	Associate Director/Guideline Lead
Margherita Fanos	Research Fellow (from June 2015)
Elisabetta Fenu	Health Economic Lead (from June 2015)
Lina Gulhane	Joint Head of Information Science (from May 2015)
Rhosyn Harris	Research Fellow (until July 2014)
Sophia Kemmis-Betty	Senior Health Economist (until August 2015)
Sana Khan	Research Fellow (from February 2015)

Name	Role
Bethany King	Document Editor/Process Assistant (from July 2014 until April 2015)
Kate Lovibond	Health Economic Lead (until May 2015)
Qudsia Malik	Senior Research Fellow
Paul Miller	Senior Information Scientist (until April 2015)
Rachel O'Mahony	Senior Research Fellow (from October 2014 until November 2015)
Ben Pordes	Project Manager (from April 2014)
Silvia Rabar	Senior Research Fellow (until December 2014)

Co-optees

Name	Topic	Role
Jens Foell	Acupuncture	NIHR Clinical Lecturer at Queen Mary, University of London
Nadine Foster	Risk assessment tools and risk stratification	NIHR Research Professor of Musculoskeletal Health in Primary Care, Arthritis Research UK Primary Care Centre, Keele University
Serena McCluskey	Return to work	Senior Research Fellow, Centre for Applied Psychological and Health Research, The University of Huddersfield
Martin Sambrook	Imaging	Consultant Radiologist, East Sussex Healthcare NHS Trust

Acknowledgements

The development of this guideline was greatly assisted by the following people:

Neil Askew, Tracey Bernstein, Katie Broomfield, Saskia Cheyne, Jill Cobb, Emily Davies, Caroline Farmer, Francesca Fasesin, Jessica Flynn, Jessica Glen, Katie Jones, Jacoby Patterson, Joshua Ruegger, Josh South, Nancy Turnbull, Ruth Wong and Giulia Zuodar.

1 Guideline summary

1.1 Algorithm

Figure 1: Low back pain and sciatica management algorithm.

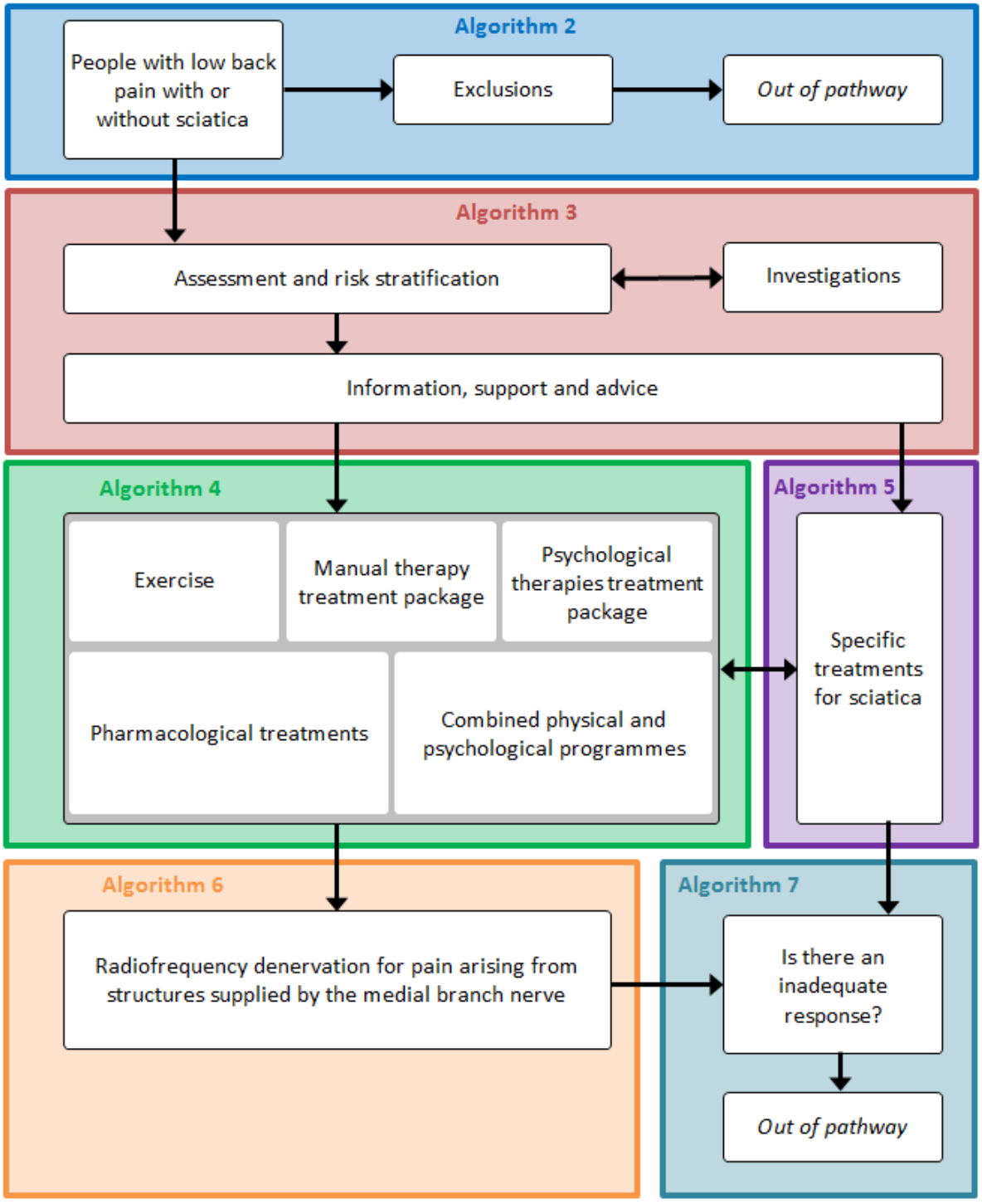
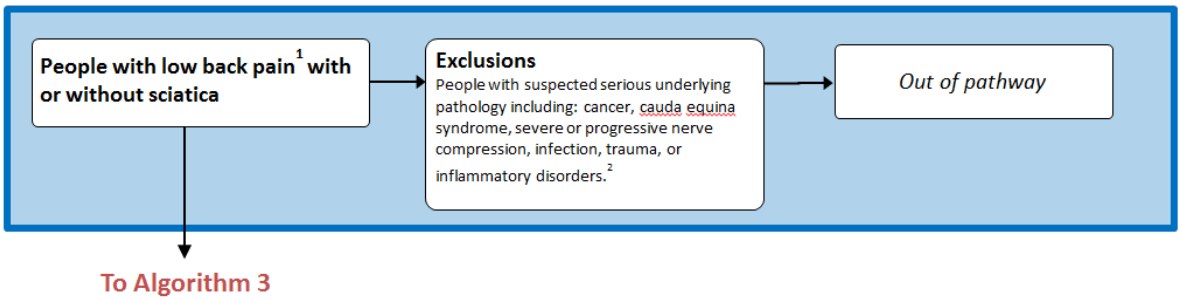


Figure 2: Algorithm 2



1 *The description of low back pain which is not due to cancer, fracture, infection or an inflammatory disease process can include the terms: simple low back pain, mechanical low back pain, musculoskeletal low back pain and non-specific low back pain. For the purposes of the review questions in this guideline, we have used non-specific low back pain.*

2 *The pathways for the investigation, referral and treatment for people with suspected serious underlying pathology are outside the scope of this guideline.*

Figure 3: Algorithm 3

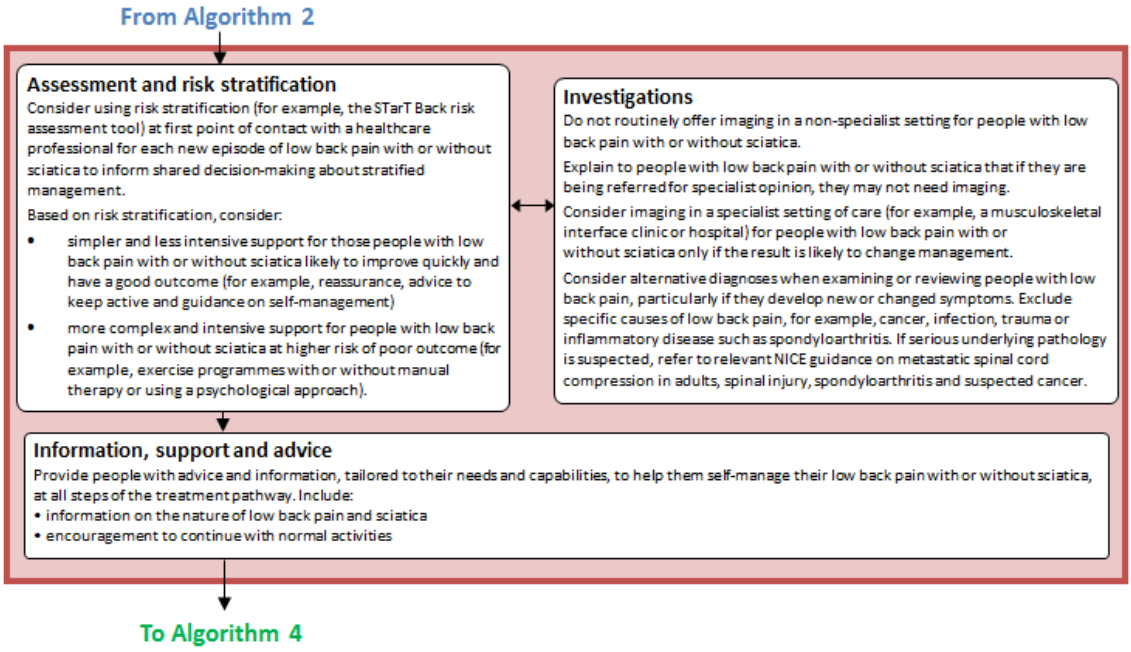


Figure 4: Algorithm 4

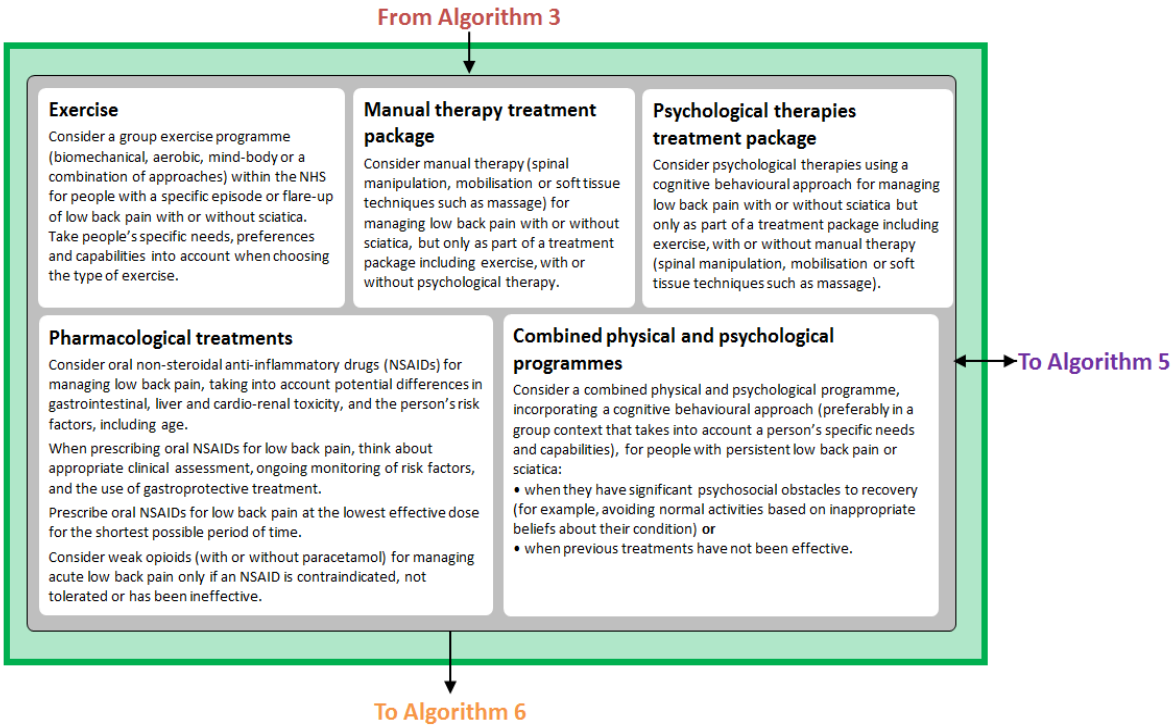
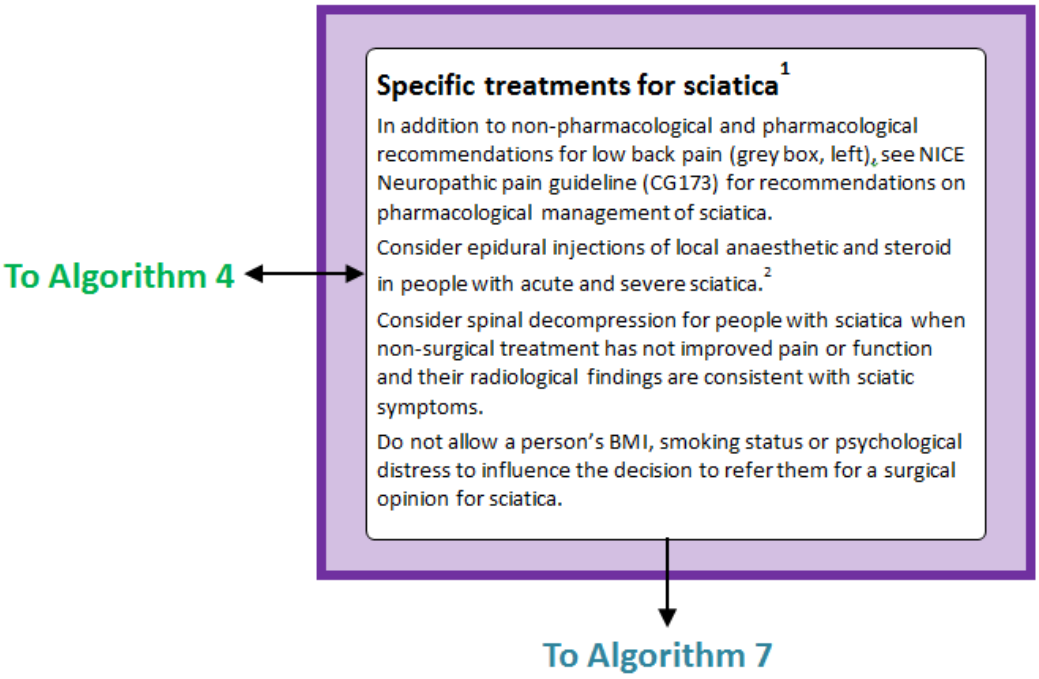


Figure 5: Algorithm 5



1 *The timing of the additional management options in the sciatica pathway, relative to options in the grey box, depends on the clinical circumstances*

2 *In people with acute sciatica, the recommendation to consider epidural injections refers to symptoms have been*

present for less than three months.

Figure 6: Algorithm 6

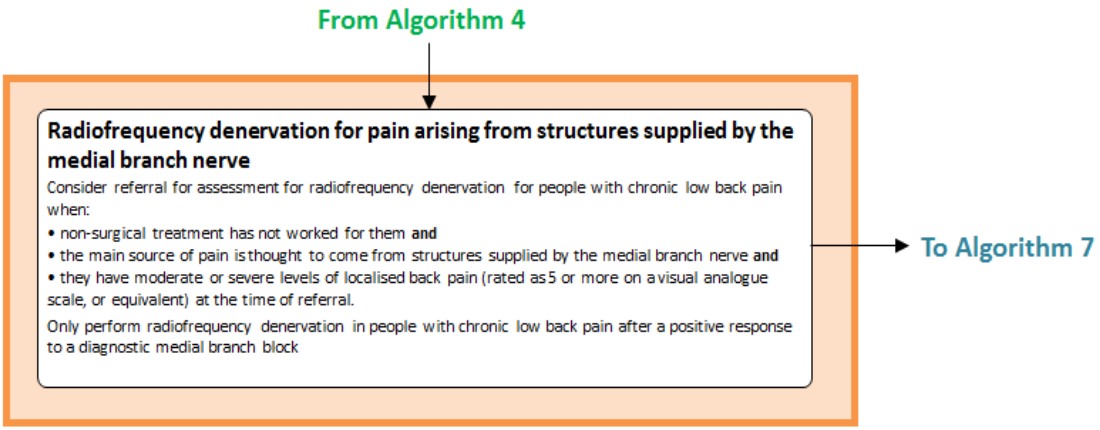
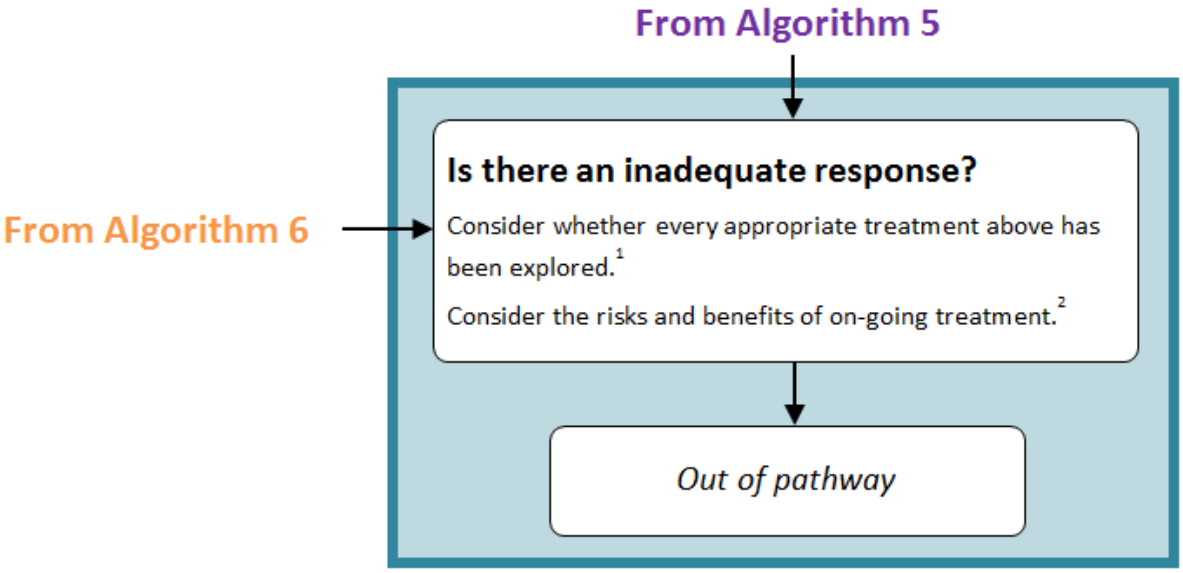


Figure 7: Algorithm 7



1 *For recommendations on spinal cord stimulation, please refer to the Spinal cord stimulation for chronic pain of neuropathic or ischaemic origin technology appraisal TA159.*

2 *If a person has troublesome symptoms, where the risks and benefits of on-going treatments covered by the guideline have been considered, it is unlikely that additional modalities of treatments will be of benefit.*

1.2 Full list of recommendations

The term 'low back pain' is used to include any non-specific low back pain which is not due to cancer, fracture, infection or an inflammatory disease process.

1. Consider using risk stratification (for example, the STarT Back risk assessment tool) at first point of contact with a healthcare professional for each new episode of low back pain with or without sciatica to inform shared decision-making about stratified management.
2. Based on risk stratification, consider:
    - simpler and less intensive support for people with low back pain with or without sciatica likely to improve quickly and have a good outcome (for example, reassurance, advice to keep active and guidance on self-management)
    - more complex and intensive support for people with low back pain with or without sciatica at higher risk of a poor outcome (for example, exercise programmes with or without manual therapy or using a psychological approach).
3. Do not routinely offer imaging in a non-specialist setting for people with low back pain with or without sciatica.
4. Explain to people with low back pain with or without sciatica that if they are being referred for specialist opinion, they may not need imaging.
5. Consider imaging in specialist settings of care (for example, a musculoskeletal interface clinic or hospital) for people with low back pain with or without sciatica only if the result is likely to change management.
6. Think about alternative diagnoses when examining or reviewing people with low back pain, particularly if they develop new or changed symptoms. Exclude specific causes of low back pain, for example, cancer, infection, trauma or inflammatory disease such as spondyloarthritis. If serious underlying pathology is suspected, refer to relevant NICE guidance on:
    - Metastatic spinal cord compression in adults
    - Spinal injury
    - Spondyloarthritis
    - Suspected cancer
7. Provide people with advice and information, tailored to their needs and capabilities, to help them self-manage their low back pain with or without sciatica, at all steps of the treatment pathway. Include:
    - information on the nature of low back pain and sciatica
    - encouragement to continue with normal activities.
8. Consider a group exercise programme (biomechanical, aerobic, mind–body or a combination of approaches) within the NHS for people with a specific episode or flare-up of low back pain with or without sciatica. Take people's specific needs, preferences and capabilities into account when choosing the type of exercise.

9. Do not offer belts or corsets for managing low back pain with or without sciatica.
10. Do not offer foot orthotics for managing low back pain with or without sciatica.
11. Do not offer rocker sole shoes for managing low back pain with or without sciatica.
12. Do not offer traction for managing low back pain with or without sciatica.
13. Consider manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage) for managing low back pain with or without sciatica, but only as part of a treatment package including exercise, with or without psychological therapy.
14. Do not offer acupuncture for managing low back pain with or without sciatica.
15. Do not offer ultrasound for managing low back pain with or without sciatica.
16. Do not offer percutaneous electrical nerve simulation (PENS) for managing low back pain with or without sciatica.
17. Do not offer transcutaneous electrical nerve simulation (TENS) for managing low back pain with or without sciatica.
18. Do not offer interferential therapy for managing low back pain with or without sciatica.
19. Consider psychological therapies using a cognitive behavioural approach for managing low back pain with or without sciatica but only as part of a treatment package including exercise, with or without manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage).
20. For recommendations on pharmacological management of sciatica, see NICE's guideline on neuropathic pain in adults.
21. Consider oral non-steroidal anti-inflammatory drugs (NSAIDs) for managing low back pain, taking into account potential differences in gastrointestinal, liver and cardio-renal toxicity, and the person's risk factors, including age.
22. When prescribing oral NSAIDs for low back pain, think about appropriate clinical assessment, ongoing monitoring of risk factors, and the use of gastroprotective treatment.
23. Prescribe oral NSAIDs for low back pain at the lowest effective dose for the shortest possible period of time.
24. Consider weak opioids (with or without paracetamol) for managing acute low back pain only if an NSAID is contraindicated, not tolerated or has been ineffective.
25. Do not offer paracetamol alone for managing low back pain.
26. Do not routinely offer opioids for managing acute low back pain (see recommendation 24).
27. Do not offer opioids for managing chronic low back pain.
28. Do not offer selective serotonin reuptake inhibitors, serotonin–norepinephrine reuptake inhibitors or tricyclic antidepressants for managing low back pain.

29. Do not offer anticonvulsants for managing low back pain.
30. Consider a combined physical and psychological programme, incorporating a cognitive behavioural approach (preferably in a group context that takes into account a person's specific needs and capabilities), for people with persistent low back pain or sciatica:
    - when they have significant psychosocial obstacles to recovery (for example, avoiding normal activities based on inappropriate beliefs about their condition) or
    - when previous treatments have not been effective.
31. Promote and facilitate return to work or normal activities of daily living for people with low back pain with or without sciatica.
32. Do not offer spinal injections for managing low back pain.
33. Consider referral for assessment for radiofrequency denervation for people with chronic low back pain when:
    - non-surgical treatment has not worked for them and
    - the main source of pain is thought to come from structures supplied by the medial branch nerve and
    - they have moderate or severe levels of localised back pain (rated as 5 or more on a visual analogue scale, or equivalent) at the time of referral.
34. Only perform radiofrequency denervation in people with chronic low back pain after a positive response to a diagnostic medial branch block.
35. Do not offer imaging for people with low back pain with specific facet join pain as a prerequisite for radiofrequency denervation.
36. Consider epidural injections of local anaesthetic and steroid in people with acute and severe sciatica.
37. Do not use epidural injections for neurogenic claudication in people who have central spinal canal stenosis.
38. Do not allow a person's BMI, smoking status or psychological distress to influence the decision to refer them for a surgical opinion for sciatica.
39. Do not offer disc replacement in people with low back pain.
40. Do not offer spinal fusion for people with low back pain unless as part of a randomised controlled trial.
41. Consider spinal decompression for people with sciatica when non-surgical treatment has not improved pain or function and their radiological findings are consistent with sciatic symptoms.

Key research recommendations

1. What is the clinical and cost-effectiveness of codeine with and without paracetamol for the acute management of low back pain?
2. What is the clinical and cost-effectiveness of benzodiazepines for the acute management of low back pain?

3. What is the clinical and cost effectiveness of image-guided compared with non-image-guided epidural injections for people with acute sciatica?
4. What is the clinical and cost effectiveness of radiofrequency denervation for chronic low back pain in the long term?
5. Should people with low back pain be offered spinal fusion as a surgical option?

2 Introduction

This guideline covers the assessment and management of low back pain and sciatica in adults over the age of 16 years.

Serious causes of low back pain are rare (for example, less than 1% of patients presenting with low back pain in primary care will have cancer as the underlying cause[213] and clinicians are usually alerted to the possibility of serious pathology by using clinical screening tools ('Red flag screening').

All clinicians involved in the management of low back pain should be aware of the common 'red flag' symptoms and signs and know when to refer patients for further testing. This guidance excludes the evaluation and management of serious spinal pathology (infection, malignancy and fractures), inflammatory causes of low back pain and the potentially serious neurological sequelae of sciatica (progressive neurological deficit and cauda equina syndrome), nor does it cover the onward management of patients with suspected serious pathology. Common low back pain red flags have been included in Appendix P.

Low back pain that is not associated with serious or potentially serious pathology has been described in the literature as 'non-specific', 'mechanical', 'musculoskeletal' or 'simple' low back pain. For uniformity, we have used the term 'low back pain' throughout the guideline; however 'non-specific low back pain' was used when formulating the review questions.

A number of spinal structures are supplied by sensory nerves and therefore capable of pain generation. Despite this, there are no reliable clinical features or imaging findings that allow us to identify these specific causes with any confidence.

The various terms used to describe low back pain reflect our difficulty in accurately identifying discrete causes of low back pain and our inability to accurately define which characteristics might help to identify specific causes.

Low back pain causes more disability, worldwide, than any other condition. Episodes of back pain are usually transient with rapid improvements in pain and disability seen within a few weeks to a few months. Whilst the majority of back pain episodes resolve improve with initial primary care management, without the need for investigations or referral to specialist services, up to one third of patients report persistent back pain of at least moderate intensity one year after an acute episode requiring care and episodes of back pain often recur.

One of the greatest challenges remains the identification of risk factors that may predict the progression from a single back pain episode to a long term, persistent pain condition where quality of life is often very low and healthcare resource use high.

A complex and variable interplay between biological, psychological and social factors undoubtedly influences this progression and it is the modification of these factors that has become one of the mainstays of back pain research and treatment over the last decade or so.

The scope of this guideline is necessarily broad. We have reviewed the evidence for treatments and interventions individually and when used in combination - from self-management advice and simple non-invasive interventions to injections, nerve ablation techniques and spinal fusion.

We have reviewed the evidence for treatment stratification and the effectiveness of tailoring treatments to these stratified groups in the hope that clinicians know which patients are likely to need more focused and intensive treatment and which patients are likely to improve rapidly with primary care management alone, without the need for investigations or referral to specialised services.

We have moved away from the traditional duration-based classification of low back pain (acute, sub-acute and chronic) and have considered low back pain to be a continuum where risk of poor outcome at any time point is almost certainly more important that the duration of symptoms. Recognising this continuum, and given that many 'acute' low back pain episodes may represent symptom recurrence or exacerbation, we have not separately analysed the results of interventions for acute, sub-acute or chronic pain unless evidence suggests otherwise as it was considered that the outcomes for a particular intervention are broadly similar in both the acute and more chronic back pain populations.

In addition to evaluating the evidence for low back pain treatments, we have reviewed the available treatments for sciatica. 'Sciatica' is a term that describes neuropathic pain radiating into the lower limbs usually caused by compression or irritation of the lumbrosacral nerve roots.

The clinical diagnosis of sciatica is often challenging and it can be difficult to distinguish between true sciatic pain and somatic referred leg pain (leg pain arising from joints, ligaments and discs rather than a spinal nerve root). Referred leg pain generally presents as diffuse pain, not radiating below the knee and patients usually describe back pain as worse than leg pain. In contrast, sciatica usually radiates dermatomally, is worse than back pain and may be associated with sensory and motor symptoms or deficits.

The prognosis for patients with sciatica is extremely good and most patients will find that pain and associated disability improves rapidly without treatment.

This guideline does not cover the evaluation or care of patients presenting with sciatica with progressive neurological deficit or cauda equina syndrome. All clinicians involved in the management of patients with sciatica should be aware of these potential neurological emergencies and know when to refer to an appropriate specialist.

In contrast to the previous NICE guidance on the management of persistent low back pain between 6 weeks and 12 months for adults aged 18 and over (NICE CG88), this document provides guidance on the assessment and management of both low back pain and sciatica from first presentation onwards in an adult population aged 16 years and older.

With this broadened scope and using updated NICE methodology to examine the latest research evidence, we hope to address the inconsistent provision and implementation of the recommendations of CG88 and to provide patients, carers and healthcare professionals with a sensible, practical and evidence based framework for the management of this important and common problem.

3 Development of the guideline

3.1 What is a NICE clinical guideline?

NICE clinical guidelines are recommendations for the care of individuals in specific clinical conditions or circumstances within the NHS – from prevention and self-care through primary and secondary care to more specialised services. We base our clinical guidelines on the best available research evidence, with the aim of improving the quality of healthcare. We use predetermined and systematic methods to identify and evaluate the evidence relating to specific review questions.

NICE clinical guidelines can:

- provide recommendations for the treatment and care of people by health professionals
- be used to develop standards to assess the clinical practice of individual health professionals
- be used in the education and training of health professionals
- help patients to make informed decisions
- improve communication between patient and health professional.

While guidelines assist the practice of healthcare professionals, they do not replace their knowledge and skills.

We produce our guidelines using the following steps:

- guideline topic is referred to NICE from NHS England
- stakeholders register an interest in the guideline and are consulted throughout the development process
- the scope is prepared by the National Guideline Centre (NGC)
- the NGC establishes a Guideline Development Group
- a draft guideline is produced after the group assesses the available evidence and makes recommendations
- there is a consultation on the draft guideline
- The final guideline is produced.

The NGC and NICE produce a number of versions of this guideline:

- the ‘full guideline’ contains all the recommendations, plus details of the methods used and the underpinning evidence
- the ‘NICE guideline’ lists the recommendations
- ‘information for the public’ is written using suitable language for people without specialist medical knowledge
- NICE Pathways brings together all connected NICE guidance.

This version is the full version. The other versions can be downloaded from NICE at www.nice.org.uk.

3.2 Remit

NICE received the remit for this guideline from NHS England. NICE commissioned the NGC to produce the guideline.

The remit for this guideline is:

This is an update of Low back pain: early management of persistent non-specific low back pain (NICE clinical guideline 88).

- The time cut-off point of 12 months and the restriction to pain that has persisted for 6 weeks specified in NICE clinical guideline 88 has been removed for the update of the guideline. There was no restriction on duration of low back pain.
- The population has been expanded to include people with sciatica.
- The age of people covered by the guideline update has been expanded to include people aged 16 and older. This is an additional population not included in NICE clinical guideline 88.

3.3 Epidemiology

Low back pain

Low back pain causes more disability, worldwide, than any other condition. Prevalence and burden increases with age until around the sixth decade, and worldwide prevalence has been reported to be highest in Western Europe.[229] In a large European-wide survey, Breivik reported a prevalence of persistent and intrusive pain of 19%.[49] Of those, 42% reported back pain - by far the most common regional site. Prevalence of back pain is (in common with most regional pains) more common in women than men, and increases with age peaking around the 7th decade.

Exposure to a number of modifiable physical and psychosocial factors increases the risk of an episode. Physical triggers of an episode of low back pain include lifting heavy loads, awkward positioning and physical activity. Psychosocial triggers of episode can include distraction while undertaking a task and fatigue.[228,469] High levels of psychological distress have been associated with back pain onset as has lifestyle factors such as being overweight and smoking.[148,367] Work factors including high job demands, low levels of colleague support and work dissatisfaction have all been found to increase the risk of back pain onset. These risks associated with physical exposures, psychosocial factors and lifestyle have been found to partly explain why back pain is more common amongst persons of lower socioeconomic status.[316]

Similarly the persistence of an episode of back pain is related to clinical factors, lifestyle, and psychosocial factors -including distress and fear-avoidance beliefs.[270,406]

Sciatica

Sciatica is a relatively common condition with a lifetime incidence ranging from 13 to 40%. The corresponding annual incidence of an episode of sciatica ranges from 1 to 5%. The incidence of sciatica is related to age - rarely seen before the age of 20, incidence peaks in the fifth decade and then declines. Modifiable factors associated with a first onset of sciatica include smoking, obesity, occupational factors and general health status.[92]

3.4 Who developed this guideline?

A multidisciplinary Guideline Development Group (GDG) comprising health professionals and researchers as well as lay members developed this guideline (see the list of Guideline Development Group members and the acknowledgements).

The National Institute for Health and Care Excellence (NICE) funds the National Guideline Centre (NGC) and thus supported the development of this guideline. The GDG was convened by the NGC and chaired by Stephen Ward in accordance with guidance from NICE.

The group met approximately every 4 weeks during the development of the guideline. At the start of the guideline development process all GDG members declared interests including consultancies, fee-paid work, shareholdings, fellowships and support from the healthcare industry. At all subsequent GDG meetings, members declared arising conflicts of interest. The May 2007 (updated October 2008) version of the NICE code of practice for declaring and dealing with conflicts of interest policy was applied to this guideline.

Members were either required to withdraw completely or for part of the discussion if their declared interest made it appropriate. The details of declared interests and the actions taken are shown in Appendix B.

Staff from the NGC provided methodological support and guidance for the development process. The team working on the guideline included a project manager, document editor, systematic reviewers (research fellows), health economists and information scientists. They undertook systematic searches of the literature, appraised the evidence, conducted meta-analysis and cost-effectiveness analysis where appropriate and drafted the guideline in collaboration with the GDG.

3.4.1 What this guideline covers

1. Assessment to identify low back pain and sciatica and any prognostic factors that could guide management. This would include relevant clinical examination and assessment (for example, imaging, physiological testing and psychosocial assessment methods).
2. Lifestyle interventions. For example:

- self-management strategies, including education and advice
- workplace interventions and return-to-work interventions (for example, occupational and ergonomic interventions).

3. Use of pharmacological treatments for low back pain:

- analgesics
- muscle relaxants
- antidepressants
- anticonvulsants
- long-term antibiotics.

Note that guideline recommendations will normally fall within licensed indications; exceptionally, and only if clearly supported by evidence, use outside a licensed indication ('off-label use') may be recommended. The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.

4. Non-pharmacological interventions. These will include but are not limited to:

- exercise therapies (for example, general exercise to manage low back pain, specific exercises for the lower back; yoga, group-based and individualised exercise programmes)
- postural therapies (for example, Alexander technique)
- manual therapies including massage
- electrotherapy
- orthotics and appliances
- acupuncture
- psychological interventions (for example, cognitive behavioural pain management).

5. Combined non-invasive therapies.
6. The use of invasive procedures. For example:

- injection therapies
- radiofrequency ablation procedures.

7. Surgery:

- indications for referral for surgery.
- surgical interventions (for example, fusion and disc replacement for low back pain and discectomy or laminectomy and decompression surgery for sciatica).

For further details please refer to the scope in Appendix A and the review questions in Section 4.1.

3.4.2 What this guideline does not cover

1. Management of:

- conditions with a select and uniform pathology of a mechanical nature (for example, spondylolisthesis, scoliosis, vertebral fracture or congenital diseases)
- conditions of a non-mechanical nature (for example, ankylosing spondylitis or diseases of the viscera)
- neurological disorders (including cauda equina syndrome), serious spinal pathology (for example, neoplasms, infections or osteoporotic collapse).

2. Post-surgery care.
3. Spinal cord stimulation.
4. Pharmacological treatments for sciatica.

3.4.3 Relationships between the guideline and other NICE guidance

This guideline will update and replace the following NICE guidance:

- Low back pain. NICE clinical guideline 88 (2009).

Related NICE technology appraisals: 2

- Percutaneous vertebroplasty and percutaneous balloon kyphoplasty for treating osteoporotic vertebral compression fractures. NICE technology appraisal guidance 279 (2013).
- Spinal cord stimulation for chronic pain of neuropathic or ischaemic origin. NICE technology appraisal guidance 159 (2008).

Related NICE interventional procedures guidance: 15

- Insertion of an annular disc implant at lumbar discectomy. NICE interventional procedure guidance 506 (2014).
- Peripheral nerve-field stimulation for chronic low back pain. NICE interventional procedures guidance 451 (2013).
- Transaxial interbody lumbosacral fusion. NICE interventional procedures guidance 387 (2011).
- Non rigid stabilisation techniques for the treatment of low back pain. NICE interventional procedures guidance 366 (2010).
- Interspinous distraction procedures for lumbar spinal stenosis causing neurogenic claudication. NICE interventional procedures guidance 365 (2010).
- Percutaneous intradiscal laser ablation in the lumbar spine. NICE interventional procedures guidance 357 (2010).
- Therapeutic endoscopic division of epidural adhesions. NICE interventional procedures guidance 333 (2010).

- Lateral (including extreme, extra and direct lateral) interbody fusion in the lumbar spine. NICE interventional procedures guidance 321 (2009).
- Percutaneous intradiscal electrothermal therapy for low back pain. NICE interventional procedures guidance 319 (2009).
- Prosthetic intervertebral disc replacement in the lumbar spine. NICE interventional procedures guidance 306 (2009).
- Percutaneous endoscopic laser lumbar discectomy. NICE interventional procedures guidance 300 (2009).
- Percutaneous disc decompression using coblation for lower back pain. NICE interventional procedures guidance 173 (2006).
- Automated percutaneous mechanical lumbar discectomy. NICE interventional procedures guidance 141 (2005).
- Percutaneous intradiscal radiofrequency thermocoagulation for lower back pain. NICE interventional procedures guidance 83 (2004).
- Endoscopic laser foraminoplasty. NICE interventional procedures guidance 31 (2003).

Related NICE guidelines: 7

- Referral for suspected cancer. NICE clinical guideline 27. (2015).
- Osteoarthritis. NICE clinical guideline 177 (2014).
- Neuropathic pain – pharmacological management. NICE clinical guideline 173 (2013).
- Patient experience in adult NHS services. NICE clinical guideline 138 (2012).
- Depression with a chronic physical health problem. NICE clinical guideline 91 (2009).
- Depression in adults. NICE clinical guideline 90 (2009).
- Metastatic spinal cord compression. NICE clinical guidance 75 (2008).

Other related guidance: 2

- Long-term sickness and incapacity for work. NICE public health guidance 19 (2009).
- EOS 2D/3D imaging system. NICE diagnostics guidance 1 (2011).

Related NICE guidance currently in development: 3

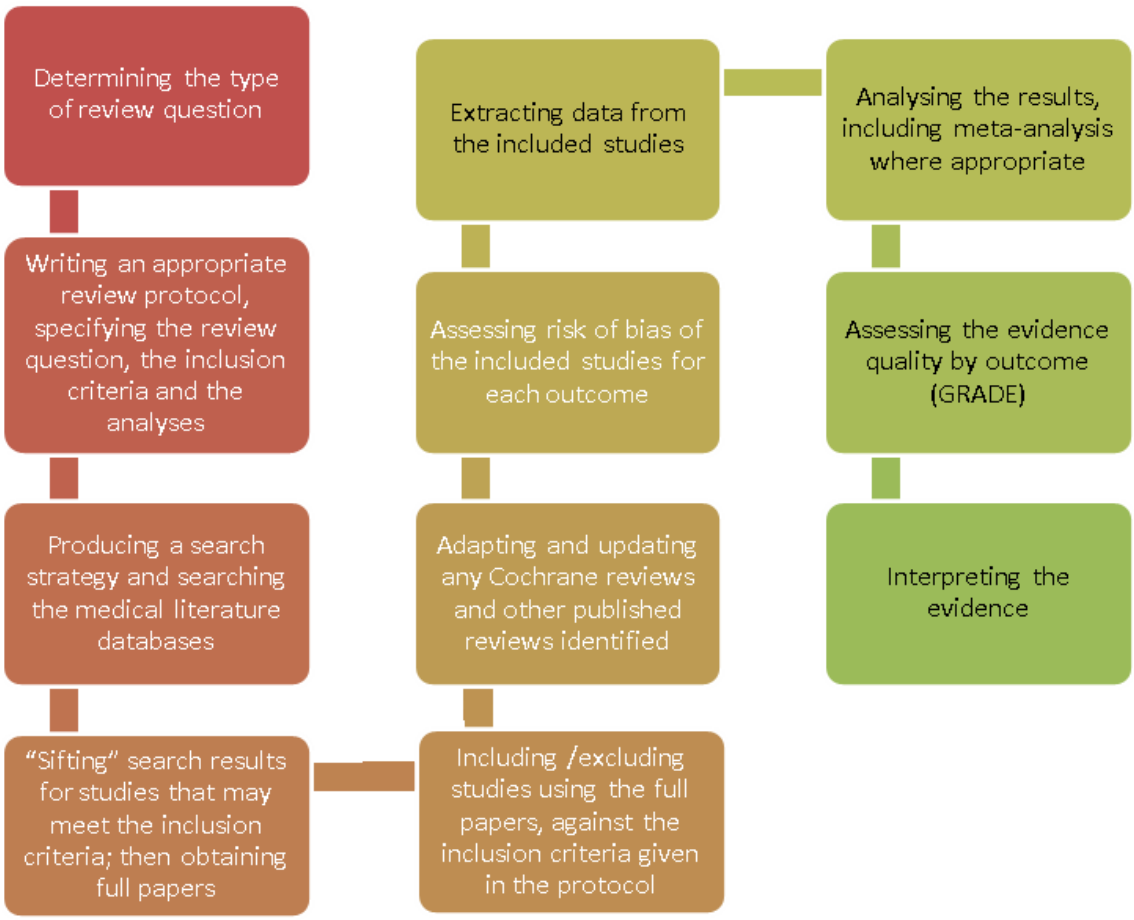
- Ankylosing spondylitis and axial spondyloarthritis (non-radiographic) - adalimumab, etanercept infliximab and. NICE technology appraisal guidance. Publication expected 2016.
- Insertion of an annular disc implant at lumbar discectomy. NICE interventional procedure guidance. Publication date to be confirmed.
- Spondyloarthritis: diagnosis and management. NICE clinical guideline. Publication expected March 2017.

4 Methods

This chapter sets out in detail the methods used to review the evidence and to develop the recommendations that are presented in subsequent chapters of this guideline. This guidance was developed in accordance with the methods outlined in the NICE guidelines manual, 2012.[376]

Sections 4.1 to 4.3 describe the process used to identify and review clinical evidence (summarised in Figure 8), Sections 4.2 and 4.4 describe the process used to identify and review the health economic evidence, and Section 4.5 describes the process used to develop recommendations.

Figure 8: Step-by-step process of review of evidence in the guideline



4.1 Developing the review questions and outcomes

Review questions were developed using a PICO framework (patient, intervention, comparison and outcome) for intervention reviews; using a framework of population, index tests, reference standard and target condition for reviews of diagnostic risk tools; using population, index test and treatment, comparator test and treatment for test and treat reviews; and using population, presence or absence of factors under investigation (for example prognostic factors) and outcomes for prognostic reviews.

This use of a framework guided the literature searching process, critical appraisal and synthesis of evidence, and facilitated the development of recommendations by the GDG. The review questions were drafted by the NGC technical team and refined and validated by the GDG. The questions were based on the key clinical areas identified in the scope (Appendix A).

A total of 23 review questions were identified.

Full literature searches, critical appraisal and evidence reviews were completed for all the specified review questions.

Table 1: Review questions

Chapter	Type of review	Review questions	Outcomes
5	Test and treat	In people with suspected (or under investigation for) sciatica, what is the clinical and cost effectiveness of clinical examination compared to history alone or history with imaging, when each is followed by treatment for sciatica, in improving patient outcomes?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
6	Prognostic risk tools	Which validated risk assessment tools are the most accurate for identifying people with low back pain with or without sciatica at risk of poor outcome/delayed improvement	• Area under the ROC curve (c-index, c-statistic). • Sensitivity, specificity, predictive values, likelihood ratio. • Predicted risk versus observed risk (calibration). • Other outcomes: e.g. D statistic, R2 statistic and Brier score, • Reclassification
6	Intervention	What is the clinical and cost effectiveness of stratifying management of non-specific low back pain with or without sciatica according to outcome of a risk assessment tool/questionnaire?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index).

Chapter	Type of review	Review questions	Outcomes
			• Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
7	Intervention	What is the clinical and cost effectiveness of performing imaging (X-ray or MRI) compared with no investigation to improve functional disability, pain or psychological distress in people with low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
8	Intervention	What is the clinical and cost effectiveness of self-management strategies in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or

Chapter	Type of review	Review questions	Outcomes
			function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
9	Intervention	What is the clinical and cost effectiveness of exercise interventions in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
10	Intervention	What is the clinical and cost effectiveness of postural therapies in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations,

Chapter	Type of review	Review questions	Outcomes
			hospitalisation or health professional visit)
11	Intervention	What is the clinical and cost effectiveness of orthotics and appliances in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
12	Intervention	What is the clinical and cost effectiveness of manual therapies in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity 2. Mortality • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
13	Intervention	What is the clinical and cost effectiveness of acupuncture in the	Critical outcomes: • Health-related quality of life

Chapter	Type of review	Review questions	Outcomes
		management of non-specific low back pain with or without sciatica?	(for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity 2. Mortality • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
14	Intervention	What is the clinical and cost effectiveness of electrotherapies in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Mortality 2. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
15	Intervention	What is the clinical and cost effectiveness of psychological interventions in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example,

Chapter	Type of review	Review questions	Outcomes
			visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
16	Intervention	What is the clinical and cost effectiveness of pharmacological treatments in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Mortality 2. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
17	Intervention	What is the clinical and cost effectiveness of MBR programmes in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability

Chapter	Type of review	Review questions	Outcomes
			questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity 2. Mortality • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit) • Return to work
18	Intervention	What is the clinical and cost effectiveness of return to work programmes in the management of non-specific low back pain with or without sciatica?	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) • Return to work Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
19	Intervention	What is the clinical and cost effectiveness of spinal injections in the management of non-specific low back pain	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index).

Chapter	Type of review	Review questions	Outcomes
			• Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Mortality 2. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
20	Intervention	What is the clinical and cost effectiveness of radiofrequency denervation in the management of non-specific low back pain	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Mortality 2. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
21	Intervention	What is the clinical and cost effectiveness of epidural injections in the management of sciatica	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes:

Chapter	Type of review	Review questions	Outcomes
			• Responder criteria (pain and function) • Adverse events: 1. Mortality 2. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
22	Prognostic	Does history of previous fusion surgery, smoking status, BMI or psychological distress predict response to surgery in people with non-specific low back pain?	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) • Adverse events 1. Mortality 2. Morbidity 3. Re-operation rate **Important** • Surgery conversion rate
23	Prognostic	Does image concordant pathology or presence of radicular symptoms predict response to surgery in people with suspected sciatica?	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) • Adverse events 1. Mortality 2. Morbidity 3. Re-operation rate **Important** Surgery conversion rate
24	Intervention	What is the clinical and cost-effectiveness of disc replacement surgery for people with non-specific low	Critical outcomes: • Health-related quality of life (for example, SF-12, SF-36 or

Chapter	Type of review	Review questions	Outcomes
		back pain?	EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) Important outcomes: • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Mortality 2. Morbidity • Revision rate • Failure rate • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
25	Intervention	What is the clinical and cost effectiveness of spinal fusion/arthrodesis in people with non-specific low back pain?	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Adverse events: 1. post-operative complications (eg. infection) 2. increased risk of requiring surgery at adjacent segments 3. Mortality. • Revision rate • Failure rate • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
26	Intervention	What is the clinical and cost effectiveness of spinal decompression in	**Critical**

Chapter	Type of review	Review questions	Outcomes
		people with sciatica?	• Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (≥30% improvement in pain or function) • Adverse events: 1. Morbidity 2. Mortality • Revision rate • Failure rate • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)

4.2 Searching for evidence

4.2.1 Clinical literature search

Systematic literature searches were undertaken to identify all published clinical evidence relevant to the review questions. Searches were undertaken according to the parameters stipulated within the NICE guidelines manual.[376] Databases were searched using relevant medical subject headings, free-text terms and study-type filters where appropriate. Where possible, searches were restricted to articles published in English. Studies published in languages other than English were not reviewed. All searches were conducted in Medline, Embase, and The Cochrane Library. Additional subject specific databases were used for some questions: CINAHL (lifestyle interventions, combinations of interventions, non-invasive interventions); PsycINFO (combinations of interventions and psychological interventions); and AMED (non-invasive interventions). All searches were updated on 15 December2015. No papers published after this date were considered.

Search strategies were quality assured by cross-checking reference lists of highly relevant papers, analysing search strategies in other systematic reviews, and asking GDG members to highlight any additional studies. Searches were quality assured by a second information scientist before being run. The questions, the study types applied, the databases searched and the years covered can be found in Appendix G.

The titles and abstracts of records retrieved by the searches were sifted for relevance, with potentially significant publications obtained in full text. These were assessed against the inclusion criteria.

All references sent by stakeholders were considered. Searching for unpublished literature was not undertaken. The NGC and NICE do not have access to drug manufacturers' unpublished clinical trial results, so the clinical evidence considered by the GDG for pharmaceutical interventions may be different from that considered by the MHRA and European Medicines Agency for the purposes of licensing and safety regulation.

4.2.2 Health economic literature search

Systematic literature searches were also undertaken to identify health economic evidence within published literature relevant to the review questions. The evidence was identified by conducting a broad search relating to lower back pain in Medline (OVID), Embase (OVID), the NHS Economic Evaluations Database (NHS EED), the Health Technology Assessment (HTA) database and the Health Economic Evaluation Database (HEED) with no date restrictions (NHS EED ceased to be updated after March 2015; HEED was used for searches up to 29 October 2013 but subsequently ceased to be available from January 2015). Additionally, the search was run on Medline and Embase using a health economic filter, from 2013, to ensure recent publications that had not yet been indexed by the economic databases were identified. This was supplemented by additional searches that looked for economic papers specifically relating to quality of life on Medline and Embase as it became apparent that some papers in this area had not been identified by the first search. Where possible, searches were restricted to articles published in English. Studies published in languages other than English were not reviewed.

The health economic search strategies are included in Appendix G. All searches were updated on 21 December 2015. No papers published after this date were considered.

4.3 Identifying and analysing evidence of effectiveness

Research fellows conducted the tasks listed below, which are described in further detail in the rest of this section:

- Identified potentially relevant studies for each review question from the relevant search results by reviewing titles and abstracts. Full papers were then obtained.
- Reviewed full papers against pre-specified inclusion and exclusion criteria to identify studies that addressed the review question in the appropriate population, and reported on outcomes of interest (review protocols are included in Appendix C).
- Critically appraised relevant studies using the appropriate study design checklist as specified in the NICE guidelines manual.[376] Prognostic studies were critically appraised using NGC checklists.
- Extracted key information about interventional study methods and results using 'Evibase', NGC's purpose-built software. Evibase produces summary evidence tables, including critical appraisal ratings. Key information about non-interventional study methods and results were manually extracted onto standard evidence tables and critically appraised separately (evidence tables are included in Appendix H).
- Generated summaries of the evidence by outcome. Outcome data were combined, analysed and reported according to study design:
    - Randomised data were meta-analysed where appropriate and reported in GRADE profile tables.
    - Observational data were presented as a range of values in GRADE profile tables or meta-analysed if appropriate.
    - Prognostic data were meta-analysed where appropriate and reported in GRADE profile tables.
    - There were no diagnostic studies identified for inclusion.

- A sample of a minimum of 10% of the abstract lists of the first 3 sifts by new reviewers and those for complex review questions (for example, prognostic reviews) were double-sifted by a senior research fellow and any discrepancies were rectified. All of the evidence reviews were quality assured by a senior research fellow. This included checking:
  - papers were included or excluded appropriately
  - a sample of the data extractions
  - correct methods were used to synthesise data
  - a sample of the risk of bias assessments.

4.3.1 Inclusion and exclusion criteria

The inclusion and exclusion of studies was based on the criteria defined in the review protocols, which can be found in Appendix C. Excluded studies by review question (with the reasons for their exclusion) are listed in Appendix L. The GDG was consulted about any uncertainty regarding inclusion or exclusion and specific decisions made by the GDG are listed in 4.3.1.1.

The key population inclusion criterion was:

- People aged 16 years or above with low back pain with or without sciatica.

The key population exclusion criterion was:

- Conditions of a non-mechanical nature, including;
  - inflammatory causes of back pain (for example, ankylosing spondylitis or diseases of the viscera)
  - serious spinal pathology (for example, neoplasms, infections or osteoporotic collapse)
  - neurological disorders (including cauda equina syndrome or mononeuritis)
  - adolescent scoliosis
- People aged under 16 years.

Conference abstracts were not included in any of the reviews. Literature reviews, posters, letters, editorials, comment articles, unpublished studies and studies not in English were excluded.

4.3.1.1 GDG agreed inclusion and exclusion criteria

4.3.1.1.1 Population

Populations included must have low back pain with or without sciatica (or as specified by the review protocol) at present, specified as the following:

- Low back pain
  - Discogenic pain
  - Degenerative disc disease
  - Lumbar disc herniation
  - Secondary to lumbar degenerative disease
  - Facet joint pain.
- Sciatica
  - Sciatica/lumbago
  - Radicular pain/Radiculopathy
  - Pain radiating to the leg
  - Neurogenic claudication
  - Nerve root compression/irritation

- Spinal stenosis

Other than the excluded populations listed in the scope (4.3.1), the following exclusions were agreed by the GDG:

- Mixed populations for example, people with low back pain and neck pain (unless the results presented in the studies are split so data for people with low back pain only is extractable).
- Pregnancy-related back pain
- Sacroiliac joint dysfunction
- Adjacent-segment disease
- Failed back surgery syndrome
- Spondylolisthesis
- Osteoarthritis.

The evidence presented in reviews were split on the basis of the following three strata:

- Low back pain alone
- Low back pain with or without sciatica (mixed/unclear)
- Low back pain with sciatica, or sciatica without low back pain.

Where the primary studies do not mention sciatica in either their inclusion criteria or exclusion criteria, these have been considered under the strata low back pain with or without sciatica. Studies which have a population of sciatica with or without low back pain were analysed under the strata low back pain with sciatica.

4.3.1.1.2 Interventions and comparisons

Sham comparisons

The GDG agreed that where interventions have been compared to sham, the sham must be for the intervention of interest e.g. a comparison between acupuncture and sham acupuncture would be accepted however acupuncture compared to sham massage would not.

Usual care

Usual care was considered in this guideline as 'standard non-invasive care in the NHS'. Waiting-list control comparisons were also pooled with usual care where possible, in which case a footnote stating which study had which comparison was inserted under the forest plot.

Due to the overlap between usual care and some of the non-invasive interventions being considered in this guideline (for example, unsupervised exercise, analgesics), the following was also agreed for a usual care comparison:

- If an intervention which could be considered as standard non-invasive care in the NHS was given to both groups with one group receiving an additional intervention, this would be considered a usual care comparison. For example, antibiotics plus advice to stay active versus advice to stay active would have been considered as antibiotics versus usual care.
- If the intervention being given to both groups was above standard non-invasive care in the NHS (agreed by the GDG), for example, epidural injections plus NSAIDs versus epidural injections, where epidural injections would not be standard non-invasive care, this would have been considered as a combination intervention versus a single intervention.

Exercise interventions

The GDG agreed that supervised exercise interventions would be reviewed under exercise therapies (chapter 9) and unsupervised exercise interventions under self management strategies (chapter 8). Where it was unclear whether the participants in a study received supervised or unsupervised exercised, this was checked with the GDG.

Excluded interventions

Studies were excluded if there was not sufficient description for them or if not all patients received the same intervention, e.g. if the intervention description was just 'exercise', 'physiotherapy', 'manual therapy', or the group received 'either aerobic exercise, TENS, NSAIDs'. These interventions would be excluded as the GDG would not be able to form recommendations based on these.

The GDG agreed for the following interventions to be excluded:

- Back school (the GDG considered this to be outdated and no longer in use)
- Neuromuscular electrical stimulation
- electrical muscle stimulation
- Kinesotaping
- Spinal cord stimulation
- Reflexotherapy/Neuroreflexotherapy.

The GDG agreed for the following comparators to be excluded:

- Sham of intervention other than the intervention randomised to (as mentioned above)
- Relaxation therapy as an attention control (if the therapy involves tensing then relaxing muscles)
- Intervention not in guideline (when only given to one group)

  A combination intervention was given to both groups if considered over and above 'standard non-invasive care in NHS' (therefore cannot be classed as usual care).

4.3.1.1.3 Outcomes

The GDG agreed that the data presented in the reviews should be stratified according to two time-points; equal to or less than 4 months and greater than 4 months. For each time-point, where appropriate, data were pooled together. Where studies reported an outcome at multiple time-points within the 4 months' time-point for example, pain severity at 2 months and 4 months, the outcome closest to 4 months was extracted. Where studies reported multiple time-points at greater than 4 months, the outcome closest to 12 months was reported for example, between 6 months and 10 months, the 10 months data was extracted. However, in instances where outcomes greater than 12 months were reported, for example, 6 months and 18 months, 18 months data were extracted as this was the end of trial data and therefore more informative to the GDG.

The GDG agreed that as well as pooling the same outcomes across studies, outcomes measuring pain severity could be pooled if they were on the same scale, i.e. numeric rating scale (NRS) and visual analogue scale (VAS) (both reported on a range of 0-10). If VAS was reported on a scale of 0-100, this was converted to 0-10. The GDG agreed that the McGill pain score should not be pooled with the above pain scales (reported on a scale of 0-78).

The GDG agreed that the Roland Morris Disability questionnaire (RMDQ) on a scale of 0-24 and Oswestry Disability index (ODI) on a scale of 0-100 should be pooled together and presented as standardised mean difference. In order to determine imprecision and clinical importance, the effect size was converted back on to the RMDQ 0-24 scale.

The health survey SF-36 was scored such that 8 scale scores are given: physical functioning, role physical, bodily pain, general health perceptions, vitality, social functioning, role emotional and mental health. Two summary measures can be calculated from these scales; physical component score and the mental component score. It was agreed that where possible, all domains would be extracted for the evidence. If the individual domains were not reported, then just the two summary measures were extracted. A single overall score would not be extracted as it is not appropriate to combine the physical and mental domains. It was agreed that SF-36, RAND-36 and SF-12 health surveys could have been pooled as they are on the same scale.

It was agreed by the GDG that 'return to work' should be considered a critical outcome for the return to work interventions evidence review (see chapter 18). It was also considered an important outcome for the multidisciplinary biopsychosocial rehabilitation programmes evidence review due to the likelihood of such complex programmes incorporating a return to work element.

4.3.2 Type of studies

Randomised trials, non-randomised trials, and observational studies (including diagnostic or prognostic studies) were included in the evidence reviews as appropriate.

For most intervention reviews in this guideline, parallel randomised controlled trials (RCTs) were included because they are considered the most robust type of study design that can produce an unbiased estimate of the intervention effects. Crossover RCTs were excluded, unless post intervention data was reported prior to the point of crossover, in which case only this data was extracted. If non-randomised studies were appropriate for inclusion (for example, in prognostic reviews) the GDG stated a priori in the protocol that the analysis had to adjust for certain variables. If the study did not fulfil this criterion it was excluded, unless there was no other evidence available. Non-randomised studies were also included in some reviews if there was insufficient RCT evidence; this was outlined a priori in the protocols. Please refer to the review protocols in Appendix C for full details on the study design of studies selected for each review question.

For the diagnostic review question, diagnostic RCTs and cohort studies were considered for inclusion. For prognostic review questions, prospective and retrospective cohort studies were included. Case–control studies and cross-sectional studies were not included.

Where data from observational studies were included, the results for each outcome were presented separately from RCT evidence, and meta-analysis was carried out where possible.

4.3.3 Methods of combining clinical studies

4.3.3.1 Data synthesis for intervention reviews

Where possible, meta-analyses were conducted using Cochrane Review Manager (RevMan5)[2] software to combine the data given in all studies for each of the outcomes of interest for the review question.

All analyses were stratified for population (that is, people with low back pain, low back pain with or without sciatica, or sciatica), which meant that different studies with predominant population-groups in different population strata were not combined and analysed together.

4.3.3.1.1 Analysis of different types of data

Dichotomous outcomes

Fixed-effects (Mantel-Haenszel) techniques (using an inverse variance method for pooling) were used to calculate risk ratios (relative risk, RR) for the binary outcomes, which included:

- responder criteria (>30% improvement in pain or function)
- healthcare utilisation
- return to work
- re-operation rate
- adverse events
  - morbidity
  - mortality
  - re-operation rate
  - post-operative complications
  - increased risk of requiring surgery at adjacent segments
- surgical conversion rate
- surgical revision rate
- surgical failure rate.

The absolute risk difference was also calculated using GRADEpro[175] software, using the median event rate in the control arm of the pooled results.

For binary variables where there were zero events in either arm or a less than 1% event rate, Peto odds ratios, rather than risk ratios, were calculated. Peto odds ratios are more appropriate for data with a low number of events.

Continuous outcomes

Continuous outcomes were analysed using an inverse variance method for pooling weighted mean differences. These outcomes included:

- heath-related quality of life (HRQoL)
- pain severity
- function
- psychological distress (assessed by HADS, GHQ, BPI, BDI, STAI).

Where the studies within a single meta-analysis had different scales of measurement, standardised mean differences were used (providing all studies reported either change from baseline or final values rather than a mixture of both); each different measure in each study was 'normalised' to the standard deviation value pooled between the intervention and comparator groups in that same study.

The means and standard deviations of continuous outcomes are required for a meta-analysis. However, in cases where standard deviations were not reported, the standard deviation was calculated using the SE, or the standard error was calculated if the p values or 95% confidence intervals (95% CI) were reported and then converted to standard deviation. Where p values were reported as 'less than', a conservative approach was undertaken. For example, if a p value was reported as '$p \leq 0.001$', the calculations for standard deviations were based on a p value of 0.001. If

these statistical measures were not available then the methods described in Section 16.1.3 of the Cochrane Handbook (version 5.1.0, updated March 2011) were applied.

4.3.3.1.2 Generic inverse variance

If a study reported only the summary statistic and 95% CI the generic inverse variance method in Cochrane Review Manager [2] software was used to enter data into RevMan5.[2] If the control event rate was reported this was used to generate the absolute risk difference in GRADEpro.[175] If multivariate analysis was used to derive the summary statistic but no adjusted control event rate was reported no absolute risk difference was calculated.

4.3.3.1.3 Outcomes reported incompletely

Where outcomes were reported incompletely, that is, only means or medians reported, these outcomes were reported in tables as data that cannot be meta-analysed. These outcomes were taken into considered by the GDG when reviewing the evidence.

4.3.3.1.4 Heterogeneity

Statistical heterogeneity was assessed for each meta-analysis estimate by considering the chi-squared test for significance at $p<0.1$ or an I-squared (I^2) inconsistency statistic (with an I-squared value of more than 50% indicating significant heterogeneity) as well as the distribution of effects. Where significant heterogeneity was present, predefined subgrouping of studies was carried out for either as per determined a priori in the protocols (Appendix C) for example, chronicity of pain.

If the subgroup analysis resolved heterogeneity within all of the derived subgroups, then each of the derived subgroups were adopted as separate outcomes (providing at least 1 study remained in each subgroup. For example, instead of the single outcome of '*pain severity of low back pain*, this was separated into 2 outcomes '*pain severity for acute low back pain'* and '*pain severity for chronic low back pain'*. Assessments of potential differences in effect between subgroups were based on the chi-squared tests for heterogeneity statistics between subgroups. Any subgroup differences were interpreted with caution as separating the groups breaks the study randomisation and as such is subject to uncontrolled confounding.

If all predefined strategies of subgrouping were unable to explain statistical heterogeneity within each derived subgroup, then a random effects (DerSimonian and Laird) model was employed to the entire group of studies in the meta-analysis. A random-effects model assumes a distribution of populations, rather than a single population. This leads to a widening of the confidence interval around the overall estimate, thus providing a more realistic interpretation of the true distribution of effects across more than 1 population. These outcomes were also further downgraded in quality using GRADEpro.

4.3.3.2 Data synthesis for prognostic reviews

4.3.3.2.1 Data synthesis for prognostic risk factors reviews

Odds ratios (ORs), risk ratios (RRs), or hazard ratios (HRs), with their 95% CIs, for the effect of the pre-specified prognostic factors were extracted from the studies. Studies were only included if the confounders pre-specified by the GDG were either matched at baseline or were adjusted for in multivariate analysis. If there was insufficient evidence that met these criteria, then studies with multivariate analysis that adjusted for other confounders were included.

Studies of lower risk of bias were preferred, taking into account the analysis and the study design. In particular, cohort studies were preferred if they reported multivariable analyses that adjusted for key confounders identified by the GDG at the protocol stage for that outcome.

Data were combined in meta-analyses for prognostic studies where possible.

4.3.3.2.2 Data synthesis for prognostic risk tools reviews

We wished to know how accurate the risk stratification tools were when predicting chronicity of pain in people with low back pain and sciatica. The risk stratification tool is considered as the "index test"; and the outcome (risk of poor outcome/delayed improvement) as the "target condition".

Discrimination and calibration were investigated for each tool. Calibration measures how well the predicted risks compare to observed risks. Discrimination refers to the ability of the prediction model to distinguish between those who do or do not experience the event of interest. Discrimination is typically assessed by calculating the area under the receiver operating characteristic curve (c-statistic). In this guideline the following cut-offs have been used:

- 90%-100% indicates perfect discrimination
- 70%-89% indicates moderate discrimination
- 50-69% indicates poor discrimination
- <50% not discriminatory at all.

RCTs and cohort studies were considered for this review. Area under the ROC curve, sensitivity, specificity, predictive values, likelihood ratios, predicted risk versus observed risk (calibration), reclassification and other metrics/tests/analyses such as D statistic, R^2 statistic and Brier score were extracted from the studies.

4.3.3.3 Data synthesis for diagnostic risk tools reviews

Diagnostic RCTs (sometimes referred to as test and treat trials) are a randomised comparison of 2 diagnostic tests, with study outcomes being clinically important consequences of the diagnosis (patient-related outcome measures similar to those in intervention trials, such as mortality). Patients are randomised to receive test A or test B, followed by identical therapeutic interventions based on the results of the test (so someone with a positive result would receive the same treatment regardless of whether they were diagnosed by test A or test B). Downstream patient outcomes are then compared between the 2 groups. As treatment is the same in both arms of the trial, any differences in patient outcomes will reflect the accuracy of the tests in correctly establishing who does and does not have the condition. Data were synthesised using the same methods for intervention reviews (see Section 4.3.3.1.1 above).

4.3.4 Appraising the quality of evidence by outcomes

4.3.4.1 Intervention reviews

The evidence for outcomes from the included RCTs and, where appropriate, observational studies were evaluated and presented using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group (http://www.gradeworkinggroup.org/). The software (GRADEpro[175]) developed by the GRADE working group was used to assess the quality of each outcome, taking into account individual study quality and the meta-analysis results.

Each outcome was first examined for each of the quality elements listed and defined in Table 2.

Table 2: Description of quality elements in GRADE for intervention studies

Quality element	Description
Risk of bias	Limitations in the study design and implementation may bias the estimates of the

Quality element	Description
	treatment effect. Major limitations in studies decrease the confidence in the estimate of the effect. Examples of such limitations are selection bias (often due to poor allocation concealment), performance and detection bias (often due to a lack of blinding of the patient, healthcare professional or assessor) and attrition bias (due to missing data causing systematic bias in the analysis).
Indirectness	Indirectness refers to differences in study population, intervention, comparator and outcomes between the available evidence and the review question.
Inconsistency	Inconsistency refers to an unexplained heterogeneity of effect estimates between studies in the same meta-analysis.
Imprecision	Results are imprecise when studies include relatively few patients and few events (or highly variable measures) and thus have wide confidence intervals around the estimate of the effect relative to clinically important thresholds. 95% confidence intervals denote the possible range of locations of the true population effect at a 95% probability, and so wide confidence intervals may denote a result that is consistent with conflicting interpretations (for example a result may be consistent with both clinical benefit AND clinical harm) and thus be imprecise.
Publication bias	Publication bias is a systematic underestimate or overestimate of the underlying beneficial or harmful effect due to the selective publication of studies. A closely related phenomenon is where some papers fail to report an outcome that is inconclusive, thus leading to an overestimate of the effectiveness of that outcome.
Other issues	Sometimes randomisation may not adequately lead to group equivalence of confounders, and if so this may lead to bias, which should be taken into account. Potential conflicts of interest, often caused by excessive pharmaceutical company involvement in the publication of a study, should also be noted.

Details of how the 4 main quality elements (risk of bias, indirectness, inconsistency and imprecision) were appraised for each outcome are given below. Publication or other bias was only taken into consideration in the quality assessment if it was apparent.

4.3.4.1.1 Risk of bias

The main domains of bias for RCTs are listed in Table 3. Each outcome had its risk of bias assessed within each study first. For each study, if there were no risks of bias in any domain, the risk of bias was given a rating of 0. If there was risk of bias in just 1 domain, the risk of bias was given a 'serious' rating of −1, but if there was risk of bias in 2 or more domains the risk of bias was given a 'very serious' rating of −2. A weighted average score was then calculated across all studies contributing to the outcome, by taking into account the weighting of studies according to study precision. For example if the most precise studies tended to each have a score of −1 for that outcome, the overall score for that outcome would tend towards −1.

Table 3: Principle domains of bias in randomised controlled trials

Limitation	Explanation
Selection bias (sequence generation and allocation concealment)	If those enrolling patients are aware of the group to which the next enrolled patient will be allocated, either because of a non-random sequence that is predictable, or because a truly random sequence was not concealed from the researcher, this may translate into systematic selection bias. This may occur if the researcher chooses not to recruit a participant into that specific group because of: • knowledge of that participant's likely prognostic characteristics, and • a desire for one group to do better than the other.
Performance and detection bias (lack	Patients, caregivers, those adjudicating or recording outcomes, and data analysts should not be aware of the arm to which patients are allocated. Knowledge of the

Limitation	Explanation
of blinding of patients and healthcare professionals)	group can influence: • the experience of the placebo effect • performance in outcome measures • the level of care and attention received, and • the methods of measurement or analysis all of which can contribute to systematic bias.
Attrition bias	Attrition bias results from an unaccounted for loss of data beyond a certain level (a differential of 10% between groups). Loss of data can occur when participants are compulsorily withdrawn from a group by the researchers (for example, when a per-protocol approach is used) or when participants do not attend assessment sessions. If the missing data are likely to be different from the data of those remaining in the groups, and there is a differential rate of such missing data from groups, systematic attrition bias may result.
Selective outcome reporting	Reporting of some outcomes and not others on the basis of the results can also lead to bias, as this may distort the overall impression of efficacy.
Other limitations	For example: • Stopping early for benefit observed in randomised trials, in particular in the absence of adequate stopping rules. • Use of invalidated patient-reported outcome measures. • Lack of washout periods to avoid carry-over effects in crossover trials. • Recruitment bias in cluster-randomised trials.

4.3.4.1.2 Indirectness

Indirectness refers to the extent to which the populations, interventions, comparisons and outcome measures are dissimilar to those defined in the inclusion criteria for the reviews. Indirectness is important when these differences are expected to contribute to a difference in effect size, or may affect the balance of harms and benefits considered for an intervention. As for the risk of bias, each outcome had its indirectness assessed within each study first. For each study, if there were no sources of indirectness, indirectness was given a rating of 0. If there was indirectness in just 1 source (for example in terms of population), indirectness was given a 'serious' rating of −1, but if there was indirectness in 2 or more sources (for example, in terms of population and treatment) the indirectness was given a 'very serious' rating of −2. A weighted average score was then calculated across all studies contributing to the outcome by taking into account study precision. For example, if the most precise studies tended to have an indirectness score of −1 each for that outcome, the overall score for that outcome would tend towards −1.

4.3.4.1.3 Inconsistency

Inconsistency refers to an unexplained heterogeneity of results for an outcome across different studies. When estimates of the treatment effect across studies differ widely, this suggests true differences in the underlying treatment effect, which may be due to differences in populations, settings or doses. When heterogeneity existed within an outcome (chi-squared $p<0.1$, or $I^2>50\%$), but no plausible explanation could be found, the quality of evidence for that outcome was downgraded. Inconsistency for that outcome was given a 'serious' score of −1 if the I^2 was 50–74%, and a 'very serious' score of −2 if the I^2 was 75% or more.

If inconsistency could be explained based on pre-specified subgroup analysis (that is, each subgroup had an $I^2<50\%$), the GDG took this into account and considered whether to make separate recommendations on new outcomes based on the subgroups defined by the assumed explanatory

factors. In such a situation the quality of evidence was not downgraded for those emergent outcomes.

Since the inconsistency score was based on the meta-analysis results, the score represented the whole outcome and so weighted averaging across studies was not necessary.

4.3.4.1.4 Imprecision

The criteria applied for imprecision were based on the 95% CIs for the pooled estimate of effect, and the minimal important differences (MID) for the outcome. The MIDs are the threshold for appreciable benefits and harms, separated by a zone either side of the line of no effect where there is assumed to be no clinically important effect. If either end of the 95% CI of the overall estimate of effect crossed 1 of the MID lines, imprecision was regarded as serious and a 'serious' score of −1 was given. This was because the overall result, as represented by the span of the confidence interval, was consistent with 2 interpretations as defined by the MID (for example, both no clinically important effect and clinical benefit were possible interpretations). If both MID lines were crossed by either or both ends of the 95% CI then imprecision was regarded as very serious and a 'very serious' score of −2 was given. This was because the overall result was consistent with all 3 interpretations defined by the MID (no clinically important effect, clinical benefit and clinical harm). This is illustrated in Figure 9. As for inconsistency, since the imprecision score was based on the meta-analysis results, the score represented the whole outcome and so weighted averaging across studies was not necessary.

The position of the MID lines is ideally determined by values reported in the literature. 'Anchor-based' methods aim to establish clinically meaningful changes in a continuous outcome variable by relating or 'anchoring' them to patient-centred measures of clinical effectiveness that could be regarded as gold standards with a high level of face validity. For example, a MID for an outcome could be defined by the minimum amount of change in that outcome necessary for people to feel their quality of life had 'significantly improved'. MIDs in the literature may also be based on expert clinician or consensus opinion concerning the minimum amount of change in a variable deemed to affect quality of life or health. For binary variables, any MIDs reported in the literature are inevitably based on expert consensus, as such MIDs relate to all-or-nothing population effects rather than measurable effects on an individual, and so are not amenable to patient-centred 'anchor' methods.

In the absence of values identified in the literature, for imprecision the alternative is to use the GRADE 'default' values, as follows:

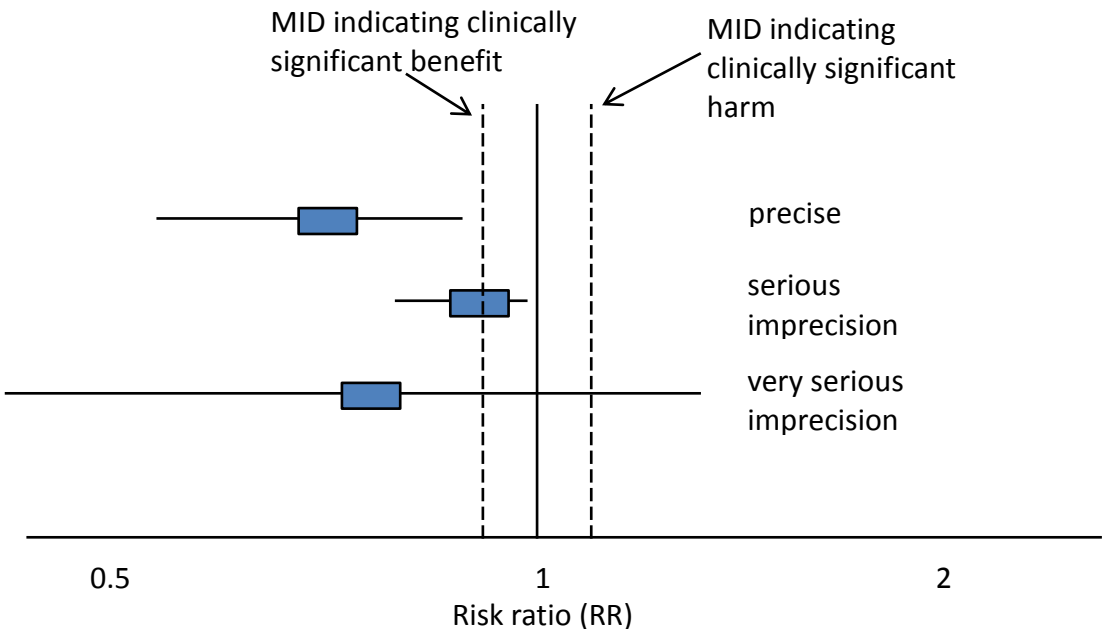
- For categorical outcomes the MIDs were taken to be RRs over 0.75 and 1.25. For 'positive' outcomes such as 'patient satisfaction', the RR of 0.75 is taken as the line denoting the boundary between no clinically important effect and a clinically significant harm, whilst the RR of 1.25 is taken as the line denoting the boundary between no clinically important effect and a clinically significant benefit. For 'negative' outcomes such as 'bleeding', the opposite occurs, so the RR of 0.75 is taken as the line denoting the boundary between no clinically important effect and a clinically significant benefit, whilst the RR of 1.25 is taken as the line denoting the boundary between no clinically important effect and a clinically significant harm.
- For mortality any change was considered to be clinically important and the imprecision was assessed on the basis of the whether the confidence intervals crossed the line of no effect, that is, whether the result was consistent with both benefit and harm.
- For continuous outcome variables the MID was taken as half the median baseline standard deviation of that variable, across all studies in the meta-analysis. Hence the MID denoting the minimum clinically significant benefit was positive for a 'positive' outcome (for example, a quality of life measure where a higher score denotes better health), and negative for a 'negative' outcome (for example, a visual analogue scale [VAS] pain score). Clinically significant harms were

the converse of these. If baseline values were unavailable, then half the median comparator group standard deviation of that variable was taken as the MID.

- If standardised mean differences were used, then the MID was set at the absolute value of +0.5. This follows because standardised mean differences are mean differences normalised to the pooled standard deviation of the 2 groups, and are thus effectively expressed in units of 'numbers of standard deviations'. The 0.5 MID value in this context therefore indicates half a standard deviation, the same definition of MID as used for non-standardised mean differences.

For this guideline, MIDs were found in the literature for the continuous health related quality of life outcome SF-36[330] which were used to assess imprecision and clinical importance (see section 4.3.5 below). Where an MID was not defined by the GDG, the default values were used as described above for imprecision only, and clinical importance was determined by consideration of clinical importance based the point estimate, baseline values (for continuous outcomes), control event rate and absolute effect.

Figure 9: Illustration of precise and imprecise outcomes based on the 95% CI of dichotomous outcomes in a forest plot (Note that all 3 results would be pooled estimates, and would not, in practice, be placed on the same forest plot)



4.3.4.1.5 Overall grading of the quality of clinical evidence

Once an outcome had been appraised for the main quality elements, as above, an overall quality grade was calculated for that outcome. The scores (0, −1 or −2) from each of the main quality elements were summed to give a score that could be anything from 0 (the best possible) to −8 (the worst possible). However scores were capped at −3. This final score was then applied to the starting grade that had originally been applied to the outcome by default, based on study design. All RCTs started as High and the overall quality became Moderate, Low or Very Low if the overall score was −1, −2 or −3 points respectively. The significance of these overall ratings is explained in Table 4. The reasons for downgrading in each case were specified in the footnotes of the GRADE tables.

Observational interventional studies started at Low, and so a score of −1 would be enough to take the grade to the lowest level of Very Low. Observational studies could, however, be upgraded if

there were all of: a large magnitude of effect, a dose-response gradient, and if all plausible confounding would reduce the demonstrated effect.

Table 4: Overall quality of outcome evidence in GRADE

Level	Description
High	Further research is very unlikely to change our confidence in the estimate of effect
Moderate	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Low	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
Very low	Any estimate of effect is very uncertain

4.3.4.2 Prognostic reviews

The quality of evidence for prognostic studies was evaluated according to the criteria given in Table 5. If data were meta-analysed, the quality for pooled studies was presented. If the data were not pooled, then a quality rating was presented for each study.

Table 5: Description of quality elements for prospective studies

Quality element	Description of cases where the quality measure would be downgraded
Study design	Case–control studies rather than prospective cohort studies
Patient recruitment	If potential for selection bias
Validity of risk factor measure(s)	If non-validated and no reasonable face validity
Validity of outcome measure	If non-validated and no reasonable face validity
Blinding	If assessors of outcome not blinded to risk factor measurement (or vice versa)
Adequate duration of follow-up (or retrospective duration)	If follow-up (or retrospective) period inadequate to allow events to occur, or retrospective period so short that causality is in doubt because the outcome may have preceded the risk factor
Confounder consideration	If there is a lack of consideration of all reasonable confounders in a multivariable analysis
Attrition	If attrition is too high and there is no attempt to adjust for this
Directness	If the population, risk factors or outcome differ from that in the review question

4.3.4.2.1 Inconsistency

Inconsistency was assessed as for intervention studies.

4.3.4.2.2 Imprecision

In meta-analysed outcomes, or for non-pooled outcomes, imprecision was determined following the default methods outlines in 4.3.4.1.4.

4.3.4.2.3 Overall grading

Because prognostic reviews were not usually based on multiple outcomes per study, quality rating was assigned by study. However, if there was more than 1 outcome involved in a study, then the quality rating of the evidence statements for each outcome was adjusted accordingly. For example, if one outcome was based on an invalidated measurement method, but another outcome in the same study was not, the second outcome was graded 1 grade higher than the first outcome.

Quality rating started at High for prospective studies, and each major limitation brought the rating down by 1 increment to a minimum grade of Very Low, as explained for interventional reviews. For prognostic reviews prospective cohort studies with a multivariate analysis are regarded as the gold standard because RCTs are usually inappropriate for these types of review for ethical or pragmatic reasons. Furthermore, if the study is looking at more than 1 risk factor of interest then randomisation would be inappropriate as it can only be applied to 1 of the risk factors.

4.3.5 Assessing clinical importance

The GDG assessed the evidence by outcome in order to determine if there was, or potentially was, a clinically important benefit favouring the intervention or comparator, or no clinically important difference between interventions. To facilitate this, binary outcomes were converted into absolute risk differences (ARDs) using GRADEpro[175] software: the median control group risk across studies was used to calculate the ARD and its 95% CI from the pooled risk ratio.

The assessment of clinical benefit favouring intervention or comparator, or no benefit was based on the point estimate of absolute effect for intervention studies, which was standardised across the reviews. The GDG used MIDs to determine clinical importance. Where there was no published MID in the literature (as discussed in section 4.3.1.3.4), the GDG were asked to determine MIDs based on consensus, that would be used as a value that would be used to assess clinical importance on consensus. This was done when agreeing the protocols, for each outcome. The GDG agreed that for the outcomes in this guideline MIDs to assess clinical importance would be based on an improvement of 10% as a measure of clinical benefit e.g. 1 point decrease on a 0-10 scale for pain severity. It was agreed that for the EQ-5D scale, a value of 0.03 should be used to be consistent with the published SF-36 values. The values used for imprecision and clinical importance are provided in Table 6.

Table 6: MIDs for assessing between group differences

Outcome	MID for imprecision	MID for clinical importance	Source
Pain measures including VAS & NRS (0-10 scale)	Default	1	GDG consensus
RMDQ (0-24 scale)	Default	2	GDG consensus
ODI (0-100 scale)	Default	10	GDG consensus
SF-36 (0-100 scale)	Physical component summary: 2 Mental component summary: 3 Physical functioning: 3 Role-physical: 3 Bodily pain: 3 General health: 2 Vitality: 2 Social functioning: 3 Role-emotional: 4 Mental health: 3		User's manual for the SF-36v2 Health Survey, Third Edition[330]
EQ5D (0.0-1.0 scale)	Default	0.03	GDG consensus
Other continuous outcomes	Default	10% of scale	GDG consensus

VAS = visual analogue scale, NRS = numeric rating scale, RMDQ = Roland Morris Disability Questionnaire, ODI = Oswestry Disability Index

This assessment was carried out by the GDG for each critical outcome, and an evidence summary table was produced to compile the GDG's assessments of clinical importance per outcome (considering also the baseline values for continuous outcomes), alongside the evidence quality and the uncertainty in the effect estimate (imprecision).

4.3.6 Clinical evidence statements

Clinical evidence statements are summary statements that are included in each review chapter, and which summarise the key features of the clinical effectiveness evidence presented. The wording of the evidence statements reflects the certainty or uncertainty in the estimate of effect. The evidence statements are presented by outcome and encompass the following key features of the evidence:

- The number of studies and the number of participants for a particular outcome.
- An indication of the direction of clinical importance (if one treatment has any added benefit compared to the other or whether there is no difference between the 2 tested treatments).
- A description of the overall quality of the evidence (GRADE overall quality).

4.4 Identifying and analysing evidence of cost-effectiveness

The GDG is required to make decisions based on the best available evidence of both clinical effectiveness and cost-effectiveness. Guideline recommendations should be based on the expected costs of the different options in relation to their expected health benefits (that is, their 'cost-effectiveness') rather than the total implementation cost alone.[374] Thus, if the evidence suggests that a strategy provides significant health benefits at an acceptable cost per patient treated, it should be recommended even if it would be expensive to implement across the whole population.

Health economic evidence was sought relating to the key clinical issues being addressed in the guideline. Health economists:

- Undertook a systematic review of the published economic literature.
- Undertook new cost-effectiveness analysis in priority areas.

4.4.1 Literature review

The health economists:

- Identified potentially relevant studies for each review question from the health economic search results by reviewing titles and abstracts. Full papers were then obtained.
- Reviewed full papers against pre-specified inclusion and exclusion criteria to identify relevant studies (see below for details).
- Critically appraised relevant studies using economic evaluations checklists as specified in the NICE guidelines manual.[376]
- Extracted key information about the studies' methods and results into economic evidence tables (included in Appendix I).
- Generated summaries of the evidence in NICE economic evidence profile tables (included in the relevant chapter for each review question) – see below for details.

4.4.1.1 Inclusion and exclusion criteria

Full economic evaluations (studies comparing costs and health consequences of alternative courses of action: cost-utility, cost-effectiveness, cost-benefit and cost-consequences analyses) and

comparative costing studies that addressed the review question in the relevant population were considered potentially includable as economic evidence.

Studies that only reported cost per hospital (not per patient), or only reported average cost-effectiveness without disaggregated costs and effects were excluded. Literature reviews, abstracts, posters, letters, editorials, comment articles, unpublished studies and studies not in English were excluded. Studies published before 1999 and studies from non-OECD countries were also excluded, on the basis that the applicability of such studies to the present UK NHS context is likely to be too low for them to be helpful for decision-making.

Remaining health economic studies were prioritised for inclusion based on their relative applicability to the development of this guideline and the study limitations. For example, if a high quality, directly applicable UK analysis was available, then other less relevant studies may not have been included. Where exclusions occurred on this basis, this is noted in the relevant section.

For more details about the assessment of applicability and methodological quality see Table 7 below and the economic evaluation checklist (Appendix G of the 2012 NICE guidelines manual[376]) and the health economics review protocol in Appendix D.

When no relevant health economic studies were found from the economic literature review, relevant UK NHS unit costs related to the compared interventions were presented to the GDG to inform the possible economic implications of the recommendations.

4.4.1.2 NICE economic evidence profiles

NICE economic evidence profile tables were used to summarise cost and cost-effectiveness estimates for the included health economic studies in each review chapter. The economic evidence profile shows an assessment of applicability and methodological quality for each economic study, with footnotes indicating the reasons for the assessment. These assessments were made by the health economist using the economic evaluation checklist from the NICE guidelines manual.[376] It also shows the incremental costs, incremental effects (for example, quality-adjusted life years [QALYs]) and incremental cost-effectiveness ratio (ICER) for the base case analysis in the study, as well as information about the assessment of uncertainty in the analysis. See Table 7 for more details.

When a non-UK study was included in the profile, the results were converted into pounds sterling using the appropriate purchasing power parity.[394]

Table 7: Content of NICE economic evidence profile

Item	Description
Study	Surname of first author, date of study publication and country perspective with a reference to full information on the study.
Applicability	An assessment of applicability of the study to this guideline, the current NHS situation and NICE decision-making:[(a)] • Directly applicable – the study meets all applicability criteria, or fails to meet 1 or more applicability criteria but this is unlikely to change the conclusions about cost-effectiveness. • Partially applicable – the study fails to meet 1 or more applicability criteria, and this could change the conclusions about cost-effectiveness. • Not applicable – the study fails to meet 1 or more of the applicability criteria, and this is likely to change the conclusions about cost-effectiveness. Such studies would usually be excluded from the review.
Limitations	An assessment of methodological quality of the study:[(a)] • Minor limitations – the study meets all quality criteria, or fails to meet 1 or more

Item	Description
	quality criteria, but this is unlikely to change the conclusions about cost-effectiveness. • Potentially serious limitations – the study fails to meet 1 or more quality criteria, and this could change the conclusions about cost-effectiveness. • Very serious limitations – the study fails to meet 1 or more quality criteria, and this is highly likely to change the conclusions about cost-effectiveness. Such studies would usually be excluded from the review.
Other comments	Information about the design of the study and particular issues that should be considered when interpreting it.
Incremental cost	The mean cost associated with one strategy minus the mean cost of a comparator strategy.
Incremental effects	The mean QALYs (or other selected measure of health outcome) associated with one strategy minus the mean QALYs of a comparator strategy.
Cost-effectiveness	Incremental cost-effectiveness ratio (ICER): the incremental cost divided by the incremental effects (usually in £ per QALY gained).
Uncertainty	A summary of the extent of uncertainty about the ICER reflecting the results of deterministic or probabilistic sensitivity analyses, or stochastic analyses of trial data, as appropriate.

(a) Applicability and limitations were assessed using the economic evaluation checklist in Appendix G of the 2012 NICE guidelines manual[376]

4.4.2 Undertaking new health economic analysis

As well as reviewing the published health economic literature for each review question, as described above, new health economic analysis was undertaken by the health economist in selected areas. Priority areas for new analysis were agreed by the GDG after formation of the review questions and consideration of the existing health economic evidence.

The GDG identified radiofrequency denervation as the highest priority area for original health economic modelling. The clinical review showed that radiofrequency denervation is clinically effective at improving the pain score outcome for individuals that have severe low back pain. Therefore an economic model was prioritised to assess whether the increase in effectiveness associated with this intervention justifies its additional costs.

The following general principles were adhered to in developing the cost-effectiveness analysis:

- Methods were consistent with the NICE reference case for interventions with health outcomes in NHS settings.[374,377]
- The GDG was involved in the design of the model, selection of inputs and interpretation of the results.
- Model inputs were based on the systematic review of the clinical literature supplemented with other published data sources where possible.
- When published data were not available GDG expert opinion was used to populate the model.
- Model inputs and assumptions were reported fully and transparently.
- The results were subject to sensitivity analysis and limitations were discussed.
- The model was peer-reviewed by another health economist at the NGC.

Full methods for the cost-effectiveness analysis for radiofrequency denervation are described in Appendix N.

4.4.3 Cost-effectiveness criteria

NICE's report 'Social value judgements: principles for the development of NICE guidance' sets out the principles that GDGs should consider when judging whether an intervention offers good value for money.[375] In general, an intervention was considered to be cost-effective (given that the estimate was considered plausible) if either of the following criteria applied:

- the intervention dominated other relevant strategies (that is, it was both less costly in terms of resource use and more clinically effective compared with all the other relevant alternative strategies), or
- the intervention cost less than £20,000 per QALY gained compared with the next best strategy.

If the GDG recommended an intervention that was estimated to cost more than £20,000 per QALY gained, or did not recommend one that was estimated to cost less than £20,000 per QALY gained, the reasons for this decision are discussed explicitly in the 'Recommendations and link to evidence' section of the relevant chapter, with reference to issues regarding the plausibility of the estimate or to the factors set out in 'Social value judgements: principles for the development of NICE guidance'.[375]

When QALYs or life years gained are not used in the analysis, results are difficult to interpret unless one strategy dominates the others with respect to every relevant health outcome and cost.

4.4.4 In the absence of economic evidence

When no relevant published health economic studies were found, and a new analysis was not prioritised, the GDG made a qualitative judgement about cost-effectiveness by considering expected differences in resource use between options and relevant UK NHS unit costs, alongside the results of the review of clinical effectiveness evidence.

The UK NHS costs reported in the guideline are those that were presented to the GDG and were correct at the time recommendations were drafted. They may have changed subsequently before the time of publication. However, we have no reason to believe they have changed substantially.

4.5 Developing recommendations

Over the course of the guideline development process, the GDG was presented with:

- Evidence tables of the clinical and economic evidence reviewed from the literature. All evidence tables are in Appendices H and I.
- Summaries of clinical and economic evidence and quality (as presented in Chapters 5-25).
- Forest plots (Appendix K).
- A description of the methods and results of the cost-effectiveness analysis undertaken for the guideline (Appendix N).

Recommendations were drafted on the basis of the GDG's interpretation of the available evidence, taking into account the balance of clinical benefit favouring the intervention or comparator. Evidence comparing intervention against sham/placebo was given priority over other comparisons when developing recommendation in order to determine whether the treatment effect was over and beyond any contextual or placebo effects.

The GDG also considered costs between different courses of action. This was either done formally in an economic model, or informally. Firstly, the net clinical benefit for the intervention over comparator (clinical effectiveness) was considered, focusing on the critical outcomes. When this was done informally, the GDG took into account the clinical effectiveness when one intervention was

compared with another. The assessment of net clinical benefit was moderated by the importance placed on the outcomes (the GDG's values and preferences), and the confidence the GDG had in the evidence (evidence quality). Secondly, the GDG assessed whether the net clinical benefit justified any differences in costs between the alternative interventions.

When clinical and economic evidence was of poor quality, conflicting or absent, the GDG drafted recommendations based on its expert opinion. The considerations for making consensus-based recommendations include the balance between potential harms and benefits, the economic costs compared to the economic benefits, current practices, recommendations made in other relevant guidelines, patient preferences and equality issues. The consensus recommendations were agreed through discussions in the GDG. The GDG also considered whether the uncertainty was sufficient to justify delaying making a recommendation to await further research, taking into account the potential harm of failing to make a clear recommendation (see Section 4.5.1 below).

The GDG considered the appropriate 'strength' of each recommendation. This takes into account the quality of the evidence but is conceptually different. Some recommendations are 'strong' in that the GDG believes that the vast majority of healthcare and other professionals and patients would choose a particular intervention if they considered the evidence in the same way that the GDG has. This is generally the case if the benefits clearly outweigh the harms for most people and the intervention is likely to be cost-effective. However, there is often a closer balance between benefits and harms, and some patients would not choose an intervention whereas others would. This may happen, for example, if some patients are particularly averse to some side effect and others are not. In these circumstances the recommendation is generally weaker, although it may be possible to make stronger recommendations about specific groups of patients.

The GDG focused on the following factors in agreeing the wording of the recommendations:

- The actions health professionals need to take.
- The information readers need to know.
- The strength of the recommendation (for example the word 'offer' was used for strong recommendations and 'consider' for weaker recommendations).
- The involvement of patients (and their carers if needed) in decisions on treatment and care.
- Consistency with NICE's standard advice on recommendations about drugs, waiting times and ineffective interventions (see Section 9.2 in the 2014 NICE guidelines manual[374]).

The main considerations specific to each recommendation are outlined in the 'Recommendations and link to evidence' sections within each chapter.

4.5.1 Research recommendations

When areas were identified for which good evidence was lacking, the GDG considered making recommendations for future research. Decisions about the inclusion of a research recommendation were based on factors such as:

- the importance to patients or the population
- national priorities
- potential impact on the NHS and future NICE guidance
- ethical and technical feasibility.

4.5.2 Validation process

This guidance is subject to a 6-week public consultation and feedback as part of the quality assurance and peer review of the document. All comments received from registered stakeholders are responded to in turn and posted on the NICE website.

4.5.3 Updating the guideline

Following publication, and in accordance with the NICE guidelines manual, NICE will undertake a review of whether the evidence base has progressed significantly to alter the guideline recommendations and warrant an update.

4.5.4 Disclaimer

Healthcare providers need to use clinical judgement, knowledge and expertise when deciding whether it is appropriate to apply guidelines. The recommendations cited here are a guide and may not be appropriate for use in all situations. The decision to adopt any of the recommendations cited here must be made by practitioners in light of individual patient circumstances, the wishes of the patient, clinical expertise and resources.

The National Guideline Centre disclaims any responsibility for damages arising out of the use or non-use of this guideline and the literature used in support of this guideline.

4.5.5 Funding

The National Guideline Centre was commissioned by the National Institute for Health and Care Excellence to undertake the work on this guideline.

5 Clinical examination

5.1 Introduction

Clinical examination of people with back pain or sciatica is routinely performed by primary health care professionals, therapists, specialist physicians and surgeons. Clinical examination serves a number of functions such as corroborating or strengthening the diagnosis made on taking a detailed history. It may also be important for reaching a diagnosis, for example, where the history is unclear or where imaging would not be expected to clarify a diagnosis. Clinical examination might also be important for supporting a management plan, assessing prognosis and assessing the response to treatment.

People consulting healthcare professionals may expect an examination as part of the consultation, and this contributes to satisfaction with the consultation. It is thought that the repercussions of not performing an examination would lead to dissatisfaction and unwarranted demand for tests or further referrals.[332]

Clinical examination is a skill that needs to be learnt and practiced. Healthcare professionals will learn their examination skills within varying concepts of care, relevant to the therapy or branch of medicine that they practice. Therefore, agreement in the clinical findings or their importance across these different paradigms of care would not be expected. Within a given model, there is considerable variation in inter-observer and intra-observer variability. However, this variation can be improved with both training such as inter-observer calibration and skills practice, and with experience.

There is uncertainty as to whether any of the clinical tests that are commonly used in the examination of people with suspected sciatica are more beneficial than others, or compared to a taking a comprehensive history. This evidence review intends to investigate whether there is any evidence to address this uncertainty.

5.2 Review question: In people with suspected (or under investigation for) sciatica, what is the clinical and cost effectiveness of clinical examination compared to history alone or history with imaging, when each is followed by treatment for sciatica, in improving patient outcomes?

For full details see review protocol in Appendix C.

Table 8: PICO characteristics of review question

Population	People aged 16 or above with suspected (or under investigation for) sciatica
Intervention(s)	• Clinical tests (+ treatment) 1. straight leg raise (may be referred to as sciatic nerve stretch test) 2. femoral nerve stretch test 3. crossed straight leg raise 4. motor muscle strength 5. dermatome sensory loss 6. reflex impairment 7. slump test 8. combination of above

Comparison(s)	• history alone (+ treatment) • history with imaging (+ treatment) • clinical tests compared to each other (+ treatment).
Outcomes	**Critical** • health-related quality of life (for example, SF-12, SF-36 or EQ-5D) • pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]) • function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index) • psychological distress (HADS, GHQ, BPI, BDI, STAI). **Important** • responder criteria (>30% improvement in pain and function) • adverse events: morbidity • healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit).
Study design	Diagnostic RCTs (test and treat studies)

5.3 Clinical evidence

A search for diagnostic randomised trials (test and treat studies) comparing the effectiveness of clinical examination versus history alone or history with imaging, or in comparison to other clinical examination techniques when each is followed by treatment for sciatica, in improving patient outcomes in people with suspected (or under investigation for) sciatica was undertaken.

No relevant clinical studies comparing different types of clinical examination with each other or with history alone or history with imaging (when each is followed by treatment for sciatica) were identified.

This search was not extended to diagnostic accuracy studies as the GDG agreed that there is no agreed reference standard for diagnosis of sciatica and such a review would therefore not be informative for setting guideline recommendations.

Two Cochrane reviews[507,508] were identified but they were not included as they included primary diagnostic studies, not test and treat studies, and therefore did not meet the protocol of this review.

5.4 Economic evidence

Published literature

No relevant economic evaluations were identified.

See also the economic article selection flow chart in Appendix F.

5.5 Evidence statements

5.5.1 Clinical

- No relevant clinical studies were identified.

5.5.2 Economic

- No relevant economic evaluations were identified.

5.6 Recommendations and link to evidence

Recommendations	No recommendation.
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (for pain and function), adverse events and healthcare utilisation were also considered as important. As no relevant clinical studies were identified, no evidence was available for any of these outcomes.
Trade-off between clinical benefits and harms	No relevant clinical studies were identified for our review which looked for test-and treat studies. This review type was chosen rather than a diagnostic accuracy review, because there is no currently agreed reference standard, and because no research has been done looking at patient outcomes based on clinical examination findings.
Trade-off between net clinical effects and costs	No relevant economic studies were identified. The GDG considered stopping performing clinical examinations might reduce costs but as no clinical evidence was available it could not be determined whether this would be cost effective.
Quality of evidence	No relevant clinical or economic studies were identified.
Other considerations	The GDG discussed the Cochrane review on clinical examination.[507] However, it was noted that this was a diagnostic accuracy review, which used a combination of different reference standards including imaging and findings at surgery rather than patient outcomes. The GDG agreed that it was not possible to make a recommendation due to the lack of evidence. The only other studies the GDG were aware of on this topic were based on clinical opinion using Delphi consensus. The GDG believed that there was insufficient evidence to recommend a substantial change to normal clinical practice and therefore agreed not to make a recommendation. The GDG discussed the possibility of making a recommendation for future research, due to the lack of evidence in this area. They agreed that feasibility of such a trial would be an issue, and therefore unlikely to be funded, unlikely to change practice or add value to the treatment pathway. The group were also aware of a clinical cohort study that would be published in the near future and concluded that it was sensible to wait for the results of this rather than making a recommendation for future research.

6 Risk assessment tools and stratification

6.1 Introduction

There are recognised risk factors or prognostic features that may make a person more likely to suffer from chronic, disabling back pain. These include demographic/physical factors, for example older age, being female, leg pain, psychological factors such as negative beliefs and behaviours, passive attitude towards treatment, depression and anxiety, and social factors such as poor work environment, job dissatisfaction and unhelpful social support. These risk factors may not always become apparent to a health professional when assessing a person with back pain. Therefore, risk stratification tools that help to support clinical decision-making have emerged. There are a number of risk assessment tools available including the following:

The Örebro Musculoskeletal Pain Screening Questionnaire (ÖMSPQ) is intended to be used in an occupational health setting with people whose back pain is affecting their ability to work. It consists of 21 questions that assess mood, attitude towards work, thoughts, beliefs and behaviours.

The STarT Back Screening Tool is a 9 item questionnaire designed to be used in primary care. It generates an overall score and psychosocial sub-score that divides people into low, medium and high risk of persistent back pain-related disability. Of equal importance to the tool are the different treatment packages that are targeted at the 3 risk groups.

The Distress and Risk Assessment Method (DRAM) is a first-stage screening method that helps alert a clinician to the fact that a person with low back pain might already have psychological distress or be at risk of it. It uses the Modified Zung Depression Index and the Modified Somatic Perceptions Questionnaire to generate a combination score to sub-divide people.

The desire to get away from a 'one size fits all' approach has led to considerable interest in stratified care strategies. There are many different proposed methods of stratification but in general they divide patients into one of 3 groups. However, it is important to appreciate that there is likely to be overlap between these methods:[145]

Stratification by risk of on-going disability is used to divide patients into different groups on the basis of whether they have single or multiple risk factors for persistent, disabling back pain. Examples include the OMPSQ and STarT Back.

Stratification by underlying mechanism for back pain uses many approaches whether based on anatomy, pathology, pain mechanisms or psychosocial factors, with the purpose of targeting treatment at the proposed mechanism of pain. An example is the Classification Based Cognitive Functional Therapy approach which combines patient history, examination findings, psychological assessment and investigation results to classify patients and thus direct treatment.[392]

Stratification by likelihood of response to treatment is often achieved using a clinical prediction rule. Common examples are those patients who might respond to spinal manipulation or spinal stabilisation.[77,217]

This chapter intends to address two areas; which tool best predicts delayed improvement or poor outcome, and secondly, whether management stratified according to the tool is effective. These questions are inherently interlinked and therefore results for each are presented jointly below.

6.2 Review question 1: Which validated risk assessment tools are the most accurate for identifying people with low back pain or sciatica at risk of poor outcome/delayed improvement?

For full details see review protocol in Appendix C.

Table 9: PICO characteristics of review question 1

Population	People aged 16 or above with non-specific low back pain People aged 16 or above with sciatica
Risk tool	Validated risk assessment/clinical prediction tools, including; • STarT Back • DRAM • Örebro
Target condition	Risk of poor outcome/delayed improvement (as reported by study)
Outcomes (in terms of predictive test accuracy, calibration)	• Area under the curve (c-statistic) • Sensitivity, specificity, predictive values (define thresholds) • Predicted risk versus observed risk (calibration) • Other outcomes e.g., D statistic, R^2 statistic and Brier score • Reclassification
Study types	Cohort studies, RCTs, systematic reviews.

6.3 Review question 2: What is the clinical and cost effectiveness of stratifying management of non-specific low back pain or sciatica according to outcome of a risk assessment tool/questionnaire?

For full details see review protocol in Appendix C.

Table 10: PICO characteristics of review question 2

Population	People aged 16 or above with non-specific low back pain People aged 16 or above with sciatica
Index tests (risk assessment tools)	Validated risk assessment/clinical prediction tools including: • STarT Back • DRAM • ÖREBRO • Gatchel • Hicks/Delitto • Childs/Flynn • Hancock • O'Sullivan
Comparisons	• Control (no risk tool, receive the same intervention as those who have undergone a risk tool) • Tools compared to each other (groups receive the same intervention)
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).

	• Function (for example, the Roland Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

6.4 Clinical evidence

6.4.1 Risk assessment tools

Sixteen studies reporting evidence for 11 risk tools were included in the review.[34,35,77,78,101,160,212,219,250,321,358,359,382,396,524,547] These are summarised in **Table 11** below and in more detail in Appendix H. Evidence from these studies is summarised in the clinical evidence summaries below. See also further details of the stratification tools in Appendix P, the study selection flow chart in Appendix E, area under the curve (AUC) plots in Appendix K and excluded studies list in Appendix L.

6.4.2 Risk stratification

Six studies (published in 8 papers) were included in the review.[18,36 151 220 146,518,539,540] As there was only one randomised trial identified for the majority of index tests, cohort studies were also searched for. However, none of the cohort studies identified met the inclusion criteria specified in the protocol. The 6 included studies are summarised in Table 12 below. Evidence from these studies is summarised in the GRADE clinical evidence profile (action flow chart) in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Table 11: Summary of studies included in question 1

Study	Risk tool	Population	Outcomes	No of events (n)
Beneciuk 2013[34]	Fear avoidance beliefs questionnaire physical activity scale Pain catastrophizing scale Eleven-item version of the tempa scale kinesophobia Patient health questionnaire – 9 (PHQ-9)	Adults between the ages of 18 and 65 years seeking physical therapy for low back pain Median symptom duration (IQR): 90 days (30-365). Acute (≤14 d): 11.8% Sub-acute (15-90 d): 39.2% Chronic (≥91 d): 49% n = 146	Recovery (RMDQ) at 6-months Pain at 6-months	Not reported

Study	Risk tool	Population	Outcomes	No of events (n)
	STarT Back: overall score STarT Back: psychosocial subscale score			
Beneciuk 2014[35]	STarT Back: change in overall score (0-4 weeks)	Adults between the ages of 18 and 65 years seeking physical therapy for low back pain Symptom duration 45.5% chronic as defined by 91 days or greater. n = 123	Recovery (ODI) at 6-months Pain at 6-months	Not reported
Childs 2004[77]	Spinal manipulation clinical prediction rule	Adults aged 18-60 years with low back pain; median duration of current episode = 27 days; mean (SD) ODI score = 41.2 (10.4) Participants recruited as part of an RCT. Prognostic accuracy data was only reported for participants in the intervention group n = 70	Recovery (50% improvement on the ODI) at 1 week Positive likelihood ratio Negative likelihood ratio	Not reported.
Childs 2005[78]	Functional Rating Index (FRI) Oswestry Disability Questionnaire (ODI)	Consecutive adults (18-60 years old) referred for physical therapy for low back pain with or without lower extremity symptoms. Duration of symptoms: 66% ≤ 6 weeks, 46% ≤ 3 weeks n = 131	Ability to distinguish patients who had improved/not improved based on the global rating of change. AUC	Not reported
Dagfinrud 2013[101]	Örebro musculoskeletal pain questionnaire (ÖMSPQ)	Adults ≥ 18 years (mean = 45.3) with low back pain; mean (SD) ODI score = 35.9 (16.5)	Functional improvement (change of >10 on the ODI) at 8 weeks	Not reported

Study	Risk tool	Population	Outcomes	No of events (n)
		Duration of pain: Acute (0-2 weeks) 26.7% Sub-acute (2-12 weeks) 24% Chronic (3-12 months) 10.7% Chronic (> 1 year) 38.7% n = 76		
Gabel 2011[160]	Örebro Musculoskeletal Pain questionnaire (ÖMSPQ) Modified Örebro Musculoskeletal Screening Questionnaire (ÖMSPQ)	Adults with acute/sub-acute low back pain Mean duration (SD): 4.1 weeks (8.1) Acute 79% Sub-acute 13% Chronic 8% n = 106	Spine functional index (SFI) at 6-months Pain at 6-months	6% of patients reported chronic low back pain at end of study
Heneweer 2007[212]	Dutch translation of the Acute Low Back Pain Screening Questionnaire (alternative name for ÖMSPQ)	Adults (21-60) consulting their physical therapist for the first time with a first or a new episode of non-specific low back pain. Duration of current complaint: <4 weeks 52% 4-6 weeks 27% 7-12 weeks 21% n = 56	Recovery at 12 weeks	31/56 reported recovered at 12 weeks
Hill 2008 [219]	STarT Back	Adults with non-specific low back pain in UK primary care Duration of symptoms: 17% <1 month 34% 1-6 months 25% 7 months -3 years 22% >3 years	Function (RMDQ ≥7) at 6 months	58/74 in high risk group had poor outcome

Study	Risk tool	Population	Outcomes	No of events (n)
		n = 500 (external validation sample)		
Jellema 2007[250]	Örebro musculoskeletal pain questionnaire (ÖMSPQ) Low back pain perception scale	Adults ≥ 18 years (mean = 42.7) with low back pain Mean (range) duration of current episode = 12 days (6-21); mean pain intensity during the day (0-10) = 4.9 n =298	Recovery (patient self-report) at 1 year	37.6% showed an unfavourable outcome
Maher 2009[321]	Örebro musculoskeletal pain questionnaire (ÖMSPQ)	Adults with low back pain Duration of episode: < 1 week 16% 1-2 week 7% 2-3 week 9% 6-8 week 20.5% 9-11 week 17% 12 week 7% n = 230	Pain at 12-months Recovery (RMDQ) at 12-months	Not reported
Morso 2013[358]	STarT Back – translated into Danish	Adults with non-specific low back pain in Danish and UK primary care Duration of pain: Danish: 44.2% <4 weeks 19.6% 4-12 weeks 36.2% >12 weeks UK: 38.2% <4 weeks 25.8% 4-12 weeks 33.3% >12 weeks n = 1200	RMDQ >30 at 3 months (poor clinical outcome) Pain being severe (8-10 on a 10 point numerical scale) at 3 months	Low risk group Danish 24%, UK 17% poor clinical outcome Medium risk group Danish 57%, UK 54% poor clinical outcome High risk group Danish 64%, UK 78% poor clinical outcome
Morso 2014[359]	STarT Back	Adults with low back pain in secondary care n=960; primary care n=172 Duration of pain: < 1 months 5% 1-3 months 15% >3 months 80%	Recovery (RMDQ) at 6-months Pain at 6-months	69% of patients in secondary care and 40.2% of patients in primary care had a poor outcome on the RMDQ at 6-months

Study	Risk tool	Population	Outcomes	No of events (n)
Newell 2015A[382]	STarT Back	Adults aged >16 years presenting to one of the chiropractic clinics with non-specific low back pain and diagnosed as amenable to chiropractic care. n=749 Symptom duration ≤3 months: 53%	Pain at 14, 30 and 90 days	Not reported
Page 2015[396]	STarT Back	Adults aged 16-80 years with non-specific chronic low back pain. Chronic defined as pain present >12 weeks and included both constant and recurrent patterns of pain. n=53 Duration of symptoms: 130.7 (SD 112.0) months	Pain, function, and fear of movement at 6 and 12 months	Not reported
Von Korff 2014[524]	Chronic pain risk item set	Adults aged 18 to 64 years who made a primary care back pain visit and had no back pain visits in the prior year. Baseline pain status: 40.8% acute, 41.1% intermediate, 18% chronic. Mean number of days with back pain in last 6 months 66.1 (64.2) n = 571	Pain at 4-months	Not reported
Williams 2014[547]	Hancock CPR (clinical prediction rule)	Adults with primary complaint of low back pain less than 6 weeks in duration, with or without leg pain, with at least moderate intensity pain during the	Pain at 12-weeks	Not reported

Study	Risk tool	Population	Outcomes	No of events (n)
		preceding 24hours and who were pain free for at least one month before the onset of the current low back pain episode. Participants recruited as part of an RCT investigating the effectiveness of paracetamol for acute low back pain). n = 937		

Table 12: Summary of studies included in review question 2

Study	Intervention and comparison	Population	Outcomes	Comments
Apeldoorn 2012[18]	Classification based physical therapy (n=74) using an updated version of the algorithm by Fritz *et al.* [153] (Hicks/Delitto Classification system), modified to fit into the Dutch healthcare system. Interventions included interventions: spinal manipulation, stabilisation exercises or direction specific exercises for a minimum of 4 weeks. Control group with no risk tool (n=82): usual physical therapy care based on Dutch physical therapy low back pain guidelines.	Low back pain with or without sciatica N=156 1 year follow-up The Netherlands	Pain (NRS) Function (ODI) Quality of Life (SF-36, Physical Component Score, PCS) Quality of Life (SF-36, Mental Component Score, MCS) Responder Criteria (Pain and Function)	Multi-centre trial. Patients assigned to the classification based group were treated according to their primary classification category for a minimum of 4 weeks. After this period, the physical therapist was allowed to change treatment strategy according to the current Dutch low back pain guidelines No concurrent treatment reported.
Beneciuk 2015[36]	STarT Back stratification (n=108)	Low back pain with or without sciatica	Pain (NRS, 0-10: patients rated their	2-phase sequential study evaluating

Study	Intervention and comparison	Population	Outcomes	Comments
	followed by one of 3 treatment pathways based on risk. Physical Therapists (PT) in the stratified care group were instructed to provide treatment for patients with using the knowledge and skills leant into subsequent management strategies for their patients with low back pain. **Low risk group** Minimal physical therapy intervention approach (1-2 sessions per week) and adherence to the APTA Orthopaedic Section CPG's **Medium risk group** Increased physical therapy intervention approach (2-3 sessions per week) and adherence to the APTA Orthopaedic Section CPG's **High risk group** Increased physical therapy intervention approach (2-3 sessions per week) and adherence to the APTA Orthopaedic Section CPG's and psychologically-informed practice principles. Control group with no risk tool (n=39) Standard Care Group: PT in the standard care group were instructed to provide	N=109 4 weeks follow-up USA	current pain intensity as well as their best and worst levels of pain intensity over the previous 24 hours). These 3 pain ratings were averaged and used as NRS variable Function(RMDQ) Responder Criteria (Pain and Function)	feasibility and generated preliminary treatment effects. Based in a secondary care outpatients physical therapy setting No concurrent treatment reported

Study	Intervention and comparison	Population	Outcomes	Comments
	treatment for patients with low back pain as they normally would have if not participating in this study			
Foster 2014[146,539]	12 months of stratified care through STarT Back risk tool (n=554) followed by one of 3 treatment pathways based on risk as described below: **Low risk group** family physicians gave written information on self-management and advice to keep active, prescribed pain medications where appropriate and reassured patients about their good prognosis **Medium and high risk group:** physicians were encouraged to refer patients to physical therapy and address their back-related concerns highlighted by the stratification tool 6 months of usual care with no risk tool (n=368)Usual care involved family physician management involving assessment, advice, medication, sickness certification and referral for investigations or further treatment as appropriate (e.g. to community physical therapy or secondary care specialists).	Low back pain with or without sciatica N=922 6 month follow-up UK	Pain (NRS) Function(RMDQ) Quality Of Life (EQ-5D) Quality of Life (SF-12, Physical Component Score, PCS) Quality of Life (SF-12, Mental Component Score, MCS) Psychological distress (HADS, anxiety scale) Psychological distress (HADS, depression scale)	IMPaCT study to test the implementation of stratified care for low back pain within a primary care physician setting. Results extend the findings of the STarT Back trial. Study prospectively compared separate patient cohorts in the 2 phases of study Multi-centre trial No concurrent treatment reported

Study	Intervention and comparison	Population	Outcomes	Comments
	Community based PT managed patients using clinical judgment to determine the number and content of treatment sessions			
Fritz 2003[151]	Classification based physical therapy described by Delitto et al.[107] (N=41).Interventions included joint mobilisation, manipulation techniques, spinal active range of motion exercises, lumbar extension exercises, trunk strengthening and mechanical or auto-traction Control group with no risk tool (n=37): usual physical therapy care based on low back pain guidelines. Interventions included low stress aerobic exercise (treadmill walking or stationary cycling and general muscle reconditioning exercises after 2 weeks). Subjects also received advice to remain as active as possible	Low back pain with or without sciatica N=78 1 year follow-up USA	Function (ODI) Quality of Life (SF-36, Physical Component Score, PCS) Quality of Life (SF-36, Mental Component Score, MCS) Healthcare utilisation	Multi-centre trial No results for the outcome pain reported despite a self-reported measure for pain being described in the methods of the study The classification group was allowed to be reassessed and the treatment adjusted on the basis of changes in the signs and symptoms of the patient, as compared with consistent, guideline-based approach in the control group No concurrent treatment reported.
Hill 2011[220,540]	STarT Back stratification (n=568) followed by one of 3 treatment pathways based on risk. Physiotherapist assessment lasting 30 minutes, including initial treatment with advice on promoting appropriate levels of	Low back pain with or without sciatica N=851 1 year follow-up UK	Pain (NRS) Function(RMDQ) Quality of life (EQ-5D) Quality of life (SF-12, Physical Component Score, PCS) Quality of life (SF-	Multi-centre trial No concurrent treatment reported

Study	Intervention and comparison	Population	Outcomes	Comments
	activity, return to work and a pamphlet about local exercise venues and self-help groups. All were shown a 15-minute educational video and given the Back Book. **Low risk group** only received above initial session. **Medium risk group** referred for standardised physiotherapy sessions to address symptoms and function. **High risk group** referred for psychologically-informed physiotherapy sessions to address symptoms and function and also psychosocial obstacles to recovery. Control group with no risk tool (n=283) Current best practice: physiotherapist assessment lasting 30 minutes which included initial treatment advice and exercise with the option for onward referral for further physiotherapy, based on physiotherapist clinical judgement.		12, Mental Component Score, MCS) Psychological distress (HADS, anxiety scale) Psychological distress (HADS, depression scale)	
Vibe Fersum 2013[518]	Classification based physical therapy, (CB-CFT) (n=51)	Low back pain without sciatica	Pain (PINRS) Function (ODI)	Single-centre trial No concurrent

Study	Intervention and comparison	Population	Outcomes	Comments
	developed incorporating the bio- psychosocial model by O'Sullivan 2005(this system is integrated within the Quebec classification system). The CB-CFT intervention had 4 main components 1) a cognitive component 2) specific movement exercise 3) targeted functional integration of activities in their daily life and 4) a physical activity programme tailored to the movement classification. Control group with no risk tool (n=43): patients were treated with joint mobilisation or manipulation techniques applied to the spine or pelvis consistent with best current manual therapy practice. In addition, most patients were given exercises or a home exercise programme.	N=94 1 year follow-up Norway		treatment reported.

6.4.3 Clinical evidence summary tables: Risk assessment tools

6.4.3.1 Discrimination

Table 13: Clinical evidence profile: tools for predicting functional improvement (as assessed using a variety of methods including self-report, ODI, RMDQ, global rating of change)

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Sensitivity	Specificity	Area Under Curve Pooled/Median (range)	Quality
Örebro Musculoskeletal Pain Questionnaire										
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at threshold 68 at 1 year	1	296	Low	-	No serious indirectness	No serious imprecision	26	79	0.61 (0.54 – 0.67)	HIGH
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at threshold 90 at 1 year	1	296	Low	-	No serious indirectness	No serious imprecision	66	52	0.61 (0.54 – 0.68)	HIGH
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at threshold 99 at 1 year	1	296	Low	-	No serious indirectness	No serious imprecision	81	35	0.61 (0.54 – 0.67)	HIGH
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at threshold 105 at 6 months	1	76	High[a]	-	No serious indirectness	Serious imprecision[b]	78	21	0.58 (0.42 – 0.73)	LOW
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at threshold 105 at one year	1	296	Low	-	No serious indirectness	No serious imprecision	89	28	0.61 (0.54 – 0.68)	HIGH
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at threshold 113 at 6 months	1	61	High[a]	-	No serious indirectness	Serious imprecision[b]	88	85.7	0.88 (0.78-0.99)	LOW
Modified Örebro Musculoskeletal screening questionnaire (ÖMSPQ) at	1	106	High[a]	-	No serious indirectness	Serious imprecision[b]	88	85.7	0.88 (0.78-0.99)	LOW

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Sensitivity	Specificity	Area Under Curve Pooled/Median (range)	Quality
threshold 112 at 6 months										
Acute Low Back Pain Screening Questionnaire (ALBPSQ) (Alternative Name For ÖREBRO)										
ALBPSQ at 12 weeks	1	56	Very high[a]	-	No serious indirectness	Not estimable	-	-	0.641	LOW
STarT Back										
STarT Back – at 12 months (secondary care)	1	53	High[a]	-	No serious indirectness	No serious imprecision	-	-	0.82 (0.61 to 1.0)	MODERATE
STarT Back – at 6 months (secondary care)	2	1013	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.77 (0.69 to 0.84)	LOW
STarT Back – at 6 months (primary care)	2	672	Low	-	No serious indirectness	No serious imprecision	80.1[c,d]	65.4[c,d]	0.82 (range 0.73-0.90)	HIGH
STarT Back – Danish translation at 3 months	1	344	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.71 (0.66 to 0.77)	LOW
STarT Back – UK at 3 months	1	845	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.81 (0.78 to 0.84)	LOW
Function Rating Index (FRI)										
Function rating index (FRI; 4 weeks)	1	131	Very high[a]	-	No serious indirectness	Serious imprecision[b]	-	-	0.93 (0.89 – 0.98)	VERY LOW
Oswestry Questionnaire										
Oswestry Disability Questionnaire (ODI; 4 weeks)	1	131	Very high[a]	-	No serious indirectness	Serious imprecision[b]	-	-	0.93 (0.88 – 0.98)	VERY LOW

GRADE was conducted with emphasis on AUC as this was the primary measure discussed in decision-making as 95% CI were not available for analysis

a) Risk of bias was assessed using the PROBAST checklist. Where there was more than one study pooled, the overall risk of bias rating was based on the majority of the evidence.

b) The judgement of precision was based on the median AUC value and its 95% CI. The evidence was downgraded by 1 increment if the CI varied across 2 areas (50–90% and 90–100%) and by 2 increments if the individual studies varied across 3 areas (0–50%, 50–90% and 90–100%).

c) Numbers transcribed directly from paper.

d) Sensitivity and specificity data is reported from the larger (N=500) study only (Hill 2008). Data for sensitivity/specificity was not reported in the second, smaller study.

Note: One study[77] at very high risk of bias evaluated the prognostic ability of the spinal manipulation clinical prediction rule to predict a positive or negative outcome for low back pain (as assessed by 50% change in ODI at 1 week). This study only reported the positive likelihood ratio (13.2%, 95% CI 3.4 – 52.1) and negative likelihood ratio (0.10%, 95% CI 0.03 – 0.41) for a subgroup of participants who received spinal manipulation plus exercise as an intervention.

Table 14: Clinical evidence profile: tools for predicting pain (as assessed using the NRS, and PGIC scale = Patient's Global Impression of Change, score 1-7)

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	Sensitivity	Specificity	Area Under Curve Pooled/Median (range)	Quality
STarT Back										
STarT Back – at 12 months (secondary care)	1	53	High[a]	-	No serious indirectness	No serious imprecision	-	-	0.71 (0.54 to 0.88)	MODERATE
STarT Back – at 6 months (secondary care)	2	1013	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.73 (0.72 to 0.73)	LOW
STarT Back – at 6 months (primary care)	1	172	Very high[a]	-	No serious indirectness	Serious imprecision[b]	-	-	0.66 (0.46 to 0.85)	VERY LOW
STarT Back – Danish translation at 3 months	1	344	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.79 (0.68 to 0.89)	LOW
STarT Back – UK at 3 months	2	1594	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.68 (0.55 to 0.81)	LOW
Chronic pain risk item set										
Chronic pain risk item set at 4 months	1	571	Very high[a]	-	No serious indirectness	No serious imprecision	72	70	0.79 (0.75 to 0.83)	LOW
Hancock CPR										
Hancock CPR at 12 weeks	1	937	Very high[a]	-	No serious indirectness	No serious imprecision	-	-	0.60 (0.56-0.64)	LOW

GRADE was conducted with emphasis on AUC as this was the primary measure discussed in decision-making as 95% CI were not available for analysis
a) Risk of bias was assessed using the PROBAST checklist. Where there was more than one study pooled, the overall risk of bias rating was based on the majority of the evidence.
b) The judgement of precision was based on the median AUC value and its 95% CI. The evidence was downgraded by 1 increment if the CI varied across 2 areas (50–90% and 90–100%) and by 2 increments if the individual studies varied across 3 areas (0–50%, 50–90% and 90–100%).

6.4.3.2 Calibration

Table 15: Clinical evidence profile: tools for predicting functional improvement (as assessed using a variety of methods including self-report, ODI, RMDQ)

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	R^2 (95%CI)	Brier score (95%CI)	D statistic (95%CI)	Quality
Örebro Musculoskeletal Pain Questionnaire										
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) – 6 months	1	76	Low	-	No serious indirectness	Not estimable	15	-	-	HIGH
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) – 1 year	1	230	Very high[a]	-	No serious indirectness	Not estimable	12.7	-	-	LOW
Fear Avoidance Beliefs Questionnaire										
Fear avoidance beliefs questionnaire physical activity scale at 6 months	1	146	Very high[a]	-	No serious indirectness	Not estimable	39.6	-	-	LOW
Fear avoidance beliefs questionnaire physical work scale at 6 months	1	146	Very high[a]	-	No serious indirectness	Not estimable	41.4	-	-	LOW
Pain Catastrophizing Scale										
Pain catastrophizing scale at 6 months	1	146	Very high[a]	-	No serious indirectness	Not estimable	41.2	-	-	LOW
Tampa Scale of Kinesiophobia										
Tampa scale of kinesiophobia (11-item version) at 6 months	1	146	Very high[a]	-	No serious indirectness	Not estimable	40.4	-	-	LOW
Patient Health Questionnaire										
Patient health questionnaire-	1	146	Very high[a]	-	No serious	Not	41.2	-	-	LOW

9 at 6 months					indirectness	estimable				
STarT Back Screening Tool										
STarT Back screening tool overall score at 6 months	1	146	Very high[a]	-	No serious indirectness	Not estimable	42.3	-	-	LOW
STarT Back screening tool change in overall score 0-4 weeks at 6 months	1	123	Very high[a]	-	No serious indirectness	Not estimable	46.3	-	-	LOW
STarT Back screening tool psychological score at 6 months	1	146	Very high[a]	-	No serious indirectness	Not estimable	44.3	-	-	LOW

a) Risk of bias was assessed using the PROBAST checklist. Where there was more than one study pooled, the overall risk of bias rating was based on the majority of the evidence.

One study [250] reported calibration for the ÖMSPQ (intercept (95% CI) -0.03 (-0.06 - -0.00) and slope (95% CI) 1.09 (1.01 – 1.17)) and low back pain perception scale (intercept (95% CI) 0.02 (0.02 - 0.03) and slope (95% CI) 0.95 (0.93 – 0.97)) in predicting functional outcome at 1 year with (high risk of bias).

Table 16: Clinical evidence profile: tools for predicting pain (as assessed using NRS)

Risk tool	No of studies	n	Risk of bias	Inconsistency	Indirectness	Imprecision	R^2 (95%CI)	Brier score (95%CI)	D statistic (95%CI)	Quality
Örebro Musculoskeletal Pain Questionnaire										
Örebro Musculoskeletal pain questionnaire (ÖMSPQ) at 1 year	1	230	Very high[a]	-	No serious indirectness	-	4.2	-	-	LOW
Fear Avoidance Beliefs Questionnaire										
Fear avoidance beliefs questionnaire physical activity scale at 6 months	1	146	Very high[a]	-	No serious indirectness	-	17.6	-	-	LOW
Fear avoidance beliefs questionnaire physical work scale at 6 months	1	146	Very high[a]	-	No serious indirectness	-	18.9	-	-	LOW
Pain Catastrophizing Scale										

Pain catastrophizing scale at 6 months	1	146	Very high[a]	-	No serious indirectness	-	17.1	-	-	LOW
Tampa Scale of Kinesiophobia										
Tampa scale of kinesiophobia (11-item version) at 6 months	1	146	Very high[a]	-	No serious indirectness	-	17.8	-	-	LOW
Patient Health Questionnaire										
Patient health questionnaire-9 at 6 months	1	146	Very high[a]	-	No serious indirectness	-	18.6	-	-	LOW
STarT Back Screening Tool										
STarT Back screening tool overall score at 6 months	1	146	Very high[a]	-	No serious indirectness	-	17.7	-	-	LOW
STarT Back screening tool change in overall score 0-4 weeks at 6 months	1	123	Very high[a]	-	No serious indirectness	-	16.8	-	-	LOW
STarT Back screening tool psychological score at 6 months	1	146	Very high[a]	-	No serious indirectness	-	8.2	-	-	LOW

a) Risk of bias was assessed using the PROBAST checklist. Where there was more than one study pooled, the overall risk of bias rating was based on the majority of the evidence.

One study [547] reported calibration for the Hancock clinical prediction rule (CPR) as the number of observed events versus predicted events of recovery (as assessed by being pain free). Although no formal calibration statistics were offered authors reported that at 4 and 12 weeks predicted and actual rates of recovery were less well calibrated with observed rates being typically about 10% less than predicted rates (very high risk of bias).

6.4.3.3 Reclassification

No reclassification data found.

6.4.4 Clinical evidence summary tables: Risk stratification

Table 17: Hicks/Delitto classification versus no risk tool

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Stratified treatment versus non-stratified treatment-Hicks/Delitto (95% CI)
QoL (SF-36, PCS,0-100) ≤4 months	78 (1 study) 4 weeks	VERY LOW [a,b] due to risk of bias, imprecision		The mean QoL (SF-36, pcs,0-100) ≤4 months in the control groups was 36.8	The mean QoL (SF-36, pcs,0-100) ≤4 months in the intervention groups was 6.2 higher (8.74 lower to 21.14 higher)
QoL(SF-36,PCS,0-100) > 4 months	234 (2 studies) > 4 months	LOW[a] due to risk of bias		*	The mean QoL(SF-36,pcs,0-100) >4 months in the intervention groups was 0.59 lower (3.7 lower to 2.52 higher)
QoL (SF-36, MCS,0-100) ≤4 months	78 (1 study) 4 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (SF-36, MCS,0-100) ≤4 months in the control groups was 50.6	The mean QoL (SF-36, MCS,0-100) ≤4 months in the intervention groups was 1.6 higher (13.34 lower to 16.54 higher)
QoL(SF-36,MCS,0-100) > 4 months	234 (2 studies) > 4 months	LOW[a] due to risk of bias		*	The mean QoL(SF-36,MCS,0-100) > 4 months in the intervention groups was 0.94 higher (2.24 lower to 4.12 higher)
Pain(NRS,0-10) ≤4 months	156 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(NRS,0-10) ≤ 4 months - new subgroup in the control groups was 6.2	The mean pain(NRS,0-10) ≤ 4 months - new subgroup in the intervention groups was 0.49 lower (1.34 lower to 0.36 higher)
Pain(NRS,0-10) > 4 months	156 (1 study) 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(NRS,0-10) > 4 months - new subgroup in the control groups was 6.2	The mean pain(NRS,0-10) > 4 months - new subgroup in the intervention groups was 0.13 higher

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Stratified treatment versus non-stratified treatment-Hicks/Delitto (95% CI)
					(0.83 lower to 1.09 higher)
Function(ODI,0-100) > 4 months *	234 (2 studies) > 4 months	LOW[a] due to risk of bias		*	The mean function(ODI,0-100) > 4 months in the intervention groups was 0.23 higher (4.09 lower to 4.54 higher)
Responder criteria(NRS>30% improvement) ≤ 4 months	156 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.81 (0.65 to 1.02)	Moderate	
				732 per 1000	139 fewer per 1000 (from 256 fewer to 15 more)
Responder criteria(NRS>30% improvement)> 4 months	156 (1 study) 1 year	LOW[a] due to risk of bias	RR 1.04 (0.87 to 1.24)	Moderate	
				744 per 1000	30 more per 1000 (from 97 fewer to 179 more)
Responder criteria(ODI>30% improvement) ≤4 months	156 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.81 (0.55 to 1.19)	Moderate	
				451 per 1000	86 fewer per 1000 (from 203 fewer to 86 more)
Responder criteria(ODI>30% improvement)> 4 months	156 (1 study) 1 year	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.19 (0.99 to 1.43)	Moderate	
				683 per 1000	130 more per 1000 (from 7 fewer to 294 more)
Number of therapy appointments ≤ 4 months	78 (1 study) 4 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean number of therapy appointments ≤ 4 months in the control groups was 5.7	The mean number of therapy appointments ≤ 4 months in the intervention groups was 0.3 lower (1.68 lower to 1.08 higher)
Number of therapy appointments > 4 months	78 (1 study) 1 years	LOW[a] due to risk of bias		The mean number of therapy appointments > 4 months in the control groups was	The mean number of therapy appointments > 4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Stratified treatment versus non-stratified treatment-Hicks/Delitto (95% CI)
				6.7	0.5 lower (2.66 lower to 1.66 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

*Control rate not reported in study, only mean difference given.

Table 18: O'Sullivan classification system versus no risk tool classification

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-O'Sullivan Classification (95% CI)
Pain(VAS,0-10)≤ 4 months	94 (1 study) 3 months	LOW[a] due to risk of bias		The mean pain(VAS,0-10)≤ 4 months in the control groups was 3.8	The mean pain(VAS,0-10)≤ 4 months in the intervention groups was 2.1 lower (2.83 to 1.37 lower)
Pain(VAS,0-10)> 4 months	94 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(VAS,0-10)> 4 months in the control groups was 3.8	The mean pain(VAS,0-10)> 4 months in the intervention groups was 1.5 lower (2.33 to 0.67 lower)
Function(ODI,0-100)≤ 4 months	94 (1 study) 3 months	LOW[a] due to risk of bias		The mean function(ODI,0-100)≤ 4 months in the control groups was 18.5	The mean function(ODI,0-100)≤ 4 months in the intervention groups was 10.9 lower (13.94 to 7.86 lower)
Function(ODI,0-100)> 4 months	94 (1 study)	VERY LOW[a,b] due to risk of		The mean function(ODI,0-100)> 4 months in the control groups was	The mean function(ODI,0-100)> 4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-O'Sullivan Classification (95% CI)
	1 years	bias, imprecision		19.7	9.8 lower (14.21 to 5.39 lower)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

Table 19: STarT Back risk tool versus no risk tool classification

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
QoL (SF-12, PCS,0-100) ≤4 months	851 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) ≤4 months in the control groups was 5.2	The mean QoL (sf-12, pcs,0-100) ≤4 months in the intervention groups was 2.3 higher (0.42 to 4.18 higher)
QoL (SF-12, PCS,0-100) > 4 months	851 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) > 4 months in the control groups was 5.2	The mean QoL (sf-12, pcs,0-100) > 4 months in the intervention groups was 2.3 higher (0.73 to 3.87 higher)
QoL (SF-12, MCS,0-100) ≤4 months	851 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, MCS,0-100) ≤4 months in the control groups was 2.1	The mean QoL (sf-12, MCS,0-100) ≤4 months in the intervention groups was 0 higher (1.58 lower to 1.58 higher)
QoL (SF-12, MCS,0-100) > 4 months	851 (1 study) 12 months	LOW[a] due to risk of bias		The mean QoL (sf-12, MCS,0-100) > 4 months in the control groups was 1.2	The mean QoL (sf-12, MCS,0-100) > 4 months in the intervention groups was 0.5 higher

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
					(1.39 lower to 2.39 higher)
Pain(VAS/NRS,0-10)≤ 4 months	951 (2 studies) ≤4 months	LOW[a] due to risk of bias		The mean pain(VAS,0-10)≤> 4 months in the control groups was 2.06	The mean pain(VAS,0-10)≤> 4 months in the intervention groups was 0.70 lower (1.01 lower to 0.39 lower)
Pain(VAS,0-10)> 4 months	851 (1 study) 12 months	MODERATE[a] due to risk of bias		The mean pain(VAS,0-10)> 4 months in the control groups was -2.8	The mean pain(VAS,0-10)> 4 months in the intervention groups was 0.2 lower (0.58 lower to 0.18 higher)
Function(RMDQ/ODI,0-24)≤ 4 months	951 (2 studies) ≤4 months	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean function(RMDQ/ODI,0-24)≤ 4 months in the control groups was -3.7	The mean function(RMDQ/ODI,0-24)≤ 4 months in the intervention groups was 0.34 lower (0.47 to 0.2 lower)
Function(RMDQ,0-24)> 4 months	851 (1 study) 12 months	LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months in the control groups was -3.3	The mean function(RMDQ,0-24)> 4 months in the intervention groups was 1 lower (1.89 to 0.11 lower)
Psychological Distress (HADS, anxiety subscale, 0-21)≤ 4 months	851 (1 study) 4 months	MODERATE[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months in the control groups was -1.2	The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months in the intervention groups was 0.5 lower (1.05 lower to 0.05 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months	851 (1 study) 12 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months in the control groups was -1.0	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months in the intervention groups was 0.3 lower (0.9 lower to 0.3 higher)
Psychological Distress (HADS,	851	LOW[a]		The mean psychological distress	The mean psychological distress (HADS,

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
depression subscale, 0-21)≤ 4 months	(1 study) 4 months	due to risk of bias		(HADS, depression subscale, 0-21)≤ 4 months in the control groups was -1.4	depression subscale, 0-21)≤ 4 months in the intervention groups was 0.3 lower (0.87 lower to 0.27 higher)
Psychological Distress (HADS, depression subscale, 0-21) > 4 months	851 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (HADS, depression subscale, 0-21) > 4 months in the control groups was -0.9	The mean psychological distress (HADS, depression subscale, 0-21) > 4 months in the intervention groups was 0.5 lower (1.08 lower to 0.08 higher)
QoL (EQ-5D,0-1) ≤4 months(stratified) - Low Risk	221 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (eq-5d,0-1) ≤4 months(stratified) - low risk in the control groups was 0.821	The mean QoL (eq-5d,0-1) ≤4 months(stratified) - low risk in the intervention groups was 0.02 lower (0.08 lower to 0.03 higher)
QoL (EQ-5D,0-1) ≤4 months(stratified) - Medium risk	394 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (eq-5d,0-1) ≤4 months(stratified) - medium risk in the control groups was 0.674	The mean QoL (eq-5d,0-1) ≤4 months(stratified) - medium risk in the intervention groups was 0.03 higher (0.03 lower to 0.09 higher)
QoL (EQ-5D,0-1) ≤4 months(stratified) - High risk	236 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (eq-5d,0-1) ≤4 months(stratified) - high risk in the control groups was 0.474	The mean QoL (eq-5d,0-1) ≤4 months(stratified) - high risk in the intervention groups was 0.11 higher (0.01 to 0.21 higher)
QoL (EQ-5D,0-1) > 4 months (stratified) - Low Risk	221 (1 study) 12 months	VERY LOW[a] due to risk of bias, imprecision		The mean QoL (eq-5d,0-1) > 4 months (stratified) - low risk in the control groups was 0.773	The mean QoL (eq-5d,0-1) > 4 months (stratified) - low risk in the intervention groups was 0.01 higher

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
					(0.05 lower to 0.08 higher)
QoL (EQ-5D,0-1) > 4 months(stratified) - Medium risk	394 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (eq-5d,0-1) > 4 months(stratified) - medium risk in the control groups was 0635	The mean QoL (eq-5d,0-1) > 4 months(stratified) - medium risk in the intervention groups was 0.05 higher (0.01 lower to 0.12 higher)
QoL (EQ-5D,0-1) > 4 months(stratified) - High risk	236 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (eq-5d,0-1) > 4 months (stratified) - high risk in the control groups was 0.458	The mean QoL (eq-5d,0-1) > 4 months (stratified) - high risk in the intervention groups was 0.08 higher (0.02 lower to 0.18 higher)
QoL (SF-12, PCS,0-100) ≤4 months(stratified) - Low Risk	221 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) ≤4 months(stratified) - low risk in the control groups was 1.8	The mean QoL (sf-12, pcs,0-100) ≤4 months(stratified) - low risk in the intervention groups was 1.4 higher (1.31 lower to 4.11 higher)
QoL (SF-12, PCS,0-100) ≤4 months(stratified) - Medium risk	394 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) ≤4 months(stratified) - medium risk in the control groups was 6.4	The mean QoL (sf-12, pcs,0-100) ≤4 months(stratified) - medium risk in the intervention groups was 2.7 higher (0.39 to 5.01 higher)
QoL (SF-12, PCS,0-100) ≤4 months(stratified) - High risk	236 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) ≤4 months(stratified) - high risk in the control groups was 15.8	The mean QoL (sf-12, pcs,0-100) ≤4 months(stratified) - high risk in the intervention groups was 2.5 higher (1.71 lower to 6.71 higher)
QoL (SF-12, PCS,0-100) > 4 months (stratified) - Low Risk	221 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean QoL (sf-12, pcs,0-100) > 4 months (stratified) - low risk in the	The mean QoL (sf-12, pcs,0-100) > 4 months (stratified) - low risk in the

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
	12 months	imprecision		control groups was 2.4	intervention groups was 1.6 higher (1.19 lower to 4.39 higher)
QoL (SF-12, PCS,0-100) > 4 months(stratified) - Medium risk	392 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - medium risk in the control groups was 5.7	The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - medium risk in the intervention groups was 3.1 higher (0.66 to 5.54 higher)
QoL (SF-12, PCS,0-100) > 4 months(stratified) - High risk	236 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) > 4 months (stratified) - high risk in the control groups was 6.8	The mean QoL (sf-12, pcs,0-100) > 4 months (stratified) - high risk in the intervention groups was 1.8 higher (1.66 lower to 5.26 higher)
QoL (SF-12, MCS,0-100) ≤4 months(stratified) - Low Risk	221 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, MCS,0-100) ≤4 months(stratified) - low risk in the control groups was 1	The mean QoL (sf-12, MCS,0-100) ≤4 months(stratified) - low risk in the intervention groups was 1.5 lower (4.58 lower to 1.58 higher)
QoL (SF-12, MCS,0-100) ≤4 months(stratified) - Medium risk	394 (1 study) 4 months	LOW[a] due to risk of bias		The mean QoL (sf-12, MCS,0-100) ≤4 months(stratified) - medium risk in the control groups was 1.1	The mean QoL (sf-12, MCS,0-100) ≤4 months(stratified) - medium risk in the intervention groups was 0.4 higher (2.01 lower to 2.81 higher)
QoL (SF-12, MCS,0-100) ≤4 months(stratified) - High risk	236 (1 study) 4 months	VERY LOW[a.b] due to risk of bias, imprecision		The mean QoL (sf-12, MCS,0-100) ≤4 months(stratified) - high risk in the control groups was 4.8	The mean QoL (sf-12, MCS,0-100) ≤4 months(stratified) - high risk in the intervention groups was 0.7 higher (3.01 lower to 4.41 higher)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
QoL (SF-12,MCS,0-100) > 4 months (stratified) - Low Risk	221 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12,MCS,0-100) ≤4 months(stratified) - low risk in the control groups was 0.4	The mean QoL (sf-12,MCS,0-100) ≤4 months(stratified) - low risk in the intervention groups was 1.7 lower (4.55 lower to 1.15 higher)
QoL (SF-12,MCS,0-100) > 4 months (stratified) - Medium risk	394 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12,MCS,0-100) ≤4 months(stratified) - medium risk in the control groups was 0.1	The mean QoL (sf-12,MCS,0-100) ≤4 months(stratified) - medium risk in the intervention groups was 1.1 higher (1.53 lower to 3.73 higher)
QoL (SF-12,MCS,0-100) > 4 months (stratified) - High risk	236 (1 study) 12 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12,MCS,0-100) ≤4 months(stratified) - high risk in the control groups was 3.6	The mean QoL (sf-12,MCS,0-100) ≤4 months(stratified) - high risk in the intervention groups was 1.9 higher (1.83 lower to 5.63 higher)
Pain(VAS/NPRS,0-10)≤ 4 months(stratified) - Low-Risk	250 (2 studies) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(VAS,0-10)≤ 4 months(stratified) - low-risk in the control groups was -1.2	The mean pain(VAS,0-10)≤ 4 months(stratified) - low-risk in the intervention groups was 0.14 lower (0.68 lower to 0.4 higher)
Pain(VAS/NPRS,0-10)≤ 4 months(stratified) - Medium-risk	437 (2 studies) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(VAS,0-10)≤ 4 months(stratified) - medium-risk in the control groups was -1.5	The mean pain(VAS,0-10)≤ 4 months(stratified) - medium-risk in the intervention groups was 0.81 lower (1.25 to 0.37 lower)
Pain(VAS/NPRS,0-10)≤ 4 months(stratified) - High-risk	264 (2 studies) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(VAS,0-10)≤ 4 months(stratified) - high-risk in the control groups was	The mean pain(VAS,0-10)≤ 4 months(stratified) - high-risk in the intervention groups was

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
				-2.15	0.76 lower (1.43 to 0.1 lower)
Pain(VAS/NPRS,0-10)> 4 months (stratified) - Low Risk	221 (1 study) 12 months	LOW[a] due to risk of bias		The mean pain(VAS,0-10)> 4 months (stratified) - low risk in the control groups was -1.7	The mean pain(VAS,0-10)> 4 months (stratified) - low risk in the intervention groups was 0 higher (0.66 lower to 0.66 higher)
Pain(VAS/NPRS,0-10)> 4 months (stratified) - Medium risk	394 (1 study) 12 months	LOW[a] due to risk of bias		The mean pain(VAS,0-10)> 4 months (stratified) - medium risk in the control groups was -3	The mean pain(VAS,0-10)> 4 months (stratified) - medium risk in the intervention groups was 0.3 lower (0.87 lower to 0.27 higher)
Pain(VAS/NPRS,0-10)> 4 months (stratified) - High risk	236 (1 study) 12 months	LOW[a] due to risk of bias		The mean pain(VAS,0-10)> 4 months (stratified) - high risk in the control groups was -3.6	The mean pain(VAS,0-10)> 4 months (stratified) - high risk in the intervention groups was 0.1 lower (0.92 lower to 0.72 higher)
Function(RMDQ/ODI)≤ 4 months (stratified) - Low-Risk	250 (2 studies) ≤4 months	LOW[a] due to risk of bias		The mean function(RMDQ/ODI)≤ 4 months (stratified) - low-risk in the control groups was -3.45	The mean function(RMDQ/ODI)≤ 4 months (stratified) - low-risk in the intervention groups was 0.22 standard deviations lower (0.48 lower to 0.05 higher)
Function(RMDQ/ODI)≤ 4 months (stratified) - Medium-risk	437 (2 studies) ≤4 months	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean function(RMDQ/ODI)≤ 4 months (stratified) - medium-risk in the control groups was -2.1	The mean function(RMDQ/ODI)≤ 4 months (stratified) - medium-risk in the intervention groups was 0.39 standard deviations lower (0.59 to 0.18 lower)
Function(RMDQ/ODI)≤ 4 months	264	VERY LOW[a,b,c]		The mean function(RMDQ/ODI)≤ 4	The mean function(RMDQ/ODI)≤ 4

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
(stratified) - High-risk	(2 studies) ≤4 months	due to risk of bias, imprecision		months (stratified) - high-risk in the control groups was -5.6	months (stratified) - high-risk in the intervention groups was 0.38 standard deviations lower (0.64 to 0.12 lower)
Function(RMDQ,0-24)> 4 months (stratified) - Low Risk	221 (1 study) 12 months	LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months (stratified) - low risk in the control groups was -1.2	The mean function(RMDQ,0-24)> 4 months (stratified) - low risk in the intervention groups was 0.4 lower (1.72 lower to 0.92 higher)
Function(RMDQ,0-24)> 4 months (stratified) - Medium risk	394 (1 study) 12 months	LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months (stratified) - medium risk in the control groups was -3.6	The mean function(RMDQ,0-24)> 4 months (stratified) - medium risk in the intervention groups was 1.3 lower (2.59 to 0.01 lower)
Function(RMDQ,0-24)> 4 months (stratified) - High risk	236 (1 study) 12 months	LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months (stratified) - high risk in the control groups was -4.8	The mean function(RMDQ,0-24)> 4 months (stratified) - high risk in the intervention groups was 1.1 lower (2.89 lower to 0.69 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - Low Risk	221 (1 study) 4 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - low risk in the control groups was -0.9	The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - low risk in the intervention groups was 0.3 higher (0.66 lower to 1.26 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - Medium risk	394 (1 study) 4 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - medium risk in the control groups was	The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - medium risk in the intervention groups was

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
				-0.8	0.9 lower (1.68 to 0.12 lower)
Psychological Distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - High risk	236 (1 study) 4 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - high risk in the control groups was -2.2	The mean psychological distress (HADS, anxiety subscale, 0-21)≤ 4 months(stratified) - high risk in the intervention groups was 0.6 lower (1.8 lower to 0.6 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - Low Risk	221 (1 study) 12 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - low risk in the control groups was -0.8	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - low risk in the intervention groups was 0.3 higher (0.75 lower to 1.35 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - Medium risk	394 (1 study) 12 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - medium risk in the control groups was -0.6	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - medium risk in the intervention groups was 0.7 lower (1.58 lower to 0.18 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - High risk	236 (1 study) 12 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - high risk in the control groups was -1.7	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months (stratified) - high risk in the intervention groups was 0.4 lower (1.71 lower to 0.91 higher)
Psychological Distress (HADS, depression subscale, 0-21)≤ 4	221 (1 study)	LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21)> 4	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
months(stratified) - Low Risk	4 months			months (stratified) - low risk in the control groups was -0.2	(stratified) - low risk in the intervention groups was 0.1 lower (1.02 lower to 0.82 higher)
Psychological Distress (HADS, depression subscale, 0-21) ≤4 months(stratified) - Medium risk	394 (1 study) 4 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - medium risk in the control groups was -1.2	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - medium risk in the intervention groups was 0.5 lower (1.24 lower to 0.24 higher)
Psychological Distress (HADS, depression subscale, 0-21) ≤4 months(stratified) - High risk	236 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - high risk in the control groups was -1.9	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - high risk in the intervention groups was 1.1 lower (2.17 to 0.03 lower)
Psychological Distress (HADS, depression subscale, 0-21)> 4 months (stratified) - Low Risk	221 (1 study) 12 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - low risk in the control groups was -0.2	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - low risk in the intervention groups was 0 higher (0.96 lower to 0.96 higher)
Psychological Distress (HADS, depression subscale, 0-21)> 4 months (stratified) - Medium risk	394 (1 study) 12 months	LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - medium risk in the control groups was -1	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months (stratified) - medium risk in the intervention groups was 0.3 lower (1.09 lower to 0.49 higher)
Psychological Distress (HADS,	236	VERY LOW[a,b]		The mean psychological distress	The mean psychological distress (HADS,

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
depression subscale, 0-21)> 4 months (stratified) - High risk	(1 study) 12 months	due to risk of bias, imprecision		(HADS, depression subscale, 0-21)> 4 months (stratified) - high risk in the control groups was -1.5	depression subscale, 0-21)> 4 months (stratified) - high risk in the intervention groups was 1.2 lower (2.43 lower to 0.03 higher)
Responder criteria(patients with > 30% improvement in pain)≤ 4 months	100 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 2.25 (1.11 to 4.55)	212 per 1000	265 more per 1000 (from 23 more to 753 more)
Responder criteria(patients with > 30% improvement in pain-STRATIFIED)≤ 4 months - low risk	29 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.93 (0.29 to 3.03)	286 per 1000	20 fewer per 1000 (from 203 fewer to 580 more)
Responder criteria(patients with > 30% improvement in pain-STRATIFIED)≤ 4 months - medium risk	43 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 3.87 (1.06 to 14.09)	167 per 1000	478 more per 1000 (from 10 more to 1000 more)
Responder criteria(patients with > 30% improvement in pain-STRATIFIED)≤ 4 months - high risk	28 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 2.67 (0.4 to 17.74)	143 per 1000	239 more per 1000 (from 86 fewer to 1000 more)
Responder criteria(patients with > 30% improvement in function)≤ 4 months	100 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.84 (1.09 to 3.08)	333 per 1000	280 more per 1000 (from 30 more to 693 more)
Responder criteria(% age of patients with > 30% improvement in ODI-STRATIFIEDI)≤ 4 months - low risk	29 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.24 (0.58 to 2.68)	429 per 1000	103 more per 1000 (from 180 fewer to 720 more)
Responder criteria(% age of	43	VERY LOW[a,b]	RR 4.26	167 per 1000	544 more per 1000

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with stratified treatment versus non-stratified treatment-STarT Back (95% CI)
patients with > 30% improvement in ODI-STRATIFIEDI)≤ 4 months - medium risk	(1 study) ≤4 months	due to risk of bias, imprecision	(1.18 to 15.39)		(from 30 more to 1000 more
Responder criteria(% age of patients with > 30% improvement in ODI-STRATIFIEDI)≤ 4 months - high risk	28 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.22 (0.47 to 3.15)	429 per 1000	94 more per 1000 (from 227 fewer to 921 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

[c] Downgraded by 1 or 2 increments because of Heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

Table 20: STarT Back risk tool versus no risk tool classification (IMPaCT cohort)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care (IMPaCT)	Risk difference with STarT Back Group (95% CI)
QoL (SF-12, PCS,0-100) > 4 months	922 (1 study) 6 months	VERY LOW due to risk of bias		The mean QoL (sf-12, pcs,0-100) > 4 months in the control group was 3.9	The mean QoL (sf-12, pcs,0-100) > 4 months in the intervention groups was 0.2 lower (2 lower to 1.6 higher)
QoL (SF-12, MCS,0-100) > 4 months	922 (1 study) 6 months	VERY LOW[a,b] due to risk of bias		The mean QoL (sf-12, MCS,0-100) > 4 months in the control groups was 2.1	The mean QoL (sf-12, MCS,0-100) > 4 months in the intervention groups was 0.2 lower (2.05 lower to 1.65 higher)

Pain(VAS,0-10)> 4 months	922 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean pain(NRS,0-10)> 4 months in the control groups was -1.9	The mean pain(NRS,0-10)> 4 months in the intervention groups was 0.2 lower (0.59 lower to 0.19 higher)
Function(RMDQ,0-24)> 4 months	922 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months in the control groups was -2.7	The mean function(RMDQ,0-24)> 4 months in the intervention groups was 0.5 lower (1.27 lower to 0.27 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months	922 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months in the control groups was -1.2	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months in the intervention groups was 0.2 lower (0.8 lower to 0.4 higher)
Psychological Distress (HADS, depression subscale, 0-21) > 4 months	922 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21) > 4 months in the control groups was -1.4	The mean psychological distress (HADS, depression subscale, 0-21) > 4 months in the intervention groups was 0.4 lower (0.91 lower to 0.11 higher)
QoL (EQ-5D,0-1) ≤4 months(stratified) - Low Risk	922 (1 study) 2 months	VERY LOW[a] due to risk of bias		The mean QoL (eq-5d,0-1) ≤4 months(stratified) - low risk in the control groups was 0.809	The mean QoL (eq-5d,0-1) ≤4 months(stratified) - low risk in the intervention groups was 0.01 higher (0.03 lower to 0.04 higher)
QoL (EQ-5D,0-1) ≤4 months(stratified) - Medium risk	922 (1 study) 2 months	VERY LOW[a] due to risk of bias		The mean QoL (eq-5d,0-1) ≤4 months(stratified) - medium risk in the control groups was 0.689	The mean QoL (eq-5d,0-1) ≤4 months(stratified) - medium risk in the intervention groups was 0.02 lower (0.06 lower to 0.02 higher)
QoL (EQ-5D,0-1) ≤4 months(stratified) - High risk	922 (1 study) 2 months	VERY LOW[a] due to risk of bias		The mean QoL (eq-5d,0-1) ≤4 months(stratified) - high risk in the control groups was 0.431	The mean QoL (eq-5d,0-1) ≤4 months(stratified) - high risk in the intervention groups was 0.06 higher (0.01 to 0.12 higher)
QoL (EQ-5D,0-1) > 4	922	VERY LOW[a]		The mean QoL (eq-5d,0-1) > 4	The mean QoL (eq-5d,0-1) > 4

months(stratified) - Low Risk	(1 study) 6 months	due to risk of bias		months(stratified) - low risk in the control groups was 0.812	months(stratified) - low risk in the intervention groups was 0 higher (0.03 lower to 0.04 higher)
QoL (EQ-5D,0-1) > 4 months(stratified) - Medium risk	922 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean QoL (eq-5d,0-1) > 4 months(stratified) - medium risk in the control groups was 0.688	The mean QoL (eq-5d,0-1) > 4 months(stratified) - medium risk in the intervention groups was 0.01 higher (0.03 lower to 0.04 higher)
QoL (EQ-5D,0-1) > 4 months(stratified) - High risk	922 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean QoL (eq-5d,0-1) > 4 months(stratified) - high risk in the control groups was 0.543	The mean QoL (eq-5d,0-1) > 4 months(stratified) - high risk in the intervention groups was 0.07 higher (0.02 to 0.12 higher)
QoL (SF-12, PCS,0-100) > 4 months(stratified) - Low Risk	350 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - low risk in the control groups was 2.6	The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - low risk in the intervention groups was 0.4 higher (2.98 lower to 3.78 higher)
QoL (SF-12, PCS,0-100) > 4 months(stratified) - Medium risk	383 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - medium risk in the control groups was 4.0	The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - medium risk in the intervention groups was 1.7 lower (4.39 lower to 0.99 higher)
QoL (SF-12, PCS,0-100) > 4 months(stratified) - High risk	189 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - high risk in the control groups was 6.1	The mean QoL (sf-12, pcs,0-100) > 4 months(stratified) - high risk in the intervention groups was 3.8 higher (0.19 lower to 7.79 higher)
QoL (SF-12,MCS,0-100) > 4 months(stratified) - Low Risk	350 (1 study)	VERY LOW[a] due to risk of bias		The mean QoL (sf-12,MCS,0-100) > 4 months(stratified) - low risk in the control groups was 0.2	The mean QoL (sf-12,MCS,0-100) > 4 months(stratified) - low risk in the intervention groups was 0.9 lower (3.87 lower to 2.07 higher)

QoL (SF-12,MCS,0-100) > 4 months(stratified) - Medium risk	383 (1 study)	VERY LOW[a] due to risk of bias, imprecision		The mean QoL (sf-12,MCS,0-100) > 4 months(stratified) - medium risk in the control groups was 2.0	The mean QoL (sf-12,MCS,0-100) > 4 months(stratified) - medium risk in the intervention groups was 0.8 higher (1.95 lower to 3.55 higher)
QoL (SF-12,MCS,0-100) > 4 months(stratified) - High risk	189 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean QoL (sf-12,MCS,0-100) > 4 months(stratified) - high risk in the control groups was 6.4	The mean QoL (sf-12,MCS,0-100) > 4 months(stratified) - high risk in the intervention groups was 1.6 higher (2.78 lower to 5.98 higher)
Pain(VAS,0-10)> 4 months(stratified) - Low Risk	350 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean pain(VAS,0-10)> 4 months(stratified) - low risk in the control groups was -0.8	The mean pain(VAS,0-10)> 4 months(stratified) - low risk in the intervention groups was 0.2 higher (0.43 lower to 0.83 higher)
Pain(VAS,0-10)> 4 months(stratified) - Medium risk	383 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean pain(VAS,0-10)> 4 months(stratified) - medium risk in the control groups was -2.4	The mean pain(VAS,0-10)> 4 months(stratified) - medium risk in the intervention groups was 0.1 lower (0.72 lower to 0.52 higher)
Pain(VAS,0-10)> 4 months(stratified) - High risk	189 (1 study) 6	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain(VAS,0-10)> 4 months(stratified) - high risk in the control groups was -2.9	The mean pain(VAS,0-10)> 4 months(stratified) - high risk in the intervention groups was 1 lower (1.84 to 0.16 lower)
Function(RMDQ,0-24)> 4 months (stratified) - Low Risk	350 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months (stratified) - low risk in the control groups was -0.9	The mean function(RMDQ,0-24)> 4 months (stratified) - low risk in the intervention groups was 0 higher (1.15 lower to 1.15 higher)
Function(RMDQ,0-24)> 4 months (stratified) - Medium risk	383 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean function(RMDQ,0-24)> 4 months (stratified) - medium risk in the control groups was	The mean function(RMDQ,0-24)> 4 months (stratified) - medium risk in the intervention groups was 0.1 lower

				-3.5	(1.37 lower to 1.17 higher)
Function(RMDQ,0-24)> 4 months (stratified) - High risk	189 (1 study) 6 months	VERY LOW[a] due to risk of bias, imprecision		The mean function(RMDQ,0-24)> 4 months (stratified) - medium risk in the control groups was -4.8	The mean function(RMDQ,0-24)> 4 months (stratified) - medium risk in the intervention groups was 2.5 lower (4.3 to 0.7 lower)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - Low Risk	350 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - low risk in the control groups was -0.6	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - low risk in the intervention groups was 0.1 higher (0.79 lower to 0.99 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - Medium risk	383 (1 study) 06 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - medium risk in the control groups was -1.0	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - medium risk in the intervention groups was 0.2 lower (0.98 lower to 0.58 higher)
Psychological Distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - High risk	189 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - high risk in the control groups was -2.7	The mean psychological distress (HADS, anxiety subscale, 0-21)> 4 months(stratified) - high risk in the intervention groups was 0.6 lower (2.05 lower to 0.85 higher)
Psychological Distress (HADS, depression subscale, 0-21)> 4 months(stratified) - Low Risk	350 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months(stratified) - low risk in the control groups was -0.6	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months(stratified) - low risk in the intervention groups was 0.2 lower (1.06 lower to 0.66 higher)
Psychological Distress (HADS, depression subscale, 0-21)> 4 months(stratified) - Medium risk	383 (1 study) 6 months	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months(stratified) - medium risk in the control groups was	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months(stratified) - medium risk in the intervention groups was

				-1.4	0 higher (0.68 lower to 0.68 higher)
Psychological Distress (HADS, depression subscale, 0-21)> 4 months(stratified) - High risk	189 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (HADS, depression subscale, 0-21)> 4 months(stratified) - high risk in the control groups was -2.7	The mean psychological distress (HADS, depression subscale, 0-21)> 4 months(stratified) - high risk in the intervention groups was 1.5 lower (2.66 to 0.34 lower)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

6.4.5 Economic evidence

6.4.5.1 Published literature – Risk assessment tools

No relevant economic evaluations were identified.

See also the economic article selection flow chart in Appendix F.

6.4.5.2 Published literature – Risk stratification

Three economic evaluations, reported in 7 papers were identified with the relevant comparison and have been included in this review[17,144,146,220,539-541]. These are summarised in the economic evidence profiles below (**Table 21** and **Table 22**) and the economic evidence tables in Appendix I.

One economic evaluation relating to this review question was identified but was excluded due to limited applicability and the availability of more applicable evidence.[151] This is listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 21: Economic evidence profile: Hicks/Delitto versus usual physical therapy care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Apeldoorn 2012[17] (Netherlands)	Partially applicable [(a)]	Potentially serious limitations [(b)]	Within-trial (RCT, associated clinical paper Apeldoorn2012A) Cost-utility analysis (QALYs) Population: Adults with low back pain (with or without sciatica) Two comparators in full analysis: 1. Usual physical therapy care based on Dutch physical therapy low back pain guidelines. 2. Hicks/Delitto classification based interventions: spinal manipulation, stabilisation exercises or direction specific exercises for a minimum of 4 weeks. Follow-up: 1 year	2-1: Saves £69 (95% CI: -£312 to £226; p=NR) [(c)]	2-1: 0.02 QALYs (95% CI: -0.03 to 0.08; p=NR) [(d)]	Intervention 2 dominates intervention 1 (lower costs and higher QALYs)	Bootstrapping of ICER conducted but only from a societal perspective not a health care provider perspective. Therefore this is not reported here. Bootstrapping of costs conducted and confidence intervals are presented here. Additional sensitivity analyses were conducted (including using a per-protocol analysis and complete cases only) however these were all from a societal perspective and so are not reported here.

(a) Dutch resource use data (2008-2010) and unit costs (2009) may not reflect current NHS context. Dutch EQ-5D tariff used. Not all risk stratification tools from the review protocol are included in this study.

(b) Within-trial analysis and so may not reflect full body of evidence for this comparison; Apeldoorn 2012A is 1 of 2 studies in the clinical review for risk stratification comparing Hicks/Delitto. Bootstrapping of ICER not undertaken.

(c) 2009 Dutch Euros converted using 2009 purchasing power parities[394]. Cost components include: Primary care utilisation including: GP contacts, physical and manual therapy, psychologist and professional home care. Secondary care utilisation including: X-ray, MRI scan, outpatient specialist visit, hospitalisation, herniated nucleus pulposus surgery, outpatient rehabilitation, epidural injection and facet denervation.

(d) EQ-5D collected baseline and 1 year follow-up. Dutch EQ-5D tariff.

Table 22: Economic evidence profile: STarT Back versus current best practice/usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Whitehurst 2012[540]/Hill 2011[220] (UK)	Directly applicable [(a)]	Potentially serious limitations [(b)]	Within-trial (RCT, associated clinical paper Hill 2011) Cost-utility analysis (QALYs) Population: Adults with low back pain (with or without sciatica) Two comparators in full analysis: • Current best practice: STarT Back stratification followed by physiotherapist assessment lasting 30 minutes which included initial treatment advice and exercise with the option for onward referral for further physiotherapy, based on physiotherapist clinical judgement. • STarT Back stratification followed by one of 3 treatment pathways based on risk. Physiotherapist assessment lasting 30 minutes, including initial treatment with advice on promoting appropriate levels of activity, return to work and a pamphlet about local exercise venues and self-help groups. All shown a 15-minute educational video and given the Back Book. - **Low risk group** only received above initial session. - **Medium risk group** referred for	2-1: saves £30.64 [(c)]	2-1: 0.039 QALYs [(d)]	Intervention 2 dominates intervention 1 (lower costs and higher QALYs)	Bootstrapping of ICER undertaken however this included private healthcare costs as well as NHS costs. Therefore this is not reported here. Sensitivity analyses were conducted using the complete case analysis rather than the primary imputed analysis. Intervention 2 remained dominant (lower costs and higher QALYs).

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			standardised physiotherapy sessions. - **High risk group** referred for psychologically-informed physiotherapy sessions. Follow-up: 1 year				
Whitehurst 2015[539,541]/Foster 2014[144,146] (UK)	Directly applicable [e]	Potentially serious limitations [f]	Within-trial (cohort study, associated clinical paper Foster 2014) Cost-utility analysis (QALYs) Population: Adults with low back pain (with or without sciatica) Two comparators in full analysis: • Usual care: Family physician management involving assessment, advice, medication, sickness certification and referral for investigations or further treatment as appropriate, based on clinical judgement. Community based physical therapists managed patients using clinical judgement to determine content and number of treatment sessions. • STarT Back stratification followed by one of 3 treatment pathways based on risk. - **Low risk group**: family physician provided written information on self-management and advice to	2−1: saves £4.89 [g]	2−1: 0.003 QALYs [h]	Intervention 2 dominates intervention 1 (lower costs and higher QALYs)	Bootstrapping of ICER undertaken however this included private healthcare costs as well as NHS costs and was done by risk group only. Therefore this is not reported here. Sensitivity analyses were conducted using the complete case analysis rather than the primary imputed analysis. Intervention 2 remained dominant (lower costs and higher QALYs).

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			keep active, prescription of pain medication where appropriate and reassurance regarding good prognosis. Single physical therapy session which included a minimal package of assessment, education and support for self-management. - **Medium risk group**: Family physician encouraged to refer patients to physical therapy and address their back-related concerns highlighted by stratification tool. Physical therapy intervention focused on reducing pain and disability using activity, exercise and manual therapy and encouraging patients in early return to work. - **High risk group**: Family physician encouraged to refer patients to physical therapy and address their back-related concerns highlighted by stratification tool. Psychologically-informed physical therapy provided. Follow-up: 6 months				

(a) Not all risk stratification tools from the review protocol are included in this study.

(b) Within-trial analysis: Hill 2011 is 1 of 2 studies included in the clinical review for risk stratification comparing STarT Back. Bootstrapping of ICER from NHS and PSS perspective not undertaken.

(c) 2008/2009 UK pounds. Cost components include: Intervention cost; primary care utilisation including: GP and nurse contacts; secondary care utilisation including: NHS and private consultant contacts, X-ray, MRI scan, CT scan, blood tests epidural injections (NHS and private) and private diagnostic tests; other healthcare professional contacts including additional

physiotherapy (NHS and private); out of pocket treatments and prescribed medication. Hill 2011 presented total healthcare costs that included both NHS and private healthcare resource use, these were recalculated and costs presented here are for NHS only healthcare resource use only.

(d) EQ-5D collected baseline and 12 months follow-up. QALYs were calculated using the area under the curve approach adjusted for baseline utility. UK EQ-5D tariff.

(e) Not all risk stratification tools from the protocol are included in study.

(f) A longer time horizon may be preferable if effects may persist beyond 6 months. Source of unit costs not reported. Within-trial analysis and so does not reflect full body of available evidence for this comparison; Foster 2014 is 1 of 2 studies included in risk stratification review comparing STarT Back to usual care. Appropriate bootstrapping of ICER not undertaken.

(g) 2008/2009 UK pounds. Cost components include: Primary care utilisation including: GP and nurse contacts; physiotherapy service; secondary care utilisation including: consultant contacts, admissions, radiograph, MRI scan, CT scan, blood tests epidural injections; other healthcare professional contacts including acupuncture and osteopathy; and prescribed medication. Foster 2014 presented total healthcare costs that included both NHS and private healthcare resource use, these were recalculated and costs presented here are for NHS only healthcare resource use only.

(h) EQ-5D collected baseline, 2 and 6 months follow-up. QALYs were calculated using the area under the curve approach adjusted for baseline utility. UK EQ-5D tariff.

6.5 Evidence statements

6.5.1 Clinical

6.5.1.1 Risk assessment tools

ÖREBRO tool

High to low quality evidence from single studies (n=61 to n=296) showed that the ÖREBRO tool had a moderate level of discrimination and low calibration for predicting functional improvement.

ÖREBRO tool / Acute low back pain screening questionnaire ÖREBRO

High to low quality evidence from single studies (n=56 to n=296) showed that the ÖREBRO tool had a moderate level of discrimination and low level of calibration for predicting functional improvement, and a low level of calibration for predicting pain. There was no discrimination data for pain.

STarT Back tool

High to low quality evidence (n=53 to n=1594) showed that the STarT Back tool had a high level of discrimination and moderate calibration for predicting functional improvement, and moderate level of discrimination and low level of calibration for predicting pain.

Functional rating index (FRI) questionnaire

Very low quality evidence from a single study (n=131) showed that the FRI questionnaire had a high level of discrimination for predicting functional improvement. There was no other data reported for this tool.

ODI questionnaire

Very low quality evidence from a single study (n=131) showed that the ODI questionnaire had a high level of discrimination for predicting functional improvement. There was no other data reported for this tool.

Chronic pain risk item set

Low quality evidence from a single study (n=571) showed that the Chronic pain risk item set had a high level of discrimination for predicting pain. There was no other data reported for this tool.

Hancock CPR

Low quality evidence from a single study (n=937) showed that the Hancock CPR had a moderate level of discrimination for predicting pain. There was no other data reported for this tool.

Fear Avoidance Beliefs questionnaire

Low quality evidence from a single study (n=146) showed that the Fear Avoidance Beliefs questionnaire had a moderate level of calibration for predicting functional improvement, and low level of calibration for predicting pain. There was no other data reported for this tool.

Pain catastrophising scale

Low quality evidence from a single study (n=146) showed that the Pain catastrophising scale had a moderate level of calibration for predicting functional improvement, and low level of calibration for predicting pain. There was no other data reported for this tool.

Tampa scale of kinesiphobia

Low quality evidence from a single study (n=146) showed that the Tampa scale of kinesiphobia scale had a moderate level of calibration for predicting functional improvement, and low level of calibration for predicting pain. There was no other data reported for this tool.

Patient health questionnaire

Low quality evidence from a single study (n=146) showed that the patient heath questionnaire had a moderate level of calibration for predicting functional improvement, and low level of calibration for predicting pain. There was no other data reported for this tool.

6.5.1.2 Risk stratification

Hicks/Delitto classification

Evidence from 2 studies demonstrated no clinical difference between the Hicks/ Delitto classification tool compared with no risk tool for quality of life measured by the mental and physical component scores of the SF-36 (2 studies, very low quality, n=234) except for the physical component score of the SF-36 which demonstrated a clinical benefit favouring stratified treatment at ≤ 4 months. There was no clinical difference between the Hicks/Delitto tools compared to no risk tool for the majority of outcomes reported (pain, function and healthcare utilisation) although clinical benefit for stratified treatment for responders to pain improvement at ≤ 4 months was demonstrated in a single, low quality study (n=156).There was also clinical benefit reported for responders in improvement in function at > 4 months (1 study, very low quality, n=156).

O'Sullivan classification system

Evidence from one study demonstrated a clinical benefit of stratified treatment using the O' Sullivan classification tool when compared with no risk tool for pain in both the short (≤ 4 months) and long term (> 4 months) and for function in the short term only (low-very low quality, n=94). No clinical difference was reported between the O'Sullivan classification compared to no risk tool for function at the >4 months' time period.

STarT Back risk tool

Overall evidence comparing the STarT Back risk tool with no risk tool demonstrated no clinical difference for most of the outcomes (quality of life (Mental component score), pain, function, psychological distress) reported from a single, low quality study (n=851). However, clinical benefit for quality of life measured by the physical component score of the SF-36 was shown to favour the use of stratified treatment at both the short (≤ 4 months) and long (>4 months) term time points.

When the individual stratified groups from the STarT Back classification of low, medium and high risk category patients were compared with no risk tool, a clinical benefit favouring stratified treatment for quality of life measured by EQ-5D was seen in the high risk category patients at ≤ 4 months (very low quality, n=236) and in the medium and high risk category patients at > 4 months (very low quality, n=394 and n=236).Similarly a clinical benefit favouring stratified treatment for quality of life measured by the physical component score of the SF-36 was demonstrated in both the medium and high risk patients at the ≤ 4 months' time point (very low quality, n=394 and n=236) as well as in the medium risk patients at > 4 months (very low quality, n=392). There was also clinical benefit in function favouring stratified treatment for the high risk category patients in the short term (≤4 months) (very low quality, n=236). Lastly, clinical benefit in responder criteria for improvement in pain and function was seen in the overall group as well each stratified risk group at the ≤ 4 month

follow up (low-very low quality, n=951). There was no clinical difference between the STarT Back risk tool compared to no risk tool for all other outcomes reported at any time point.

STarT Back risk tool (IMPaCT cohort)

Overall evidence comparing the STarT Back risk tool with no risk tool demonstrated no clinical difference for any outcome reported (quality of life, pain, function and psychological distress) from a single study (very low quality evidence, n=922).

When the individual stratified groups from the STarT Back classification of low, medium and high risk category patients were compared with no risk tool, a clinical benefit favouring stratified treatment for quality of life measured by EQ-5D was seen in the high risk category patients at ≤ 4 months and > 4 months' time points (very low quality, n=922). Clinical benefit for stratified treatment in patients identified as being at high risk was also demonstrated for quality of life measured by the physical component score of the SF-36, pain and function at the > 4 month follow-up (very low quality, n=189). There was no clinical difference between the STarT Back risk tool compared to no risk tool for all other outcomes reported at any time point.

6.5.2 Economic

No relevant economic evaluations were identified for risk assessment tools.

One cost-utility analysis found that in adults with low back pain (with or without sciatica) Hicks/Delitto classification based intervention dominated (less costly and more effective) compared to usual physical therapy care. This analysis was assessed as partially applicable with potentially serious limitations.

Two cost-utility analyses found that in adults with low back pain (with or without sciatica) STarT Back stratification based intervention based intervention dominated (less costly and more effective) compared to current best practice/usual care. These analyses were assessed as directly applicable with potentially serious limitations.

6.6 Recommendations and link to evidence

Recommendations	**1. Consider using risk stratification (for example, the STarT Back risk assessment tool) at first point of contact with a healthcare professional for each new episode of low back pain with or without sciatica to inform shared decision-making about stratified management.** **2. Based on risk stratification, consider:** • **simpler and less intensive support for people with low back pain with or without sciatica likely to improve quickly and have a good outcome (for example, reassurance, advice to keep active and guidance on self-management)** • **more complex and intensive support for people with low back pain with or without sciatica at higher risk of a poor outcome (for example, exercise programmes with or without manual therapy or using a psychological approach).**
Relative values of different outcomes	**Risk assessment** For the risk assessment review, the outcomes assessed were grouped together in terms of the following accuracy measures: discrimination, calibration, and

	reclassification. The GDG agreed that calibration and reclassification were the outcomes that were critical for decision-making. Discrimination was considered as important. Evidence was found for both discrimination (in terms of AUC and sensitivity and specificity) and for calibration (in terms of R^2 values) for the outcomes of pain and function. No evidence was found for reclassification. All of the studies were conducted in a low back pain population (2 of which had a mixed population of people either with or without additional sciatica). **Risk stratification** For the risk stratification review, the GDG agreed that health-related quality of life, pain severity, function, and psychological distress were the outcomes that were critical for decision-making. Responder criteria, adverse events (morbidity and mortality), and healthcare utilisation were also considered as important. Evidence was found for all of the outcomes except for adverse events (morbidity and mortality). All of the studies were conducted in a population of low back pain with or without sciatica.
Trade-off between clinical benefits and harms	**Risk assessment** Data was available for the following tools: ÖREBRO, STarT Back, functional rating index, ODI, fear avoidance beliefs, pain catastrophising scale, Tampa kinesiophobia scale, patient health questionnaire, and the Hancock CPR. The evidence for discrimination was available for the following tools ÖREBRO, STarT Back, functional rating index and ODI. For calibration there was evidence for ÖREBRO, fear avoidance beliefs, pain catastrophising scale, Tampa kinesiophobia scale, patient health questionnaire, STarT Back, and the Hancock CPR. The GDG noted that there was no data for reclassification, however it was thought this may be because this is often performed as part of derivation or validation of the tools, so it may just be unreported in the publications included in this review. <u>ÖREBRO</u> The evidence showed moderate discrimination for predicting function at thresholds of 112 and 113 of the ÖREBRO, however at thresholds lower than this, the discrimination was poor. There was no pain discrimination data reported. The evidence for calibration showed that the tool was poor for both function and pain. It was also noted that this tool consisted of 21 questions, which would take considerable time to complete, which although feasible in a trial context, would not be appropriate for routine use in a primary care setting. The GDG therefore considered that the evidence for the ÖREBRO tool was insufficient and the accuracy was not good enough to warrant a recommendation <u>STarT Back</u> The evidence showed that there was a high- moderate level of discrimination for predicting pain and function. There was also a moderate level of calibration of 42-46% for predicting functional outcome and 8-17% of predicting pain outcomes. The GDG therefore agreed that there was sufficient evidence and levels of discrimination and calibration to consider STarT Back as a reasonably useful risk assessment tool with regards to functional outcome. Additionally this tool only takes a few minutes to complete, which would be feasible to use in clinical practice. <u>Functional Rating Index</u> The evidence showed a high level of discrimination for predicting function, however there was no evidence for pain, and no calibration data was reported by any of the studies. The GDG therefore considered that the evidence for the functional rating index was insufficient to recommend it, despite it being a fairly quick tool to use. <u>ODI</u> The evidence showed a high level of discrimination for predicting function, however

there was no evidence for pain, and no calibration data was reported by any of the studies. The GDG therefore considered that the evidence for the ODI tool was insufficient to recommend it, despite it being an easy tool to use.

Fear avoidance beliefs

There was no evidence for discrimination, however, the evidence for calibration showed a moderate level of calibration for function, but a very low level for pain. This tool also consists of 11 questions which may take too long to complete for it to be appropriate for use in clinical practice. The GDG therefore considered that the evidence for the tool was insufficient to recommend it.

Pain catastrophising scale

There was no evidence for discrimination, however, the evidence for calibration showed a moderate level of calibration for function, but a very low level for pain. The GDG therefore considered that the evidence for the tool was insufficient to recommend it. It was also noted that this tool consisted of 13 questions, which would take a long time to complete, which although is feasible in a trial context, it would not be appropriate for clinical practice.

Tampa scale of kinesiophobia

There was no data for discrimination, however, the evidence showed a moderate level of calibration for predicting function but a very low level for predicting pain. This tool also consists of 11 questions which may take too long to complete for it to be appropriate in clinical practice. The GDG therefore considered that the evidence for this tool was insufficient to recommend it.

Chronic pain risk set

The evidence showed a moderate level of discrimination for predicting pain but there was no data for function. There was also no calibration data. It was also noted that this tool consisted of 22 questions, which would take a long time to complete, which although is feasible in a trial context, it would not be appropriate for clinical practice. The GDG therefore considered that the evidence for this tool was insufficient to recommend it.

Patient health questionnaire

There was no data for discrimination; however the evidence showed a moderate level of calibration for predicting function but a very low level for predicting pain. The GDG therefore considered that the evidence for this tool was insufficient to recommend it, despite it being reasonably easy to use.

Hancock CPR

The evidence showed a poor level of discrimination and calibration for predicting pain, however there was no data for function. The GDG therefore considered that the evidence for this tool was insufficient to recommend it, despite it being a -an easy tool to use.

Summary

The GDG discussed that sensitive tests were very important in primary care when ruling out a diagnosis. The sensitivity of the STarT Back tool was 80% comparing people of low risk versus those of medium + high risk. Therefore, the false negative rate was 20%.

In terms of predicting functional outcomes, the AUC results were found to be best for STarT Back (C-statistic=0.82 in primary care), functional rating index and ODI. In terms of predicting the outcome of pain intensity, the AUC results were best for STarT Back (C-statistic=0.66 in primary care), and Hancock CPR.

The GDG noted that in terms of calibration, for all the tools reviewed, the R^2 values were generally low (particularly for pain outcomes). However, the GDG considered that because no test will be both highly sensitive and highly specific, an R^2 value of

40% (as shown by STarT Back trial for function), would be sufficient for the purposes of this review.

The GDG considered that for most of the tools there was either no evidence or poor evidence for the accuracy of either one of the outcomes of function or pain. However STarT Back had both calibration and discrimination evidence for both of these outcomes, and several studies reported this tool. The evidence for STarT Back was also amongst the more accurate of the tools. The GDG considered that people whose treatment was stratified based on the STarT Back tool fared better when considering the intervention population as a whole, but noted that some people would be misclassified by the tool. The GDG therefore reflected this in recommending that a stratification tool should be considered as an assessment tool at point of first contact, thereby allowing people re-presenting to be considered for further treatment. The GDG also reflected the predictive value of the tool by recommending that the tool should support but not replace clinical decision-making.

Risk stratification

Data was available for the following tools: Hicks/Delitto classification system, O'Sullivan classification system, and STarT Back. All studies compared stratified care (based on tools) versus usual care (non-stratified care).

Hicks/Delitto tool

The GDG agreed that the classification tool was based on clinical prediction rules; combining key information from clinical history and physical examination studies. However, it was noted that tools discussed in this review were only validated for people suffering from low back pain and not a sciatica population. There was a clinically important difference favouring the stratification system for the outcomes of quality of life (SF-36 physical component) only in the short term but no difference was reported for the SF-36 mental component, pain or function at any time point.

O'Sullivan tool

The evidence showed a clinically important difference favouring the stratification system for the outcomes of pain (short and longer term) and for function (ODI) in the short term, which was not carried through in the longer term.

STarT Back tool

Evidence showed a clinically important effect favouring the risk stratification (compared to no stratification) for the following:

- Quality of life; SF-12 physical component in both the short term for the overall population and the medium and high risk stratified groups and in the longer term for the overall population and the medium risk stratified group. EQ-5D in the short term for the high risk stratified group and in the longer term for the medium and high risk stratified groups.
- Responder criteria for improvement in pain and function in the short term for both the overall population as well as all stratified risk groups.

There were no clinically important differences for the aforementioned outcomes at the other follow-up times or in the other stratified risk groups. Pain, function (other measures), psychological distress and the mental component of quality of life also showed no clinically important difference for the overall population or each of the stratified risk groups. However, further evidence from an impact study showed a clinically important effect favouring risk stratification (compared to no stratification) in the high risk stratified group for quality of life (EQ-5D and SF-12 physical), pain, and function. All evidence was for the long-term follow-up and none was reported for the short term. There was no clinically significant difference for the low or medium risk groups for these outcomes, nor for any of the risk groups in terms of the mental component of SF-12 and psychological distress. The GDG noted that although some of the effects were clinically important, the evidence was of very low quality due to being non-randomised and therefore prone to selection bias and lack

	of blinding to key confounders. The GDG felt it was appropriate that less weight be placed on evidence from this non-randomised study due to the high risk of bias attached to the effects. The GDG were concerned that the intervention in the low risk group might be misinterpreted as 'no treatment' and noted that the low risk group identified in the RCT assessing STarT Back received a package of care comprising advice and education (with booklet and video) delivered by a physiotherapist during the course of a 30 min appointment in addition to usual care. The GDG were concerned that commissioners and clinicians, by misinterpreting 'low risk' as being synonymous with 'no treatment' might deny these patients appropriate and effective care. The GDG considered that if the people stratified to the low risk group continued to experience pain they may return to their GP (or other healthcare provider) and be offered clinically appropriate treatment. It was emphasised that STarT Back is a decision support tool and not a substitute for clinical acumen. It was also discussed that one of the trials relating to STarT Back is only validated in a primary care setting at first point of contact. It was clarified that this did not imply first consultation for low back pain, and may represent a range of durations of pain for different people and at different stages in the patient pathway. As the questionnaire is only validated at first point of contact, it was agreed that it was not appropriate to apply the tool again if the person returned for the same episode. The second trial however was based on the implementation of STarT Back in a secondary care outpatient setting. The GDG felt that this range of settings balanced the evidence. The GDG agreed that one of the strengths of the tool was that it correctly identified more patients who were in the low risk category compared to non-use of the tool, thus giving the healthcare provider confidence in the management of the patient after the first initial treatment. It was acknowledged that avoidance of overtreatment in patients where it was not required was a real benefit of the tool with potential to save time and money if implemented correctly. The GDG also noted that STarT Back performs better than non-use of the tool in people at high risk compared to medium or low risk groups. The GDG discussed that the value of the tool may be in identifying those with a poorer prognosis and ensuring they get more intensive treatment without delay. **Summary** The GDG agreed that an essential part of stratification was not just identifying subgroups at risk of poor outcome but also informing appropriate management and therefore agreed it was important to make clear in the recommendation that management should be tailored as a result of stratification. The GDG was not able to recommend any specific risk assessment tool or sets of interventions for stratified management based on the evidence included in this review. However the GDG agreed that based on risk stratification, simpler and less intensive support should be considered for people with low back pain or sciatica likely to improve quickly and have a good outcome (for example, reassurance, advice to keep active and guidance on self-management), while more complex and intensive support should be offered to those at higher risk of a poor outcome (for example, exercise programmes with or without manual therapy or using a psychological approach).
Trade-off between net clinical effects and costs	Three relevant economic evaluations were identified for risk stratification. One cost-utility analysis found that in adults with low back pain (with or without sciatica) Hicks/Delitto classification based intervention was dominant (less costly and more effective) than usual physical therapy care. This analysis was assessed as partially applicable with potentially serious limitations. The GDG considered this evidence in conjunction with the clinical evidence for Hicks/Delitto and considered that there was insufficient evidence of clinical effect to recommend it exclusively. One cost-utility analysis based on an RCT[220,540] found that in adults with low back pain (with or without sciatica) STarT Back stratification followed by interventions

	based on the risk group was dominant (less costly and more effective) compared to current best practice/usual care. Another paper based on a cohort study [146,539] reported similar conclusions; however there was greater uncertainty around the magnitude of cost savings and health gain. The GDG agreed that these studies show that stratifying people into risk groups and offering intervention based on them is cost effective, however the details of the interventions to be offered to each risk group could not be established as studies did not compare alternative options for each group. These analyses were assessed as directly applicable with potentially serious limitations. Of note, one analysis was based on an RCT and the other on an implementation cohort trial of STarT Back. Based on the clinical and cost-effectiveness evidence, the GDG recommended that a risk stratification tool should be considered at first consultations in primary care for stratification and risk-adjusted interventions for people in whom a specific treatment is being considered. No economic evaluations were identified for risk assessment tool. The GDG discussed the importance of assessment tools that are easy and quick to conduct in practice. It was noted that the STarT Back tool is short and can be completed in a few minutes and was therefore given as an example of the tool that could be used in the recommendation.
Quality of evidence	**Risk assessment** The evidence was rated as low or very low quality for all of the outcomes and risk assessment tools, except for ÖREBRO which was graded as high quality (for both discrimination and calibration). The reduction in quality for evidence relating to the other tools was based upon them being at high risk of bias due to outcome reporting bias, and attrition bias (using the PROBAST checklist criteria). The evidence for the tools came mostly from single trials, using a range of cut-off threshold values, however there were more studies reporting on STarT Back and ÖMSPQ than the other tools. It was noted that obtaining an adequate sample size is a particular challenge in conducting a good quality stratification study as sample sizes are usually required to be 4 times higher to detect differences in subgroups. Most of the studies included in the review were small, except for those looking at the chronic pain risk item set, Hancock CPR and STarT Back. However the evidence for chronic pain risk item set and Hancock CPR came only from single studies, whereas the evidence for STarT Back came from several studies (most of which were very large). There was insufficient data reported in the trials to be able to calculate complete 2 x 2 tables for sensitivity and specificity, and that most of the studies reported AUC values. The GDG noted that AUC data has methodological limitations and is less robust than calibration data, in terms of assessing the accuracy of a tool at predicting outcome. **Risk stratification** The evidence was rated as low or very low quality for all of the outcomes, mainly due to risk of bias (and sometimes due to additional imprecision). The evidence from randomised studies was at high risk of bias mainly due lack of appropriate blinding to the key confounders that could influence the outcome. The evidence was mainly from single studies with a reasonable sample size. Evidence from a non-randomised study also had selection bias associated with it which coupled with lack of appropriate blinding meant that there was serious risk of bias attached to the effects reported from this study. The GDG also expressed concern regarding the evidence for the O'Sullivan classification tool versus no risk tool stratification as it was from a single study that only included people who had already been assessed by the O'Sullivan tool and stratified into treatment groups accordingly. Information on people that did not meet the specific inclusion criteria for the risk tool were not reported which led the GDG to question the applicability of this evidence.

Other considerations	It was noted that all of the tools are validated in either solely low back pain populations or mixed populations of people with low back pain and/or sciatica. None are validated for sciatica specifically. The group also considered the setting that the assessment tools would be conducted in. Although some of the studies were conducted in primary care, and the STarT Back tool was only validated in primary care, in clinical practice the tools are often used by therapists in secondary care, as well as GPs. The GDG agreed on that the STarT Back tool over the other clinical prediction tools included in this review demonstrated superior specificity, sensitivity and usability in a clinical setting. STarT Back is quick and easy to conduct in practice unlike the ÖREBRO tool, for example, which is more complicated and less practical to use in a consultation. It was also the most relevant as it was based and validated in a primary care setting in the UK. There was also concern raised about the inability of some risk tools to subgroup the full spectrum of low back pain patients leaving a large portion of the population unclassified. The evidence for STarT Back exhibited positive results favouring stratified care for some critical outcomes such as function and was also supported by an IMPaCT study testing the implementation of stratified care for low back pain within in a primary care physician setting, although it was noted that this evidence was of poorer quality due to being from a non-randomised study. The GDG therefore agreed that stratification should be considered, and that the STarTBack tool could be given as an example of a tool that may be used.

7 Imaging

7.1 Introduction

There are several methods that can be used to image the spine. The introduction of MRI scans in the late 1980s brought a more precise method of studying soft tissue structures including the spinal cord, ligaments and discs. Previously, X-ray investigations showed bony structures adequately but not soft tissue. CT myelogram, a more invasive CT with a lumbar puncture administration of intrathecal contrast was the only way of showing cord or nerve root pathology. Other ways of imaging including bone densometry and isotope scanning were performed specifically to answer questions of pathology and osteoporosis.

Simple X-ray of the lumbar spine is non-specific in showing pathology. Although inexpensive and readily available, it is of limited value to osteoporotic fracture follow-up and post-treatment measurement of alignment and stability in trauma and deformity. However, it is still the only readily available dynamic test, where the effect of gravity flexion and extension on the spine can be determined.

CT scans are the preferred method when investigating bony pathology. With the advancement of faster and more powerful scanners, 3D reconstructions and multi-directional cuts are easier to obtain and use. This is useful for assessing trauma, deformity and planning surgery, as well as the follow-up of the treatment plans. CT scans carry high dose radiation and a simple un-contrasted CT scan of the lumbar spine equates to approximately 70 chest x-rays.

MRI scans have no radiation hazards and, so far, no documented risks have been shown directly as a result of the high magnetic field used. It is extremely good at showing soft tissue and pathology of the cord, disc and ligaments. Although becoming more readily available and cheaper, it is still a relatively expensive test.

The exact method of imaging should be determined after a careful scrutiny of the individual's condition by history taking and examination. It should be directed at posing a specific diagnostic question rather than as a screening tool.

Whether or not imaging is of benefit in terms of improving patient related outcomes for people with back pain or sciatica, either at initial presentation or later in the pathway, remains an area of uncertainty. This review intends to address this uncertainty.

7.2 Review question: What is the clinical and cost effectiveness of performing imaging (X-ray or MRI) compared with no investigation to improve functional disability, pain or psychological distress in people with low back pain and/or sciatica?

For full details see review protocol in Appendix C.

Table 23: PICO characteristics of review question

Population	• People aged 16 or above with non-specific low back pain • People aged 16 or above with sciatica
Intervention(s)	• Imaging with MRI (or CT where MRI is contraindicated), X-ray for low back pain • Imaging with MRI for sciatica

Comparison(s)	• No initial imaging • Deferred imaging
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland Morris Disability Questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs/SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies (cohort studies) will be included.

7.3 Clinical evidence

A search for randomised trials comparing the clinical and cost effectiveness of performing imaging (X-ray or MRI/CT) versus no investigation in improving functional disability, pain or psychological distress in people with low back pain and/or sciatica was undertaken.

Nine studies were included in the review reporting results from 5 randomised trials.[111,116,164,165,167,267,268,268,271,272]

- Gilbert 2004 and Gillan 2001 are the same study as Gilbert 2004A.[164,165,167] Gillan 2001 is a pilot study performed prior to Gilbert 2004A. [165,167] Gilbert 2004 reports additional healthcare outcomes from the same study.[164]
- Kendrick 2001A is the same study as Kendrick 2001; full details of methods, results and discussion are available from this paper. [267,268]
- Kerry 2002 is the same study as Kerry 2000; full details of methods, results and discussion are available from this paper. [271,272]

All randomised trials included mixed populations of people with low back pain with and without sciatica. One of the trials included an indirect population (including people from 14 years of age).[164,165,167] All trials compared imaging to no imaging; 4 compared X-ray to no imaging,[111,116,267,268,271,272] while one compared MRI to no imaging.[164,165,167]

The search was extended to cohorts for all comparisons due to insufficient evidence and 4 additional studies were identified that met the inclusion criteria.[178,179,245,532]

- Graves 2014 is the same study as Graves 2012; healthcare utilisation data are available from this paper. [178,179]

Most of the cohort studies included a mixed population of people with low back pain with and without sciatica. One study had a population with low back pain only and another with a sciatica only population.[178,179] Two studies compared imaging (X-ray) to no imaging.[267,268,271,272] Two studies compared imaging to no imaging or deferred imaging; with one comparing MRI only to no imaging or deferred imaging,[178,179] and another comparing X-ray and MRI separately, to no imaging or deferred imaging.[245] One study compared imaging (MRI) to no imaging and to deferred imaging separately.[532]

The evidence from Deyo 1987, Djais 2005 and part of the evidence from Kendrick 2001 were reported in a format that could not be analysed in this report, and has been presented in **Table 25**.[111,116,267,268]

Included studies are summarised in Table 24 below. Evidence from these studies is summarised in the clinical evidence summary below (**Table 27**). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

7.3.1 Summary of included studies

Table 24: Summary of studies included in the review

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
Deyo 1987[111]	X-ray at index visit No imaging (X-ray only if unimproved after 3 weeks of conservative therapy) + educational intervention (a 5-minutes explanation by research assistant of low back pain and its causes, an illustration of the spine and its associated structures. Emphasis on the following points: small yield of useful findings; many of the structures that give rise to pain not being visible on X-ray; substantial gonadal irritation; film obtained if necessary in 3 weeks)	Low back pain with or without sciatica N=621 3 months follow-up United States of America	Pain severity (self-rated improvement of pain) Function, Sickness Impact Profile (SIP) Physical dimension score, Sickness Impact Profile (SIP) Psychosocial dimension score Healthcare utilisation (sought care elsewhere, X-ray, hospitalisation, total physician visits)	All participants were also randomised to receive either 2 days or 7 days bed rest, but this didn't affect the outcomes. 15 (31%) people in the control group went on to receive X-ray versus 88.4% of the X-ray group by 3 months
Djais 2005[116]	X-ray at baseline interview No imaging	Low back pain with or without sciatica N=101 >20 and < 55 years of age 3 weeks follow-up Indonesia	Health-related quality of life (EQ-5D) Pain severity (VAS pain score) Function (RMDQ)	Usual care for patients with low back pain Some people in the control group (number not given) went on to receive X-ray as findings on radiography are reported for both treatment groups
Gilbert	MRI or CT ('early	Low back pain with	Health-related	115 (30%) people in

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
2004A[164,165,167]	imaging', imaging as soon as practicable) No imaging ('delayed, selective imaging', no imaging unless a clear clinical indication developed)	or without sciatica N=782 24 months follow-up United Kingdom	quality of life (EQ-5D, SF-36) Pain severity (Aberdeen Low Back Pain score (ALBP)) Healthcare utilisation (Imaging, MRI, CT, outpatient consultation, physiotherapy, admission to hospital, surgery, injection, primary care physician consultation)	the control group went on to receive imaging versus 353 (90%) of the imaging group by 24 months. This study was downgraded for indirectness as the study population included people aged 14 years and above.
Graves 2012[178,179]	MRI within 6 weeks of injury No imaging or deferred imaging (MRI > 6 weeks of injury)	Low back pain with or without sciatica; low back pain; sciatica N=1226 (Graves 2012), N=1770 (Graves 2014) 1 year follow-up United States of America	Health-related quality of life (SF-36v2 Role-physical and Physical functioning) Pain severity (Graded chronic pain scale) Function (RMDQ) Healthcare utilisation (MRI, CT, X-ray, injection, surgery, chiropractic, physical therapy or occupational therapy, outpatients services)	Low back pain with or without sciatica group: a small percentage (1.4%) of workers who did not receive an early MRI received early CT imaging
Jarvik 2015[245]	X-ray (within 6 weeks of index visit) MRI or CT (within 6 weeks of index visit) No imaging within 6 weeks of index visit (no imaging or deferred imaging) matched control for X-ray No imaging within 6 weeks of index visit (no imaging or deferred imaging)	Low back pain with or without sciatica N=5239 1 year follow-up United States of America	Health-related quality of life (EQ-5D index, EQ-5D VAS) Pain severity (Brief Pain Inventory Interference Scale, Back Pain Numerical Rating Scale, Leg Pain Numerical Rating Scale) Function (RMDQ)	Some patients assigned to the early radiograph group could also have received early MRI/CT, but only if the imaging occurred after their X-ray.

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
	matched control for MRI			
Kendrick 2001[267,268] (RCT)	X-ray (given a card to attend an X-ray at local hospital) No imaging (unless considered clinically necessary)	Low back pain with or without sciatica N=421 9 months follow-up United Kingdom	Health-related quality of life (EQ-5D) Pain severity (VAS 0-5) Function (RMDQ) Healthcare utilisation (hospital admission, outpatient attendance, visit to doctor, prescribed drug, over the counter drug, physiotherapy, osteopathy, acupuncture)	Usual care provided by the practice for patients with low back pain 15 (7%) people in the control group went on to receive X-ray versus 168 (84%) in the intervention group by 3 months 25 (13%) people in the control group went on to receive X-ray versus 171 (88%) of the X-ray group by 9 months
Kendrick 2001[267,268] (cohort)	Patients chose to have an X-ray Patients didn't choose to have an X-ray	Low back pain with or without sciatica N=55 9 months follow-up United Kingdom	Health-related quality of life (EQ-5D) Pain severity (VAS 0-5) Function (RMDQ)	Not stated
Kerry 2000[271,272] (RCT)	X-ray (referral on the day of randomisation) No imaging (patients could be referred at a later consultation if clinically appropriate)	Low back pain with or without sciatica N=153 1 year follow-up United Kingdom	Health-related quality of life (SF-36, EQ-5D VAS) Function (RMDQ) Psychological distress (HADS) Healthcare utilisation (subsequent consultation, referral to physiotherapist or other health professional)	In the RCT, 10 patients (14%) in the group who were randomised to no referral for X-ray did receive an X-ray in the 12 months after recruitment
Kerry 2000[271,272] (cohort)	X-ray referral No imaging	Low back pain with or without sciatica N=506 1 year follow-up United Kingdom	Health-related quality of life (SF-36, EQ-5D VAS) Function (RMDQ) Psychological distress (HADS) Healthcare utilisation (subsequent consultation,	45/316 patients (14%) in the control group went on to be referred to X-ray in the 12 months after recruitment

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
			referral to physiotherapist or other health professional)	
Webster 2014[532]	MRI ('early', within the first 30 days post-onset) Deferred MRI ('timely', 41-180 days post-onset) No imaging (2-years study period)	Low back pain with or without sciatica N=3022 2 years follow-up United States of America	Healthcare utilisation (injection, nerve testing, advanced imaging, surgery)	Not stated

Table 25: Imaging versus No imaging – data unsuitable for meta-analysis

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Deyo 1987[111]	Pain (self-rated improvement of pain, 0-6) ≤ 4 months	Change score: 2.6	Not given	Change score: 2.6	Not given	Very high
	Function (Sickness Impact Profile, 0-100) ≤ 4 months	Mean: 12.3	Not given	Mean: 10.3	Not given	Very high
	Function (Sickness Impact Profile, Physical dimension score, 0-100) ≤ 4 months	Mean: 7.3	Not given	Mean: 8.1	Not given	Very high
	Function (Sickness Impact Profile, Psychosocial dimension score, 0-100) ≤ 4 months	Mean: 15.7	Not given	Mean: 10.6	Not given	Very high
	Healthcare utilisation (sought care elsewhere) ≤ 4 months	9.3%	Not given	9.8%	Not given	Very high
	Healthcare utilisation (X-ray) ≤ 4 months	88.4%	Not given	29.3%	Not given	Very high
	Healthcare utilisation (hospitalisation) ≤ 4 months	2.3%	Not given	0%	Not given	Very high
	Healthcare utilisation (physician visits) ≤ 4 months	1.07%	Not given	0.42%	Not given	Very high
Djais 2005[116]	Health-related quality of life (EQ-5D, 0-1) ≤ 4 months	Median (Q1, Q3): 0.63 (0.41, 0.75)	38	Median (Q1, Q3):	38	Very high
	Pain severity (VAS, 0-10) ≤ 4 months	Median (Q1, Q3): 4 (2, 6)	38	Median (Q1, Q3): 3 (2,5)	38	Very high
	Function (RMDQ, 0-24) ≤ 4 months	Median (Q1, Q3): 6.5 (2,10)	38	Median (Q1, Q3):4.5 (2,7)	38	Very high
Kendrick 2001[267,268] (RCT evidence)	Health-related quality of life (EQ-5D, 0-1) ≤ 4 months	Median (IQR): 0.80 (0.69-0.88)	189	Median (IQR): 0.80 (0.69-0.91)	190	Very high

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
	Health-related quality of life (EQ-5D, 0-1) > 4 months	Median (IQR): 0.80 (0.69-1.00)	180	Median (IQR): 0.80 (0.73-1.00)	189	Very high
	Pain severity (VAS, 0-5) ≤ 4 months	Median (IQR): 1 (1-2)	199	Median (IQR): 1 (0-2)	203	Very high
	Pain severity (VAS, 0-5) > 4 months	Median (IQR): 1 (0-2)	195	Median (IQR): 1 (0-2)	199	Very high
	Function (RMDQ, 0-24) ≤ 4 months	Median (IQR): 4 (1-8)	199	Median (IQR):3 (1-7)	203	Very high
	Function (RMDQ, 0-24) > 4 months	Median (IQR): 3 (0-7)	195	Median (IQR): 2 (0-6)	199	Very high
Kendrick 2001[267,268] (Cohort study evidence)	Health-related quality of life (EQ-5D, 0-1) ≤ 4 months	Median (IQR): 0.80 (0.64-0.84)	28	Median (IQR): 0.76 (0.72-0.91)	22	Very high
	Health-related quality of life (EQ-5D, 0-1) > 4 months	Median (IQR): 0.80 (0.76-1.00)	27	Median (IQR): 0.83 (0.76-1.00)	20	Very high
	Pain severity (VAS, 0-5) ≤ 4 months	Median (IQR): 1 (0-2)	30	Median (IQR): 1 (1-2)	22	Very high
	Pain severity (VAS, 0-5) > 4 months	Median (IQR): 1 (0-2)	29	Median (IQR): 0 (0-1)	21	Very high
	Function (RMDQ, 0-24) ≤ 4 months	Median (IQR): 6.5 (3-14.75)	30	Median (IQR): 3 (2-7.25)	22	Very high
	Function (RMDQ, 0-24) > 4 months	Median (IQR): 3 (0.5-6.5)	29	Median (IQR): 1 (0-4)	21	Very high

Table 26: Clinical evidence summary: Imaging versus No imaging for Low back pain and/or sciatica (RCTs)

Outcomes	No of	Quality of the	Relative	Anticipated absolute effects

	Participants (studies) Follow-up	evidence (GRADE)	effect (95% CI)	Risk with control	Risk difference with Imaging (95% CI)
Health-related quality of life (SF-36 bodily pain, 0-100) ≤ 4 months	124 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the control groups was 49	The mean health-related quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the intervention groups was 0 higher (8.31 lower to 8.31 higher)
Health-related quality of life (SF-36 general health perception, 0-100) ≤ 4 months	120 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 general health perception, 0-100) ≤ 4 months in the control groups was 67	The mean health-related quality of life (SF-36 general health perception, 0-100) ≤ 4 months in the intervention groups was 2 higher (6.31 lower to 10.31 higher)
Health-related quality of life (SF-36 vitality, 0-100) ≤ 4 months	123 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (SF-36 vitality, 0-100) ≤ 4 months in the control groups was 46	The mean health-related quality of life (SF-36 vitality, 0-100) ≤ 4 months in the intervention groups was 8 higher (0.93 to 15.07 higher)
Health-related quality of life (SF-36 role-physical functioning, 0-100) ≤ 4 months	119 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 role-physical functioning, 0-100) ≤ 4 months in the control groups was 45	The mean health-related quality of life (SF-36 role-physical functioning, 0-100) ≤ 4 months in the intervention groups was 4 lower (19.31 lower to 11.31 higher)
Health-related quality of life (SF-36 social functioning, 0-100) ≤ 4 months	124 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (SF-36 social functioning, 0-100) ≤ 4 months in the control groups was 67	The mean health-related quality of life (SF-36 social functioning, 0-100) ≤ 4 months in the intervention groups was 5 higher (4.78 lower to 14.78 higher)
Health-related quality of life (SF-36 mental health, 0-100) ≤ 4 months	123 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean health-related quality of life (SF-36 mental health, 0-100) ≤	The mean health-related quality of life (SF-36 mental health, 0-100) ≤ 4

	6 weeks	imprecision		4 months in the control groups was 65	months in the intervention groups was 9 higher (3.46 to 14.54 higher)
Health-related quality of life (SF-36 physical functioning, 0-100) ≤ 4 months	121 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the control groups was 65	The mean health-related quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the intervention groups was 2 higher (6.31 lower to 10.31 higher)
Health-related quality of life (SF-36 role-emotional functioning, 0-100) ≤ 4 months	118 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (SF-36 role-emotional functioning, 0-100) ≤ 4 months in the control groups was 65	The mean health-related quality of life (SF-36 role-emotional functioning, 0-100) ≤ 4 months in the intervention groups was 10 higher (3.85 lower to 23.85 higher)
Health-related quality of life (EQ-5D VAS, 0-100) ≤ 4 months	121 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (eq-5d VAS, 0-100) ≤ 4 months in the control groups was 67	The mean health-related quality of life (eq-5d VAS, 0-100) ≤ 4 months in the intervention groups was 7 higher (1.31 lower to 15.31 higher)
Pain severity (Aberdeen Low Back Pain (ALBP) score, 0-100) > 4 months	692 (1 study) 2 years	VERY LOW[a,c] due to risk of bias, indirectness		The mean pain severity (ALBP score, 0-100) > 4 months in the control groups was 35.8	The mean pain severity (ALBP score, 0-100) > 4 months in the intervention groups was 4.2 lower (7.17 to 1.23 lower)
Function (RMDQ, 0-24) ≤ 4 months	126 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 6.9	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 1 lower (3.08 lower to 1.08 higher)
Function (RMDQ, 0-24) > 4 months	103 (1 study) 1 years	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) > 4 months in the control groups was	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was

				4.3	0.2 higher (1.88 lower to 2.28 higher)
Psychological distress (HADS Anxiety Score, 0-21) ≤ 4 months	122 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (HADS Anxiety Score, 0-21) ≤ 4 months in the control groups was 7.7	The mean psychological distress (HADS Anxiety Score, 0-21) ≤ 4 months in the intervention groups was 0.9 lower (2.43 lower to 0.63 higher)
Psychological distress (HADS Anxiety Score, 0-21) > 4 months	99 (1 study) 1 years	LOW[a] due to risk of bias		The mean psychological distress (HADS Anxiety Score, 0-21) > 4 months in the control groups was 6.7	The mean psychological distress (HADS Anxiety Score, 0-21) > 4 months in the intervention groups was 0.4 lower (2.08 lower to 1.28 higher)
Psychological distress (HADS Depression Score, 0-21) ≤ 4 months	122 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean psychological distress (HADS Depression Score, 0-21) ≤ 4 months in the control groups was 5.1	The mean psychological distress (HADS Depression Score, 0-21) ≤ 4 months in the intervention groups was 0.4 lower (1.65 lower to 0.85 higher)
Psychological distress (HADS Depression Score, 0-21) >4 months	102 (1 study) 1 years	LOW[a] due to risk of bias		The mean psychological distress (HADS Depression Score, 0-21) > 4 months in the control groups was 4.1	The mean psychological distress (HADS Depression Score, 0-21) > 4 months in the intervention groups was 0.3 lower (1.68 lower to 1.08 higher)
Health-related quality of life (SF-36 bodily pain, 0-100) >4 months	792 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision		The mean health-related quality of life (SF-36 bodily pain, 0-100) > 4 months in the control groups was 53.1	The mean health-related quality of life (SF-36 bodily pain, 0-100) > 4 months in the intervention groups was 3.97 higher (0.36 to 7.59 higher)
Health-related quality of life (SF-36 mental health, 0-100) >4 months	790 (2 studies)	VERY LOW[a,b,c,d] due to risk of bias,		The mean health-related quality of life (SF-36 mental health, 0-100) >	The mean health-related quality of life (SF-36 mental health, 0-100) > 4

		inconsistency, indirectness, imprecision		4 months in the control groups was 66.45	months in the intervention groups was 2.77 higher (0.03 to 5.51 higher)
Health-related quality of life (SF-36 physical functioning, 0-100) >4 months	790 (2 studies)	VERY LOW[a,b,e] due to risk of bias, indirectness, imprecision		The mean health-related quality of life (SF-36 physical functioning, 0-100) > 4 months in the control groups was 62.9	The mean health-related quality of life (SF-36 physical functioning, 0-100) > 4 months in the intervention groups was 3.25 higher (0.6 lower to 7.11 higher)
Health-related quality of life (SF-36 social functioning, 0-100) >4 months	794 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision		The mean health-related quality of life (SF-36 social functioning, 0-100) > 4 months in the control groups was 70.4	The mean health-related quality of life (SF-36 social functioning, 0-100) > 4 months in the intervention groups was 4.25 higher (0.16 to 8.33 higher)
Health-related quality of life (SF-36 role reported health transition, 0-100) >4 months	692 (1 study) 24 months	VERY LOW[a,c] due to risk of bias, indirectness		The mean health-related quality of life (SF-36 role reported health transition, 0-100) > 4 months in the control groups was 49.8	The mean health-related quality of life (SF-36 role reported health transition, 0-100) > 4 months in the intervention groups was 1.9 higher (1.77 lower to 5.57 higher)
Health-related quality of life (SF-36 vitality, 0-100) >4 months	790 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision		The mean health-related quality of life (SF-36 vitality, 0-100) > 4 months in the control groups was 47.35	The mean health-related quality of life (SF-36 vitality, 0-100) > 4 months in the intervention groups was 3.72 higher (0.54 to 6.9 higher)
Health-related quality of life (SF-36 general health perception, 0-100) >4 months	790 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision		The mean health-related quality of life (SF-36 general health perception, 0-100) > 4 months in the control groups was 60.3	The mean health-related quality of life (SF-36 general health perception, 0-100) > 4 months in the intervention groups was 1.59 higher (1.76 lower to 4.93 higher)
Health-related quality of life (SF-36	789	VERY LOW[a,b,c]		The mean health-related quality of	The mean health-related quality of

role-physical functioning, 0-100) >4 months	(2 studies)	due to risk of bias, indirectness, imprecision		life (SF-36 role-physical functioning, 0-100) > 4 months in the control groups was 52.6	life (SF-36 role-physical functioning, 0-100) > 4 months in the intervention groups was 4.76 higher (1.24 lower to 10.75 higher)
Health-related quality of life (SF-36 role-emotional functioning, 0-100) >4 months	789 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision		The mean health-related quality of life (SF-36 role-emotional functioning, 0-100) > 4 months in the control groups was 66.9	The mean health-related quality of life (SF-36 role-emotional functioning, 0-100) > 4 months in the intervention groups was 5.54 higher (0.51 lower to 11.58 higher)
Health-related quality of life (EQ-5D, 0-1) >4 months	692 (1 study) 2 years	VERY LOW[a,c] due to risk of bias, indirectness		The mean health-related quality of life (eq-5d, 0-1) > 4 months in the control groups was 0.539	The mean health-related quality of life (eq-5d, 0-1) > 4 months in the intervention groups was 0.06 higher (0.01 to 0.11 higher)
Health-related quality of life (EQ-5D VAS, 0-100) >4 months	100 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (eq-5d VAS, 0-100) > 4 months in the control groups was 76	The mean health-related quality of life (eq-5d VAS, 0-100) > 4 months in the intervention groups was 2 lower (9.06 lower to 5.06 higher)
Healthcare utilisation (physiotherapy) ≤ 4 months	402 (1 study) 3 months	LOW[e,f] due to risk of bias, imprecision	RR 1.16 (0.87 to 1.55)	Moderate	
				291 per 1000	47 more per 1000 (from 38 fewer to 160 more)
Healthcare utilisation (acupuncture) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.44 (0.11 to 1.67)	Moderate	
				35 per 1000	20 fewer per 1000 (from 31 fewer to 23 more)
Healthcare utilisation (chiropractic) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.68 (0.19 to 2.37)	Moderate	
				30 per 1000	10 fewer per 1000 (from 24 fewer to 41 more)
Healthcare utilisation (hospital admission) ≤ 4 months	402 (1 study) 3 months		Not estimable	Moderate	
				0 per 1000	-

Healthcare utilisation (osteopathy) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.79 (0.3 to 2.09)	Moderate	
				44 per 1000	9 fewer per 1000 (from 31 fewer to 48 more)
Healthcare utilisation (outpatient attendance) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.87 (0.3 to 2.56)	Moderate	
				35 per 1000	5 fewer per 1000 (from 24 fewer to 55 more)
Healthcare utilisation (over the counter drug) ≤ 4 months	402 (1 study) 3 months	LOW[b,e] due to risk of bias, imprecision	RR 1.04 (0.79 to 1.36)	Moderate	
				330 per 1000	13 more per 1000 (from 69 fewer to 119 more)
Healthcare utilisation (prescribed drug) ≤ 4 months	402 (1 study) 3 months	LOW[b,e] due to risk of bias, imprecision	RR 1.09 (0.81 to 1.47)	Moderate	
				291 per 1000	26 more per 1000 (from 55 fewer to 137 more)
Healthcare utilisation (referral to physiotherapist or other health professional) ≤ 4 months	140 (1 study) 6 weeks	VERY LOW[a,g] due to risk of bias, imprecision	RR 1.13 (0.68 to 1.88)	Moderate	
				282 per 1000	37 more per 1000 (from 90 fewer to 248 more)
Healthcare utilisation (subsequent doctor consultation for back pain) ≤ 4 months	542 (2 studies)	VERY LOW[b,e,f] due to risk of bias, inconsistency	RR 1.53 (1.24 to 1.9)	Moderate	
				331 per 1000	175 more per 1000 (from 79 more to 298 more)
Healthcare utilisation (outpatient consultation) > 4 months	1176 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision	RR 1.24 (1.14 to 1.35)	Moderate	
				370 per 1000	89 more per 1000 (from 52 more to 130 more)
Healthcare utilisation (physiotherapy) > 4 months	1176 (2 studies)	VERY LOW[a,c] due to risk of bias, indirectness	RR 1.07 (0.95 to 1.19)	Moderate	
				367 per 1000	26 more per 1000 (from 18 fewer to 70 more)
Healthcare utilisation (acupuncture) > 4 months	394 (1 study) 9 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.51 (0.05 to 5.58)	Moderate	
				10 per 1000	5 fewer per 1000 (from 9 fewer to 46 more)
Healthcare utilisation (primary care consultation) > 4 months	717 (1 study) 2 years	LOW[a,c] due to risk of bias, indirectness	RR 1.01 (0.92 to 1.11)	Moderate	
				701 per 1000	7 more per 1000

					(from 56 fewer to 77 more)
Healthcare utilisation (subsequent doctor consultation for back pain) > 4 months	534 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.87 (0.66 to 1.16)	Moderate	
				315 per 1000	41 fewer per 1000 (from 107 fewer to 50 more)
Healthcare utilisation (referral to physiotherapist or other health professional) > 4 months	140 (1 study) 1 years	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.97 (0.67 to 1.39)	Moderate	
				465 per 1000	14 fewer per 1000 (from 153 fewer to 181 more)
Healthcare utilisation (chiropractic) > 4 months	394 (1 study) 9 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 1.22 (0.38 to 3.95)	Moderate	
				25 per 1000	6 more per 1000 (from 16 fewer to 74 more)
Healthcare utilisation (hospital admission) > 4 months	1176 (2 studies)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision	RR 1.25 (0.77 to 2.05)	Moderate	
				33 per 1000	8 more per 1000 (from 8 fewer to 35 more)
Healthcare utilisation (osteopathy) > 4 months	394 (1 study) 9 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.87 (0.3 to 2.56)	Moderate	
				35 per 1000	5 fewer per 1000 (from 24 fewer to 55 more)
Healthcare utilisation (over the counter drug) > 4 months	394 (1 study) 9 months	LOW[c,e] due to risk of bias, imprecision	RR 1.24 (0.92 to 1.65)	Moderate	
				286 per 1000	69 more per 1000 (from 23 fewer to 186 more)
Healthcare utilisation (prescribed drug) > 4 months	394 (1 study) 9 months	LOW[c,e] due to risk of bias, imprecision	RR 1.17 (0.84 to 1.62)	Moderate	
				246 per 1000	42 more per 1000 (from 39 fewer to 153 more)
Healthcare utilisation (CT imaging) > 4 months*	782 (1 study) 2 years	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision	RR 1.44 (0.83 to 2.49)	Moderate	
				51 per 1000	22 more per 1000 (from 9 fewer to 76 more)
Healthcare utilisation (imaging at least once) > 4 months*	782 (1 study) 2 years	VERY LOW[a,c] due to risk of bias, indirectness	RR 3.04 (2.6 to 3.55)	Moderate	
				296 per 1000	604 more per 1000 (from 474 more to 755 more)
Healthcare utilisation (injection) > 4	782	VERY LOW[a,b,c]	RR 0.91	Moderate	

months	(1 study) 2 years	due to risk of bias, indirectness, imprecision	(0.68 to 1.22)	195 per 1000	18 fewer per 1000 (from 62 fewer to 43 more)
Healthcare utilisation (MRI imaging) > 4 months*	782 (1 study) 2 years	VERY LOW[a,c] due to risk of bias, indirectness	RR 3.38 (2.82 to 4.04)	Moderate	
				244 per 1000	581 more per 1000 (from 444 more to 742 more)
Healthcare utilisation (surgery) > 4 months	782 (1 study) 2 years	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision	RR 1.34 (0.76 to 2.34)	Moderate	
				51 per 1000	17 more per 1000 (from 12 fewer to 68 more)
Healthcare utilisation (equipment: back support) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.51 (0.16 to 1.67)	Moderate	
				39 per 1000	19 fewer per 1000 (from 33 fewer to 26 more)
Healthcare utilisation (day-case treatment) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision	Not estimable	Moderate	
				0 per 1000	-
Healthcare utilisation (aromatherapy) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 1.36 (0.31 to 6)	Moderate	
				15 per 1000	5 more per 1000 (from 10 fewer to 75 more)
Healthcare utilisation (social services, reflexology, massage) ≤ 4 months	402 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 1.19 (0.41 to 3.48)	Moderate	
				30 per 1000	6 more per 1000 (from 18 fewer to 74 more)
Healthcare utilisation (day-case treatment) > 4 months	394 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 3.06 (0.1 to 74.69)	Moderate	
				0 per 1000	-
Healthcare utilisation (aromatherapy) > 4 months	394 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 5.10 (0.6 to 43.28)	Moderate	
				5 per 1000	20 more per 1000 (from 2 fewer to 211 more)
Healthcare utilisation (equipment: back support) > 4 months	394 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 0.94 (0.42 to 2.07)	Moderate	
				60 per 1000	4 fewer per 1000 (from 35 fewer to 64 more)

Healthcare utilisation (social services) > 4 months	394 (1 study) 3 months	VERY LOW[a,g] due to risk of bias, imprecision	RR 7.14 (0.37 to 137.38)	Moderate	
				0 per 1000	-

a Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
b Downgraded by 1 increment if the confidence interval crossed 1 MID
c Downgraded by 1 increment because the majority of the evidence included an indirect population
d Heterogeneity, I^2=66%, p=0.09. Different imaging techniques used in the 2 studies.
e Downgraded by 1 increment if the majority of the evidence was at high risk of bias
f Heterogeneity, I^2=82%, p=0.01
g Downgraded by 2 increments if the confidence interval crossed both MIDs
*Imaging received as part of the intervention is included in this outcome

Table 27: Clinical evidence summary: Imaging versus No imaging for Low back pain with or without sciatica (Cohort studies)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
Healthcare utilisation (advanced imaging) ≤ 4 months	2599 (1 study) 3 months	VERY LOW[a] due to risk of bias	RR 14.64 (7.55 to 28.38)	Moderate	
				6 per 1000	82 more per 1000 (from 39 more to 164 more)
Healthcare utilisation (nerve testing) ≤ 4 months	2599 (1 study) 3 months	VERY LOW[a] due to risk of bias	RR 31.75 (13.92 to 72.44)	Moderate	
				3 per 1000	92 more per 1000 (from 39 more to 214 more)
Healthcare utilisation (injections) ≤ 4 months	2599 (1 study) 3 months	VERY LOW[a] due to risk of bias	RR 28.52 (18.62 to 43.68)	Moderate	
				12 per 1000	330 more per 1000 (from 211 more to 512 more)
Healthcare utilisation (surgery) ≤ 4 months	2599 (1 study)	VERY LOW[a] due to risk of bias	RR 32.53	Moderate	
				3 per 1000	95 more per 1000

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
	3 months		(13.18 to 80.28)		(from 37 more to 238 more)
Healthcare utilisation (injections) > 4 months	2599 (1 study) 6 months	VERY LOW[a] due to risk of bias	RR 23.89 (16.78 to 34.01)	Moderate	
				18 per 1000	412 more per 1000 (from 284 more to 594 more)
Healthcare utilisation (surgery) > 4 months	2599 (1 study) 6 months	VERY LOW[a] due to risk of bias	RR 26.26 (13.83 to 49.85)	Moderate	
				6 per 1000	139 more per 1000 (from 71 more to 269 more)
Healthcare utilisation (advanced imaging) > 4 months	2599 (1 study) 6 months	VERY LOW[a] due to risk of bias	RR 21.63 (12.28 to 38.08)	Moderate	
				7 per 1000	144 more per 1000 (from 79 more to 260 more)
Healthcare utilisation (referral to healthcare professional) ≤ 4 months	404 (1 study) 6 weeks	VERY LOW[a] due to risk of bias	RR 1.88 (1.39 to 2.56)	Moderate	
				233 per 1000	205 more per 1000 (from 91 more to 363 more)
Healthcare utilisation (referral to healthcare professional) > 4 months	404 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.56 (1.24 to 1.95)	Moderate	
				374 per 1000	209 more per 1000 (from 90 more to 355 more)
Healthcare utilisation (nerve testing) > 4 months	2599 (1 study) 6 months	VERY LOW[a] due to risk of bias	RR 29.17 (14.87 to 57.22)	Moderate	
				5 per 1000	141 more per 1000 (from 69 more to 281 more)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
Healthcare utilisation (subsequent consultation for back pain) ≤ 4 months	404 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.42 (1.06 to 1.91)	Moderate	
				294 per 1000	123 more per 1000 (from 18 more to 268 more)
Healthcare utilisation (subsequent consultation for back pain) > 4 months	404 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.55 (1.16 to 2.07)	Moderate	
				284 per 1000	156 more per 1000 (from 45 more to 304 more)
Health-related quality of life (SF-36 bodily pain, 0-100) ≤ 4 months	347 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the control groups was 56	The mean health-related quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the intervention groups was 7 lower (14.06 lower to 0.06 higher)
Health-related quality of life (SF-36 Emotional role, 0-100) ≤ 4 months	332 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 emotional role, 0-100) ≤ 4 months in the control groups was 67	The mean health-related quality of life (SF-36 emotional role, 0-100) ≤ 4 months in the intervention groups was 3 higher (8.42 lower to 14.42 higher)
Health-related quality of life (SF-36 general health, 0-100) ≤ 4 months	332 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 general health, 0-100) ≤ 4 months in the control groups was 68	The mean health-related quality of life (SF-36 general health, 0-100) ≤ 4 months in the intervention groups was 1 higher (3.38 lower to 5.38 higher)
Health-related quality of life (SF-36 mental health, 0-100) ≤ 4 months	343 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 mental health, 0-100) ≤ 4 months in the control groups was 68	The mean health-related quality of life (SF-36 mental health, 0-100) ≤ 4 months in the intervention groups was 3 higher

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
					(1.38 lower to 7.38 higher)
Health-related quality of life (SF-36 physical functioning, 0-100) ≤ 4 months	334 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the control groups was 71	The mean health-related quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the intervention groups was 8 lower (15.07 to 0.93 lower)
Health-related quality of life (SF-36 physical role, 0-100) ≤ 4 months	329 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 physical role, 0-100) ≤ 4 months in the control groups was 54	The mean health-related quality of life (SF-36 physical role, 0-100) ≤ 4 months in the intervention groups was 8 lower (19.42 lower to 3.42 higher)
Health-related quality of life (SF-36 social functioning, 0-100) ≤ 4 months	348 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 social functioning, 0-100) ≤ 4 months in the control groups was 74	The mean health-related quality of life (SF-36 social functioning, 0-100) ≤ 4 months in the intervention groups was 5 lower (12.07 lower to 2.07 higher)
Health-related quality of life (SF-36 vitality, 0-100) ≤ 4 months	346 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 vitality, 0-100) ≤ 4 months in the control groups was 52	The mean health-related quality of life (SF-36 vitality, 0-100) ≤ 4 months in the intervention groups was 2 higher (2.38 lower to 6.38 higher)
Health-related quality of life (EQ-5D VAS, 0-100) ≤ 4 months	343 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean health-related quality of life (eq-5d VAS, 0-100) ≤ 4 months in the control groups was 72	The mean health-related quality of life (eq-5d VAS, 0-100) ≤ 4 months in the intervention groups was 2 lower (6.38 lower to 2.38 higher)
Health-related quality of life (SF-36	315	VERY LOW[a,b]		The mean health-related quality of	The mean health-related quality of

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
bodily pain, 0-100) > 4 months	(1 study) 1 years	due to risk of bias, imprecision		life (SF-36 bodily pain, 0-100) > 4 months in the control groups was 65	life (SF-36 bodily pain, 0-100) > 4 months in the intervention groups was 7 lower (14.06 lower to 0.06 higher)
Health-related quality of life (SF-36 Emotional role, 0-100) > 4 months	291 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 emotional role, 0-100) > 4 months in the control groups was 78	The mean health-related quality of life (SF-36 emotional role, 0-100) > 4 months in the intervention groups was 1.00 higher (9.56 lower to 11.56 higher)
Health-related quality of life (SF-36 general health, 0-100) > 4 months	302 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 general health, 0-100) > 4 months in the control groups was 68	The mean health-related quality of life (SF-36 general health, 0-100) > 4 months in the intervention groups was 1 lower (7.19 lower to 5.19 higher)
Health-related quality of life (SF-36 mental health, 0-100) > 4 months	311 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 mental health, 0-100) > 4 months in the control groups was 71	The mean health-related quality of life (SF-36 mental health, 0-100) > 4 months in the intervention groups was 0 higher (4.37 lower to 4.37 higher)
Health-related quality of life (SF-36 physical functioning, 0-100) > 4 months	300 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 physical functioning, 0-100) > 4 months in the control groups was 74	The mean health-related quality of life (SF-36 physical functioning, 0-100) > 4 months in the intervention groups was 4.00 lower (11.06 lower to 3.06 higher)
Health-related quality of life (SF-36	297	VERY LOW[a]		The mean health-related quality of	The mean health-related quality of

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
physical role, 0-100) > 4 months	(1 study) 1 years	due to risk of bias		life (SF-36 physical role, 0-100) > 4 months in the control groups was 69	life (SF-36 physical role, 0-100) > 4 months in the intervention groups was 8.00 lower (19.43 lower to 3.43 higher)
Health-related quality of life (SF-36 social functioning, 0-100) > 4 months	315 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 social functioning, 0-100) > 4 months in the control groups was 81	The mean health-related quality of life (SF-36 social functioning, 0-100) > 4 months in the intervention groups was 4.00 lower (10.2 lower to 2.2 higher)
Health-related quality of life (SF-36 vitality, 0-100) > 4 months	312 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (SF-36 vitality, 0-100) > 4 months in the control groups was 56	The mean health-related quality of life (SF-36 vitality, 0-100) > 4 months in the intervention groups was 3.00 lower (9.19 lower to 3.19 higher)
Health-related quality of life (EQ-5D VAS, 0-100) > 4 months	312 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean health-related quality of life (eq-5d VAS, 0-100) > 4 months in the control groups was 75	The mean health-related quality of life (eq-5d VAS, 0-100) > 4 months in the intervention groups was 3.00 lower (7.37 lower to 1.37 higher)
Function (RMDQ, 0-24) ≤ 4 months	352 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 5.4	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 1.30 higher (0.01 lower to 2.61 higher)
Function (RMDQ, 0-24) > 4 months	317 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) > 4 months in the control groups was 4.2	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 1.40 higher

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging	Risk difference with Imaging (95% CI)
					(0.08 to 2.72 higher)
Psychological distress (HADS Anxiety, 0-21) ≤ 4 months	340 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS anxiety, 0-21) ≤ 4 months in the control groups was 7.3	The mean psychological distress (HADS anxiety, 0-21) ≤ 4 months in the intervention groups was 0.10 lower (1.08 lower to 0.88 higher)
Psychological distress (HADS Anxiety, 0-21) > 4 months	309 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS anxiety, 0-21) > 4 months in the control groups was 6.5	The mean psychological distress (HADS anxiety, 0-21) > 4 months in the intervention groups was 0.20 lower (1.34 lower to 0.94 higher)
Psychological distress (HADS Depression, 0-21) ≤ 4 months	341 (1 study) 6 weeks	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS depression, 0-21) ≤ 4 months in the control groups was 4.5	The mean psychological distress (HADS depression, 0-21) ≤ 4 months in the intervention groups was 0.30 lower (1.28 lower to 0.68 higher)
Psychological distress (HADS Depression, 0-21) > 4 months	310 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean psychological distress (HADS depression, 0-21) > 4 months in the control groups was 4.1	The mean psychological distress (HADS depression, 0-21) > 4 months in the intervention groups was 0.40 lower (1.29 lower to 0.49 higher)

a Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
b Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 28: Clinical evidence summary: Imaging versus No imaging or deferred imaging for Low back pain with or without sciatica (Cohort studies)

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging or Deferred imaging for Low back pain with or without sciatica	Risk difference with Imaging (95% CI)

	Follow-up				
Quality of life (EuroQuol 5D Index, 0-1) ≤ 4 months	3046 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean quality of life (euroquol 5d index, 0-1) ≤ 4 months in the control groups was 0.735	The mean quality of life (euroquol 5d index, 0-1) ≤ 4 months in the intervention groups was 0 higher (0.01 lower to 0.01 higher)
Quality of life (EuroQuol 5D VAS, 0-100) ≤ 4 months	3046 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean quality of life (euroquol 5d VAS, 0-100) ≤ 4 months in the control groups was 69.75	The mean quality of life (euroquol 5d VAS, 0-100) ≤ 4 months in the intervention groups was 0.63 higher (0.72 lower to 1.97 higher)
Quality of life (EuroQuol 5D Index, 0-1) > 4 months	3046 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean quality of life (euroquol 5d index, 0-1) > 4 months in the control groups was 0.745	The mean quality of life (euroquol 5d index, 0-1) > 4 months in the intervention groups was 0.01 higher (0 to 0.02 higher)
Quality of life (EuroQuol 5D VAS, 0-100) > 4 months.	3046 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, inconsistency		The mean quality of life (euroquol 5d VAS, 0-100) > 4 months in the control groups was 70	The mean quality of life (euroquol 5d VAS, 0-100) > 4 months in the intervention groups was 1.33 higher (0.01 lower to 2.66 higher)
Pain severity (Back Pain NRS, 0-10) ≤ 4 months	3046 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean pain severity (back pain NRS, 0-10) ≤ 4 months in the control groups was 4.2	The mean pain severity (back pain NRS, 0-10) ≤ 4 months in the intervention groups was 0.09 lower (0.28 lower to 0.1 higher)
Pain severity (Leg pain NRS, 0-10) ≤ 4 months	3046 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean pain severity (leg pain NRS, 0-10) ≤ 4 months in the control groups was 3.68	The mean pain severity (leg pain NRS, 0-10) ≤ 4 months in the intervention groups was 0.29 lower (0.5 to 0.08 lower)
Pain severity (Brief Pain Inventory Interference, 0-10) ≤ 4 months	3046 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean pain severity (brief Pain Inventory Interference, 0-10) ≤ 4 months in the control groups was	The mean pain severity (brief Pain Inventory Interference, 0-10) ≤ 4 months in the intervention groups

				3.345	was 0 higher (0.18 lower to 0.17 higher)
Pain severity (Back Pain NRS, 0-10) > 4 months	3046 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean pain severity (back pain NRS, 0-10) > 4 months in the control groups was 3.97	The mean pain severity (back pain NRS, 0-10) > 4 months in the intervention groups was 0.17 lower (0.36 lower to 0.02 higher)
Pain severity (Leg pain NRS, 0-10) > 4 months	3046 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean pain severity (leg pain NRS, 0-10) > 4 months in the control groups was 3.53	The mean pain severity (leg pain NRS, 0-10) > 4 months in the intervention groups was 0.23 lower (0.44 to 0.02 lower)
Pain severity (Brief Pain Inventory Interference, 0-10) > 4 months	3046 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean pain severity (brief Pain Inventory Interference, 0-10) > 4 months in the control groups was 3.15	The mean pain severity (brief Pain Inventory Interference, 0-10) > 4 months in the intervention groups was 0.11 lower (0.29 lower to 0.07 higher)
Function (RMDQ, 0-24) ≤ 4 months	3046 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 10.52	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 0.02 higher (0.44 lower to 0.49 higher)
Function (RMDQ, 0-24) > 4 months	3046 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) > 4 months in the control groups was 9.62	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 0.3 lower (0.79 lower to 0.18 higher)
Healthcare utilisation (physical therapy or occupational therapy) > 4 months	1770 (1 study) 1 years	VERY LOW[c] due to risk of bias		The mean healthcare utilisation (physical therapy or occupational therapy) > 4 months in the control groups was 6.8	The mean healthcare utilisation (physical therapy or occupational therapy) > 4 months in the intervention groups was 11.6 higher

					(9.36 to 13.84 higher)
Healthcare utilisation (chiropractic) > 4 months	1770 (1 study) 1 years	VERY LOW[c] due to risk of bias		The mean healthcare utilisation (chiropractic) > 4 months in the control groups was 13.9	The mean healthcare utilisation (chiropractic) > 4 months in the intervention groups was 0.8 higher (2.46 lower to 4.06 higher)
Healthcare utilisation (outpatient services) > 4 months	1770 (1 study) 1 years	VERY LOW[c] due to risk of bias		The mean healthcare utilisation (outpatient services) > 4 months in the control groups was 4.3	The mean healthcare utilisation (outpatient services) > 4 months in the intervention groups was 7.9 higher (6.99 to 8.81 higher)
Healthcare utilisation (injections) > 4 months	1770 (1 study) 12 months	VERY LOW[c] due to risk of bias	RR 5.91 (4.96 to 7.43)	Moderate	
				69 per 1000	339 more per 1000 (from 273 more to 444 more)
Healthcare utilisation (X-ray) > 4 months	1770 (1 study) 1 years	VERY LOW[c] due to risk of bias	RR 1.67 (1.38 to 2.04)	Moderate	
				181 per 1000	121 more per 1000 (from 69 more to 188 more)
Healthcare utilisation (CT) > 4 months	1770 (1 study) 1 years	VERY LOW[c,d] due to risk of bias, imprecision	RR 1.75 (1.02 to 2.98)	Moderate	
				31 per 1000	23 more per 1000 (from 1 more to 61 more)
Healthcare utilisation (MRI) > 4 months	1770 (1 study) 1 years	VERY LOW[c] due to risk of bias	RR 5.61 (5.02 to 6.27)	Moderate	
				178 per 1000	821 more per 1000 (from 716 more to 938 more)
Healthcare utilisation (surgery) > 4 months	1770 (1 study) 12 months	VERY LOW[c] due to risk of bias	RR 7.94 (5.39 to 11.7)	Moderate	
				25 per 1000	174 more per 1000 (from 110 more to 268 more)

a Downgraded by 1 increment if the majority of the evidence was at high risk of bias
b Heterogeneity, I^2=81%, p=0.02
c Downgraded by 2 increments if the majority of evidence was at very high risk of bias
d Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 29: Clinical evidence summary: Imaging versus No imaging or deferred imaging for Low back pain without sciatica (Cohort studies)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging or Deferred imaging	Risk difference with Imaging (95% CI)
Quality of life (SF-36v2 Role-physical, 0-100) > 4 months	955 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36v2 role-physical, 0-100) > 4 months in the control groups was 46	The mean quality of life (SF-36v2 role-physical, 0-100) > 4 months in the intervention groups was 7.7 lower (10.16 to 5.24 lower)
Quality of life (SF-36v2 Physical functioning, 0-100) > 4 months	955 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36v2 physical functioning, 0-100) > 4 months in the control groups was 44.7	The mean quality of life (SF-36v2 physical functioning, 0-100) > 4 months in the intervention groups was 7.7 lower (10.09 to 5.31 lower)
Pain severity (Graded chronic pain scale, 0-10) > 4 months	955 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean pain severity (graded chronic pain scale, 0-10) > 4 months in the control groups was 4.1	The mean pain severity (graded chronic pain scale, 0-10) > 4 months in the intervention groups was 0.9 higher (0.3 to 1.5 higher)
Function (RMDQ, 0-24) > 4 months	955 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) > 4 months in the control groups was 7.4	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 4.6 higher (3.25 to 5.95 higher)
1 Downgraded by 2 increments if the majority of the evidence was at very high risk of bias 2 Downgraded by 1 increment if the confidence interval crossed 1 MID					

Table 30: Clinical evidence summary: Imaging versus Deferred imaging for Low back pain with or without sciatica (Cohort studies)

Outcomes	No of Participants (studies)	Quality of the evidence	Relative effect	Anticipated absolute effects	
				Risk with Deferred imaging for	Risk difference with Imaging (95%

	Follow-up	(GRADE)	(95% CI)	Low back pain with or without sciatica	CI)
Healthcare utilisation (injections) ≤ 4 months	1205 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.3 (1.08 to 1.57)	Moderate	
				265 per 1000	79 more per 1000 (from 21 more to 151 more)
Healthcare utilisation (advanced imaging) ≤ 4 months	1205 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.31 (0.84 to 2.04)	Moderate	
				62 per 1000	19 more per 1000 (from 10 fewer to 64 more)
Healthcare utilisation (nerve testing) ≤ 4 months	1205 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.34 (0.91 to 1.98)	Moderate	
				78 per 1000	27 more per 1000 (from 7 fewer to 76 more)
Healthcare utilisation (surgery) ≤ 4 months	1205 (1 study) 3 months	VERY LOW[a] due to risk of bias	RR 2.91 (1.63 to 5.2)	Moderate	
				31 per 1000	59 more per 1000 (from 20 more to 130 more)
Healthcare utilisation (injections) > 4 months	1205 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.16 (1 to 1.35)	Moderate	
				362 per 1000	58 more per 1000 (from 0 more to 127 more)
Healthcare utilisation (advanced imaging) > 4 months	1205 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.34 (0.98 to 1.82)	Moderate	
				116 per 1000	39 more per 1000 (from 2 fewer to 95 more)
Healthcare utilisation (nerve testing) > 4 months	1205 (1 study) 6 months	VERY LOW[a] due to risk of bias	RR 1.15 (0.85 to 1.56)	Moderate	
				125 per 1000	19 more per 1000 (from 19 fewer to 70 more)
Healthcare utilisation (surgery) > 4 months	1205 (1 study) 6 months	VERY LOW[a] due to risk of bias	RR 2.55 (1.67 to 3.89)	Moderate	
				57 per 1000	88 more per 1000 (from 38 more to 165 more)

a Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
b Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 31: Clinical evidence summary: Imaging versus No imaging or deferred imaging for sciatica (Cohort studies)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with No imaging or Deferred imaging	Risk difference with Imaging (95% CI)
Quality of life (SF-36v2 Physical functioning, 0-100) > 4 months	271 (1 study) 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36v2 physical functioning, 0-100) > 4 months in the control groups was 38	The mean quality of life (SF-36v2 physical functioning, 0-100) > 4 months in the intervention groups was 5 lower (7.94 to 2.06 lower)
Quality of life (SF-36v2 Role-physical, 0-100) > 4 months	271 (1 study) 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36v2 role-physical, 0-100) > 4 months in the control groups was 41.2	The mean quality of life (SF-36v2 role-physical, 0-100) > 4 months in the intervention groups was 5.4 lower (8.35 to 2.45 lower)
Pain severity (Graded chronic pain scale, 0-10) > 4 months	271 (1 study) 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (graded chronic pain scale, 0-10) in the control groups was 4.8	The mean pain severity (graded chronic pain scale, 0-10) in the intervention groups was 0.8 higher (0.15 to 1.45 higher)
Function (RMDQ, 0-24) > 4 months	271 (1 study) 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) > 4 months in the control groups was 11.5	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 2.3 higher (0.58 to 4.02 higher)

a Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
b Downgraded by 1 increment if the confidence interval crossed 1 MID

7.4 Economic evidence

Published literature

One economic evaluation relating to imaging versus no imaging was identified and has been included in this review. [164,165] This is summarised in the economic evidence profile below (**Table 32**) and the economic evidence table in Appendix I.

Six economic evaluations published in seven different papers relating to this review were identified but excluded due to applicability issues or selectively excluded due to methodological limitations and the availability of more applicable evidence[271,268,254,340,179,245,532].

These are listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 32: Economic evidence profile: imaging verses no imaging

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
GILBERT2004[164]/GILBERT2004A[165] (UK)	Partially applicable [(a)]	Potentially serious limitations [(b)]	Within-trial analysis (RCT, same paper). Cost-utility analysis (CUA). Population: Adults with low back pain (with and without sciatica). Two comparators in full analysis: • 'delayed, selective imaging' (no imaging unless a clear clinical indication developed). • 'early imaging' (MRI or CT as soon as practicable). Follow-up: 2 years. Perspective: UK NHS. Patient reported outcomes taken from RCT. Health-related quality of life (EQ-5D) collected at baseline, 8 months and 24 months follow-up.	Mean incremental cost: £61.07 (95% CI: –25.24, 147.36)	Mean additional QALYs: 0.04 (95% CI: –0.015 to 0.10)	Mean incremental cost per QALY of £1,527 when missing data are imputed.	Probability early imaging is cost-effective (£20K threshold): 89.7% Bootstrapping of ICER (using adjusted QALYs) was conducted from a health care payer perspective. The results are presented above. Additional sensitivity analyses were conducted to show the effect on cost per QALY gained from changing the estimated cost of imaging. This found as the cost of imaging increases, the likelihood that 'early imaging' would be cost-effective decreases. Bootstrapping was also conducted using unadjusted QALYs (no adjustment for baseline characteristics). This resulted in approximately a 98% probability that early imaging was cost-effective.

(a) Discounting only applied to costs at a rate of 6%, as opposed to 3.5% for both costs and effects (NICE reference case). Another issue around applicability is that patients are recruited between 1996 and 1999 (the period where resource use data are collected), and therefore may not reflect current UK NHS context.

(b) Within-trial analysis, same paper : this is one of several studies included in the clinical review for imaging comparing imaging to no imaging for adults with low back pain, and therefore may not reflect the full body of evidence. In addition, because of some missing questionnaire data some costs (including staff costs) had to be estimated.

7.5 Evidence statements

7.5.1 Clinical

7.5.1.1 Imaging versus no imaging for low back pain with or without sciatica

There was inconsistent evidence for the effect of Imaging on quality of life in people with low back pain with or without sciatica. One RCT comparing X-ray to no imaging found clinical benefit in some SF-36 outcomes (general health perception, vitality, social functioning, mental health, emotional functioning) and in the EQ-5D at ≤ 4 months (low to very low quality; n=153). Similar results were observed from 2 studies comparing X-ray to no imaging and MRI or CT to no imaging at > 4 months for some SF-36 outcomes (low to very low quality; n=935; bodily pain, physical functioning, vitality, role-physical functioning, emotional functioning) and the EQ-5D (1 study; very low quality; n=782). However, these results were not consistent with cohort study evidence comparing X-ray to no imaging (very low quality; n=506), which showed no clinical difference or clinical benefit favouring no imaging for quality of life at both short and longer term follow-ups.

Evidence from 1 RCT comparing MRI or CT to no imaging suggested no clinical difference between imaging and no imaging for the pain severity outcome at > 4 months (very low quality; n=782). Function and psychological distress outcomes were reported by an RCT and a cohort paper by the same study group, comparing X-ray to no imaging (low to very low quality; n=153 and 506 respectively); there was also no clinical difference between imaging and no imaging for these outcomes at both ≤ 4 and > 4 months.

Evidence from RCTs comparing X-ray to no imaging (1 or 2 studies; low to very low quality; n=153 and 421) suggested that there was no clinical difference for healthcare utilisation outcomes at ≤ 4 months. Fewer subsequent doctor consultations were observed in the group that did not receive imaging. Individual cohort studies, comparing either X-ray or MRI or CT to no imaging, suggested that there was clinical benefit favouring no imaging for healthcare utilisation outcomes at ≤ 4 months (2 studies; very low quality; n=506 and 3022). Similarly, evidence from RCTs (3 studies; 2 comparing X-ray to no imaging, 1 comparing MRI to no imaging; low to very low quality; range of n=153-782) and individual observational studies (2 studies; 1 comparing X-ray to no imaging, 1 comparing MRI to no imaging; very low quality; n=506 and 3022) demonstrated no clinical difference or clinical benefit favouring no imaging for healthcare utilisation outcomes at > 4 months.

No data were available for responder criteria or adverse events.

7.5.1.2 Imaging versus no imaging or deferred imaging for low back pain with or without sciatica

Evidence from 1 cohort study (within 6 weeks of index visit) showed imaging (X-ray, MRI or CT) to have no clinically important difference when compared to no imaging or deferred imaging on the critical outcomes health-related quality of life (EQ-5D), pain severity and function, both at short and long term follow ups (very low quality; n=5239). The same was true for healthcare utilisation when comparing imaging and no imaging or deferred imaging, in some cases, healthcare utilisation was less in the groups that did not receive imaging (1 cohort study, very low quality; n=1770).

No data were available for the critical outcome of psychological distress, responder criteria or adverse events.

7.5.1.3 Imaging versus no imaging or deferred imaging for low back pain without sciatica

Evidence from a single cohort study comparing MRI (within 6 weeks of injury) to no imaging or deferred imaging (MRI > 6 weeks of injury) indicated clinical benefit of no imaging or deferred

imaging in quality of life (SF-36 physical functioning and role-physical) and function outcomes at ≥4 months. No clinical difference between imaging and no imaging or deferred imaging was found in pain severity at ≥4 months (all outcomes rated as very low quality; n=1226).

No data were available for psychological distress or any of the important outcomes.

7.5.1.4 Imaging versus deferred imaging for low back pain with or without sciatica

Evidence from a single cohort study (n=3022) comparing early MRI (within the first 30 days post-onset) to deferred MRI (41-180 days post-onset) suggested clinical benefit of deferred imaging for most healthcare utilisation outcomes reported at both ≤4 and ≥4 months. No clinical difference between imaging and deferred imaging was seen in healthcare utilisation of injections at ≤4 months and nerve testing at > 4 months (very low quality).

No data were available for any critical outcome or any of the other important outcomes.

7.5.1.5 Imaging versus no imaging or deferred imaging for sciatica

Evidence from a single cohort study comparing MRI (within 6 weeks of injury) to no imaging or deferred imaging (no MRI or MRI after 6 weeks of injury) showed clinical benefit favouring of the latter for quality of life (SF-36 physical functioning and role-physical) and function at > 4 months (very low quality, n=1226). No clinically important difference was demonstrated in pain severity at > 4 months.

No data were available for the outcome of psychological distress or any of the important outcomes.

7.5.2 Economic

- One cost-utility analysis found that early imaging is cost effective compared to delayed, selective imaging (ICER: £1,527 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.

7.6 Recommendations and link to evidence

Recommendations	**3. Do not routinely offer imaging in a non-specialist setting for people with low back pain with or without sciatica.** **4. Explain to people with low back pain with or without sciatica that if they are being referred for specialist opinion, they may not need imaging.** **5. Consider imaging in specialist settings of care (for example, a musculoskeletal interface clinic or hospital) for people with low back pain with or without sciatica only if the result is likely to change management.** **6. Think about alternative diagnoses when examining or reviewing people with low back pain, particularly if they develop new or changed symptoms. Exclude specific causes of low back pain, for example, cancer, infection, trauma or inflammatory disease such as spondyloarthritis. If serious underlying pathology is suspected, refer to relevant NICE guidance on:** • **Metastatic spinal cord compression in adults** • **Spinal injury**

	• **Spondyloarthritis** • **Suspected cancer**
Relative values of different outcomes	The GDG agreed that health-related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (for pain and function), adverse events and healthcare utilisation were also considered as important. There was also no evidence in this review for adverse events or responder criteria for any of the comparisons.
Trade-off between clinical benefits and harms	**Low back pain with or without sciatica population** The GDG noted that for the comparison of imaging versus no imaging, a substantial amount of the evidence came from a single RCT which was carried out in a secondary care setting. Although there was some evidence of clinical benefit of imaging from this study, this was contrary to the evidence from cohort studies which reported imaging to have no clinical benefit over no imaging. The GDG were surprised at this discrepancy and suggested this could at least in part be due to the heterogeneous nature of low back pain. The GDG also noted that the only evidence for the comparison of imaging versus no imaging or deferred imaging came from 2 cohort studies, with the majority of outcomes showing imaging to have no substantial benefit over no or deferred imaging. Furthermore, for the comparison of imaging versus deferred imaging there was only evidence from a single cohort study, which just reported healthcare utilisation outcomes, showing clinical benefit of deferred imaging. **Low back pain without sciatica population** All the evidence for the comparison of imaging versus no imaging or deferred imaging came from a single cohort study. No clinical benefit of imaging was demonstrated, however clinical benefit on health-related quality of life, pain severity and function was observed in the group who either did not have any imaging or deferred imaging, at greater than 4 months. **Sciatica population** The GDG observed that all evidence for the comparison of imaging versus no imaging, or deferred imaging, came from a single cohort study only reporting outcomes at > 4 months. There was some clinical benefit observed with no imaging or deferred imaging compared to early imaging. **Summary** The GDG noted that for most of the comparisons, there was limited evidence from a small number of studies. Furthermore, the GDG acknowledged that a considerable amount of evidence came from cohort studies, and discussed the difficulty in determining cause and effect in interpreting outcomes. A number of further limitations were noted by the GDG; the available evidence could be outdated, as x-rays were the imaging modality studied in most papers, rather than MRI. One RCT used bed rest as concomitant treatment to imaging. Furthermore, the evidence from 3 studies would not necessarily be applicable to the UK healthcare setting where data relating to quality of life and healthcare utilisation were collected from US settings of care (for example, workers' complaints registers). Therefore the GDG concluded that there was no clear benefit for imaging all people presenting with low back pain. The GDG observed that most of the evidence in favour of imaging was obtained from a single RCT performed in a secondary setting of care. It was considered that primary care clinicians might be less likely to be experts in musculoskeletal evaluation compared to clinicians within specialist settings of care and as such, have a greater degree of diagnostic uncertainty. As the level of diagnostic uncertainty in specialist settings is likely to be lower, the GDG agreed that imaging should not be carried out in primary care but in specialist settings of care only, for example, a musculoskeletal

	interface clinic or hospital. The GDG further discussed that the positive results in this setting were only from one study and that the findings could not be generalised to all patients with low back pain and/or sciatica. The GDG agreed that imaging should be performed based on clinical appropriateness. It was discussed that imaging is often unable to confirm or refute a provisional diagnosis and that many of the imaging findings some would associate with low back pain causation (for example; disc and joint degeneration) are frequently found in asymptomatic individuals. In view of the limited and conflicting evidence, the GDG agreed that imaging should only be carried out where it was likely to change future management of the condition (for example if epidural or spinal surgery was being considered), and not in response to diagnostic uncertainty. In instances where imaging was not likely to change management, it was considered that people might accept the decision not to image more readily from expert specialist clinicians. It was agreed that the evidence reviewed was sufficient to recommend advising against the routine use of imaging within a non-specialist setting in this population. The GDG noted that people often seek imaging for reassurance, as they lack confidence in a clinical diagnosis. However, on the basis of the clinical and cost-effectiveness evidence reviewed, the GDG discussed that imaging in this circumstance would not be appropriate. The GDG were concerned that the recommendation that imaging should only be performed in specialist settings of care could lead to referrals with the expectation that imaging would be performed. The GDG therefore advised that health professionals should make it clear that if they are to refer to a specialist service, they do so primarily for a clinical opinion and not necessarily for imaging.
Trade-off between net clinical effects and costs	One relevant economic evaluation was included that considered imaging compared to no imaging/delayed imaging for people with low back pain with or without sciatica. This was based on the RCT by Gilbert et al. (2004) included in the clinical review.[164,165] This within-trial analysis found that the early imaging with MRI or CT as soon as practicable increased costs and improved health (increased QALYs) compared with a delayed selective imaging (no imaging unless a clear clinical indication developed), with an incremental cost-effectiveness ratio of £1,527per QALY gained. The probability that early imaging is cost effective at the £20,000 per QALY threshold was around 90%. The analysis only reflected the effectiveness evidence from 1 RCT included in the clinical review whereas other studies were identified. The GDG noted that the conclusions of this study were not consistent with cohort studies evidence, which indicated no clinically important difference or clinically important benefit favouring no imaging. They also noted that in this study patients received a more accurate test (MRI or CT) compared to other studies where they received x-rays. The GDG discussed the opportunity cost of providing imaging with MRI to people with low back pain, which could result in a longer wait for imaging or treatments for other conditions. They also discussed the cause for the higher QALY gain in the imaging arm of the included economic study and concluded that this could be the alteration in management following from the imaging test. The population of this study was also discussed; the fact that this was people in a secondary care setting was considered important as the results may be different for people presenting in a primary care setting. For these reasons the GDG considered imaging unlikely to be cost effective in a primary care setting, while it could be cost effective in those cases where imaging in specialist settings of care could lead to a change in management.
Quality of evidence	For the majority of evidence in this review, the quality ranged from a GRADE rating of low to very low. This was due to the high number of drop outs or crossover of participants from each group resulting in a high risk of bias rating, as well as the imprecise nature of the results extracted and analysed in this review. For 2 of the

	intervention trials, data were only reported as median and interquartile range for pain, function and health-related quality of life and therefore conclusions on the efficacy based on these outcomes could not be made with any degree of certainty. A considerable amount of evidence was extracted from cohort studies, which scored a very low GRADE quality rating. The economic analysis was judged to be partially applicable with potentially serious limitations.
Other considerations	The GDG discussed which people with low back pain should be imaged. The presence of symptoms or signs suggestive of possible serious underlying pathology (red flags), including a past history of cancer or trauma may warrant early imaging, however it is beyond the scope of this guideline to review the use of imaging for these conditions. The GDG noted that when imaging is requested from primary care, it is often for x-ray. However, the GDG discussed that MRI is more likely to change management than x-rays. Thus they debated in which setting (i.e. primary care or secondary care) and for what reason (e.g. diagnosis or treatment pathway) should imaging be delivered to people with back pain and agreed it should be in a specialist setting of care only, for example, a musculoskeletal interface clinic or hospital. The GDG agreed on the importance of considering alternative diagnoses when examining and reviewing people with low back pain or sciatica. Similarly, the GDG recognised that new or changed signs and symptoms could suggest alternative diagnoses and may be an indication of possible serious underlying pathology. They discussed that health professionals should make people aware that they should seek further advice if people developed new or changed symptoms, and agreed to make a consensus recommendation in this regard.

8 Self-management

8.1 Introduction

The majority of episodes of low back pain are expected to improve within a few days or weeks with a return to normal activity. However, if the pain does not resolve and becomes long term, it can impact on people's physical condition and their ability to undertake normal activities of daily living. Back pain can affect their mood and confidence and can become increasingly distressing.

Low back pain is difficult to define accurately and people often have descriptions for their symptoms, in the manner of a syndrome, rather than a definitive diagnosis. This lack of a clear definition can result in increasing confusion, distress and, for many people, may result in an inability to adopt positive coping strategies. This can quickly result in vicious cycles of physical deconditioning, low mood, withdrawal from normal activity and increased anxiety.

These factors can often place the management of chronic low back pain largely outside the scope of a biomedical approach. There is often a difficult transition from the familiar ontology of curative medicine, into the unknown territory of self-management and counter-intuitive ideas such as 'living well' with a long-term health condition.[221] The quality of life for people in this situation depends less on interventions from health professionals and more on the ability of the person to undertake self-management.[477,523]

This review intends to review the evidence for self-management for low back pain and sciatica and includes self management advice, self management programmes and the effectives of written information and unsupervised exercise regimes.

8.2 Review question: What is the clinical and cost effectiveness of self-management in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 33: PICO characteristics of review question

Population	People aged 16 or above with non-specific low back pain People aged 16 or above with sciatica
Intervention(s)	• Self-management programmes (including patient education and reassurance for example, the Back Book) • Advice to stay active • Advice to bed rest • Unsupervised exercise (including exercise prescription, advice to exercise at home)
Comparison(s)	• Placebo/sham/attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry

	disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

8.3 Clinical evidence

8.3.1 Summary of studies included – single interventions

Twenty-eight studies were included in the review, 3 of which included in multiple papers for a total of 32 papers.[37, 47, 73, 72, 74, 129, 166, 186, 188, 206, 209, 216, 225, 227, 242, 274, 310, 315, 323, 395, 402, 411, 416, 424, 448, 451, 464, 491, 527, 545, 546, 560] These are summarised in **Table 34** below. Pengel et al. 2007 is also included in the chapter on Multidisciplinary biopsychosocial rehabilitation programmes (See Chapter 17).[402] Evidence from these studies is summarised in the clinical evidence summaries below. See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Five Cochrane reviews on self-management were identified but could not be included for the following reasons:

- the review was withdrawn from publication;[189,218]
- the stratification of people with low back pain, low back pain with or without sciatica and sciatica was unclear;[130]
- the review included studies in people with thoracic as well as lumbar back pain;[517]
- the review[102] included studies on intraclass comparison, for example a comparison of shorter or longer bed rest.

The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol.

8.3.2 Summary of studies included – combined interventions

Seven studies (1 included into 2 papers for a total of 8papers) [4 7,117,137,182,188,225,310] looking at combinations of non-invasive interventions (with self-management as the adjunct) were also included in this review. These are summarised in **Table 35**below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below. See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L. The Ferreira et al. study and Little et al. are also included in the manual therapy chapter (See Chapter 12).[137,225,310]

8.3.3 Heterogeneity

For the comparison of self-management programmes versus usual care, there was substantial heterogeneity between the studies when they were meta-analysed for the following outcomes: Pain (VAS and VonKorff 0-10) and for function (RMDQ/ODI) at ≤4 months. Pre-specified subgroup analyses (different within-class modalities, and chronicity of pain) were unable to be performed on this outcome because the studies were not different in terms of these factors. A random effects meta-

analysis was therefore applied to these two outcomes, and the evidence was downgraded for inconsistency in GRADE.

Table 34: Summary of studies included in the review – single intervention

Study	Intervention/comparison	Population	Outcomes	Comments
Self-management programmes				
Cherkin 1996A[73]	Booklet Nurse session + booklet Usual care (no extra intervention)	Low back pain with or without sciatica N=294 Study duration: one-off intervention (1 year follow up) Usa	Function (RMDQ) Healthcare utilisation (consultation for back pain)	Concurrent treatment: not stated Function outcome was reported in a format that could not be meta-analysed
Cherkin 1998 [72]	Booklet Mckenzie exercises	Low back pain without sciatica N=321 Study duration: 1 month treatment Usa	Function (RMDQ)	Concurrent treatment: most patients taking medication for low back pain
Cherkin 2001 [74]	Education (booklet + videos) Acupuncture Massage	Low back pain without sciatica N=262 Study duration: 10 weeks treatment Usa	Function (RMDQ) Healthcare utilisation (provider visits; low back pain medication fills)	Concurrent treatment: not stated
Gilbert 1985 [166]	Self-management - bed rest + exercise Self-management - unsupervised exercise Bed rest Usual care: allowed minor (muscle relaxants or <8 aspirins/day) or major (NSAID or >8 aspirins/day) analgesics.	Low back pain with or without sciatica N=262 Study duration: median 12 days Canada	Responder criteria (no pain)	Also had a bed rest group versus usual care (see Table 4 below) Concurrent treatment: as for usual care
Haas 2005A [186]	Self-management (skills building, problem solving etc.) Waiting list	Low back pain with or without sciatica N=109 Study duration: 6 weeks Usa	Pain (von Korff) Function (von Korff) Quality of life (SF-36) Healthcare utilisation (consultation for back pain)	Concurrent treatment: not stated
Hazard 2000 [206]	Booklet Usual care (no pamphlet)	Low back pain N=489 Study duration: one-off treatment	Function (number of people not working)	Concurrent treatment: not stated

Study	Intervention/comparison	Population	Outcomes	Comments
		(6 month follow-up) Usa		
Hemmila 2002 [209]	Exercise+ stretching+ booklet Manual therapy – combination of techniques (manual manipulation excluding mobilisation + thermal+ electrotherapy) Manual therapy - mobilisation (bone-setting)	Low back pain without sciatica N=132 Study duration: 6 weeks Finland	Function (ODI) Healthcare utilisation (visits to healthcare centres)	Concurrent treatment: Massage, specific mobilizations, and manual (nut not manipulations with impulse) were allowed. Individual autostretching exercises were added when appropriate in the combined therapy group. None mentioned in the other groups.
Irvine 2015[242]	Self-management programme (fitback, online education and behavioural strategies with a cognitive behavioural approach) Self-management programme (online; patient had choice of websites to visit for education) Usual care (no treatment given. Emails sent to complete assessments)	Low back pain with or without sciatica N=597 Study duration: 4 months Usa	No relevant outcomes reported	Concurrent treatment: not stated
Lorig 2002 [315]	Email discussion group, booklet and videotape Usual care (subscription to non-health magazine)	Low back pain with or without sciatica N=580 Study duration: 1 year Usa	Function (RMDQ) Healthcare utilisation (physician visits for back pain; chiropractor visits for back pain; physical therapy visits for back pain; hospital days)	Concurrent treatment: Not stated
Paatelma 2008 [395] (Kilpikoski 2009[274])	Counselling from physiotherapist, avoid bed rest, early return to work Mckenzie exercise	Low back pain with or without sciatica N=134 Study duration unclear Finland	Pain Function	Concurrent treatment: not stated
Pengel 2007[402]	Advice sessions Sham advice	Low back pain with or without sciatica	Pain (VAS) Function	Advice sessions aimed to encourage a graded

Study	Intervention/comparison	Population	Outcomes	Comments
	Note: other arms/comparisons in this trial have been included in the MBR review	N=260 6 weeks treatment Australia and new zealand	(RMDQ)	return to normal activities. The physiotherapist explained the benign nature of low back pain, addressed any unhelpful beliefs about back pain, and emphasized that being overly careful and avoiding light activity would delay recovery. Concurrent treatment: sham exercise - the control for the exercise intervention consisted of sham pulsed ultrasonography (5 minutes) and sham pulsed short-wave diathermy (20 minutes).
Rantonen 2012[411]	Booklet (back book) Exercise (biomechanical) Note: other arms/comparisons in this trial have been included in the MBR review	Low back pain and sciatica N=126 12 weeks treatment Finland	Pain (VAS) Function (ODI) Quality of life (15-d)	Concomitant treatment: both groups had access to occupational health care as usual during the study period. The exercise group also were encouraged to participate in home exercises.
Roland 1989 [424]	Booklet Usual care (not stated)	Low back pain with or without sciatica N=936 Study duration: one-off treatment (1 year follow-up) Uk	Healthcare utilisation (hospitalisation)	Concurrent treatment: not stated
Sherman 2005 [448] (Horng 2006[227])	Booklet Yoga Exercise	Low back pain without sciatica N=101 Study duration: 12 weeks Usa	Responder criteria (>50% improvement in RMDQ) Healthcare utilisation (medication use in previous	Concurrent treatment: patients retained access to all medical care provided by their insurance plan

Study	Intervention/comparison	Population	Outcomes	Comments
			week)	
Sparkes 2012 [464]	Booklet Usual care (waiting list)	Low back pain with or without sciatica N=62 Study duration: one-off treatment (mean in each group 17 and 24 days respectively) Uk	Pain (VAS) Function (ODI)	Concurrent treatment: not stated
Zhang 2014[560]	Education sessions Usual care (supervised exercise programme)	Low back pain with or without sciatica N=54 Study duration: 12 weeks China	Pain (VAS) Function (RMDQ) Quality of life (SF-36)	Concurrent treatment: usual care was also given in the intervention arm
Advice to stay active				
Hagen 2000A [188]	Advice to stay active Usual care (GP care)	Low back pain with or without sciatica on sick leave N=457 Study duration: 12 months Norway	No relevant outcomes reported	The only outcome reported is return to work (not in the protocol) Concurrent treatment: not stated
Wiesel 1980 [545]	Advice to stay active Advice to bed rest	Low back pain without sciatica N=200 Study duration: 14 days Usa	Days to full activity	Concurrent treatment: one acetaminophen tablet twice daily
Wilkinson 1995 [546]	Advice to stay active Advice to bed rest	Low back pain with or without sciatica N=42 Study duration: 48 hours Uk	Function (RMDQ)	Concurrent treatment: ibuprofen or, if this was contraindicated, co-proxamol for analgesia. Subjects did not receive physiotherapy during the trial, and other treatments, including self-remedies and physical therapies (apart from local application of heat), were discouraged.
Advice to bed rest				

Study	Intervention/comparison	Population	Outcomes	Comments
Gilbert 1985 [166]	Bed rest Usual care: allowed minor (muscle relaxants or <8 aspirins/day) or major (NSAID or >8 aspirins/day) analgesics.	Low back pain with or without sciatica N=262 Study duration: median 12 days Canada	Responder criteria (no pain)	Concurrent treatment: as for usual care
Malmivaaara 1995[323]	Bed rest Unsupervised exercise Usual care (avoid bed rest and advised to continue their routines as actively as possible)	Low back pain with or without sciatica N=186 2 days intervention Finland	Function (ODI)	Concurrent treatment: none given except unsupervised exercise group were given usual care. Quality of life outcome not suitable for extraction.
Vroomen 1999 [527]	Bed rest Usual care (instructed to be up and about whenever possible but to avoid straining the back or provoking pain. They were allowed to go to work, but bed rest was not prohibited.)	Low back pain with sciatica N=183 Study duration: 2 weeks Netherlands	Pain (VAS) Function (ODI)	Concurrent treatment: allowed to take acetaminophen (1000 mg three times a day) for pain, supplemented by codeine (10 to 40 mg six times a day) or naproxen (500 mg three times a day) when necessary. Temazepam (10 mg once daily) was prescribed for insomnia. Patients were asked to record any other treatments they used for radicular symptoms, although these were discouraged.
Unsupervised exercise				
Bentsen 1997 [37]	Unsupervised exercise. Exercise	Low back pain N=74 Study duration: 3 months Sweden	Function (subjective disability index)	Concurrent treatment: not stated Data was provided in a format that could not be meta-analysed.
Brandt 2015[47]	Unsupervised exercise Usual care	Low back pain with or without sciatica N=13	Function (Modified ODI (MODI))	Concurrent treatment: not stated Usual care:

Study	Intervention/comparison	Population	Outcomes	Comments
		Study duration: 12 weeks Usa		continuation of the subjects' prestudy exercise regiment Data was provided in a format that could not be meta-analysed.
Hernandez-Reif 2001 [216]	Unsupervised exercise Massage	Low back pain without sciatica N=24 Study duration: 5 weeks Usa	Pain (McGill)	Concurrent treatment: not stated
Little 2008A[310](Ehrlich 2009[129], Hollinghurst 2008[225])	Unsupervised exercise plus usual care Usual care (no details reported) Massage Alexander technique (6 sessions) Alexander technique (24 sessions)	Low back pain without sciatica N=579 Study duration: 3 weeks – 5 months Uk	Pain (von Korff) Function (RMDQ) Quality of life (SF-36)[(a)]	Concurrent treatment: not stated
Malmivaaara 1995[323]	Bed rest Unsupervised exercise Usual care (avoid bed rest and advised to continue their routines as actively as possible)	Low back pain with or without sciatica N=186 2 days intervention Finland	Function (ODI)	Concurrent treatment: none given except unsupervised exercise group were given usual care. Quality of life outcome not suitable for extraction.
Reilly 1989 [416]	Unsupervised exercise Mixed exercise (biomechanical + aerobic)	Low back pain with or without sciatica N=40 Study duration: 6 months Usa	Pain (number of pain relapses)	Concurrent treatment: not stated
Shirado 2010 [451]	Unsupervised exercise NSAID	Low back pain without sciatica N=201 Study duration: 8 weeks Japan	Pain (VAS) Function (RMDQ) Quality of life (Japan low back pain evaluation questionnaire)	Concurrent treatment: not stated Data was reported in a format not suitable for meta-analysis
Torstensen 1998 [491]	Unsupervised exercise Exercise	Low back pain with or without	Pain (VAS) Function (ODI)	Concurrent treatment: not

Study	Intervention/comparison	Population	Outcomes	Comments
		sciatica N=141 Study duration: 3 months Norway	Return to work	stated

Table 35: Summary of studies included in the review: combinations of interventions (self-management adjunct)

Study	Intervention/comparison	Population	Outcomes	Comments
Adamczyk 2009[4]	Physical (taping), self-management + exercise Electrotherapy + exercise	Low back pain with or without sciatica N= 60 Duration of intervention and follow-up not stated Poland	Pain severity (VAS/NRS)	Concomitant treatment: not stated Data was reported in a format not suitable for meta-analysis
Alayat 2014[7]	Electrotherapy (hilt laser) + self-management (unsupervised exercise) Self-management (unsupervised exercise) + placebo laser therapy Electrotherapy (hilt laser therapy)	Low back pain with or without sciatica N=72 4 weeks intervention + 12 weeks follow up Saudi arabia	Pain severity (VAS) Function (RMDQ, modi)	Concomitant treatment: not stated
Djavid 2007[117]	Combined non-invasive interventions: electrotherapy (laser) + self-management (unsupervised exercise) Self-management (exercise =biomechanical - core stability) Electrotherapy (laser)	Low back pain with or without sciatica N=61 6 weeks intervention + 12 weeks follow up Iran	Pain severity (VAS) Function (ODI)	Concomitant treatment: not stated
Ferreira 2010[137]	Self-management (education) + exercise (biomechanical) Biomechanical exercise (motor control)	Low back pain with or without sciatica N=34 Study duration: 8 weeks Australia	Pain (VAS) Function (RMDQ)	Concurrent treatment: not stated Other comparisons included in the manual therapy chapter
Gur 2003[182]	Electrotherapy (laser) + exercise Electrotherapy (laser) Exercise (biomechanical - core stability)	Low back pain with or without sciatica N=75 4 weeks intervention Turkey	Pain severity (VAS) Function (RMDQ; Modified ODI (MODI))	Concomitant treatment: not stated
Hagen	Education; self-	Low back pain	Study meets	Concomitant

Study	Intervention/comparison	Population	Outcomes	Comments
2000a[188]	management; home exercise Usual care (primary health care; had at least one visit to GP to obtain sick leave.)	with or without sciatica N=457 Immediate Norway	all inclusion criteria for the review, but does not report any relevant outcomes	treatment: not stated
Little 2008a (ATEAM) Hollingshurt 2008 [225,310]	Self-management (exercise prescription) + 6 sessions alexander technique Self-management (exercise prescription)+ 24 sessions alexander technique 6 alexander technique lessons 24 alexander technique lessons Self-management (exercise prescription)manual therapy (soft tissue techniques – massage) Usual care: details not specified Manual therapy (massage) + self-management (home exercise)	Low back pain without sciatica N=579 9 months intervention + 1 year follow up) Uk	Quality of life (SF-36 and eq-5d)[(a)] Pain severity (von Korff pain scores) Function (RMDQ) Healthcare utilisation (primary care contacts, number of prescriptions)	Concomitant treatment: not stated. For usual care: no exercise prescription given

(a) EQ-5D was collected but not reported by study apart from as QALYs in economic analysis (see 8.4))

8.3.4 Data not suitable for meta-analysis

Table 36: Single interventions

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Unsupervised exercise versus exercise (core stability)						
Bentsen 1997 [37]	Function (Subjective disability index) ≤ 4 months	Mean change score: -5.15	N=28	Mean change score: -6.75	N=40	Very high
Unsupervised exercise versus usual care						
Brandt 2015[47]	Function (MODI, 0-100) ≤ 4 months	Mean change score: -4.8	N=6	Mean change score: +1.7	N=7	Very high
Booklet versus usual care						
Cherkin 1996A[73]	Function (RMDQ, 0-24) ≤ 4 months	Mean change score: -5.4	N=100	Mean change score: -5.3	N=93	Very high
Booklet + nurse versus usual care						
Cherkin 1996A[73]	Function (RMDQ, 0-24) ≤ 4 months	Mean change score: -5.2	N=93	Mean change score: -5.3	N=93	Very high
Unsupervised exercise versus diclofenac						
Shirado 2010 [451]	Quality of life (Japan low back pain evaluation questionnaire, 0-120) ≤ 4 months	Change score (median; 25th and 75th percentiles): -0.58 (-0.78 to -0.33)	N=103	Change score (median; 25th and 75th percentiles): -0.44 (-0.75 to -0.17)	N=98	High
Shirado 2010 [451]	Pain severity (VAS, 0-10) ≤ 4 months	Change score (median; 25th and 75th percentiles): -0.44 (-0.73 to -0.15)	N=103	Change score (median; 25th and 75th percentiles): -0.35 (-0.67 to -0.02), 0.332	N=98	High
Shirado 2010 [451]	Function (RMDQ, 0-	Change score	N=103	Change score	N=98	Very high

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
	24) ≤ 4 months	(median; 25th and 75th percentiles): -0.72 (-1.00 to -0.33)		(median; 25th and 75th percentiles): -0.47 (-1.00 to 0)		

Table 37: Combined interventions - Physical (taping) plus self-management plus exercise versus electrotherapy plus exercise

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Adamczyk 2009[4]	Pain (VAS, 0-10) at end of treatment (duration not stated)	Mean: 0.3333	N=30	Mean: 7.1333	N=30	Very high

8.3.5 Clinical evidence summary tables

Table 38: Self-management programme versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus usual care (95% CI)
Quality of life (SF-36 physical component summary, 0-100) ≤ 4 months	49 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 physical component summary, 0-100) ≤ 4 months in the control groups was 63.68	The mean quality of life (SF-36 physical component summary, 0-100) ≤ 4 months in the intervention groups was 27.24 higher (16.41 to 38.07 higher)
Quality of life (SF-36 mental component summary, 0-100) ≤ 4 months	49 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 mental component summary, 0-100) ≤ 4 months in the control groups was 82.35	The mean quality of life (SF-36 mental component summary, 0-100) ≤ 4 months in the intervention groups was 7.49 higher (0.16 to 14.82 higher)
Quality of life (SF-36 energy domain, 0-100) > 4 months	80 (1 study)	LOW[a,b] due to risk of bias,		The mean quality of life (SF-36 energy domain, 0-100) > 4 months in	The mean quality of life (SF-36 energy domain, 0-100) > 4 months in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus usual care (95% CI)
		imprecision		the control groups was -1.6	intervention groups was 5.9 higher (4.33 lower to 16.13 higher)
Quality of life (SF-36 well-being domain, 0-100) > 4 months	80 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 well-being domain, 0-100) > 4 months in the control groups was -2.5	The mean quality of life (SF-36 well-being domain, 0-100) > 4 months in the intervention groups was 8.5 higher (0.35 to 16.65 higher)
Quality of life (SF-36 general health domain, 0-100) > 4 months	80 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 general health domain, 0-100) > 4 months in the control groups was 3.2	The mean quality of life (SF-36 general health domain, 0-100) > 4 months in the intervention groups was 4.4 lower (11.33 lower to 2.53 higher)
Pain severity (low back pain, VAS 0-10) ≤ 4 months	106 (2 studies)	VERY LOW[a,c] due to risk of bias, inconsistency		The mean pain severity (low back pain, VAS 0-10) ≤ 4 months in the control groups was 1.54	The mean pain severity (low back pain, VAS 0-10) ≤ 4 months in the intervention groups was 0.16 lower (0.81 lower to 0.49 higher)
Pain severity (low back pain, modified von Korff 0-10) > 4 months	101 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (low back pain, VAS 0-10) > 4 months in the control groups was -0.67	The mean pain severity (low back pain, VAS 0-10) > 4 months in the intervention groups was 0.1 lower (1.07 lower to 0.87 higher)
Function (modified von Korff, 0-100) >4 months	101 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean Function (modified von Korff 0-100) >4 months in the control groups was -4.2	The mean Function (modified von Korff 0-100) >4 months in the intervention groups was 8.0 lower (19.28 lower to 3.28 higher)
Function (number not working) >4	419	VERY LOW[a,b]	RR	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus usual care (95% CI)
months	(1 study)	due to risk of bias, imprecision	1.09 (0.51 to 2.29)	59 per 1000	5 more per 1000 (from 29 fewer to 76 more)
Function (RMDQ/ODI) ≤ 4 months	106 (2 studies)	VERY LOW[a,b,d] due to risk of bias, inconsistency, imprecision		The mean function (RMDQ/ODI) ≤ 4 months in the control groups was 12.17	The mean function (RMDQ/ODI) ≤ 4 months in the intervention groups was 0.02 lower (0.78 lower to 0.73 higher)
Function (RMDQ, 0-24)> 4 months.	421 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ) >4 months in the control groups was -1.51	The mean function (RMDQ) >4 months in the intervention groups was 1.26 lower (2.18 to 0.34 lower)
Responder criteria (no pain) ≤ 4 months	122 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.04 (0.83 to 1.29)	Moderate	
				717 per 1000	29 more per 1000 (from 122 fewer to 208 more)
Responder criteria (no pain) > 4 months	113 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.89 (0.66 to 1.19)	Moderate	
				648 per 1000	71 fewer per 1000 (from 220 fewer to 123 more)
Healthcare utilisation (consultation for back pain) > 4 months	1304 (4 studies)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.86 (0.74 to 1.01)	Moderate	
				227 per 1000	32 fewer per 1000 (from 59 fewer to 2 more)
Healthcare utilisation (hospitalisation)	936	VERY LOW[a,b]	RR	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus usual care (95% CI)
> 4 months	(1 study)	due to risk of bias, imprecision	0.54 (0.26 to 1.13)	42 per 1000	19 fewer per 1000 (from 31 fewer to 5 more)
Healthcare utilisation (physician visits for back) > 4 months	421 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (physician visits for back) > 4 months in the control groups was -0.65	The mean healthcare utilisation (physician visits for back) > 4 months in the intervention groups was 0.89 lower (1.63 to 0.15 lower)
Healthcare utilisation (chiropractor visits for back) > 4 months	421 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (chiropractor visits for back) > 4 months in the control groups was -0.797	The mean healthcare utilisation (chiropractor visits for back) > 4 months in the intervention groups was 0.52 lower (2.52 lower to 1.47 higher)
Healthcare utilisation (physical therapist visits for back) > 4 months	421 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (physical therapist visits for back) > 4 months in the control groups was -1.31	The mean healthcare utilisation (physical therapist visits for back) > 4 months in the intervention groups was 0.68 lower (2.16 lower to 0.8 higher)
Healthcare utilisation (hospital days) > 4 months	421 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (hospital days) > 4 months in the control groups was 0.04	The mean healthcare utilisation (hospital days) > 4 months in the intervention groups was 0.24 lower (0.48 lower to 0 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

(c) Downgraded by 1 or 2 increments because of heterogeneity, I^2=54%, p=0.14, unexplained by subgroup analysis

(d) Downgraded by 2 increments because of heterogeneity, I^2=74%, p=0.05, unexplained by subgroup analysis

Table 39: Self-management programme versus sham in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus sham (95% CI)
Pain severity (VAS 0-10) ≤ 4 months	131 (1 study)	LOW[a] due to risk of bias, imprecision		*	The mean pain severity (low back pain 0-10) ≤ 4 months in the intervention groups was 0.6 lower (1.2 lower to 0 higher)
Pain severity (VAS 0-10) >4 months	131 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean pain severity (low back pain 0-10) >4 months in the intervention groups was 0.4 lower (1 lower to 0.2 higher)
Function (RMDQ, 0-24) ≤ 4 months	131 (1 study)	MODERATE[a] due to risk of bias		*	The mean function (RMDQ) ≤ 4 months in the intervention groups was 0.9 lower (2.1 lower to 0.3 higher)
Function (RMDQ, 0-24) >4 months	131 (1 study)	MODERATE[a] due to risk of bias		*	The mean function (RMDQ) >4 months in the intervention groups was 0.6 lower (1.9 lower to 0.7 higher)
* Control event rates not given, only mean difference reported by study					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the 95% CI crossed 1 MID, and downgraded by 2 increments if the 95% CI crossed both MIDs

Table 40: Self-management programme versus bed rest in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus bed rest (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus bed rest (95% CI)
Responder outcome (no pain) ≤ 4 months	119 (1 study)	MODERATE[a] due to risk of bias	RR 0.96 (0.78 to 1.18)	Moderate	
				772 per 1000	31 fewer per 1000 (from 170 fewer to 139 more)
Responder outcome (no pain) > 4 months	112 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.95 (0.7 to 1.3)	Moderate	
				604 per 1000	30 fewer per 1000 (from 181 fewer to 181 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 41: Self-management programme versus exercise in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus exercise (95% CI)
Pain severity (VAS, 0-10) ≤ 4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS, 0-10) ≤ 4 months in the control groups was 3.1	The mean pain severity (VAS, 0-10) ≤ 4 months in the intervention groups was 0.4 higher (0.65 lower to 1.45 higher)
Pain severity (VAS, 0-10) >4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS, 0-10) >4 months in the control groups was 2.9	The mean pain severity (VAS, 0-10) >4 months in the intervention groups was 1 higher (0.02 lower to 2.02 higher)
Function (ODI, 0-100) ≤ 4 months	83 (1 study)	LOW[a,b] due to risk of bias,		The mean function (ODI 0-100) ≤ 4 months in the control groups was	The mean function (ODI 0-100) ≤ 4 months in the intervention groups was

		imprecision		14	2 higher (2.52 lower to 6.52 higher)
Function (ODI, 0-100) >4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI 0-100) >4 months in the control groups was 12	The mean function (ODI 0-100) >4 months in the intervention groups was 2 higher (3.02 lower to 7.02 higher)
Quality of life (15-D, 0-1) ≤ 4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (15-d, 0-1) ≤ 4 months in the control groups was 0.9	The mean quality of life (15-d, 0-1) ≤ 4 months in the intervention groups was 0.01 lower (0.04 lower to 0.02 higher)
Quality of life (15-D, 0-1) >4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (15-d, 0-1) >4 months in the control groups was 0.9	The mean quality of life (15-d, 0-1) >4 months in the intervention groups was 0.02 lower (0.05 lower to 0.01 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the 95% CI crossed 1 MID, and downgraded by 2 increments if the 95% CI crossed both MIDs

Table 42: Self-management programme versus exercise in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus exercise (95% CI)
Function (RMDQ, 0-24) ≤ 4 months	180 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 4.1	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 0.2 higher (1.3 lower to 1.7 higher)
Responder criteria (>50% improvement in RMDQ) ≤ 4 months	60 (1 study)	LOW[b] due to risk of bias, imprecision	RR 0.6 (0.31 to 1.15)	Moderate	
				500 per 1000	200 fewer per 1000 (from 345 fewer to 75 more)
Healthcare utilisation (medication	61	VERY LOW[a,b]	RR	Moderate	

use) > 4 months	(1 study)	due to risk of bias, imprecision	1.17 (0.74 to 1.86)	500 per 1000	85 more per 1000 (from 130 fewer to 430 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 43: Self-management programme versus massage in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus massage (95% CI)
Function (RMDQ, 0-24) ≤ 4 months	160 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 6.3	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 2.5 higher (0.65 to 4.35 higher)
Function (RMDQ, 0-24) > 4 months	159 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) > 4 months in the control groups was 6.8	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 0.4 lower (2.23 lower to 1.43 higher)
Healthcare utilisation (provider visits) > 4 months	159 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (provider visits) > 4 months in the control groups was 1	The mean healthcare utilisation (provider visits) > 4 months in the intervention groups was 0.5 higher (0.48 lower to 1.48 higher)
Healthcare utilisation (low back pain medication fills) > 4 months	159 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (low back pain medication fills) > 4 months in the control groups was 2.5	The mean healthcare utilisation (low back pain medication fills) > 4 months in the intervention groups was 1.5 higher (0.52 lower to 3.52 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 44: Self-management programme versus yoga in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus yoga (95% CI)
Responder criteria (>50% improvement in RMDQ) ≤ 4 months	66 (1 study)	MODERATE[a] due to risk of bias	RR 0.43 (0.24 to 0.78)	Moderate	
				694 per 1000	396 fewer per 1000 (from 153 fewer to 528 fewer)
Healthcare utilisation (Medication use) > 4 months	63 (1 study)	MODERATE[a] due to risk of bias	RR 2.85 (1.38 to 5.89)	Moderate	
				206 per 1000	381 more per 1000 (from 78 more to 1000 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 45: Self-management versus acupuncture in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus acupuncture (95% CI)
Function (RMDQ, 0-24) ≤ 4 months	172 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 7.9	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 0.9 higher (1.07 lower to 2.87 higher)
Function (RMDQ, 0-24) > 4 months	173 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) > 4 months in the control groups was 8	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 1.6 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management versus acupuncture (95% CI)
					(3.51 lower to 0.31 higher)
Healthcare utilisation (provider visits) >4 months	173 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (provider visits) >4 months in the control groups was 1.9	The mean healthcare utilisation (provider visits) >4 months in the intervention groups was 0.4 lower (1.55 lower to 0.75 higher)
Healthcare utilisation (low back pain medication fills) > 4 months	173 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation (low back pain medication fills) > 4 months in the control groups was 4.4	The mean healthcare utilisation (low back pain medication fills) > 4 months in the intervention groups was 0.4 lower (3.01 lower to 2.21 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 46: Self-management programmes (bed rest plus exercise) versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management (bed rest + exercise) versus usual care (95% CI)
Responder criteria (No pain) ≤ 4 months	123 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.04 (0.84 to 1.29)	Moderate	
				717 per 1000	29 more per 1000 (from 115 fewer to 208 more)
Responder criteria (No pain) > 4 months	114 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.95 (0.72 to 1.26)	Moderate	
				648 per 1000	32 fewer per 1000 (from 181 fewer to 169 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 47: Self-management programmes (bed rest plus exercise) versus bed rest in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management (bed rest + exercise) versus bed rest (95% CI)
Responder criteria (No pain) ≤ 4 months	120 (1 study)	MODERATE[a] due to risk of bias	RR 0.97 (0.79 to 1.18)	Moderate	
				772 per 1000	23 fewer per 1000 (from 162 fewer to 139 more)
Responder criteria (No pain) > 4 months	113 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.02 (0.76 to 1.37)	Moderate	
				604 per 1000	12 more per 1000 (from 145 fewer to 223 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 48: Self-management programmes (bed rest plus exercise) versus self-management (exercise); in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management (bed rest plus exercise) versus self-management (exercise) (95% CI)
Responder criteria (No pain) ≤ 4 months	125 (1 study)	MODERATE[a] due to risk of bias	RR 1.01 (0.82 to 1.24)	Moderate	
				742 per 1000	7 more per 1000 (from 134 fewer to 178 more)
Responder criteria (No pain) > 4 months	119 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.07 (0.8 to 1.44)	Moderate	
				576 per 1000	40 more per 1000 (from 115 fewer to 254 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 49: Self-management (exercise, stretching and education) compared to manual therapy combination of techniques (mobilisation and electrotherapy) in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Manual therapy combination of techniques (manual manipulation excluding mobilisation + thermal+ electrotherapy)	Risk difference with Self-management (exercise+ stretching+ booklet) (95% CI)
Function (improvement of ODI) ≤ 4 months	68 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (improvement of ODI) ≤ 4 months in the control groups was 4	The mean function (improvement of ODI) ≤ 4 months in the intervention groups was 1.10 lower (4.99 lower to 2.79 higher)
Function (improvement of ODI) > 4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (improvement of ODI) > 4 months in the control groups was 4.4	The mean function (improvement of ODI) > 4 months in the intervention groups was 2.20 lower (6.76 lower to 2.36 higher)
Healthcare utilisation (visits to healthcare centres) > 4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (visits to healthcare centres) in the control groups was 0.2	The mean healthcare utilisation (visits to healthcare centres) in the intervention groups was 0.30 higher (0.12 lower to 0.72 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 50: Self-management programme (exercise plus stretching plus booklet) versus manual therapy (mobilisation) in low back pain without sciatica

Outcomes	No of	Quality of the	Relativ	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	e effect (95% CI)	Risk with Mobilisation (bone-setting)	Risk difference with Self-management (exercise+ stretching+ booklet) (95% CI)
Function (ODI, 0-100) ≤ 4 months	78 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI, 0-100) ≤ 4 months in the control groups was 5.1	The mean function (ODI, 0-100) ≤ 4 months in the intervention groups was 2.20 lower (6.52 lower to 2.12 higher)
Function (ODI, 0-100) > 4 months	76 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI, 0-100) > 4 months in the control groups was 8.4	The mean function (ODI, 0-100) > 4 months in the intervention groups was 6.20 lower (10.78 to 1.62 lower)
Healthcare utilisation (visits to healthcare centres) > 4 months	76 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (visits to healthcare centres) in the control groups was 0.4	The mean healthcare utilisation (visits to healthcare centres) in the intervention groups was 0.10 higher (0.33 lower to 0.53 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 51: Advice to stay active versus bed rest in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Advice to stay active versus bed rest (95% CI)
Function (RMDQ, 0-24) ≤ 4 months	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 3.2	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 2.7 higher (0.72 lower to 6.12 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 52: Advice to stay active versus bed rest in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Bed rest	Risk difference with Advice to stay active (95% CI)
Days to full activity ≤ 4 months	80 (1 study)	VERY LOW[a,b] due to risk of bias			The mean days to full activity ≤ 4 months in the intervention groups was 5.23 lower (5.74 to 4.72 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) The majority of the evidence included an indirect population (downgrade by 1 increment) or a very indirect population (downgrade by 2 increments)

Table 53: Bed rest versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Bed rest versus usual care (95% CI)
Responder criteria (No pain) ≤ 4 months	117 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.08 (0.87 to 1.33)	Moderate	
				717 per 1000	57 more per 1000 (from 93 fewer to 237 more)
Responder criteria (No pain) > 4 months	107 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.93 (0.69 to 1.25)	Moderate	
				648 per 1000	45 fewer per 1000 (from 201 fewer to 162 more)
Function (ODI, 0-100) ≤ 4 months	134 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean function (ODI, 0-100) ≤ 4 months in the intervention groups was 3.9 higher (0.1 to 7.7 higher)
* Control event rates not given, only mean difference reported by study					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the 95% CI crossed 1 MID, and downgraded by 2 increments if the 95% CI crossed both MID

Table 54: Bed rest versus usual care in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Bed rest versus usual care (95% CI)
Pain severity (back pain, VAS 0-10) ≤ 4 months	169 (1 study)	LOW[a] due to risk of bias		The mean pain severity (back pain, VAS 0-10) ≤ 4 months in the control groups was 2.2	The mean pain severity (back pain, VAS 0-10) ≤ 4 months in the intervention groups was 0.3 lower (1.8 lower to 0.48 higher)
Pain severity (leg pain, VAS 0-10) ≤ 4 months	169 (1 study)	LOW[a] due to risk of bias		The mean pain severity (leg pain VAS 0-10) ≤ 4 months in the control groups was 14	The mean pain severity (leg pain VAS 0-10) ≤ 4 months in the intervention groups was 2 higher (5.54 lower to 9.54 higher)
Function (ODI, 0-100) ≤ 4 months	169 (1 study)	LOW[a] due to risk of bias		The mean function (ODI 0-100) ≤ 4 months in the control groups was 11	The mean function (ODI, 0-100) ≤ 4 months in the intervention groups was 0 higher (3.17 lower to 3.17 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 55: Unsupervised exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Unsupervised exercise (95% CI)
Quality of life (SF-36 Physical component summary, 0-100) > 4 months	111 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean quality of life (SF-36 physical component summary, 0-100) > 4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Unsupervised exercise (95% CI)
					2.08 lower (10.66 lower to 6.44 higher)
Quality of life (SF-36 Mental component summary, 0-100) > 4 months	111 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean quality of life (SF-36 mental component summary, 0-100) > 4 months in the intervention groups was 0.72 lower (7.38 lower to 8.22 higher)
Function (RMDQ, 0-24) > 4 months	111 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 1.65 lower (3.62 lower to 0.32 higher)
* Control event rates not given, only mean difference reported by study					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 56: Unsupervised exercise versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Unsupervised exercise versus usual care (95% CI)
Function (ODI, 0-100) ≤ 4 months	119 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean function (ODI, 0-100) ≤ 4 months in the intervention groups was 2.6 higher (1.6 lower to 6.8 higher)
* Control event rates not given, only mean difference reported by study					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the 95% CI crossed 1 MID, and downgraded by 2 increments if the 95% CI crossed both MIDs

Table 57: Unsupervised exercise versus Alexander technique in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Unsupervised exercise versus Alexander technique (95% CI)
Quality of life (SF-36 Physical component summary, 0-100) > 4 months	221 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 physical component summary, 0-100) > 4 months in the control groups was 6.93	The mean quality of life (SF-36 physical component summary, 0-100) > 4 months in the intervention groups was 9.03 lower (17.09 to 0.96 lower)
Quality of life (SF-36 Mental component summary, 0-100) > 4 months	221 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 mental component summary, 0-100) > 4 months in the control groups was 3.92	The mean quality of life (SF-36 mental component summary, 0-100) > 4 months in the intervention groups was 3.38 lower (14.34 lower to 7.58 higher)
Pain severity (Von Korff, 0-10) > 4 months	221 (1 study)	LOW[a] due to risk of bias		The mean pain severity (von Korff, 0-10) > 4 months in the control groups was -0.88	The mean pain severity (von Korff, 0-10) > 4 months in the intervention groups was 0.57 higher (0.32 lower to 1.46 higher)
Function (RMDQ, 0-24) > 4 months	221 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) > 4 months in the control groups was -2.7	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 1.15 higher (0.78 lower to 3.07 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 58: Unsupervised exercise versus exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Unsupervised exercise versus exercise (95% CI)
Pain severity (Back pain, VAS 0-10) ≤ 4 months	116 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (back pain, VAS 0-10) ≤ 4 months in the control groups was 3.72	The mean pain severity (back pain, VAS 0-10) ≤ 4 months in the intervention groups was 1.32 higher (0.36 to 2.28 higher)
Pain severity (Back pain, VAS 0-10) > 4 months	156 (2 studies)	VERY LOW[a,b] due to risk of bias, inconsistency		The mean pain severity (back pain, VAS 0-10) > 4 months in the control groups was 3.70	The mean pain severity (back pain, VAS 0-10) > 4 months in the intervention groups was 3.16 higher (2.55 to 3.77 higher)
Pain severity (Leg pain VAS, 0-10) ≤ 4 months	116 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (leg pain, 0-10) ≤ 4 months in the control groups was 1.88	The mean pain severity (leg pain, 0-10) ≤ 4 months in the intervention groups was 1.64 higher (0.55 to 2.73 higher)
Pain severity (Leg pain VAS, 0-10) > 4 months	116 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (leg pain, 0-10) > 4 months in the control groups was 2.12	The mean pain severity (leg pain, 0-10) > 4 months in the intervention groups was 1.45 higher (0.41 to 2.49 higher)
Function (ODI, 0-100) ≤ 4 months	116 (1 study)	MODERATE[a] due to risk of bias		The mean function (ODI, 0-100) ≤ 4 months in the control groups was 46.2	The mean function (ODI, 0-100) ≤ 4 months in the intervention groups was 6.5 higher (1.05 to 11.95 higher)

Function (ODI, 0-100) > 4 months	116 (1 study)	MODERATE[a] due to risk of bias		The mean function (ODI, 0-100) > 4 months in the control groups was 44.1	The mean function (ODI, 0-100) > 4 months in the intervention groups was 6.5 higher (0.94 to 12.06 higher)
Number of pain relapses > 4 months	40 (1 study)	LOW[a] due to risk of bias		The mean number of pain relapses > 4 months in the control groups was 0.25	The mean number of pain relapses > 4 months in the intervention groups was 2.8 higher (1.95 to 3.65 higher)
Return to work > 4 months	139 (1 study)	VERY LOW[a,c] due to risk of bias, imprecision	RR 0.96 (0.73 to 1.27)	Moderate	
				594 per 1000	24 fewer per 1000 (from 160 fewer to 160 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 2 increments because of heterogeneity, I^2 = 97%, p<0.00001

(c) Downgraded by 1 increment if the confidence interval crossed one MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 59: Unsupervised exercise versus massage in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Unsupervised exercise versus massage (95% CI)
Quality of life (SF-36 Physical component summary, 0-100) > 4 months	115 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 physical component summary, 0-100) > 4 months in the control groups was -1.45	The mean quality of life (SF-36 physical component summary, 0-100) > 4 months in the intervention groups was 0.63 lower (12.03 lower to 10.77 higher)
Quality of life (SF-36 Mental component summary, 0-100) > 4 months	115 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 mental component summary, 0-100) > 4 months in the control groups was -2.11	The mean quality of life (SF-36 mental component summary, 0-100) > 4 months in the intervention groups was 2.83 higher (8.06 lower to 13.72 higher)
Pain (McGill, 0-78) ≤ 4 months	24	VERY LOW[a,b]		The mean pain severity (McGill) ≤ 4	The mean pain severity (McGill) ≤ 4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Unsupervised exercise versus massage (95% CI)
	(1 study)	due to risk of bias, imprecision		months in the control groups was 4.1	months in the intervention groups was 2.3 higher (2.31 lower to 6.91 higher)
Pain severity (Von Korff, 0-10) > 4 months	115 (1 study)	LOW[a] due to risk of bias		The mean pain severity (von Korff, 0-10) > 4 months in the control groups was 0.29	The mean pain severity (von Korff, 0-10) > 4 months in the intervention groups was 0.6 lower (1.86 lower to 0.66 higher)
Function (RMDQ, 0-24) > 4 months	115 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) > 4 months in the control groups was -0.45	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 1.2 lower (3.9 lower to 1.5 higher)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

(b) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

8.3.6 Combinations of interventions – self-management adjunct

8.3.6.1 Low back pain without sciatica

Table 60: Clinical evidence summary: self-management (exercise prescription) + Alexander technique (6 lessons) versus Alexander technique (6 lessons) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (6 lessons) + self-management (exercise prescription) versus Alexander technique (6 lessons) (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (6 lessons) + self-management (exercise prescription) versus Alexander technique (6 lessons) (95% CI)
Quality of life (SF-36 physical component summary, 09-100) >4 months	115 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 physical component summary) >4 months in the control groups was 58.1	The mean quality of life (SF-36 physical component summary) >4 months in the intervention groups was 6.49 higher (2.03 lower to 15.01 higher)
Quality of life (SF-36 mental component summary, 0-100) >4 months	115 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 mental component summary) >4 months in the control groups was 68.9	The mean quality of life (SF-36 mental component summary) >4 months in the intervention groups was 3.46 lower (11.41 lower to 4.49 higher)
Pain (Von Korff pain scale) >4 months	115 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (von Korff pain scale) >4 months in the control groups was 4.3	The mean pain (von Korff pain scale) >4 months in the intervention groups was 0.64 lower (1.59 lower to 0.31 higher)
Function (RMDQ, 0-24) >4 months	115 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ) >4 months in the control groups was 7.79	The mean function (RMDQ) >4 months in the intervention groups was 1.54 lower (3.44 lower to 0.36 higher)
Healthcare utilisation (primary care contacts) >4 months	115 (1 study)	MODERATE[a] due to risk of bias		The mean Healthcare utilisation primary care contacts >4 months in the control groups was 0.48	The mean Healthcare utilisation primary care contacts >4 months in the intervention groups was 0.13 lower (0.45 lower to 0.19 higher)
Healthcare utilisation (prescriptions) >4 months	115 (1 study)	MODERATE[a] due to risk of bias		The mean Healthcare utilisation prescriptions >4months in the control groups was 0.64	The mean Healthcare utilisation prescriptions >4months in the intervention groups was 0.06 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (6 lessons) + self-management (exercise prescription) versus Alexander technique (6 lessons) (95% CI)
					(0.5 lower to 0.38 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by two increments if the confidence interval crossed both MIDs.

Table 61: Clinical evidence summary: self-management (exercise prescription) + Alexander technique (24 lessons) versus Alexander technique (6 lessons) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (24 lessons) + self-management (exercise prescription) versus Alexander technique (6 lessons) (95% CI)
Quality of life (SF-36 physical component summary, 0-100) >4 months	114 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 physical component summary) >4 months in the control groups was 58.1	The mean quality of life (SF-36 physical component summary) >4 months in the intervention groups was 7.39 higher (1.02 lower to 15.8 higher)
Quality of life (SF-36 mental component summary, 0-100) >4 months	114 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 mental component summary) >4 months in the control groups was 68.9	The mean quality of life (SF-36 mental component summary) >4 months in the intervention groups was 0.89 higher (6.94 lower to 8.72 higher)
Pain (Von Korff pain scale, 0-10) >4 months	114 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (von Korff pain scale) >4 months in the control groups was 4.3	The mean pain (von Korff pain scale) >4 months in the intervention groups was 1.19 lower (2.13 to 0.25 lower)

Function (RMDQ) >4 months	114 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ) >4 months in the control groups was 7.79	The mean function (RMDQ) >4 months in the intervention groups was 2.78 lower (4.69 lower to 0.87 higher)
Healthcare utilisation (primary care contacts) >4 months	114 (1 study)	MODERATE[a] due to risk of bias		The mean healthcare utilisation (primary care contacts) >4 months in the control groups was 0.48	The mean healthcare utilisation (primary care contacts) >4 months in the intervention groups was 0.11 higher (0.25 lower to 0.47 higher)
Healthcare utilisation (prescriptions) >4 months	114 (1 study)	MODERATE[a] due to risk of bias		The mean healthcare utilisation (prescriptions) >4 months in the control groups was 0.64	The mean Healthcare utilisation prescriptions >4 months in the intervention groups was 0.04 higher (0.51 lower to 0.59 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 62: Clinical evidence summary: self-management (exercise prescription) + Alexander technique (6 lessons) versus Alexander technique (24 lessons) for low back pain without sciatica

				Anticipated absolute effects	
Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Relative effect (95% CI)**	**Risk with Control**	**Risk difference with Alexander technique (6 lessons) + self-management (exercise prescription) versus Alexander technique (24 lessons) (95% CI)**
Quality of life (SF-36 physical component summary, 0-100) >4 months	116 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 physical component summary) >4 months in the control groups was 67.9	The mean quality of life (SF-36 physical component summary) >4 months in the intervention groups was 3.3 lower (11.63 lower to 5.03 higher)
Quality of life (SF-36 mental component summary, 0-100) >4	118 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 mental component summary) >4 months in the control groups was	The mean quality of life (SF-36 mental component summary) >4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (6 lessons) + self-management (exercise prescription) versus Alexander technique (24 lessons) (95% CI)
months				68.54	3.1 lower (11.42 lower to 5.22 higher)
Pain severity (Von Korff pain scale, 0-10) >4 months	118 (1 study)	MODERATE[a] due to risk of bias		The mean pain (von Korff pain scale) >4 months in the control groups was 3.4	The mean pain (von Korff pain scale) >4 months in the intervention groups was 0.26 higher (0.68 lower to 1.2 higher)
Function (RMDQ, 0-24) > 4 months	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ) > 4 months in the control groups was 5.09	The mean function (RMDQ) > 4 months in the intervention groups was 1.16 higher (0.71 lower to 3.03 higher)
Healthcare utilisation (primary care contacts) > 4 months	118 (1 study)	MODERATE[a] due to risk of bias		The mean healthcare utilisation primary care contacts >4 months in the control groups was 0.44	The mean healthcare utilisation primary care contacts >4 months in the intervention groups was 0.09 lower (0.4 lower to 0.22 higher)
Healthcare utilisation (prescriptions) >4 months	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation prescriptions >4 months in the control groups was 1.07	The mean healthcare utilisation prescriptions >4 months in the intervention groups was 0.49 lower (1.14 lower to 0.16 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 63: Clinical evidence summary: self-management (exercise prescription) + Alexander technique (24 lessons) versus Alexander technique (24 lessons) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (24 lessons) + self-management (exercise prescription) versus Alexander technique (24 lessons) (95% CI)
Quality of life (SF-36 physical component summary, 0-100) > 4 months	117 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 physical component summary) >4 months in the control groups was 67.93	The mean quality of life (SF-36 physical component summary) >4 months in the intervention groups was 2.4 lower (10.62 lower to 5.82 higher)
Quality of life (SF-36 mental component summary, 0-100) > 4 months	117 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 mental component summary) >4 months in the control groups was 68.54	The mean quality of life (SF-36 mental component summary) >4 months in the intervention groups was 1.25 higher (6.96 lower to 9.46 higher)
Pain (Von Korff pain scale, 0-10) > 4 months	117 (1 study)	MODERATE[a] due to risk of bias		The mean pain (von Korff pain scale) >4 months in the control groups was 3.4	The mean pain (von Korff pain scale) >4 months in the intervention groups was 0.29 lower (1.21 lower to 0.63 higher)
Function (RMDQ, 0-24) > 4 months	117 (1 study)	MODERATE[a] due to risk of bias		The mean function (RMDQ, 0-24) >4 months in the control groups was 5.09	The mean function (RMDQ, 0-24) >4 months in the intervention groups was 0.08 lower (1.96 lower to 1.8 higher)
Healthcare utilisation (primary care contacts) > 4 months	117 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (primary care contacts) > 4months in the control groups was 0.44	The mean healthcare utilisation (primary care contacts) > 4monthsr in the intervention groups was 0.15 higher (0.2 lower to 0.5 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (24 lessons) + self-management (exercise prescription) versus Alexander technique (24 lessons) (95% CI)
Healthcare utilisation (prescriptions) >4 months	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation prescriptions >4 months in the control groups was 1.07	The mean healthcare utilisation prescriptions >4 months in the intervention groups was 0.39 lower (1.12 lower to 0.34 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 64: Clinical evidence summary: self-management (exercise prescription) + Alexander technique (24 lessons) versus Alexander technique (6 lessons) + self-management (exercise prescription) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (24 lessons) + self-management (exercise prescription) versus Alexander technique (6 lessons) + self-management (exercise prescription) (95% CI)
Quality of life (SF-36 physical component summary, 0-100) >4 months	113 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 physical component summary) >4 months in the control groups was 64.63	The mean quality of life (SF-36 physical component summary) >4 months in the intervention groups was 0.9 higher (7.56 lower to 9.36 higher)
Quality of life (SF-36 mental component summary, 0-100) >4 months	113 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 mental component summary) >4 months in the control groups was	The mean quality of life (SF-36 mental component summary) >4 months in the intervention groups was 4.35 higher

				65.4	(3.97 lower to 12.67 higher)
Pain (Von Korff pain scale, 0-10) >4 months	113 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (von Korff pain scale) >4 months in the control groups was 3.66	The mean pain (von Korff pain scale) >4 months in the intervention groups was 0.55 lower (1.49 lower to 0.39 higher)
Function (RMDQ, 0-24) >4 months	113 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) >4 months in the control groups was 6.25	The mean function (RMDQ, 0-24) >4 months in the intervention groups was 1.24 lower (3.15 lower to 0.67 higher)
Healthcare utilisation (primary care contacts) > 4months	113 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation primary care contacts >4months in the control groups was 0.35	The mean healthcare utilisation primary care contacts >4months in the intervention groups was 0.24 higher (0.1 lower to 0.58 higher)
Healthcare utilisation (prescriptions) > 4 months	113 (1 study)	MODERATE[a] due to risk of bias		The mean healthcare utilisation prescriptions in the control groups was 0.58	The mean healthcare utilisation prescriptions in the intervention groups was 0.1 higher (0.46 lower to 0.66 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

8.3.6.2 Low back pain with or without sciatica

Table 65: Self-management (Home exercise) + electrotherapy (laser) compared to electrotherapy (laser) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with laser	Risk difference with Home exercise + laser (95% CI)

Pain severity (VAS, 0-10) ≤4 months	85 (2 studies)	VERY LOW[a,b] due to risk of bias, inconsistency		The mean pain severity (VAS, 0-10) ≤ 4 months in the control groups was 3.15	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.63 lower (1.24 to 0.01 lower)
Function (ODI, 0-100) ≤4 months	85 (2 studies)	VERY LOW[a,c,d] due to risk of bias, inconsistency, imprecision		The mean function (ODI,0-100) ≤ 4 months in the control groups was 27.3	The mean function (ODI 0-100) - ≤4 months in the intervention groups was 2.82 lower (5.80 lower to 0.16 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 2 increments because of heterogeneity, I^2=86%, p=0.007

(c) Downgraded by 2 increments because of heterogeneity, I^2=73%, p=0.06

(d) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 66: Self-management (unsupervised exercise) + electrotherapy (HILT laser) versus electrotherapy (HILT laser) for low back pain with or without sciatica

				Anticipated absolute effects	
Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Relative effect (95% CI)**	**Risk with Control**	**Risk difference with Self-management (unsupervised exercise) + electrotherapy (HILT laser) versus electrotherapy (HILT laser) (95% CI)**
Pain severity (VAS, 0-10) ≤ 4 months	48 (1 study)	LOW[a] due to risk of bias		The mean pain severity (VAS, 0-10) ≤ 4 months in the control groups was 5.65	The mean pain severity (VAS, 0-10) ≤ 4 months in the intervention groups was 3.01 lower (3.66 to 2.36 lower)
Function (RMDQ, 0-24) ≤ 4 months	48 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 7.35	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 1.85 lower (2.64 to 1.06 lower)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management (unsupervised exercise) + electrotherapy (HILT laser) versus electrotherapy (HILT laser) (95% CI)
Function (MODI, 0-100) ≤ 4 months	48 (1 study)	LOW[a] due to risk of bias		The mean function (MODI, 0-100) ≤ 4 months in the control groups was 19.05	The mean function (MODI, 0-100) ≤ 4 months in the intervention groups was 3.91 lower (5.96 to 1.86 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 67: Self-management (education) + exercise (biomechanical) versus exercise (biomechanical – motor control) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Self-management (education) + exercise (biomechanical) versus exercise (biomechanical) (95% CI)
Pain severity (VAS, 0-10) ≤ 4 months	21 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS, 0-10) ≤ 4 months in the control groups was 4.7	The mean pain severity (VAS, 0-10) ≤ 4 months in the intervention groups was 0.70 lower (2.50 lower to 1.10 higher)
Function (RMDQ, 0-24) ≤ 4 months	21 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 9	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 1.64 lower (7.06 lower to 3.78 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID.

8.4 Economic evidence

Published literature

One economic evaluation was identified that included unsupervised exercise (exercise prescription) as a comparator and has been included in this review.[225] This is summarised in the economic evidence profile below (Table 68) and the economic evidence table in Appendix I. This was a within-trial analysis of the ATEAM RCT also included in the clinical review.[310] The analysis included eight comparators with combinations of usual care, self-management (unsupervised exercise - exercise prescription), manual therapy (soft tissue techniques – massage) and Alexander technique lessons. Results are summarised here for the unsupervised exercise comparator as an adjunct to other care only first (**Table 68**), followed by the full incremental analysis (**Table 69**) including all comparator in the study (this includes other active interventions and also combinations of interventions).

No relevant economic evaluations were identified that included self-management programmes, advice to stay active or advice for bed rest as a comparator.

One economic evaluation relating to self-management programmes and one relating to unsupervised exercise were identified but were excluded due to limited applicability.[74,208] One economic evaluation (with two publications) relating to bed rest was identified but was excluded due to serious methodological limitations.[140,302] These are listed in Appendix M, with reasons for exclusion given.

Other economic evaluations compared self-management alone with self-management in combination with other interventions, for example mixed modality manual therapy and biomechanical exercise (Beam 2004),[498] cognitive behavioural approaches (Lamb et al 2010),[289] manipulation/mobilisation and biomechanical exercise (Niemisto 2003[388]/Niemisto 2005[387]). These studies are presented in the chapters relevant to the active comparator.

Self-management in combination with other interventions was assessed in other evidence presented in the relevant chapters. One economic evaluation compared three interventions: biomechanical exercise, a combination of mixed manual therapy and self-management, and MBR (Critchley 2007[94]), presented in the MBR and Exercise chapters.

See also the economic article selection flow chart in Appendix F.

Table 68: Economic evidence profile: unsupervised exercise (exercise prescription) + usual care versus usual care comparisons only

Study	Applicability	Limitations	Other comments	Incremental cost [(c)]	Incremental effects	Cost effectiveness	Uncertainty
Hollinghurst 2008[225] (UK)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• within-RCT analysis (ATEAM[310]) • population: low back pain (without sciatica) (3 months or more) • eight comparators in full analysis • in this comparison: 1. Usual care (UC) 2. UC + exercise prescription • follow-up: 1 year	Groups that did not receive massage or Alexander technique lessons			
				2 versus 1: £100	2 versus 1: 0.04 QALYs	2 versus 1: £2847 per QALY	Probability cost effective (£5K) >95% Complete case only analysis results in exercise having lower QALYs than UC.
				Groups that received massage or Alexander technique lessons			
				2 versus 1: £44	2 versus 1: 0.04 QALYs	2 versus 1: £1096 per QALY	Probability cost effective NR

ICER = incremental cost effectiveness ratio; RCT = randomised clinical trial; QALY = quality-adjusted life year

(a) Study does not include all available non-invasive treatment options. Resource use data (2002-2004) and unit costs (2005) may not reflect current NHS context.

(b) A longer time horizon may be preferable if effects may persist beyond 1 year. Within-trial analysis and so does not reflect full body of available evidence for this intervention; ATEAM is 1 of 6 studies included in the clinical review for unsupervised exercise - although the only one compared to usual care and with EQ5D data.

(c) Cost components incorporated: interventions, primary care contacts, outpatient appointments, inpatient hospital stays and medication.

Table 69: Economic evidence profile: unsupervised exercise (exercise prescription) – full incremental analysis of all comparators

Study	Applicability	Limitations	Other comments	Cost[c,d]	Effects[c]	Incremental costs[e]	Incremental effects[e]	Cost effectiveness[e]	Uncertainty
Hollinghurst 2008[225] (UK)	Partially applicable[a]	Potentially serious limitations [b]	• within-RCT analysis (ATEAM[310]) • population: low back pain (without sciatica) (3 months or more) • eight comparators in full	2. £204	2. -0.01 QALYs	Dominated (1 has lower costs and greater effects)			• probability cost effective: NR • complete case only QALY analysis results in fewer QALYs
				1. £0	1. 0 QALYs	Baseline			
				3. £163	3. 0.03 QALYs	Dominated (5 has lower costs and greater effects)			

Study	Applicability	Limitations	Other comments	Cost[c,d]	Effects[c]	Incremental costs[e]	Incremental effects[e]	Cost effectiveness[e]	Uncertainty
			analysis: 1. Usual care (UC) 2. Soft tissue techniques (massage 6 sessions) 3. Alexander technique (AT) (6 lessons) 4. AT (24 lessons) 5. UC + self-management (exercise prescription) 6. Self-management (exercise prescription) + soft tissue techniques (massage 6 sessions) 7. Self-management (exercise prescription) + AT (6 lessons) 8. Self-management (exercise prescription) + AT (24 lessons) • Follow-up: 1 year	5. £100	5. 0.04 QALYs	5 v 1: £100	0.04 QALYs	£2497 per QALY	than usual care for exercise prescription, massage or AT (6 lessons).
				4. £556	4. 0.05 QALYs	Dominated (6 has lower costs and greater effects)			
				6. £213	6. 0.06 QALYs	Dominated (7 has lower costs and equal effects)			
				7. £185	7. 0.06 QALYs	7 v 5: £86	0.02 QALYs	£4280 per QALY	
				8. £607	8. 0.09 QALYs	8 v 7: £421	0.03 QALYs	£14,042 per QALY	

Abbreviations: AT, Alexander technique; RCT, randomised clinical trial; QALY, quality-adjusted life year

(a) Study does not include all available non-invasive treatment options; resource use data (2002-2004) and unit costs (2005) may not reflect current NHS context.

(b) Time horizon may not be sufficient to capture all benefits and costs - authors suggest that the effects of Alexander technique lessons may be longer lasting than massage or an exercise prescription. Within-trial analysis and so does not reflect full body of available evidence for all the included comparators. Uncertainty has not been quantified for all analyses. Usual care not described and unclear if this is was provided also in the massage and AT groups.

(c) Cost/effect over usual care in order of least to most effective intervention.

(d) Cost components incorporated: interventions, primary care contacts, outpatient appointments, inpatient hospital stays and medication.

(e) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

Unit costs

Relevant unit costs are provided below to aid consideration of cost effectiveness.

For self-management strategies the relevant intervention unit costs will be the personnel time required to advise the patient regarding the relevant strategy. This will typically take place in primary care and could be delivered by different healthcare professionals, including GPs, nurses, physiotherapists and occupational therapists. Unit costs are provided below:

- The cost of a per patient GP contact lasting 11.7 minutes is £45, this cost includes direct care staff costs and with qualifications (PSSRU 2013).[99]
- The cost of a per patient nurse (GP practice) contact lasting 15.5 minutes is £13, this cost includes direct care staff costs and with qualifications (PSSRU 2013).[99]
- The cost of a one-to-one 'care contact' with a community physiotherapist or occupational therapist is £50 and £76 respectively (NHS reference costs 2012-2013).[110]

The amount of personnel time required will depend on the specific intervention. It may be that advice is briefly delivered during the primary consultation or it could be provided in a more structured way with follow-up appointments required. For example, in the ATEAM study (Little 2008[310]) the exercise prescription involved a GP visit and up to three nurse follow-up consultations to provide reinforcement and support. There may also be materials costs e.g. an information booklet.

8.5 Evidence statements

8.5.1 Clinical

8.5.1.1 Self-management programmes

8.5.1.1.1 Self-management programme versus usual care

In people with low back pain with or without sciatica, evidence from 1 study comparing self-management to usual care found clinical benefit for quality of life domains - physical and mental composites at the short-term follow-up (low and very low quality; n = 49). Evidence from 1 study reporting at the longer-term time-point confirmed a benefit of self-management compared to usual care for quality of life in terms of well-being and general health domains of the SF-36, but not for the energy domain (low to moderate quality; n = 80). Two studies showed no benefit of self-management programmes for reducing pain intensity measured with VAS pain scale in the short term (very low to moderate quality; n = 106). Another study confirmed no clinical difference in pain severity measured with von Korff pain scale in the long term (moderate quality; n=101). There was no benefit in function as measured by different scores: RMDQ/ODI score at either time point (very low and low quality; n = 106 and 421), modified von Korff scale (low quality; n=101), number of people not working (very low quality; n=419). No evidence was available for the outcome of psychological distress.

Evidence from one study found no difference in the responder criteria for pain at either time point (low quality; n=122 and 113). There was evidence of benefit for all healthcare utilisation outcomes reported (hospitalisation; physicians and physical therapy visits for back, hospital days) except for chiropractor visits for back (one study, very low to low quality; n=936, n=1304; n=421).

No evidence was available for the individual low back pain or sciatica populations.

8.5.1.1.2 Self-management programme versus sham

Evidence from 1 study suggested no clinical benefit of self-management compared with sham for pain and function in both the short and long-term in people with low back pain with or without sciatica (low to moderate quality; n = 131).

8.5.1.1.3 Self-management programme versus other non-invasive interventions

One study reported no clinical difference between a self-management programme and bed rest at either time point in people with low back pain without sciatica (very low to moderate quality; n=119, n=112).

In those with sciatica, evidence from 1 study (low quality; n=83) suggested no clinical difference of self-management compared with exercise for quality of life (15-D) and function in both the short and long-term, and for pain in the short term. However the same study showed evidence of clinical benefit of exercise over self-management for pain in the long term.

In people with low back pain without sciatica, limited evidence from single studies (range of n = 60-180) across a number of comparators (exercise, massage, yoga, acupuncture, manual therapy and mobilisation plus electrotherapy), demonstrated no clinical benefit of the self-management programme in terms of function (very low to moderate quality). Indeed, a clinical benefit of the comparator (massage) compared with self-management was seen for function measured on RMDQ (very low quality; range of n = 160). No evidence was available for quality of life, pain intensity or psychological distress. Clinical benefit of the comparator (exercise, yoga) was observed for responder criteria in function (low to moderate quality; range of n=60-66). Clinical benefit of the comparator (exercise, massage, yoga) was also reported for healthcare utilisation outcomes (low to moderate quality; range of n=61-159).

8.5.1.2 Advice to stay active and bed rest

Advice to stay active demonstrated a clinical benefit compared with bed rest for short-term function on the RMDQ in one study of people with low back pain with or without sciatica (very low quality; n = 34). There was no clinical difference between bed rest and usual care in responder criteria (pain) and function (low quality; n=134).

One study reported no clinical difference between bed rest and usual care for back pain or function in the short term for people with low back pain and sciatica however clinical benefit in favour of usual care versus bed rest was observed in terms of leg pain (low quality; n = 169).

Evidence in people with low back pain without sciatica from 1 study suggested benefit of bed rest over advice to stay active in the days to full activity outcome at ≤ 4 months (very low quality; n=80).

8.5.1.3 Unsupervised exercise

Across all comparisons and outcomes reported, no clinical benefit of unsupervised exercise was reported in either people with low back pain alone, or low back pain with sciatica.

In the mixed population with or without sciatica, clinical benefit of supervised exercise versus unsupervised exercise was demonstrated for back pain in the short term (1 study; moderate quality; n = 116) and in the long term (2 studies, very low quality; n = 156). The same was observed for leg pain both in the short and long term (1 study, moderate quality; n=116) and for the number of pain relapses at > 4 months (1 study, low quality; n=40).

Evidence from 1 study in people with low back pain without sciatica reported clinical benefit of usual care compared to unsupervised exercise in terms of quality of life – physical component summary

(very low quality; n=111). One study showed clinical benefit of either 6 or 24 sessions of the Alexander technique compared to unsupervised exercise at longer-term follow-up for the physical and mental domains of SF-36 (low quality; n=221).

Further evidence in this population showed no clinical benefit of unsupervised exercise compared with either massage or usual care for function, pain or quality of life scores (3 studies; low and very low quality; range of n = 24-115).

No evidence was available for psychological distress, nor for people with sciatica only.

8.5.1.4 Combinations of interventions - self-management adjunct

All evidence from populations with low back pain without sciatica comprised self-management (exercise prescription) as an adjunct to postural therapy (Alexander technique, given as either 6 lessons or 24 lessons) (1 study, moderate to very low quality; range of n=113 - 118). Outcomes of pain, function and quality of life (mental and physical) were available in both the short and long term. For most of the outcomes and comparisons there was no clinical benefit seen. The exceptions to this were:

- Self-management plus Alexander technique (6 lessons) versus Alexander technique (6 lessons): there was clinical benefit of comparator for long-term (> 4 months) SF-36 physical composite.
- Self-management plus Alexander technique (24 lessons) versus Alexander technique (6 lessons): there was clinical benefit for long-term quality of life (SF-36 physical component summary score), pain and function.
- Self-management plus Alexander technique (6 lessons) versus Alexander technique (24 lessons): there was clinical benefit for Alexander technique – 24 lessons for long-term SF-36 physical and mental composites.
- Self-management plus Alexander technique (24 lessons) versus Alexander technique (24 lessons): there was clinical benefit for Alexander technique – 24 lessons for long-term SF-36 physical composite.
- Self-management plus Alexander technique (24 lessons) versus Alexander technique (6 lessons) + self-management: there was clinical benefit for Alexander technique – 24 lessons long-term SF-36 mental composite.

Very low quality evidence from 2 studies in people with low back pain with or without sciatica (n=85) showed no clinical benefit on short-term pain and function of self-management (home exercise) when given as an adjunct to electrotherapy (laser) compared to electrotherapy (laser) alone. However, when self-management (unsupervised exercise) was given as an adjunct to electrotherapy (HILT laser) there was clinical benefit seen for short-term pain, but no benefit on function (low quality, 1 study, n=48).

8.5.2 Economic

- One cost-utility analysis (partially applicable; potentially serious limitations) in people with low back pain (without sciatica) found:
  - The combination of an unsupervised exercise (exercise prescription) with usual care was cost effective compared to usual care alone (ICER: £2,847 per QALY gained) in those who did not receive massage or Alexander technique lessons.
  - The combination of an unsupervised exercise (exercise prescription) with usual care was cost effective compared to usual care alone (ICER: £1,096 per QALY gained) in those who received massage or Alexander technique lessons.

  - When considered amongst a selection of active treatments, the combination of Alexander technique (24 lessons) with unsupervised exercise (exercise prescription) was the most effective (highest QALYs) and most cost effective option from usual care, unsupervised exercise (exercise prescription), soft tissue techniques (massage), exercise prescription + massage, Alexander technique lessons (6 lessons), exercise prescription + Alexander technique lessons (6 lessons), Alexander technique (24 lessons), and exercise prescription + Alexander technique (24 lessons).
- No economic evaluations were identified that compared exercise prescription with usual care for the management of sciatica.
- No economic evaluations were identified that included self-management programmes, advice to stay active or advice for bed rest as a comparator for the management of low back pain or sciatica.

8.6 Recommendations and link to evidence

Recommendations	**7. Provide people with advice and information, tailored to their needs and capabilities, to help them self-manage their low back pain with or without sciatica, at all steps of the treatment pathway. Include:** • **information on the nature of low back pain and sciatica** • **encouragement to continue with normal activities.**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (for pain and function), adverse events and healthcare utilisation were also considered as important. The GDG agreed that mortality was not a relevant treatment related adverse event for this intervention, and therefore it was not included within the review protocol. No evidence was available for any adverse events for this review; the GDG agreed that was unsurprising given the nature of the intervention.
Trade-off between clinical benefits and harms	The GDG discussed the necessity of a body of evidence to show specific intervention effects, that is, over and above any contextual or placebo effects. It was therefore agreed that if placebo or sham-controlled evidence is available, this should inform decision making in preference to contextual effects. However, if there was a lack of placebo or sham-controlled evidence, evidence against usual care will be given priority when decision making. The GDG noted that when self-management was compared to usual care, clinical benefit was in most cases observed at the outcomes reported at longer term follow up (greater than 4 months), but this was not consistent across all outcomes. Some benefit was seen in quality of life, but not for pain or function. There was evidence that healthcare utilisation (consultation for back pain, hospitalisation, physician visits, physiotherapist visits) was reduced by the use of self-management programmes. However, there was uncertainty about this evidence, as this could in part be the result of people taking part in a trial, so by nature visiting other healthcare professionals less during this time. If the reduction in healthcare use was to continue beyond the trial duration, it would be of more importance. The GDG noted that there was some evidence that when self-management was compared to a supervised activity, the latter was more effective. The GDG however considered that, as both groups received self-management advice, this may just indicate that contact with a healthcare professional and the associated contextual effects are providing the additional benefit. The evidence comparing advice to stay active with bed rest showed clinical benefit of

	advice to stay active in short-term function, but clinical benefit of bed rest in days to full activity. However the GDG discussed that these were the only outcomes reported from a single study, and that this was an old study with a population of USA based combat trainees. Therefore, this was a very specific population which would not be generalizable to the general population with low back pain in the UK. It was also noted that the best rest arm was in a hospital setting, and therefore may have added an incentive to encourage people to get back to their usual activity. The evidence for bed rest included in this review was considered inconclusive. The GDG were aware of anecdotal evidence that short term bed rest might be helpful, but prolonged bed rest might be harmful. Evidence from this review did not inform that opinion. Except for leg pain, there was no evidence from this review that bed rest in the short term was harmful, but also no evidence to suggest that it was beneficial to do so. The GDG considered that the interventions reported in the review were all forms of self-management support programmes, and distinct from pain management programmes. However, it was agreed that interventions where the patient would take an active role in managing their condition could be considered self-management, and the goal might not be just to improve pain. Although the direct evidence from this review was far from convincing, the GDG considered that in part this was perhaps because advice provided in isolation is unlikely to be very helpful. When considering evidence from the combination and multidisciplinary programmes reviews and anecdotal evidence from GDG experience, it was noted that self-management plays an important role in the management of a variety of chronic conditions. The GDG therefore agreed that although there was no conclusive evidence in favour of self-management provided in isolation of other management strategies, it was still important to provide advice to people about their condition and encourage them to continue with normal activities. The GDG therefore felt that a good practice statement to support self-management was justified. The GDG intended self-management to apply as a principal alongside all treatment for people with low back pain and sciatica as part of routine practice. It was noted that there is no evidence from this review that a more complex intervention was any more effective than simple advice.
Trade-off between net clinical effects and costs	One economic evaluation was included which compared exercise prescription in combination with usual care with usual care alone for the management of low back pain (without sciatica). This within-trial cost-utility analysis found that the combination of an exercise prescription with usual care was cost effective compared to usual care alone in those who did and did not receive massage or Alexander technique lessons (ICER: £1,096 and £2,847 per QALY gained, respectively).[225] Considering all the other interventions assessed in this study, adding exercise prescription component to them was always more cost effective than each intervention alone, that is, the combination of exercise prescription and massage was more cost effective than massage alone (ICER £128 per QALY), and the combination of exercise prescription and Alexander technique was more cost effective than Alexander technique lessons alone (ICER £753 per QALY for 6 lessons and £1,275 per QALY for 24 lessons). The GDG considered the unit costs of different healthcare professionals who may be involved in the delivery of such advice and considered that the provision of advice would not be a change of practice. Furthermore the GDG noted that the cost of information leaflets for patients was minimal. For example, the Back Book can be ordered from the TSO stationery office shop and costs £1.25 per book.[57] The GDG considered that although the provision of advice and information to promote self-management of low back pain may incur some minimal costs, this is an essential part of good patient care to ensure patients are adequately informed.

Quality of evidence	The quality of evidence in this review ranged from moderate to very low. All the studies included in this review were assessed as having serious or very serious risk of bias. They all were small trials which could not be pooled due to the variability in trial design and outcomes reported. A contributing factor to the risk of bias rating was the difficulty of adequate blinding with such interventions. There was also a lack of detail provided about the background care that the two study groups received apart from the intervention; therefore in some cases it was impossible to assess whether the care in the two groups was comparable. This increases the risk of overestimating effects in subjective outcomes such as pain and function. The GDG noted that the included studies were not optimally designed to test self-management. Some studies had methodological limitations due to including only highly selected populations, for example one study all participants were aged over 60 and were recruited by advertisement, and another was from a military population with bed rest based in a military hospital. The economic evidence was assessed as partially applicable with potentially serious limitations.
Other considerations	The GDG noted the existing recommendation from CG88 relating to self-management should still stand. It was agreed important for clinicians to take into account people's concerns about their back pain and sciatica, and tailor the advice to the individual. It was noted that there would likely be an overlap with this review and the review of multidisciplinary biopsychosocial rehabilitation programmes which also incorporate a large self-management element (see MBR chapter 17). To distinguish between the two, this review had focussed on programmes that were solely self-management education or advice interventions, or advice to rest/stay active. Furthermore, unsupervised exercise was included within this review, rather than the exercise review as the GDG agreed that it was more appropriately defined as self-management if there was no supervision involved. The GDG agreed there was no evidence to suggest sciatica should be treated differently to low back pain in terms of providing advice to the person with pain. The GDG was also aware of some existing NICE guidance related to this area: NICE public health guidance: Managing long term sickness and incapacity to work (PH16) and NICE guideline CG138 Patient experience in adult NHS services: improving the experience of care for people using adult NHS services.

9 Exercise therapies

9.1 Introduction

Exercise therapies make use of various forms of physical exercise to prevent or treat low back pain. The term 'exercise therapy' encompasses a wide range of different exercise types, environments and theoretical models. What they have in common is the engagement of the person with a programme of physical exercise that the person is encouraged to perform on a regular basis.

Exercise therapy may be delivered by a range of healthcare professionals, on a one to one basis or in a group environment. The focus may vary from exercise using specialist gym equipment to exercises conducted at home or in the outdoor environment. Exercise may be directed at improving a variety of parameters of fitness and function including muscle strength, timing or endurance, flexibility and range of motion, precision of movement, cardiovascular fitness, functional task performance and confidence.

Biomechanical exercise includes any exercise intervention that is primarily directed at altering or improving spinal mechanics. This includes muscle strengthening, stretching, range of motion exercise, motor control exercise (including core stability programmes and Pilates) or programmes aimed at addressing specific problem movements (including McKenzie exercise and the Feldenkrais method).

Aerobic exercise includes any exercise intervention that is primarily directed at improving cardiovascular fitness and endurance.

Mind–body exercise includes any exercise intervention that includes a combined physical, mental and spiritual focus, often with connection to metaphysical and cultural philosophies. Examples include the various forms of Yoga and Tai Chi.

Mixed modality exercise includes any exercise intervention that incorporates a combination of any of the previous three categories.

9.2 Review question: What is the clinical and cost-effectiveness of exercise therapies in the management of non-specific low back pain and sciatica?

Table 70: PICO characteristics of review question

Population	• People aged 16 or above with non-specific low back pain • People aged 16 or above with sciatica
Intervention(s)	Individual/group exercise: • Mind-body exercises (Yoga, Tai-Chi) • Biomechanical (Pilates, core stability, McKenzie, motor control, stretching, Feldenkrais) • Aerobics (swimming, walking programme, aerobic exercise) • Mixed modality exercise (aerobics and/or mind-body and/or biomechanical)
Comparison(s)	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline

	• Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	Randomised controlled trials (RCTs) and systematic reviews (SRs). If insufficient evidence is identified, observational studies will be included.

9.3 Clinical evidence

9.3.1 Summary of included studies – single interventions

A search was conducted for randomised trials comparing the effectiveness of exercise therapies (mind-body exercises, biomechanical exercise, aerobic exercise, and mixed modality exercises) with either placebo, usual care, or other non-invasive treatments in the management of people with low back pain or sciatica.

Seventy-five randomised trials were identified from a total of 80 papers.[8,12,26,37,55,67,71,72,79,80,84,93,98,104,112,132,134,138,161,168,170,173,180,194,196,199-201,211,233,265,277,278,282,295,309,313,317,318,324,325,329,331,334,335,342,348,352,364,124,125,370,371,379,395,400,410,414,416,419,430,436,447-449,457-462,466,473] Details of these studies are summarised in **Table 71**, **Table 72**, **Table 73** and **Table 74** below. Evidence from the study is summarised in the clinical evidence summary below (see section 9.3.5 to (a)). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

The Smeets 2006 trial[460] (Smeets 2008[459], Smeets 2009[457], Smeets 2006[461], Smeets 2008[458]) reported data from 4 arms (exercise, cognitive behavioural approaches, exercise and cognitive behavioural approaches/MBR, and waiting list control). The data extracted in this review was for the exercise versus cognitive behavioural approaches and exercise versus waiting list control. The data for cognitive behavioural approaches versus waiting list is in the psychological review, and the data for the combination arm (exercise and cognitive behavioural approaches) is in the MBR review (see section 17).

Data from Aboagye et al. 2015 was excluded as data was not interpretable due to the number of participants in each group not being provided, therefore effect size could not be estimated.[3]

Evidence of cognitive therapy compared to mixed exercise (biomechanical and aerobic), and behavioural therapy compared to aerobic exercise was identified and analysed in chapter 17.This review only considered supervised exercise programmes. Unsupervised exercise was considered as self management, and therefore included in the self management review.

9.3.2 Summary of included studies – combined interventions (exercise therapy adjunct)

Sixteen studies looking at combinations of non-invasive interventions (with exercise therapy as the adjunct) were also included in this review.[66,97,106,115,115,281,301,309,328,341,342,411,429,479,496,499,535,561] These are summarised in **Table 75** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (see section (a)). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Ding et al. 2015 had no outcomes relevant to the review protocol to be extracted.[115]

Szulc et al. 2015 reported data from 3 arms (exercise with self-management and manual therapy, exercise and self-management, and TENS with laser, massage and self-management). The data extracted in this review was for the exercise and self-management versus TENS with laser, massage and self-management comparison. The data for exercise with self-management and manual therapy versus exercise and self-management, and exercise with self-management and manual therapy versus TENS with laser, massage and self-management was analysed in chapter 17.

Two Cochrane reviews[244,552] were identified but could not be included for the following reasons:

- The review was not limited to RCTs;[244]
- The population was stratified by chronicity of pain (acute: less than 6 weeks; subacute, 6-12 weeks; chronic, greater than 12 weeks).[552]

The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol.

9.3.3 Summary of included studies

Table 71: Biomechanical exercise

Study	Intervention/ comparison	Population	Outcomes	Comments
Alp 2014[12]	Self-management - Unsupervised exercise versus group biomechanical exercise - Core stabilization (45-60minutes 3 times per week).	Low back pain (with or without sciatica) n=48 Turkey Duration of pain: minimum 6 months Age (range): 36-63	Quality of life (SF36) Pain (VAS) Function (RMDQ, timed sit-to-stand)	Concurrent treatment: not stated. Study length: 6 weeks treatment
Bentsen 1997[37]	Back-strengthening exercises (frequency unclear) versus Unsupervised exercise	Low back pain without sciatica n=74 Sweden Duration of pain: minimum 30 days Mean age: 57 years	Function (subjective disability index VAS)	Unsupervised exercise: Home exercise programme Concurrent treatment: none stated. Both arms had 9 months of home exercise after the intervention. Study length: 3 months treatment (+9 months home exercise)

Bronfort 2011[55]	Strengthening exercises (1 hour session 2x per week) versus Spinal manipulation (low-amplitude high-velocity thrust)	Low back pain without sciatica n=200 USA Duration of pain: minimum 6 weeks Mean age: Intervention, 44.5 years; Control, 45.2 years	Quality of life (SF-36) Pain (back pain severity score) Function (RMDQ)	Manipulation: Short-lever, low-amplitude, high-velocity. 1 to 2 sessions per week for 15 to 30 minutes per session of SMT. Concurrent treatment: not stated Study length: 12 weeks treatment
Chen 2014[71]	Individual Biomechanical exercise – Stretching (50 minutes 3 times a week versus usual care.	Low back pain (with or without sciatica) n=127 Taiwan Duration of pain: minimum 6 months Age: Range of means 30.67-37.70	Pain (VAS)	Usual care: Instructed to perform usual activities. Concurrent medication/care: None Duration 6 months treatment.
Cherkin 1998[72]	McKenzie (9 sessions) versus Usual care	Low back pain without sciatica n=321 USA Duration of pain: minimum 7 days Mean age: 40.7 years	Function (RMDQ)	Usual care: Both groups received an educational booklet Concurrent treatment: most patients taking medication for back pain. Study length: 1 month treatment.
Cho 2014[80]	Individual Biomechanical exercise - Core stability. 30 minutes, 3 times a week versus usual care.	Low back pain (with or without sciatica) n=30 South Korea Duration of pain: not stated Age (range): 38.1-36.5	Pain (VAS)	Usual care: Received routine care but did not perform core stability exercises. Concurrent treatment: Not stated. Study length: 4 weeks treatment
Cho 2015[82]	Individual Biomechanical exercise - Stretching. (30 minutes, thrice a week) versus usual care.	Low back pain (with or without sciatica) N=20 South Korea Duration of pain: 3 months minimum Age Range: 22-36 years	Pain (VAS) Function (ODI)	Usual care: The low back pain rehabilitation program was conducted for 30 minutes, thrice a week for 8 weeks. Consisted of 14 exercises including flexion and extension, under the

				supervision of an expert in a low back pain treatment room. Concurrent treatment: Not stated. Duration 8 weeks treatment.
Chok 1999[84]	Endurance strengthening exercises (3x per week for 6 weeks) versus Usual care	Low back pain (with or without sciatica) n=66 Singapore Duration of pain: 7 days – 7 weeks Mean age: Intervention, 37.5 years; Control, 34.2 years	Pain (VAS) Function (RMDQ)	Usual care: Both groups received an educational booklet Concurrent treatment: told to not seek treatment from any other practitioner. Study length: 6 weeks treatment
Davies 1979[104]	Stretching (flexion) (extension) (frequency unclear) versus Usual care	Low back pain without sciatica n=43 United Kingdom Duration of pain: between 3 weeks and 6 months Age range: 15-45 years	Pain (VAS)	Usual care: Both groups received short wave diathermy to the lumbosacral spine Concurrent treatment: as for usual care Study length: 4 weeks treatment
Deyo 1990[112]	Stretching (3 relaxation exercises followed by stretching exercises) versus Usual care	Low back pain (with or without sciatica) N=145 USA Duration of pain: not stated 'chronic' Mean age: Intervention, 50.6 years; Control, 48.1 years	Pain (VAS) Function (sickness impact profile)	Usual care: Both groups received sham TENS Concurrent treatment: sham TENS Study length: 4 weeks treatment
Evans 1987[132]	Kendalls flexion exercises (frequency unclear) versus Usual care	Low back pain (with or without sciatica) n=127 Canada Duration of pain: acute Mean age: 40.6 years	Responder criteria (no or mild pain)	Usual care: Standard medical care only Concurrent treatment: as for usual care Study length: 6 months treatment
Eadie	Individual aerobic	Low back pain without	Quality of life (SF-	Individual aerobic

2013[124,125]	exercise versus group biomechanical exercise (1 hour session per week)	sciatica n=40 United Kingdom Duration of pain: 3 months Mean age: 44.9 years	36) Pain (NRS) Psychological distress (HADS)	exercise: Walking programme Concurrent treatment: Given a back book Study length: 8 weeks intervention, 6 months follow-up
Faas 1993[134]	Core stability (20 minutes sessions 2x per week) versus Usual care	Low back pain without sciatica n=311 Netherlands Duration of pain: 3 weeks or less Age range: 16-65 years	Pain (VAS) Healthcare utilisation (analgesic use, physiotherapy)	Usual care: Standard medical care only Concurrent treatment: Access advice from general practitioner and analgesics on demand. Study length: 5 weeks treatment
Gladwell 2006[168]	Pilates (class once a week and 2 sessions per week at home) versus Usual care	Low back pain without sciatica n=49 United Kingdom Duration of pain: minimum 12 weeks Mean age: Intervention, 36.9 years; Control, 35.9 years	Quality of life (SF-12) Pain (RMQ pain VAS) Function (ODI)	Usual care: Standard pain relief and normal activities Concurrent treatment: not stated. Study length: 6 weeks treatment
Goldby 2006[170]	Core stability (20 minutes 2x per week) versus Usual care	Low back pain without sciatica n=473 Netherlands Duration of pain: less than 3 weeks Mean age: 36 years	Pain (NRS) Function (ODI)	Usual care: General information and advice given to both groups Concurrent treatment: back school. Study length: 5 weeks
Gunay 2014[180]	Individual Biomechanical exercise – Stretching versus mixed exercise - Biomechanical + aerobic. MET program (3 days per a week).	Low back pain (with or without sciatica) N=63 Turkey Duration of pain: 3 months Age (range): 39.13-40.22	Pain (VAS) Function (ODI)	Concurrent treatment: At the end of the treatment sessions, hot-pack was applied to relieve discomfort in the lower back. Postural education and low back care advice also given. Study length: 6 weeks.

Han 2011[196]	Hydrotherapy (5x per week) versus Usual care	Low back pain (with or without sciatica) n=27 South Korea Duration of pain: not stated, participants had completed 4 weeks of treatment Mean age: Intervention, 61.3 years; Control, 60.8 years	Pain (VAS)	Usual care: Standard medical care only Concurrent treatment: not stated Study duration: 10 weeks treatment
Hansen 1993[199]	Core stability (1 hour 2x per week) versus Traction	Low back pain without sciatica n=150 Denmark Duration of pain: not stated 'chronic/subchronic' Mean age: 21-64 years	Pain (0-9 visual intensity scale)	Traction: Resting for 20 minutes on semi-hot packs, followed by intermittent gradual traction with 10% body weight force Concurrent treatment: not stated Study length: 4 weeks treatment
Harts 2008[200]	Core stability (frequency unclear) versus Waiting-list	Low back pain without sciatica n=44 Netherlands Duration of pain: minimum 12 weeks Mean age: Intervention, 44 years; Control, 41 years	Quality of life (SF-36) Function (RMDQ)	Usual care: Participants on waiting-list Concurrent treatment: not stated Study length: 8 weeks
Huber 2011[233]	Core stability (frequency unclear) versus Usual care	Low back pain with sciatica n=52 Poland Duration of pain: not stated Mean age: 35 years	Pain (VAS)	Usual care: Both groups offered analgesics and myorelaxants for 14 days prior to intervention. Control group advised to reduce spinal loading Concurrent treatment: offered analgesics and myorelaxants for first 14 days post onset of acute pain (before study intervention started) Study length: 20 days treatment

Kell 2009 [265]	Group biomechanical exercise (resistance training) versus usual care	Low back pain without sciatica N = 33 Canada Duration of pain: 3 months minimum Age (mean) Ex group: 40.1(8.7), UC group: 35.3(7.3)	Pain (VAS) Function (ODI) Quality of life (SF-36)	Concurrent treatment: not stated Usual care: Patients advised to continue with their regular exercise training and levels of physical activity, for the duration of the study period.
Kim 2015[278]	Individual Biomechanical exercise - Core stability. 30 minutes, 5 times a week versus usual care.	Low back pain without sciatica n=73 South Korea Duration of pain: 3 months minimum Age (mean) Ex group: 29.7 (3.9), UC group: 28.6 (3.2).	Pain (VAS)	Usual care: 20 minutes TENS and 15 minutes hot packs 5 times a week. Concurrent medication/care: 20 minutes TENS and 15 minutes hot packs 5 times a week. Study length: 8 weeks intervention, 2 months follow up
Lawand 2015[295]	Individual Biomechanical exercise - Stretching (12, weekly, 60 minute sessions & then followed-up for a further 12 weeks) versus usual care.	Low back pain without sciatica n=61 Brazil Duration of pain: minimum 3 months	Quality of life (SF36) Pain (VAS) Function (RMDQ) Healthcare utilisation (medication use)	Usual care: no treatment Concurrent treatment: Up to 3.0g acetaminophen per day as first choice for back pain or up to 150mg of diclofenac as secondary choice if needed. Study length: 24 weeks (12 weeks of treatment).
Ljunggren 1992[313]	Core stability (20 minutes per day) versus Traction	Low back pain with sciatica n=50 Norway Duration of pain: acute, hospitalised due to sciatica Mean age: 41.6 years	No outcomes relevant to review protocol	Traction: Manual traction by therapist Concurrent treatment: not stated Study length: 1 week treatment
Machado 2010[318]	McKenzie (frequency unclear) versus usual care	Low back pain without sciatica n=146	Pain intensity rating (0-10) Function (RMDQ)	Usual care: Both groups received advice to remain active, paracetamol

		Australia Duration of pain: less than 6 weeks Mean age: Intervention, 47.5 years; Control, 45.9 years		and possibly non-steroidal anti-inflammatory drugs Concurrent treatment: as for usual care. Study length: 3 weeks treatment
Masharawi 2013[331]	Core stabilization (2x per week) versus usual care	Low back pain (with or without sciatica) n=40 Israel Duration of pain: minimum 12 weeks Age range: 45-65 years	Pain (VAS) Function (RMDQ)	Usual care: Participants on waiting-list Concurrent treatment: unclear Study length: 4 weeks treatment
Mcilveen 1998[335]	Hydrotherapy (2x per week) versus usual care	Overall low back pain (with or without sciatica) n=109 Australia Duration of pain: not stated 'chronic' Mean age: Intervention 57.2 years; Control 58.4 years	Pain (McGill pain question present pain intensity) Function (ODI)	Usual care: Participants on waiting-list Concurrent treatment: not stated. Study length: 4 weeks treatment
Miyamoto 2013[342]	Pilates (1 hour 2x per week) versus Usual care	Low back pain without sciatica n=86 Brazil Duration of pain: minimum 6 weeks Mean age: Intervention, 38.3 years; Control, 40.7 years	Pain (VAS) Function (RMDQ)	Usual care: Both groups received advice and education. Control group also received telephone calls for clarification of instructions Concurrent treatment: about half of patients were having either physiotherapy or medication Study length: 6 weeks treatment
Moon 2015[352]	Individual Biomechanical exercise - Core stability versus usual care.	Low back pain (with or without sciatica) n=16 South Korea Duration of pain: Not reported Mean age: Ex: 45.1	No relevant outcomes reported	Usual care: no details provided. Concurrent treatment: Not stated Study length: 8 weeks

		(2.23), Con: 41.6 (4.27).		treatment.
Myounggi 2015[364]	Individual Biomechanical exercise – McKenzie (5 times a week) versus electrotherapy - Interferential therapy.	Low back pain (with or without sciatica) n=90 South Korea Duration of pain: not reported Age range: 34.2-35.2 years	Pain (VAS)	Concurrent treatment: None given Study length: 2 weeks treatment
Natour 2015[379]	Group biomechanical exercise – Pilates (50 minutes twice a week) versus usual care.	Low back pain (with or without sciatica) n=60 Brazil Duration of pain: 12 months minimum Age range: 47.79-48.08.	Quality of life (SF36) Pain (VAS) Function (RMDQ) Healthcare utilisation (NSAID use)	Usual care: no intervention. Concurrent medication/care: Use of non-steroidal anti-inflammatory drugs (NSAIDS). Instructed to use 50mg of sodium diclofenac at intervals no shorter than 8h when needed. Patients recorded the number of pills taken per day throughout the study on a chart. Study length: 90 days treatment + 90 days follow up.
Paatelma 2008[395]	McKenzie (10-15 repetitions every 1 to 2 hours) versus self-management	Low back pain (with or without sciatica) n=134 Finland Duration of pain: not stated 'acute or chronic' Mean age: 44 years	Pain (VAS) Function (RMDQ)	Self-management: 45-60 minutes counselling from a physiotherapist - advice to avoid bed rest and continue normal activity including exercise as much as possible; 2-page back booklet provided Concurrent treatment: not stated Study length: Unclear – possibly 6 weeks
Park 2013[400]	Core stability (3x per week)versus Usual care	Low back pain (with or without sciatica) n=24 South Korea Duration of pain: minimum 12 weeks	Quality of life (RAND-36) Pain (VAS)	Usual care: Both groups received physical therapy (could consist of hot pack, interferential current therapy and

		Mean age: 44 years		deep heat with ultrasound Concurrent treatment: as for usual care Study length: 8 weeks treatment
Quinn 2011[410]	Pilates (One hour per week) versus usual care	Low back pain (with or without sciatica) n=29 Irish Republic Duration of pain: minimum 12 weeks Mean age: 43 years	Pain (VAS) Function (RMDQ)	Usual care: Participants on waiting-list Concurrent treatment: not stated Study length: 8 weeks treatment
Rasmussen-barr 2009[414]	Core stability (45 minutes sessions weekly and at home 15 minutes daily) versus usual care	Low back pain without sciatica n=71 Sweden Duration of pain: minimum 8 weeks Mean age: Intervention, 37 years; Control, 40 years	Quality of life (SF-36) Pain (VAS) Function (ODI)	Usual care: Both groups encouraged to exercise at home daily Concurrent treatment: not stated. Study length: 8 weeks treatment
Risch 1993[419]	Core stability (2x per week) versus usual care	Low back pain (with or without sciatica) n=54 United Kingdom Duration of pain: minimum 1 year Mean age: 45 years	Psychological distress (mental health inventory)	Usual care: Participants on waiting-list Concurrent treatment: not stated Study length: 10 weeks treatment
Rydeard 2006[430]	Pilates (3x 1 hour sessions per week) versus usual care	Low back pain (with or without sciatica) n=39 Hong Kong (China) Duration of pain: minimum 6 weeks Mean age: Intervention, 37 years; Control, 34 years	Pain (pain intensity score) Function (RMDQ)	Usual care: Standard medical care only Concurrent treatment: not stated Study length: 4 weeks treatment
Shaughnessy 2004[447]	Core stability (frequency unclear) versus Placebo/Sham	Low back pain (with or without sciatica) n=41 Irish Republic Duration of pain: minimum 12 weeks	Quality of life (SF-36) Function (RMDQ)	Usual care: No active intervention Concurrent treatment: not stated

		Mean age: Intervention, 43 years; Control, 34 years		Study length: 10 weeks treatment
Steele 2013 [466]	Individual biomechanical exercise (core stability, full range of motion) versus Usual care Individual biomechanical exercise (core stability, limited range of motion) versus Usual care	Low back pain without sciatica N = 31 UK Duration of pain: minimum 12 weeks	Pain (VAS) Function (ODI)	Concurrent treatment: Participants continued with any current treatments or training they were receiving. Participants were, instructed to avoid beginning any other resistance training exercises designed to address the lower back. Usual care: Participants did not train Study length: 12 weeks treatment
Torstensen 1998[491]	Core stabilization (1 hour 3x per week) versus Unsupervised exercise	Low back pain (with or without sciatica) n=141 Norway Duration of pain: minimum 6 weeks Mean age: Intervention, 37 years; Control, 34 years	Pain (VAS) Function (ODI)	Unsupervised exercise: Patients asked to walk for 1 hour, 3 times a week for 12 weeks Concurrent treatment: not stated Study length: 12 weeks treatment
Vincent 2014[521]	Individual Biomechanical exercise - Stretching (3 times a week for one-on-one training sessions) versus usual care.	Low back pain without sciatica N=60 USA Duration of pain: 6 months minimum Age: 60-85	Pain (NRS) Function (RMDQ) Adverse events	Usual care: received normal medical care and follow-up during the four month study, with no resistance exercise intervention. Concurrent medication/care: Educational recommendations from the Centres for Disease Control and Prevention and the American Heart Association regarding physical activity and diet were provided and reviewed with each

				participant as part of standard care. Study length: 4 months treatment.
Zylbergold 1981[564]	Core stability (2x per week) versus Usual care	Low back pain without sciatica n=28 Canada Duration of pain: not stated Mean age: Intervention, 49.1 years; Control, 46 years	Function (problem oriented index functional assessment) Pain (VAS)	Usual care: Both groups received home-care instruction in back and body mechanics Concurrent treatment: not stated Study length: 4 weeks treatment

Table 72: Aerobic exercise evidence

Study	Intervention/ comparison	Population	Outcomes	Comments
Chan 2011[67]	Aerobics exercise (3x per week) versus Usual care	Low back pain (with or without sciatica) n=46 Hong Kong (China) Duration of pain: minimum 6 weeks Mean age: Intervention, 37 years; Control, 34 years	Pain (VAS) Function (Aberdeen Low Back Pain Disability Scale [ALBPS])	Usual care: Both groups were provided with conventional physiotherapy treatments that are commonly used clinically for chronic low back pain Concurrent treatment: as for usual care. Study length: 8 weeks treatment
Cuesta-vargas 2012[98]	Aerobic exercise (deep water running 3x per week) versus Usual care	Low back pain without sciatica n=58 Spain Duration of pain: minimum 12 weeks Mean age: Intervention, 38.6 years; Control, 37.8 years	Pain (VAS) Function (RMDQ)	Usual care: Both groups received an educational booklet Concurrent treatment: GP intervention Study length: 4 months treatment
Ferrell 1997[138]	Group walking (1 hour 4x per week) versus Usual care versus Self-management	Low back pain without sciatica n=29 USA Duration of pain: minimum 12 weeks Mean age: 73 years	Pain ('patient pain questionnaire') Function (SF-36)	Usual care group: Standard medical care as well as friendly phone call from investigator (to reduce attrition) Self-management group: 90 minute education

				session with weekly telephone calls to reinforce advice Concurrent treatment: not stated Study length: 6 weeks treatment
Hartvigsen 2010[201]	Group walking (45 minutes 2x per week) versus Unsupervised exercise versus Self-management	Low back pain (with or without sciatica) n=151 Denmark Duration of pain: minimum 8 weeks	Quality of life (EQ5D) - paper states outcome was recorded but no data reported Pain (low back pain rating scale 0-60)	Unsupervised exercise: Participants received instruction on Nordic Walking as well as Nordic Walking poles and were left to perform exercise as much as they wanted at home Self-management: Participants received information about active living and exercise, and about maintaining daily function level Concurrent treatment: not stated Study length: 8 weeks treatment
Henchoz 2010[211]	Group aerobics (2x per week) versus Usual care	Low back pain without sciatica n=105 Switzerland Duration of pain: not stated 'subacute or chronic' Mean age: Intervention 41 Control 39.25	Quality of life (SF-36) Pain (VAS) Function (ODI)	Usual care: 'Routine follow-up' (participants in both groups had completed a functional multidisciplinary rehabilitation programme) Concurrent treatment: as for usual care Study length: 3 months treatment
Kell 2009 [265]	Group aerobic exercise (3x per week) versus usual care	Low back pain without sciatica N = 33 Canada Duration of pain: 3 months minimum Age (mean, SD)	Pain (VAS) Function (ODI) Quality of life (SF-36)	Concurrent treatment: not stated Usual care: Patients advised to continue with their regular exercise training and levels of physical

		Intervention: 36.7(8.9), Control: 35.3(7.3)		activity, for the duration of the study period. Study length: 16 week treatment
Koldas dogan 2008[282]	Aerobics exercise (3x per week) versus usual care	Low back pain without sciatica n=40 Turkey Duration of pain: minimum 6 weeks Mean age: Intervention, 37 years; Control, 34 years	Pain (VAS) Function (RMDQ) Psychological distress (BDI)	Usual care: Both groups given advice on home exercise regimen Concurrent treatment: as for usual care Study length: 6 weeks treatment
Mannion 1999a/ Mannion 01[324,325]	Group exercise (aerobic) versus group exercise (biomechanical core stabilization) Both 2x per week.	Low back pain with or without sciatica N=99 Finland Duration of pain: >3 months	Pain severity (VAS) Function (RMDQ)	Concomitant treatment: not stated. Study length: 3 months Intervention + 6 months follow up
Marshall 2013 [329]	Group stationary cycling versus Pilates (1 hour 3x per week for each)	Low back pain with sciatica n=64 Australia Duration of pain: minimum 12 weeks Mean age: Intervention, 48 years; Control, 51 years	Pain (VAS) Function (ODI)	Both groups received active intervention Concurrent treatment: not stated Study length: 8 weeks treatment
Mcdonough 2013[334]	Walking programme (frequency unclear) versus usual care	Low back pain without sciatica n=56 n=57 United Kingdom Duration of pain: minimum 12 weeks Mean age: Intervention, 48 years; Control, 51 years 8 weeks treatment	Quality of life (EQ5D) Pain (NRS) Function (ODI)	Usual care: Both groups received advice and education with “The Back Book” Concurrent treatment: as for usual care
Turner 1990[496]	Group walking (2 hours weekly) versus Waiting-list	Low back pain without sciatica n=50 USA Duration of pain: minimum 6 months Mean age: 44 years	Pain (McGill Questionnaire) Psychological distress (Centre for Epidemiological studies depression scale	Usual care: Participants on waiting-list Concurrent treatment: not stated

			CESD)	Study length: 8 weeks treatment

Table 73: Mind-body exercise evidence

Study	Intervention/ comparison	Population	Outcomes	Comments
Cho 2014[81]	Individual Mind-body exercise - Tai-chi versus individual Biomechanical exercise – Stretching (both 3 times per week, for one hour).	Low back pain (with or without sciatica) n=40 South Korea Duration of pain: Not reported Age: 'in their 20s'	Pain (VAS)	Duration 4 weeks. Concurrent medication/care: None stated
Cox 2010[93]	Group yoga (viniyoga 75 minutes per week) versus Usual care	Low back pain (with or without sciatica) n=20 United Kingdom Duration of pain: with past 18 months Mean age: Intervention, 39 years; Control, 51 years	Quality of life (SF-12 EQ5D) Function (RMDQ) Healthcare utilisation (medication use, GP visits, physiotherapy visits)	Usual care: Both groups received an educational booklet Concurrent treatment: as for usual care Study length: 12 weeks treatment
Galantino 2004[161]	Group yoga (Hatha 1 hour 2x per week) versus Usual care	Low back pain (with or without sciatica) n=22 USA Duration of pain: minimum 6 months Mean age: not stated	Function (ODI)	Usual care: Standard medical care only. Offered yoga therapy at the end of study period Concurrent treatment: not stated Study length: 6 weeks treatment
Hall 2011[194]	Group tai-chi (40 minutes 2x per week) versus Usual care	Low back pain (with or without sciatica) n=160 Australia Duration of pain: not stated Mean age: Intervention, 43.4 years; Control, 44.3 years	Psychological distress (BDI)	Usual care: Participants on waiting-list to receive intervention at end of study Concurrent treatment: not stated Study length: 10 weeks treatment
Kim 2014[277]	Individual Mind-body exercise - Yoga (30 minute virtual reality-based yoga program using Wii Fit 12 sessions)	Low back pain (with or without sciatica) n=30 South Korea Duration of pain: 2	Pain (VAS) Function (ODI & RMDQ)	Concurrent treatment: Not reported Study length: 4 weeks.

	versus individual Biomechanical exercise - Core stability.	months minimum Mean age (range): 44.33-50.46 years		
Monro 2015[348]	Group mind-body exercise - Group Yoga. (two or more group classes per week for 2 weeks asked to continue daily at home) versus usual care.	Low back pain (with or without sciatica) n=61 India Duration of pain: Age range: 20-45 years *NB. Specific population with presence of at least 1 disc extrusion or bulge*	Pain (VAS) Function (RMDQ)	Usual care: Continued with their normal medical care, pain killers and non-steroidal anti-inflammatory medication. Education classes were offered as a compensation for not having yoga, after 2 weeks the attendance was less than 30% and classes were discontinued. Concurrent medication/care: Worst pain in past 2 w. - Mild/nil (13%) Moderate (63%) Severe (23%) Duration 3 months.
Nambi 2014[370]	Group mind-body exercise - Group Yoga (1 hour per week also asked to practice yoga at home (30 minutes, 5 days a week) versus individual Biomechanical exercise - Stretching (asked to practice them for 3 days a week)	Low back pain (with or without sciatica) n=60 India Duration of pain: 3 months Age range: 43.66-44.26	Pain (VAS)	Concurrent treatment: Received lecture of 1 hour on physical therapy education regarding CLBP, 2 weeks prior to the commencement of the program. Instructional hand-outs were given to help subjects use the information they received. Study length: 4 weeks treatment.
Saper 2009[436]	Group yoga (Hatha 75 minutes per week) versus Usual care	Low back pain (with or without sciatica) n=30 USA Duration of pain: minimum 12 weeks Mean age: 44 years	Pain (NRS) Healthcare utilisation (medication use) Function (RMDQ) Responder criteria (≥30% improvement in function)	Usual care: Participants on waiting-list Concurrent treatment: 30-40% of patients used non-study treatments. Study length: 12 weeks treatment

Sherman 2005[448]	Group yoga (viniyoga) versus Biomechanical plus Aerobic (75 minutes a week each) versus Self-management	Low back pain without sciatica n=101 USA Duration of pain: minimum 12 weeks Mean age: 44 years	Responder criteria (≥50% improvement in function) Function (RMDQ) Healthcare utilisation (medication use)	Self-management: Participants were sent a copy of "the back book" Concurrent treatment: access to all medical care provided by their insurance plan Study length: 12 weeks treatment
Sherman 2011[449]	Group yoga (viniyoga) versus Biomechanical plus Aerobic (75 minutes a week each) versus Self-management	Low back pain without sciatica n=228 USA Duration of pain: minimum 12 weeks Mean age: 48.4 years	Responder criteria (30% improvement in function) Function (RMDQ)	Self-management: Participants were sent a copy of "The Back Book" Concurrent treatment: access medical care as required Study length: 12 weeks treatment
Tilbrook 2011 Tilbrook 2014[489])[488]	Group yoga ("yoga for healthy lower backs" 75 minutes a week) versus Waiting-list	Low back pain (with or without sciatica) n=313 United Kingdom Duration of pain: not stated Mean age: 46 years	Quality of life (EQ5D/SF-12) Pain Severity (Aberdeen back pain scale) Function (RMDQ)	Usual care: Participants on waiting-list Concurrent treatment: back pain educational booklet (the back book) and continued their usual care (not specified) Study length: 12 weeks treatment
Vincent 2010[520]	Tai-chi (weekly) versus Placebo/sham	Low back pain (with or without sciatica) n=50 USA Duration of pain: minimum 12 weeks	Pain (VAS) no data reported	Placebo/Sham: Attention control. Participants received 25-30 minutes full attention from an investigator in which both engaged in conversation. Concurrent treatment: not stated Study length: 4 weeks treatment
Williams 2005[550]	Group yoga (Iyengar 90 minutes weekly) versus	Low back pain Without sciatica	Pain (VAS) Healthcare	Usual care: Participants continued

	Usual care	n=60 USA Duration of pain: minimum 12 weeks Mean age: 48 years	utilisation (decreased or stopped medication)	usual medical care Concurrent treatment: two educational lectures on low back pain, weekly newsletters on back care and were permitted to continue with their usual medical care. Study length: 16 weeks treatment
Williams 2009[549]	Group yoga (Iyengar 90 minutes 2x per week) versus Waiting-list	Low back pain (with or without sciatica) n=90 USA Duration of pain: minimum 12 weeks Mean age: 48 years	Pain (VAS) Function (ODI) Psychological distress (BDI)	Usual care: Participants continued usual medical care Concurrent treatment: not stated. Study length: 24 weeks treatment

Table 74: Mixed exercise evidence

Study	Intervention/ comparison	Population	Outcomes	Comments
Baena-beato 2014[27]	Mixed exercise - Biomechanical + aerobic. 40 sessions, five days per week versus Usual care - Waiting-list.	Low back pain (with or without sciatica) n=49 Spain Duration of pain: minimum 12 weeks Age: range: 46.2-50.9.	Quality of life (SF36) Pain (VAS) Function (ODI)	Intervention. Aquatic therapy (resistance exercise, aerobic exercise, stretching exercises) Waiting-list. Received different recommendations about adequate posture, healthy lifestyle and information about exercises contraindicated for chronic low back pain. Concurrent treatment: Encouraged to maintain normal dietary habits and physical activity level. Asked not to change medication during the two-month intervention period.

				Study length: 2 months.
Goren 2010[173]	Individual biomechanical (stretching and strengthening exercise) plus aerobic (low-intensity cycling exercises) exercise (5 days a week) versus waiting list	Low back pain with sciatica n=50 Turkey Duration of pain: minimum 12 weeks Mean age: 53.2 years	Pain (VAS) Function (ODI)	Usual care: No additional treatment Concurrent treatment: allowed paracetamol Study length: 3 weeks treatment
Little 2014 [309]	Group mixed exercise (biomechanical + aerobic) versus usual care	Low back pain with or without sciatica N = 28 UK	Pain (von Korff scale) Function (RMDQ)	Concomitant treatment: not stated 3 months intervention + 12 months follow up
Machado 2007[317]	Group biomechanical plus Aerobic (40 minutes 2x per week) versus cognitive therapy	Low back pain without sciatica n=33 Setting unknown Duration of pain: minimum 12 weeks Mean age: Intervention, 42.4 years; Control, 44.6 years	Pain (VAS) Function (RMDQ) Psychological distress (BDI)	Cognitive therapy: Non-directive counselling in groups of up to 10 patients. 80 minute sessions twice a week for 9 weeks. Concurrent treatment: not stated. Study length: 3 weeks treatment
Nassif 2011[371]	Biomechanical plus Aerobic (60 minutes 3x per week) versus Usual care	Low back pain (with or without sciatica) n=65 France Duration of pain: not stated “chronic” Mean age: Intervention, 45.1 years; Control, 45.3 years	Pain (VAS) Function (RMDQ)	Usual care: No active intervention Concurrent treatment: not stated. Study length: 2 months treatment
Reilly 1989[416]	Biomechanical plus Aerobic (4x per week) versus Unsupervised exercise	Low back pain (with or without sciatica) n=40 USA Duration of pain: minimum 12 weeks Mean age: Intervention, 48 years; Control, 51 years	Pain (VAS)	Unsupervised exercise: Unsupervised, participants were given a predesigned exercise programme (flexibility, strength and aerobic), to be done 4 times a week for 6 months Concurrent treatment: as for usual care Study length: 6 months

				treatment
Smeets 2006[460] (Smeets 2008[459], Smeets 2009[457], Smeets 2006[461], Smeets 2008[458])	Biomechanical + Aerobic (105 minutes 3x per week) versus Waiting-list versus cognitive behavioural approaches versus combination (exercises + cognitive behavioural approaches) *NOTE: only data for the exercise comparisons have been reported in this review. The combination arm data has been reported in the MBR review.*	Low back pain (with or without sciatica)* n=104 Netherlands Duration of pain: minimum 12 weeks Mean age: Intervention 42.7Control 40.6 **NOTE: the population in this study has been classified as low back pain 'with or without sciatica' because they have included leg pain, with no way of knowing whether or not the patients have nerve root entrapment (the study says it has excluded people with nerve root involvement but does not specify if this was determined on the basis of MRI).*	Pain (VAS) Function (RMDQ) Psychological distress (BDI) Healthcare utilisation	Usual care: Participants on waiting-list Concurrent treatment: None. Study length: 10 weeks treatment
Storheim 2000[473]	Aerobic plus Mind-body plus Biomechanical (75 minutes 2x per week) versus Waiting-list	Low back pain without sciatica n=29 Norway Duration of pain: minimum 12 weeks Mean age: Intervention, 45.4 years; Control, 48.3 years	Pain (VAS) Function (ODI) Psychological distress (HADS)	Usual care: Participants continued usual medical care Concurrent treatment: not stated Study length: 15 weeks treatment
Storheim 2003[474]	Biomechanical plus Aerobic (1 hour 3x per week) versus Usual care	Low back pain without sciatica n=59 Norway Duration of pain: 8-12 weeks Mean age: Intervention, 42.3 years; Control, 48.9 years	Quality of life (SF-36) Pain (self-efficacy score for pain) Function (self-efficacy for function)	Usual care: Participants continued usual medical care Concurrent treatment: not stated Study length: 15 weeks treatment

Vad 2007[503]	Mind-body plus Biomechanical (15 minutes 3x per week) versus Usual care	Low back pain with sciatica n=46 Qatar, USA Duration of pain: minimum 12 weeks Mean age: Intervention, 48 years; Control, 51 years	Pain (NRS) Function (RMDQ)	Usual care: Participants continued usual medical care Concurrent treatment: Celecoxib (200 mg) and hydrocodone (5 mg) with acetaminophen (500 mg) as needed, and all participants wore a lumbar cryobrace for 15 minutes before bedtime Study length: 1 year treatment

Table 75: Combinations of interventions – exercise adjunct

Study	Intervention/ comparison	Population	Outcomes	Comments
Celestini 2005[66]	Exercise (biomechanical – core stability) + orthotics (corset) Orthotics (corset)	Low back pain with or without sciatica N=48 Italy	Responder criteria (remission of pain)	Concomitant treatment: not stated 90 days intervention + 1 year follow-up
Del Pozo-Cruz 2013a[106]	Exercise + self-management (education) Self-management programme	Low back pain with or without sciatica N=100 Spain	Quality of life (number of people improving on EQ-5D-3L utility) Function (Number of patients improving on RMDQ)	Concomitant treatment: participants were asked not to attend another treatment facility over study time 9 months intervention
Ding 2015[115]	Acupuncture + electrotherapy (low frequency device) + manual therapy (massage) Acupuncture + electrotherapy (low frequency device) + manual therapy (massage) + exercise (biomechanical)	Low back pain with sciatica N=128 China	No relevant outcomes	Concomitant treatment: not stated 2-3 week intervention
Kofotolis 2008[281]	Electrotherapy (TENS) + exercise Electrotherapy (TENS)	Low back pain without sciatica N=92 Greece	Pain severity (Borg verbal pain rating scale) Function (ODI)	Concomitant treatment: not stated 4 weeks intervention + 8 weeks follow up

	Sham electrotherapy (TENS) Individual exercise (biomechanical exercise - Core stability)			
Lewis 2005[301]	Group exercise (mixed) + manual therapy (manipulation) + education individual exercise + manual therapy (manipulation) + self-management (education)	Low back pain without sciatica N=80 UK	Healthcare utilisation (people taking analgesics)	Concomitant treatment: not stated 8 weeks intervention + 1 year follow up
Little 2014 [309]	Mixed exercise (biomechanical + aerobic) + Alexander technique Alexander technique	Low back pain with or without sciatica N = 69 UK	Pain (von Korff scale) Function (RMDQ)	Concomitant treatment: not stated 3 months intervention + 12 months follow up
Marshall 2008 [328]	Individual biomechanical exercise (core stability) + manual therapy (manipulation) Self-management (advice to stay active) + manual therapy (manipulation)	Low back pain (with or without sciatica) n=50 New Zealand Duration of pain: minimum 12 weeks Mean age: 36.5 years	Quality of life (SF-12) Pain (McGill pain questionnaire sensory and affective)	Self-management: Participants provided with advice to stay active and an information sheet on exercises to perform Spinal manipulation (high-velocity low-amplitude thrusts) by registered chiropractors and manipulative physiotherapists for 4 weeks prior to intervention. Study length: 12 weeks treatment
Mirovsky 2006[341]	Exercise + manual therapy (traction) Manual therapy (traction)	Low back pain with or without sciatica N=84 Israel	Pain severity (VAS) NB Results only reported graphically with no SDs therefore cannot be included in review	Concomitant treatment: not stated 28 days intervention + 1 year follow up
Miyamoto	Exercise (biomechanical –	Low back pain without	Pain severity	Concomitant treatment: people

2013a[342]	Pilates) + self-management (education) Self-management (education)	sciatica N=86 Brazil	(NRS) Function (RMDQ)	instructed not to undergo treatment elsewhere during study period; allowed to keep taking medication as prescribed by doctor. 6 weeks intervention + 6 months follow up
Rantonen 2012[411]	Exercise (biomechanical) + self-management (home exercise) Exercise + self-management (education) Self-management (self-care advice based on the Back Book)	Low back pain with or without sciatica N=126 Finland	Quality of life (15D) Pain severity (VAS) Function (RMD 18 items, ODI) Psychological distress (Depression Scale)	Concomitant treatment: All subjects had access to OH care as usual during the study period. Exercise + self-management arm of the trial excluded due to insufficient description of the exercise programme. Psychological distress not eligible (DEPS score) 12 weeks intervention + 4 years follow up
Ryan 2010[429]	Exercise + psychological intervention (cognitive behavioural approaches) + self-management (education) Psychological intervention (cognitive behavioural approaches) + self-management (education)	Low back pain without sciatica N=38 UK	Pain severity (NRS) Function (RMDQ)	Concomitant treatment: not stated 8 weeks intervention + 3 months follow up
Szulc 2015[479]	Exercise (biomechanical) + self-management (unsupervised exercise) TENS + laser + massage + self-management (unsupervised exercise)	Low back pain with sciatica N=6- Poland	Pain severity (VAS) Function (revised ODI)	Concomitant treatment: not stated 2 weeks intervention + 3 months follow up
Turner 1990[496]	Exercise (aerobic) + psychological intervention (behavioural	Low back pain without sciatica N=96 USA	Pain severity (McGill Pain Questionnaire)	Concomitant treatment: not stated Psychological distress reported as CES-D so

	therapy) Exercise (group aerobic) Psychological intervention (behavioural therapy) Waiting list control (usual care not specified)			not eligible 1 year intervention + follow up
UK BEAM Trail Team 2004[499]	Self-management Self-management + exercise (biomechanical) Self-management +manual therapy (mixed modality) Self-management + exercise (biomechanical) + manual therapy (mixed modality)	Low back pain with or without sciatica N=1334 12 weeks intervention + 12 months follow up UK	Quality of life (SF-36 and EQ-5D) Pain severity (Von Korff) Function (RMDQ and Von Korff)	Concomitant treatment: not stated
Weiner 2008[535]	Electrotherapy (PENS) + exercise Exercise (biomechanical + aerobic) + sham electrotherapy (PENS) Electrotherapy (PENS) Sham electrotherapy (PENS)	Low back pain without sciatica N=200 USA	Quality of life (SF-36) Pain severity (VAS; McGill pain) Function (RMDQ) Psychological distress (Geriatric depression scale)	Concomitant treatment: not stated Depression score not eligible (not a protocol defined outcome) 6 weeks intervention + 6 months follow up
Zhang 2015[561]	Manual therapy (massage) + exercise (core stability) Manual therapy (massage)	Low back pain with or without sciatica N=92 China	Pain severity (VAS) Function (ODI) Responder criteria (pain free period of at least 30 days)	Concomitant treatment: not stated 8 weeks intervention + 1 year follow up

9.3.4 Data unsuitable for meta-analysis

Table 76: Group exercise

Study	Intervention /comparison	Outcome	Intervention results	Comparison results	Risk of bias
Group exercise versus usual care					
Hartvigsen 2010[201]	Group walking versus Usual care (advice) • Overall low back pain (with or without sciatica)	Pain (Lower Back Pain Rating Scale: 0 – 60*) at ≤4 months *high is good outcome	Mean improvement: 8.8	Mean improvement: 4.8	High
Group exercise versus single intervention					
Hartvigsen 2010[201]	Supervised group walking versus Unsupervised walking • Overall low back pain (with or without sciatica)	Pain (Lower Back Pain Rating Scale: 0 – 60*) at ≤4 months *high is good outcome	Mean improvement: 8.8	Mean improvement: 3.4	High

Table 77: Biomechanical exercise

Study	Intervention /comparison	Outcome	Intervention results	Comparison results	Risk of bias
Core stability versus placebo/sham					
Chok 1999[84]	Core stability versus placebo/sham • Overall low back pain (with or without sciatica)	Pain (VAS 0-10) at ≤4 months	Mean (range): 0.81 (0-9.5)	Mean (range): 2.1 (0-8.1)	Very high
Hansen 1993[199]	Core stability versus placebo/sham • low back pain (without sciatica)	Pain (visual interval pain score, 0-9) at ≤4 months for men and women of moderate/hard workload	Median (IQR): 3 (1, 5)	Median (IQR): 4 (1,7)	Very high
Hansen 1993[199]	Core stability versus placebo/sham • low back pain (without sciatica)	Pain (visual interval pain score, 0-9) at > 4 months for men and women of sedentary/light workload	Median (IQR): 2 (1, 4)	Median (IQR): 4 (2,5)	Very high

Study	Intervention /comparison	Outcome	Intervention results	Comparison results	Risk of bias
Albert 2012[8]	Core stability versus placebo/sham • low back pain with sciatica	Function (RMDQ) at ≤4 months	Median 6.0	Median 6.0	Very high
Chok 1999[84]	Core stability versus placebo/sham • Overall low back pain (with or without sciatica)	Function (RMDQ) at ≤4 months	Mean 4.5 (range 0-19)	Mean 7.4 (range 0-21)	Very high
Albert 2012[8]	Core stability versus placebo/sham • low back pain with sciatica	Function (RMDQ) at > 4 months	Median difference 3.5 (IQR 1, 10)		Very high
Core stability versus usual care					
Rasmussen-barr 2009[414]	Core stability versus Usual Care • low back pain (without sciatica)	Pain (VAS 0-10) at > 4 months	Median change (IQR): -1.2 (-3.5, -0.3)	Median change (IQR): -1.2 (-2.2, 0)	Very high
Rasmussen-barr 2009[414]	Core stability versus Usual Care • low back pain (without sciatica)	Function (ODI) at > 4 months	Median change (IQR): -10 (-20, -2)	Median change (IQR): -2 (-12, 2) p=0.025 between groups	Very high
Rasmussen-barr 2009[414]	Core stability versus Usual Care • low back pain (without sciatica)	Quality of life (SF-36 physical) at > 4 months	Median change (IQR): 13 (7, 16)	Median change (IQR): 8 (0, 10)	Very high

9.3.5 Biomechanical exercise evidence

9.3.5.1 Clinical evidence summary: Individual Biomechanical exercise

Table 78: Individual biomechanical exercise versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months - general health	57 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - general health in the control groups was 50	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - general health in the intervention groups was 14.13 higher (5.56 to 22.7 higher)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months - vitality	57 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - vitality in the control groups was 49.5	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - vitality in the intervention groups was 12.33 higher (3.4 to 21.25 higher)
Overall - Quality of life pain score (SF-36/RAND-36 0-100) ≤4 months - bodily pain	57 (2 studies)	LOW[a] due to risk of bias		The mean overall - quality of life pain score (SF-36/rand-36 0-100) ≤4 months - bodily pain in the control groups was 32.13	The mean overall - quality of life pain score (SF-36/rand-36 0-100) ≤4 months - bodily pain in the intervention groups was 19.05 higher (12.5 to 25.61 higher)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months - physical role limitation	57 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - physical role limitation in the control groups was 45.56	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - physical role limitation in the intervention groups was 21.44 higher (10.21 to 32.75 higher)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months - emotional role limitation	57 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - emotional role limitation in the control groups was 63.5	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - emotional role limitation in the intervention groups was 12.25 higher (1.34 to 23.16 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months - social functioning	57 (2 studies)	LOW[a] due to risk of bias		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - social functioning in the control groups was 50.31	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months - social functioning in the intervention groups was 20.27 higher (11.27 to 29.27 higher)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months (unexplained heterogeneity) - physical functioning	57 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months (unexplained heterogeneity) - physical functioning in the control groups was 48.06	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months (unexplained heterogeneity) - physical functioning in the intervention groups was 12.68 higher (7.94 lower to 33.3 higher)
Overall - Quality of life individual (SF-36/RAND-36 0-100) ≤4 months (unexplained heterogeneity) - mental health	57 (2 studies)	VERY LOW[a,b,d] due to risk of bias, inconsistency, imprecision		The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months (unexplained heterogeneity) - mental health in the control groups was 66.25	The mean overall - quality of life individual (SF-36/rand-36 0-100) ≤4 months (unexplained heterogeneity) - mental health in the intervention groups was 2.88 higher (14.38 lower to 20.15 higher)
Overall - Pain (VAS 0-10) ≤4 months - Pain	317 (5 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean overall - pain (VAS 0-10) ≤4 months - pain in the control groups was 3.6	The mean overall - pain (VAS 0-10) ≤4 months - pain in the intervention groups was 0.74 lower (1.12 to 0.36 lower)
Overall - Pain (VAS 0-10) ≤4 months - Pain at rest	30 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean overall - pain (VAS 0-10) ≤4 months - pain at rest in the control groups was 3.76	The mean overall - pain (VAS 0-10) ≤4 months - pain at rest in the intervention groups was 1.61 lower (2.21 to 1.01 lower)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
Overall - Pain (VAS 0-10) ≤4 months - Pain during movement	30 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean overall - pain (VAS 0-10) ≤4 months - pain during movement in the control groups was 5.71	The mean overall - pain (VAS 0-10) ≤4 months - pain during movement in the intervention groups was 2.07 lower (2.55 to 1.59 lower)
Overall - Pain (VAS 0-10) ≤4 months - Pain- chair rise	32 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) ≤4 months - pain- chair rise in the control groups was 1.3	The mean overall - pain (VAS 0-10) ≤4 months - pain- chair rise in the intervention groups was 0.4 lower (1.86 lower to 1.066 higher)
Overall - Pain (VAS 0-10) ≤4 months - Pain walking	32 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) ≤4 months - pain walking in the control groups was 2.6	The mean overall - pain (VAS 0-10) ≤4 months - pain walking in the intervention groups was 1.5 lower (3.38 lower to 0.38 higher)
Overall - Pain (VAS 0-10) ≤4 months - Pain stair climb	32 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) ≤4 months - pain stair climb in the control groups was 1.4	The mean overall - pain (VAS 0-10) ≤4 months - pain stair climb in the intervention groups was 0.3 higher (1.42 lower to 2.02 higher)
Overall - Pain (VAS 0-10) > 4 months> 4 months	99 (1 study) >4 months	LOW[a] due to risk of bias		The mean overall - pain (VAS 0-10) > 4 months> 4 months in the control groups was 3	The mean overall - pain (VAS 0-10) > 4 months> 4 months in the intervention groups was 0.08 lower (1.53 lower to 1.37 higher)
Overall - Function (RMDQ/ODI) ≤4 months	253 (5 studies) ≤4 months	LOW[a] due to risk of bias, imprecision		The mean overall - function (RMDQ/ODI) ≤4 months in the control groups was 17.74	The mean overall - function (RMDQ/ODI) ≤4 months in the intervention groups was 1.31 standard deviations lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
					(2.47 to 0.15 lower)
Overall - Function (RMDQ/ODI) > 4 months> 4 months	159 (2 studies) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ/ODI) > 4 months> 4 months in the control groups was 18.78	The mean overall - function (RMDQ/ODI 0-100) > 4 months in the intervention groups was 0.32 standard deviations lower (0.66 lower to 0.01 higher)
Overall - Psychological distress (mental health inventory 24-142)	54 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - psychological distress (mental health inventory 24-142) in the control groups was 70.3	The mean overall - psychological distress (mental health inventory 24-142) in the intervention groups was 11.3 lower (26.48 lower to 3.88 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Heterogeneity, I^2=84%, unexplained by subgroup analysis

(d) Heterogeneity, I^2 = 80%, unexplained by subgroup analysis

Table 79: Individual biomechanical exercise versus usual care in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
With sciatica - Pain (VAS 0-10) ≤4 months	52 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - pain (VAS 0-10) ≤4 months in the control groups was 6.9	The mean with sciatica - pain (VAS 0-10) ≤4 months in the intervention groups was 1.70 lower (2.33 to 1.07 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 80: Individual biomechanical exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
Without sciatica - Quality of life (SF-36) ≤4 months - Functional capacity	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) ≤4 months - functional capacity in the control groups was 53.8	The mean without sciatica - quality of life (SF-36) ≤4 months - functional capacity in the intervention groups was 1.1 lower (13.47 lower to 11.27 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - Pain	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) ≤4 months - pain in the control groups was 40.9	The mean without sciatica - quality of life (SF-36) ≤4 months - pain in the intervention groups was 11.5 higher (2.25 to 20.75 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - General health	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) ≤4 months - general health in the control groups was 60.9	The mean without sciatica - quality of life (SF-36) ≤4 months - general health in the intervention groups was 6.9 higher (3.54 lower to 17.34 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - Vitality	60 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) ≤4 months - vitality in the control groups was 48.5	The mean without sciatica - quality of life (SF-36) ≤4 months - vitality in the intervention groups was 15.6 higher (6.35 to 24.85 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - Social aspects	60 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) ≤4 months - social aspects in	The mean without sciatica - quality of life (SF-36) ≤4 months - social aspects in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
				the control groups was 64.6	14.4 higher (3.27 to 25.53 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - Emotional aspects	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) ≤4 months - emotional aspects in the control groups was 56.7	The mean without sciatica - quality of life (SF-36) ≤4 months - emotional aspects in the intervention groups was 19 higher (0.68 lower to 38.68 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - physical	99 (2 studies)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) ≤4 months - physical in the control groups was 59.9	The mean without sciatica - quality of life (SF-36) ≤4 months - physical in the intervention groups was 13.54 higher (4.08 to 22.99 higher)
Without sciatica - Quality of life (SF-36) ≤4 months - mental	99 (2 studies)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) ≤4 months - mental in the control groups was 69.9	The mean without sciatica - quality of life (SF-36) ≤4 months - mental in the intervention groups was 12.63 higher (5.72 to 19.53 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Functional capacity	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) > 4 months - functional capacity in the control groups was 57.7	The mean without sciatica - quality of life (SF-36) > 4 months - functional capacity in the intervention groups was 5.4 higher (6.11 lower to 16.91 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Pain	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) > 4 months - pain in the control groups was 42.5	The mean without sciatica - quality of life (SF-36) > 4 months - pain in the intervention groups was 8.5 higher (0.05 to 16.95 higher)
Without sciatica - Quality of life (SF-36) > 4	60	VERY LOW[a,b]		The mean without sciatica -	The mean without sciatica - quality of

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
months - General health	(1 study)	due to risk of bias, imprecision		quality of life (SF-36) > 4 months - general health in the control groups was 59.2	life (SF-36) > 4 months - general health in the intervention groups was 5.2 higher (5.57 lower to 15.97 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Vitality	60 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) > 4 months - vitality in the control groups was 50.2	The mean without sciatica - quality of life (SF-36) > 4 months - vitality in the intervention groups was 14 higher (4.39 to 23.61 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Social aspects	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) > 4 months - social aspects in the control groups was 66.5	The mean without sciatica - quality of life (SF-36) > 4 months - social aspects in the intervention groups was 8.1 higher (4.55 lower to 20.75 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Emotional aspects	60 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) > 4 months - emotional aspects in the control groups was 51.6	The mean without sciatica - quality of life (SF-36) > 4 months - emotional aspects in the intervention groups was 27.3 higher (9.55 to 45.05 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Physical	60 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36) > 4 months - physical in the control groups was 44.7	The mean without sciatica - quality of life (SF-36) > 4 months - physical in the intervention groups was 22.4 higher (3.4 to 41.4 higher)
Without sciatica - Quality of life (SF-36) > 4 months - Mental health	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36) > 4 months - mental health in the control groups was 61.8	The mean without sciatica - quality of life (SF-36) > 4 months - mental health in the intervention groups was 10.3 higher (0.02 to 20.58 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
Without sciatica- Function (RMDQ) ≤4 months Scale from: 0 to 24.	32 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica-function (RMDQ) ≤4 months in the control groups was 6.3	The mean without sciatica - pain (VAS 0-85) > 4 months> 4 months in the intervention groups was 1.9 higher (1.46 lower to 5.26 higher)
Without sciatica - Function (RMDQ 0-24) ≤4 months Scale from: 0 to 24.	86 (1 study)	MODERATE[a] due to risk of bias		*	The mean without sciatica - function (RMDQ 0-24) ≤4 months in the intervention groups was 2.7 lower (4.4 to 1 lower)
Without sciatica - Function (RMDQ 0-24) > 4 months	86 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean without sciatica - function (RMDQ 0-24) > 4 months in the intervention groups was 1.54 lower (3.1 lower to 0.03 higher)
Without sciatica - Function (RMDQ 0-24) ≤ 4 months	418 (4 studies)	LOW[a] due to risk of bias		The mean without sciatica - function (RMDQ 0-24) ≤ 4 months in the control groups was 6.38	The mean without sciatica - function (RMDQ 0-24) ≤ 4 months in the intervention groups was 0.96 lower (1.95 lower to 0.04 higher)
Without sciatica - Function (RMDQ 0-24) > 4 months	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - function (RMDQ 0-24) > 4 months in the control groups was 11.4	The mean without sciatica - function (RMDQ 0-24) > 4 months in the intervention groups was 3.3 lower (6.29 to 0.31 lower)
Without sciatica - Function (change score, ODI) ≤4 months - Full range of motion	17 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - function (change score, ODI) ≤4 months - full range of motion in the control	The mean without sciatica - function (change score, ODI) ≤4 months - full range of motion in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
				groups was 6.87	1.52 lower (2.17 to 0.86 lower)
Without sciatica - Function (change score, ODI) ≤4 months - Limited range of motion	14 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - function (change score, ODI) ≤4 months - limited range of motion in the control groups was 6.87	The mean without sciatica - function (change score, ODI) ≤4 months - limited range of motion in the intervention groups was 0.9 lower (1.53 to 0.26 lower)
Without sciatica - Pain (VAS 0-10) ≤4 months ≤ 4months	246 (4 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) ≤ 4months in the control groups was 2.78	The mean without sciatica - pain (VAS 0-10) ≤ 4months in the intervention groups was 1.14 lower (1.61 to 0.67 lower)
Without sciatica - Pain (VAS 0-10) > 4 months	146 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) > 4 months in the control groups was 5.55	The mean without sciatica - pain (VAS 0-10) > 4 months in the intervention groups was 1.05 lower (1.76 to 0.35 lower)
Without sciatica - Pain (0-85) ≤4 months (change score) Scale from: 0 to 85.	260 (4 studies)	LOW[a] due to risk of bias		The mean without sciatica - pain (0-85) ≤4 months (change score) in the control groups was -27	The mean without sciatica - pain (0-85) ≤4 months (change score) in the intervention groups was 0.00 higher (6.6 lower to 6.6 higher)
Without sciatica - Pain (VAS 0-85) > 4 months Scale from: 0 to 85.	271 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - pain (VAS 0-85) > 4 months in the control groups was -27	The mean without sciatica - pain (VAS 0-85) > 4 months in the intervention groups was 1 higher (4.48 lower to 6.48 higher)
Without sciatica - Pain (change score VAS	17	LOW[a]		The mean without sciatica -	The mean without sciatica - pain

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual biomechanical exercise (95% CI)
0-10) ≤4 months - Full range of motion	(1 study)	due to risk of bias		pain (change score VAS 0-10) ≤4 months - full range of motion in the control groups was 6.71	(change score VAS 0-10) ≤4 months - full range of motion in the intervention groups was 3.70 lower (5.64 to 1.76 lower)
Without sciatica - Pain (change score VAS 0-10) ≤4 months - Limited range of motion	14 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - pain (change score VAS 0-10) ≤4 months - limited range of motion in the control groups was 6.71	The mean without sciatica - pain (change score VAS 0-10) ≤4 months - limited range of motion in the intervention groups was 2.3 lower (3.67 to 0.93 lower)
without sciatica-adverse events (morbidity)≤4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 7 (0.38 to 127.32)	0 per 1000	-
* Control rate not given, only mean difference reported.					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 81: Individual biomechanical exercise versus self-management in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active)	Risk difference with Individual biomechanical exercise (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active)	Risk difference with Individual biomechanical exercise (95% CI)
Overall - Pain (VAS 0-10) <4 months	77 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (VAS 0-10) <4 months in the intervention groups was 0.7 lower (2 lower to 0.6 higher)
Overall - Leg pain (VAS 0-10) <4 months	77 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - leg pain (VAS 0-10) <4 months in the intervention groups was 0.8 lower (2.2 lower to 0.6 higher)
Overall - Pain (VAS 0-10) > 4 months -	71 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (VAS 0-10) > 4 months in the intervention groups was 0.4 lower (1.7 lower to 0.9 higher)
Overall - Leg pain (VAS 0-10) > 4 months	71 (1 study)	LOW[a] due to inconsistency		*	The mean overall - leg pain (VAS 0-10) > 4 months in the intervention groups was 1 lower (2.3 lower to 0.3 higher)
Overall - Function (RMDQ 0-24) <4 months	77 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) <4 months in the intervention groups was 1 lower (4 lower to 2 higher)
Overall - Function (RMDQ 0-24) > 4 months	71 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) > 4 months in the intervention groups was 3 lower (6 lower to 0 higher)

* Control rate not given, only mean difference reported.

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Heterogeneity, I^2=80%, unexplained by subgroup analysis

Table 82: Individual biomechanical exercise versus spinal manipulation (high-velocity low-amplitude thrust) in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with SMT (low-amplitude high-velocity)	Risk difference with Individual biomechanical exercise (95% CI)
With sciatica - Quality of life (SF-36 0-100) <4 months - physical component	191 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - quality of life (SF-36 0-100) <4 months- physical component in the control groups was 48	The mean with sciatica - quality of life (SF-36 0-100) <4 months- physical component in the intervention groups was 1.7 higher (0.5 lower to 3.9 higher)
With sciatica - Quality of life (SF-36 0-100) <4 months- mental component	191 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - quality of life (SF-36 0-100) <4 months- mental component in the control groups was 57.2	The mean with sciatica - quality of life (SF-36 0-100) <4 months- mental component in the intervention groups was 2 lower (3.91 to 0.09 lower)
With sciatica - Quality of life (SF-12 0-100) > 4 months - physical component	164 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - quality of life (sf-12 0-100) > 4 months - physical component in the control groups was 48.4	The mean with sciatica - quality of life (sf-12 0-100) > 4 months - physical component in the intervention groups was 2 higher (0.33 lower to 4.33 higher)
With sciatica - Quality of life (SF-12 0-100) > 4 months - mental component	164 (1 study)	LOW[a] due to risk of bias		The mean with sciatica - quality of life (sf-12 0-100) > 4 months - mental component in the control groups was 55.2	The mean with sciatica - quality of life (sf-12 0-100) > 4 months - mental component in the intervention groups was 1.3 lower (3.77 lower to 1.17 higher)
With sciatica - Pain (VAS 0-10) <4 months	191	LOW[a]		The mean with sciatica	The mean with sciatica - pain (VAS 0-10) <4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with SMT (low-amplitude high-velocity)	Risk difference with Individual biomechanical exercise (95% CI)
	(1 study)	due to risk of bias		- pain (VAS 0-10) <4 months in the control groups was 2.9	months in the intervention groups was 0.3 lower (0.87 lower to 0.27 higher)
With sciatica - Pain (VAS 0-10) > 4 months	164 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - pain (VAS 0-10) > 4 months in the control groups was 3.3	The mean with sciatica - pain (VAS 0-10) > 4 months in the intervention groups was 0.5 lower (1.17 lower to 0.17 higher)
With sciatica - Function (RMDQ 0-24) <4 months	191 (1 study)	LOW[a] due to risk of bias		The mean with sciatica - function (RMDQ 0-24) <4 months in the control groups was 3.8	The mean with sciatica - function (RMDQ 0-24) <4 months in the intervention groups was 0.1 higher (1.22 lower to 1.42 higher)
With sciatica - Function (RMDQ 0-24) > 4 months	164 (1 study)	LOW[a] due to risk of bias		The mean with sciatica - function (RMDQ 0-24) > 4 months in the control groups was 5.1	The mean with sciatica - function (RMDQ 0-24) > 4 months in the intervention groups was 0.2 lower (1.72 lower to 1.32 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 83: Individual biomechanical exercise versus individual interferential therapy in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Individual	Risk difference with Individual

				interferential therapy	**biomechanical (95% CI)**
Overall-Pain (VAS 0-10) <4 months	60 (1 study)	MODERATE[a] due to risk of bias		The mean overall-pain (VAS 0-10) <4 months in the control groups was 7	The mean overall-pain (VAS 0-10) <4 months in the intervention groups was 1.2 lower (1.55 to 0.85 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias or by 2 increment if the majority of the evidence was at very high risk of bias

9.3.5.2 Clinical evidence summary: Group Biomechanical Exercise

Table 84: Group biomechanical exercise versus usual care in low back pain with or without sciatica

Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Relative effect (95% CI)**	**Anticipated absolute effects**	
				Risk with Usual care	**Risk difference with Group biomechanical exercise (95% CI)**
Overall-Pain (VAS) >4 months Scale from: 0 to 10.	127 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall-pain (VAS) >4 months in the control groups was 3.48	The mean overall-pain (VAS) >4 months in the intervention groups was 1.34 lower (1.9 to 0.78 lower)
Overall-Pain (VAS) <4 months Scale from: 0 to 10.	127 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall-pain (VAS) <4 months in the control groups was 3.46	The mean overall-pain (VAS) <4 months in the intervention groups was 0.52 lower (1.12 lower to 0.08 higher)
Overall - Pain <4 months - stretching Scale from: 0 to 10.	122 (1 study)	LOW[a] due to risk of bias		*	The mean overall - pain <4 months - stretching in the intervention groups was 0.09 higher (0.8 lower to 0.98 higher)
Overall - Pain (VAS 0-10) <4 months - core stability	40 (1 study)	MODERATE[a] due to risk of bias		*	The mean overall - pain (VAS 0-10) <4 months - core stability in the intervention groups was 2.2 lower (2.96 to 1.44 lower)
Overall - Function (RMDQ 0-24) <4 months	40	LOW[a,b]		The mean overall - function	The mean overall - function (RMDQ 0-24)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group biomechanical exercise (95% CI)
	(1 study)	due to risk of bias, imprecision		(RMDQ 0-24) <4 months in the control groups was 14.37	<4 months in the intervention groups was 5.06 lower (8.65 to 1.47 lower)
Overall-NSAID use >4 months	60 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall-NSAID use >4 months in the control groups was 13.73	The mean overall-NSAID use >4 months in the intervention groups was 7.13 lower (14.5 lower to 0.24 higher)
(* Control rate not given, only mean difference reported.					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 85: Group biomechanical exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group biomechanical exercise (95% CI)
Without sciatica - Quality of life composite scores (SF-36 0-100) <4 months - Mental component	18 (1 study)	MODERATE[a] due to risk of bias		The mean without sciatica - quality of life composite scores (SF-36 0-100) <4 months - mental component in the control groups was 41.56	The mean without sciatica - quality of life composite scores (SF-36 0-100) <4 months - mental component in the intervention groups was 9.04 higher (6.57 to 11.51 higher)
Without sciatica - Quality of life composite scores (SF-36 0-100) <4 months - Physical component	18 (1 study)	MODERATE[a] due to risk of bias		The mean without sciatica - quality of life composite scores (SF-36 0-100) <4 months - physical component in the control	The mean without sciatica - quality of life composite scores (SF-36 0-100) <4 months - physical component in the intervention groups was 8.3 higher

				groups was 39.1	(5.3 to 11.3 higher)
Without sciatica - Quality of life individual scores (SF-12) <4 months - general health	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life individual scores (sf-12) <4 months - general health in the control groups was 0	The mean without sciatica - quality of life individual scores (sf-12) <4 months - general health in the intervention groups was 0.10 higher (0.51 lower to 0.71 higher)
Without sciatica - Quality of life individual scores (SF-12) <4 months - physical functioning	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life individual scores (sf-12) <4 months - physical functioning in the control groups was 3.1	The mean without sciatica - quality of life individual scores (sf-12) <4 months - physical functioning in the intervention groups was 0.1 higher (0.19 lower to 0.39 higher)
Without sciatica - Quality of life individual scores (SF-12) <4 months - physical role limitation	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life individual scores (sf-12) <4 months - physical role limitation in the control groups was 3	The mean without sciatica - quality of life individual scores (sf-12) <4 months - physical role limitation in the intervention groups was 0.2 higher (0.31 lower to 0.71 higher)
Without sciatica - Quality of life individual scores (SF-12) <4 months - bodily pain	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life individual scores (sf-12) <4 months - bodily pain in the control groups was 3.9	The mean without sciatica - quality of life individual scores (sf-12) <4 months - bodily pain in the intervention groups was 0.5 lower (1.11 lower to 0.11 higher)
Without sciatica - Quality of life individual scores (SF-12) <4 months - social functioning	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life individual scores (sf-12) <4 months - social functioning in the control groups was 3.4	The mean without sciatica - quality of life individual scores (sf-12) <4 months - social functioning in the intervention groups was 0.1 higher (0.31 lower to 0.51 higher)
Without sciatica - Quality of life individual scores (SF-12) <4 months - health perception	34 (1 study)	VERY LOW[a,b] due to risk		The mean without sciatica - quality of life individual	The mean without sciatica - quality of life individual scores (sf-12) <4 months -

		of bias, imprecision		scores (sf-12) <4 months - health perception in the control groups was 2.8	health perception in the intervention groups was 0.3 lower (0.84 lower to 0.24 higher)
Without sciatica - Pain (VAS 0-10) <4 months	52 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) <4 months in the control groups was 3.6	The mean without sciatica - pain (VAS 0-10) <4 months in the intervention groups was 0.87 lower (1.27 to 0.46 lower)
Without sciatica - Function (ODI 0-100) <4 months	52 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - function (ODI 0-100) <4 months in the control groups was 28.6	The mean without sciatica - function (ODI 0-100) <4 months in the intervention groups was 13.67 lower (16.08 to 11.25 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 86: Group biomechanical exercise versus self-management (unsupervised exercise) in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Unsupervised exercise	Risk difference with Group biomechanical exercise (95% CI)
Overall - Pain (VAS 0-10) <4 months	170 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) <4 months in the control groups was 2.3	The mean overall - pain (VAS 0-10) <4 months in the intervention groups was 0.8 lower (1.53 to 0.07 lower)
Overall - Pain (VAS 0-10) > 4 months	141 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean overall - pain (VAS 0-10) > 4 months in the	The mean overall - pain (VAS 0-10) > 4 months in the intervention groups was 1.45 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Unsupervised exercise	Risk difference with Group biomechanical exercise (95% CI)
		imprecision		control groups was 5.5	(2.2 to 0.7 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

9.3.6 Aerobic exercise evidence

9.3.6.1 Clinical evidence summary: Individual aerobic exercise

Table 87: Individual aerobic exercise versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual aerobic exercise (95% CI)
Overall - Pain (VAS 0-10) <4 months	46 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) <4 months in the control groups was 3.45	The mean overall - pain (VAS 0-10) <4 months in the intervention groups was 0.3 lower (1.52 lower to 0.92 higher)
Overall - Function(ALBPS 0-100) <4 months	46 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall - function (albps 0-100) <4 months in the control groups was 20.8	The mean overall - function (ALBPS 0-100) <4 months in the intervention groups was 1.8 lower (9.24 lower to 5.64 higher)
Overall - Function (ALBPS 0-100) > 4 months	46	LOW[a,b]		The mean overall -	The mean overall - function (RMDQ/ALBPS)

	(1 study)	due to risk of bias, imprecision		function (RMDQ/albps) > 4 months in the control groups was 24	> 4 months in the intervention groups was 5.6 lower (14.36 lower to 3.16 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 88: Individual aerobic exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual aerobic exercise (95% CI)
Without sciatica - Quality of life (EuroQol weighted health index 0.59-1) > 4 months	56 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (euroqol weighted health index 0.59-1) > 4 months in the control groups was 0.69	The mean without sciatica - quality of life (EuroQol weighted health index 0.59-1) > 4 months in the intervention groups was 0.06 lower (0.19 lower to 0.07 higher)
Without sciatica - Quality of life (EuroQol VAS 0-100) > 4 months	57 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (euroqol VAS 0-100) > 4 months in the control groups was 62.5	The mean without sciatica - quality of life (EuroQol VAS 0-100) > 4 months in the intervention groups was 9.6 higher (3.69 lower to 22.89 higher)
Without sciatica - Pain (VAS 0-10) <4 months - Pain (VAS 0-10) <4 months (deep water running)	49 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) <4 months (deep water running) in the control groups was 3.29	The mean without sciatica - pain (VAS 0-10) <4 months (deep water running) in the intervention groups was 1.49 lower (2.35 to 0.63 lower)
Without sciatica - Pain (VAS 0-10) <4 months -	37	VERY LOW[a,b]		The mean without	The mean without sciatica - pain (VAS 0-10)

Pain (VAS 0-10) <4 months (treadmill running)	(1 study)	due to risk of bias, imprecision		sciatica - pain (VAS 0-10) <4 months (treadmill running) in the control groups was 3.36	<4 months (treadmill running) in the intervention groups was 0.05 higher (1.62 lower to 1.72 higher)
Without sciatica - Pain (VAS 0-10) > 4 months (deep water running)	49 (1 study)	MODERATE[a] due to risk of bias		The mean without sciatica - pain (VAS 0-10) > 4 months (deep water running) in the control groups was 3.6	The mean without sciatica - pain (VAS 0-10) > 4 months (deep water running) in the intervention groups was 2.6 lower (3.28 to 1.92 lower)
Without sciatica - Pain (VAS 0-10) > 4 months (walking)	57 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) > 4 months (walking) in the control groups was 4.1	The mean without sciatica - pain (VAS 0-10) > 4 months (walking) in the intervention groups was 0.3 lower (1.77 lower to 1.17 higher)
Without sciatica - Function (RMQD 0-24) <4 months	86 (2 studies)	LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - function (RMDQ 0-24) <4 months in the control groups was 9.2	The mean without sciatica - function (RMDQ 0-24) <4 months in the intervention groups was 2.6 lower (4.21 to 0.99 lower)
Without sciatica - Psychological distress (BDI 0-63) <4 months	37 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - psychological distress (BDI 0-63) <4 months in the control groups was 12.5	The mean without sciatica - psychological distress (BDI 0-63) <4 months in the intervention groups was 0.2 higher (5.57 lower to 5.97 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 89: Individual aerobic exercise versus individual biomechanical exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Individual biomechanical exercise	Risk difference with Individual aerobic exercise (95% CI)
Overall - Function (ODI 0-100) <4 months	52 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall - function (ODI 0-100) <4 months in the control groups was 19.1	The mean overall - function (ODI 0-100) <4 months in the intervention groups was 3.5 higher (3.91 lower to 10.91 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 90: Individual aerobic exercise versus group biomechanical exercise in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Group biomechanical exercise	Risk difference with Individual aerobic exercise (95% CI)
Quality of life: SF-36, Physical Component Score, 0-100	30 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life: sf-36, physical component score, 0-100 in the control groups was 1.16	The mean quality of life: sf-36, physical component score, 0-100 in the intervention groups was 2.27 lower (8.67 lower to 4.13 higher)
Quality of life: SF-36, Mental Component Score, 0-100	30 (1 study) 6 months	VERY LOW[a,b] due to risk of bias,		The mean quality of life: sf-36, mental component score, 0-100 in the control groups was	The mean quality of life: sf-36, mental component score, 0-100 in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Group biomechanical exercise	Risk difference with Individual aerobic exercise (95% CI)
		imprecision		3.54	3.63 lower (11.94 lower to 4.68 higher)
Psychological distress: HADS, Anxiety, 0-21	30 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress: hads, anxiety, 0-21 in the control groups was -0.89	The mean psychological distress: hads, anxiety, 0-21 in the intervention groups was 1.16 higher (1.54 lower to 3.86 higher)
Psychological distress: HADS, Depression, 0-21	30 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress: hads, depression, 0-21 in the control groups was -0.11	The mean psychological distress: hads, depression, 0-21 in the intervention groups was 0.32 higher (2.97 lower to 3.61 higher)
Pain severity: NRS average back pain <4 months, 0-10	30 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity: nrs average back pain <4 months, 0-10 in the control groups was -0.68	The mean pain severity: nrs average back pain <4 months, 0-10 in the intervention groups was 0 higher (1.68 lower to 1.68 higher)
Pain severity: NRS average back pain >4 months, 0-10	30 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity: nrs average back pain >4 months, 0-10 in the control groups was -1	The mean pain severity: nrs average back pain >4 months, 0-10 in the intervention groups was 1.1 higher (0.67 lower to 2.87 higher)
Pain severity: NRS average leg pain <4 months, 0-10	30 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity: nrs average leg pain <4 months, 0-10 in the control groups was 0.43	The mean pain severity: nrs average leg pain <4 months, 0-10 in the intervention groups was 0.07 higher (2.07 lower to 2.21 higher)
Pain severity: NRS average leg pain >4 months, 0-10	30 (1 study)	VERY LOW[a,b]		The mean pain severity: nrs average leg pain >4 months, 0-10 in the control	The mean pain severity: nrs average leg pain >4 months, 0-10 in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Group biomechanical exercise	Risk difference with Individual aerobic exercise (95% CI)
	3 months	due to risk of bias, imprecision		groups was 0.81	groups was 0.04 lower (2.29 lower to 2.21 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2increments if the confidence interval crossed both MIDs.

9.3.6.2 Clinical evidence summary: Group aerobic exercise

Table 91: Group aerobic exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group aerobic exercise (95% CI)
Without sciatica - Quality of life (SF-36 mental component 0-100) <4 months	109 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 mental component 0-100) <4 months in the control groups was 43.98	The mean without sciatica - quality of life (SF-36 mental component 0-100) <4 months in the intervention groups was 3.86 higher (2.19 to 5.53 higher)
Without sciatica - Quality of life (SF-36 physical component 0-100) <4 months	109 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 physical component 0-100) <4 months in the control groups was 39.55	The mean without sciatica - quality of life (SF-36 physical component 0-100) <4 months in the intervention groups was 2.26 higher (0.02 to 4.5 higher)
Without sciatica - Quality of life (SF-36 physical functioning 0-100) <4 months	20 (1 study)	VERY LOW[a,b] due to risk		The mean without sciatica - quality of life	The mean without sciatica - quality of life (SF-36 physical functioning 0-100) <4 months in

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group aerobic exercise (95% CI)
Scale from: 0 to 100.		of bias, imprecision		(SF-36 physical functioning 0-100) <4 months in the control groups was 43	the intervention groups was 15.5 higher (4.55 lower to 35.55 higher)
Without sciatica - Quality of life (SF-36 physical role limitation 0-100) <4 months Scale from: 0 to 100.	20 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 physical role limitation 0-100) <4 months in the control groups was 22.5	The mean without sciatica - quality of life (SF-36 physical role limitation 0-100) <4 months in the intervention groups was 17.5 higher (13.2 lower to 48.2 higher)
Without sciatica - Pain (McGill Questionnaire 0-78) <4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (McGill questionnaire 0-78) <4 months in the control groups was 20.95	The mean without sciatica - pain (McGill questionnaire 0-78) <4 months in the intervention groups was 3.43 lower (9.9 lower to 3.04 higher)
Without sciatica - Pain (VAS 0-10) <4 months	119 (3 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) <4 months in the control groups was 5.42	The mean without sciatica - pain (VAS 0-10) <4 months in the intervention groups was 0.1 lower (0.64 lower to 0.44 higher)
Without sciatica - Pain (VAS 0-10) > 4 months	83 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - pain (VAS 0-10) > 4 months in the control groups was 3.766	The mean without sciatica - pain (VAS 0-10) > 4 months in the intervention groups was 0.05 higher (1.07 lower to 1.16 higher)
Without sciatica - Function (ODI 0-100) <4 months	106 (2 studies)	VERY LOW[a,b] due to risk		The mean without sciatica - function (ODI	The mean without sciatica - function (ODI 0-100) <4 months in the intervention groups

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group aerobic exercise (95% CI)
		of bias, imprecision		0-100) <4 months in the control groups was 33.58	was 2.99 lower (5.47 to 0.52 lower)
Without sciatica - Function (ODQ 0-100) > 4 months	89 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - function (odq 0-100) > 4 months in the control groups was 27.16	The mean without sciatica - function (ODI 0-100) > 4 months in the intervention groups was 1.84 lower (8.67 lower to 4.99 higher)
Without sciatica - Psychological distress (CESDS 0-60) <4 months - without sciatica	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - psychological distress (cesds 0-60) <4 months - without sciatica in the control groups was 7.03	The mean without sciatica - psychological distress (CESDS 0-60) <4 months - without sciatica in the intervention groups was 0.35 higher (2.64 lower to 3.34 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 92: Group aerobic exercise versus self-management in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active)	Risk difference with Group aerobic exercise (95% CI)
Overall - Pain (0-10) <4 months	18 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (0-10) <4 months in the control groups was 7.02	The mean overall - pain (0-10) <4 months in the intervention groups was 1.85 lower (3.76 lower to 0.06 higher)
Overall - Pain over preceding week (0-100) <4	18	VERY LOW[a,b]		The mean overall - pain	The mean overall - pain over preceding

months	(1 study)	due to risk of bias, imprecision		over preceding week (0-10) <4 months in the control groups was 6.37	week (0-10) <4 months in the intervention groups was 1.2 lower (3.12 lower to 0.725 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 93: Group aerobic exercise versus group biomechanical exercise in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Group biomechanical exercise	Risk difference with Group aerobic exercise (95% CI)
Without - Pain(VAS 0-10) <4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without - pain(VAS 0-10) <4 months in the control groups was -1.9	The mean without - pain(VAS 0-10) <4 months in the intervention groups was 1.1 higher (0.15 to 2.05 higher)
Without - Pain (VAS 0-10) > 4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without - pain (VAS 0-10) > 4 months in the control groups was -1.6	The mean without - pain (VAS 0-10) > 4 months in the intervention groups was 0.4 higher (0.55 lower to 1.35 higher)
Without - Function (ODI 0-100) <4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without - function (ODI 0-100) <4 months in the control groups was -10.4	The mean without - function (ODI 0-100) <4 months in the intervention groups was 6.5 higher (1.27 to 11.73 higher)
Without - Function (ODI 0-100) > 4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean without - function (ODI 0-100) > 4 months in the control groups was -10.4	The mean without - function (ODI 0-100) > 4 months in the intervention groups was 4.5 higher (0.39 lower to 9.39 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 94: Group aerobic exercise versus group biomechanical exercise in low back pain with or without sciatica

Outcomes	No of	Quality of the	Relative	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	effect (95% CI)	Risk with Group biomechanical exercise	Risk difference with Group aerobic exercise (95% CI)
Overall - Pain (VAS 0-10) <4 months	91 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) <4 months in the control groups was 3.1	The mean overall - pain (VAS 0-10) <4 months in the intervention groups was 0.3 higher (0.58 lower to 1.18 higher)
Overall - Pain (VAS 0-10) > 4 months	83 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) > 4 months in the control groups was 2.9	The mean overall - pain (VAS 0-10) > 4 months in the intervention groups was 0.3 higher (0.65 lower to 1.25 higher)
Overall - Function (RMDQ 0-24) <4 months	91 (1 study)	VERY LOW[a] due to risk of bias, imprecision		The mean overall - function (RMDQ 0-24) <4 months in the control groups was 6.8	The mean overall - function (RMDQ 0-24) <4 months in the intervention groups was 0.5 lower (2.52 lower to 1.52 higher)
Overall - Function (RMDQ 0-24) > 4 months	83 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ 0-24) > 4 months in the control groups was 5.8	The mean overall - function (RMDQ 0-24) > 4 months in the intervention groups was 0.4 higher (1.63 lower to 2.43 higher)

(a) *Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias*
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

9.3.7 Mind-body exercise evidence

9.3.7.1 Clinical evidence summary: individual mind-body

Table 95: Individual mind-body exercise versus individual biomechanical exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Individual mind-body exercise versus individual biomechanical exercise (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Individual mind-body exercise versus individual biomechanical exercise (95% CI)
Overall-Function (RMDQ, 0-24) <4 months	30 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall-function (RMDQ) <4 months in the control groups was 12.64	The mean overall-function (RMDQ) <4 months in the intervention groups was 5.18 lower (9.27 to 1.09 lower)
Tai Chi, overall-Pain (VAS 0-10) <4 months Scale from: 0 to 10.	40 (1 study)	LOW[a] due to risk of bias		The mean overall-pain (VAS 0-10) <4 months in the control groups was 2.8	The mean overall-pain (VAS 0-10) <4 months in the intervention groups was 0.7 lower (1.01 to 0.39 lower)
Yoga, overall-Pain (VAS 0-10) <4 months Scale from: 0 to 10.	30 (1 study)	LOW[a] due to risk of bias		The mean yoga, overall-pain (VAS 0-10) <4 months in the control groups was 4.63	The mean yoga, overall-pain (VAS 0-10) <4 months in the intervention groups was 2.63 lower (3.48 to 1.24 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

9.3.7.2 Clinical evidence summary: Group mind-body exercise

Table 96: Group mind-body exercise versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mind-body exercise (95% CI)
Overall - Quality of life (EQ-5D 0-1) <4 months	325 (2 studies)	LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life (eq-5d 0-1) <4 months in the control groups was 0.379	The mean overall - quality of life (eq-5d 0-1) <4 months in the intervention groups was 0.06 higher (0.01 to 0.1 higher)

Overall - Quality of life (EQ-5D 0-1) > 4 months	313 (1 study)	MODERATE[a] due to risk of bias		The mean overall - quality of life (eq-5d 0-1) > 4 months in the control groups was 0.744	The mean overall - quality of life (eq-5d 0-1) > 4 months in the intervention groups was 0.02 higher (0.03 lower to 0.07 higher)
Overall - Quality of life (SF-12 0-100) <4 months - Physical component	326 (2 studies)	MODERATE[a] due to risk of bias		The mean overall - quality of life (sf-12 0-100) <4 months - physical component in the control groups was 4.09	The mean overall - quality of life (sf-12 0-100) <4 months - physical component in the intervention groups was 1.12 higher (1.1 lower to 3.34 higher)
Overall - Quality of life (SF-12 0-100) <4 months - Mental component	326 (2 studies)	MODERATE[a] due to risk of bias		The mean overall - quality of life (sf-12 0-100) <4 months - mental component in the control groups was 0.26	The mean overall - quality of life (sf-12 0-100) <4 months - mental component in the intervention groups was 2.05 higher (0.47 lower to 4.56 higher)
Overall - Quality of life (SF-12 0-100) > 4 months	313 (1 study)	MODERATE[a] due to risk of bias		The mean overall - quality of life (sf-12 physical component 0-100) > 4 months in the control groups was 2.2	The mean overall - quality of life (sf-12 0-100) > 4 months in the intervention groups was 0.79 higher (1.49 lower to 3.07 higher)
Overall - Quality of life (SF-12 0-100) > 4 months	313 (1 study)	MODERATE[a] due to risk of bias		The mean overall - quality of life (sf-12 mental component 0-100) > 4 months in the control groups was 0.41	The mean overall - quality of life (sf-12 0-100) > 4 months in the intervention groups was 0.42 higher (2.16 lower to 3 higher)

Overall - Pain (VAS 0-10) <4 months - Hatha yoga	82 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) <4 months - hatha yoga in the control groups was 1.71	The mean overall - pain (VAS 0-10) <4 months - hatha yoga in the intervention groups was 0.88 lower (2.61 lower to 0.85 higher)
Overall - Pain (VAS 0-10) <4 months - Iyengar yoga	90 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) <4 months - Iyengar yoga in the control groups was 3.74	The mean overall - pain (VAS 0-10) <4 months - Iyengar yoga in the intervention groups was 0.43 lower (1.21 lower to 0.35 higher)
Overall - Pain (VAS 0-10) > 4 months - Hatha yoga	23 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) > 4 months - hatha yoga in the control groups was 4.5	The mean overall - pain (VAS 0-10) > 4 months - hatha yoga in the intervention groups was 0.6 lower (1.34 lower to 0.14 higher)
Overall - Pain (VAS 0-10) > 4 months - Iyengar yoga	90 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (VAS 0-10) > 4 months - Iyengar yoga in the control groups was 3.85	The mean overall - pain (VAS 0-10) > 4 months - Iyengar yoga in the intervention groups was 1.08 lower (1.93 to 0.23 lower)
Overall - Pain (Aberdeen pain scale 0-100) <4 months	313 (1 study)	MODERATE[a] due to risk of bias		The mean overall - pain (Aberdeen pain scale 0-100) <4 months in the control groups was -1.2	The mean overall - pain (Aberdeen pain scale 0-100) <4 months in the intervention groups was 2.42 lower (5.21 lower to 0.37 higher)
Overall - Pain (Aberdeen pain scale 0-100) > 4 months	313 (1 study)	MODERATE[a] due to risk of bias		The mean overall - pain (Aberdeen pain scale 0-100) > 4	The mean overall - pain (Aberdeen pain scale 0-100) > 4 months in the intervention groups was

				months in the control groups was -2.51	0.72 lower (3.53 lower to 2.09 higher)
Overall - Function (RMDQ/ODI) <4 months - Yoga	516 (6 studies)	LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ/ODI) <4 months - yoga in the control groups was 10.75	The mean overall - function (RMDQ/ODI) <4 months - yoga in the intervention groups was 0.34 standard deviations lower (0.52 to 0.17 lower)
Overall - Function (RMDQ/ODI) > 4 months	426 (3 studies)	LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ/ODI) > 4 months in the control groups was 8.3	The mean overall - function (RMDQ/ODI) > 4 months in the intervention groups was 0.3 standard deviations lower (0.5 to 0.11 lower)
Overall- Psychological distress (BDI 0-63) <4 months (Hatha)	16 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall- psychological distress (BDI 0-63) <4 months (hatha) in the control groups was 17.3	The mean overall- psychological distress (BDI 0-63) <4 months (hatha) in the intervention groups was 10.18 lower (19.68 to 0.68 lower)
Overall- Psychological distress (BDI 0-63) <4 months (Iyengar)	90 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall- psychological distress (BDI 0-63) <4 months (Iyengar) in the control groups was 8.1	The mean overall- psychological distress (BDI 0-63) <4 months (Iyengar) in the intervention groups was 1.5 lower (3.94 lower to 0.94 higher)
Overall - Psychological distress (BDI 0-63) > 4 months	90 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - psychological distress (BDI 0-63) > 4 months in the control groups was 7.5	The mean overall - psychological distress (BDI 0-63) > 4 months in the intervention groups was 2.6 lower (4.7 to 0.5 lower)
Overall - Responder criteria	160	MODERATE[a] due to risk of	RR 3.08 (1.74 to	150 per 1000	312 more per 1000

(improvement in pain) <4 months	(1 study)	bias	5.47)		(from 111 more to 670 more)
Overall - Responder criteria (improvement in function) <4 months	160 (1 study)	MODERATE[a] due to risk of bias	RR 2.11 (1.34 to 3.3)	238 per 1000	264 more per 1000 (from 81 more to 546 more)
Overall - Healthcare utilisation - GP visits <4 months	14 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - healthcare utilisation - GP visits <4 months in the control groups was 1.33	The mean overall - healthcare utilisation - GP visits <4 months in the intervention groups was 0.73 lower (2.49 lower to 1.03 higher)
Overall - Healthcare utilisation - Practice nurse visits <4 months	14 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - healthcare utilisation - practice nurse visits <4 months in the control groups was 0.11	The mean overall - healthcare utilisation - practice nurse visits <4 months in the intervention groups was 0.11 lower (0.44 lower to 0.22 higher)
Overall - Healthcare utilisation - Physiotherapist visits <4 months	14 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - healthcare utilisation - physiotherapist visits <4 months in the control groups was 0.33	The mean overall - healthcare utilisation - physiotherapist visits <4 months in the intervention groups was 0.33 lower (1.33 lower to 0.67 higher)
Overall - Healthcare utilisation - Medication use <4 months (Viniyoga)	14 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.2 (0.63 to 2.27)	667 per 1000	133 more per 1000 (from 247 fewer to 847 more)
Overall - Healthcare utilisation - Medication use <4 months (Hatha)	30 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.18 (0.05 to 0.68)	733 per 1000	601 fewer per 1000 (from 235 fewer to 697 fewer)
Overall - Healthcare utilisation - Reduced or stopped medication <4	44 (1 study)	LOW[a] due to risk of	RR 2.8 (1.32 to	250 per 1000	450 more per 1000 (from 80 more to 1000 more)

months		bias	5.93)		
Overall - Healthcare utilisation - Reduced or stopped medication > 4 months	42 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.73 (0.43 to 1.24)	682 per 1000	184 fewer per 1000 (from 389 fewer to 164 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 97: Group mind-body exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mind-body exercise (95% CI)
Without sciatica - Pain (VAS 0-10) <4 months	42 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) <4 months in the control groups was 2.1	The mean without sciatica - pain (VAS 0-10) <4 months in the intervention groups was 1.1 lower (2.18 to 0.02 lower)
Without sciatica - Pain (VAS 0-10) > 4 months	42 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10) > 4 months in the control groups was 2	The mean without sciatica - pain (VAS 0-10) > 4 months in the intervention groups was 1.4 lower (2.4 to 0.4 lower)

***(a)** Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias*
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 98: Group mind-body exercise versus self-management in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active)	Risk difference with Group mind-body exercise (95% CI)
Function (RMDQ 0-24) <4 months -	191	LOW[a]		*	The mean function (RMDQ 0-24) <4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active)	Risk difference with Group mind-body exercise (95% CI)
without sciatica	(2 studies)	due to risk of bias			months - without sciatica in the intervention groups was 2.78 lower (3.76 to 1.81 lower)
Without - Function (RMDQ 0-24) > 4 months - without sciatica	191 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		*	The mean without - function (RMDQ 0-24) > 4 months - without sciatica in the intervention groups was 2.6 lower (4.34 to 0.85 lower)
Without - Responder criteria (improvement in function) <4 months	125 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.67 (1.17 to 2.38)	Not estimatable	Not estimatable
Healthcare utilisation - medication use > 4 months - without sciatica	63 (1 study)	LOW[a] due to risk of bias	RR 0.35 (0.17 to 0.73)	586 per 1000	381 fewer per 1000 (from 158 fewer to 487 fewer)

** Control rate not given, only mean difference reported.*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Heterogeneity, I^2=88%, unexplained by subgroup analysis.

Table 99: Group mind-body exercise versus group mixed exercise in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Group mixed exercise	Risk difference with Group mind-body exercise (95% CI)
Without sciatica - Function (RMDQ 0-24) <4	228	VERY LOW[a,b,c] due to risk of		*	The mean without sciatica - function (RMDQ 0-24) <4 months in the intervention groups

months	(2 studies)	bias, inconsistency, imprecision			was 0.89 lower (2.32 lower to 0.55 higher)
Without sciatica - Function (RMDQ 0-24) > 4 months	229 (2 studies)	MODERATE[a] due to risk of bias		*	The mean without sciatica - function (RMDQ 0-24) > 4 months in the intervention groups was 0.72 lower (1.68 lower to 0.24 higher)
Without sciatica - Responder criteria (improvement in function) < 4 months	162 (1 study)	LOW [a,b] due to risk of bias, imprecision	RR 1.06 (0.87 to 1.29)	Not estimatable	Not estimatable
Without sciatica - Healthcare utilisation - medication use > 4 months	66 (1 study)	LOW [a,b] due to risk of bias, imprecision	RR 0.41 (0.2 to 0.87)	500 per 1000	295 fewer per 1000 (from 65 fewer to 400 fewer)

** Control rate not given, only mean difference reported.*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) *Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs*

Table 100: Group mind-body exercise versus individual biomechanical exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Group mind-body exercise versus individual biomechanical exercise (95% CI)
Overall-Pain (VAS, 0-10) - <4 months	60 (1 study)	MODERATE[a] due to risk of bias		The mean overall-pain (VAS) - <4 months in the control groups was 5.3	The mean overall-pain (VAS) - <4 months in the intervention groups was 1.5 lower (1.96 to 1.04lower)
Overall-Pain (VAS, 0-10) - > 4 months	60 (1 study)	MODERATE[a] due to risk of bias		The mean overall-pain (VAS) - > 4 months in the control groups was 3.8	The mean overall-pain (VAS) - > 4 months in the intervention groups was 2 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Group mind-body exercise versus individual biomechanical exercise (95% CI)
					(2.47 to 1.53 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

9.3.8 Mixed exercise evidence

9.3.8.1 Clinical evidence summary: Individual mixed exercise

Table 101: Individual mixed exercise versus waiting list in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Waiting list	Risk difference with Individual mixed exercise (95% CI)
With sciatica - Pain (VAS 0-10) ≤4 months	30 (1 study)	LOW[a,b] due to risk of bias		The mean with sciatica - pain (VAS 0-10) ≤4 months in the control groups was 0.4	The mean with sciatica - pain (VAS 0-10) ≤4 months in the intervention groups was 2.34 lower (4.02 to 0.66 lower)
With sciatica - Leg pain (VAS 0-10) ≤4 months	30 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - leg pain (VAS 0-10) in the control groups was 0.53	The mean with sciatica - leg pain (VAS 0-10) in the intervention groups was 3 lower (5.06 to 0.94 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias.
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 102: Individual mixed exercise versus unsupervised exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Unsupervised exercise	Risk difference with Individual mixed exercise (95% CI)
Overall - Pain (VAS 0-10) > 4 months	40 (1 study)	LOW[a] due to risk of bias		The mean overall - pain (VAS 0-10) > 4 months in the control groups was 8	The mean overall - pain (VAS 0-10) > 4 months in the intervention groups was 4.65 lower (5.44 to 3.86 lower)

(c) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 103: Individual mixed exercise versus biomechanical exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Individual mixed exercise versus biomechanical (95% CI)
Overall-function (ODI, 0-100)<4 months	63 (1 study)	MODERATE[a] due to imprecision		The mean overall-function (ODI)<4 months in the control groups was 21.09	The mean overall-function (ODI)<4 months in the intervention groups was 2.8 lower (5.52 to 0.08 lower)
Overall-Pain (VAS 0-10) <4 months	63 (1 study)	MODERATE[a] due to imprecision		The mean overall-pain (VAS 0-10) <4 months in the control groups was 2.56	The mean overall-pain (VAS 0-10) <4 months in the intervention groups was 0.3 lower (0.83 lower to 0.23 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

9.3.8.2 Clinical evidence summary: Group mixed exercise

Table 104: Group mixed exercise versus usual care in low back pain with or without sciatica

Outcomes	No of Participants	Quality of the	Relative	Anticipated absolute effects

	(studies) Follow up	evidence (GRADE)	effect (95% CI)	Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
Overall - Pain (VAS 0-10) <4 months	162 (2 studies)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (VAS 0-10) <4 months in the intervention groups was 1.15 lower (1.8 to 0.49 lower)
Overall-Pain (VAS 0-10) <4 months - Pain at flexion	38 (1 study)	MODERATE[a] due to risk of bias		The mean overall-pain (VAS) <4 months - pain at flexion in the control groups was 6.83	The mean overall-pain (VAS) <4 months - pain at flexion in the intervention groups was 5.21 lower (5.48 to 4.94 lower)
Overall-Pain (VAS, 0-10) <4 months - Pain at rest	38 (1 study)	MODERATE[a] due to risk of bias		The mean overall-pain (VAS) <4 months - pain at rest in the control groups was 6.42	The mean overall-pain (VAS) <4 months - pain at rest in the intervention groups was 4.05 lower (4.31 to 3.79 lower)
Overall - Pain (VAS 0-10) > 4 months	92 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean overall - pain (VAS 0-10) > 4 months in the control groups was 5.77	The mean overall - pain (VAS 0-10) > 4 months in the intervention groups was 2.55 lower (6.73 lower to 1.64 higher)
Overall - Pain (von Korff 0-100) <4 months [mean difference from control]	27 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (von Korff 0-100) <4 months [mean difference from control] in the intervention groups was 0.88 lower (2.26 lower to 0.5 higher)
Overall - Pain (von Korff 0-100) > 4 months [mean difference from control]	27 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (von Korff 0-100) > 4 months - pain (von Korff 0-100) in the intervention groups was 0.15 higher (1.34 lower to 1.63 higher)
Overall - Function (RMDQ 0-24) <4 months	162 (2 studies)	LOW[a,b] due to risk of bias,		*	The mean overall - function (RMDQ 0-24) <4 months in the intervention groups was 2.02 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
		imprecision			(3.48 to 0.55 lower)
Overall - Function (RMDQ 0-24) > 4 months	52 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ 0-24) > 4 months in the control groups was 10.6	The mean overall - function (RMDQ 0-24) > 4 months in the intervention groups was 0.57 lower (3.45 lower to 2.31 higher)
Overall - Function (RMDQ 0-24) <4 months [mean difference from control)	27 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) <4 months [mean difference from control) in the intervention groups was 1.91 lower (5.41 lower to 1.6 higher)
Overall - Function (RMDQ 0-24) > 4 months [mean difference from control]	27 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) > 4 months [mean difference from control] in the intervention groups was 3 lower (6.88 lower to 0.88 higher)
Overall- SF-36 (0-100) <4 months - Physical	38 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall- SF-36 (0-100) <4 months - physical in the control groups was 52.9	The mean overall- SF-36 (0-100) <4 months - physical in the intervention groups was 1 lower (2.1 lower to 0.1 higher)
Overall- SF-36 (0-100) <4 months - Mental	38 (1 study)	MODERATE[a] due to risk of bias		The mean overall- SF-36 (0-100) <4 months - mental in the control groups was 39.2	The mean overall- SF-36 (0-100) <4 months - mental in the intervention groups was 4.5 higher (2.89 to 6.11 higher)
Overall - Psychological distress (BDI 0-63) <4 months	102 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - psychological distress (BDI 0-63) in the intervention groups was 2.09 lower (3.86 to 0.32 lower)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)

** Control rate not given, only mean difference reported.*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) *Heterogeneity, I^2=97% unexplained by subgroup analysis*

Table 105: Group mixed exercise versus usual care in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
With sciatica - Pain (VAS/NRS 0-10) <4 months - Pain at rest	53 (1 study)	MODERATE[a] due to risk of bias		The mean with sciatica - pain (VAS/NRS 0-10) <4 months - pain at rest in the control groups was 5.25	The mean with sciatica - pain (VAS/NRS 0-10) <4 months - pain at rest in the intervention groups was 2.59 lower (3.11 to 2.07 lower)
With sciatica - Pain (VAS/NRS 0-10) <4 months - Pain on movement	53 (1 study)	MODERATE[a] due to risk of bias		The mean with sciatica - pain (VAS/NRS 0-10) <4 months - pain on movement in the control groups was 6.83	The mean with sciatica - pain (VAS/NRS 0-10) <4 months - pain on movement in the intervention groups was 2.47 lower (3 to 1.94 lower)
With sciatica - Pain (NRS 0-10) <4 months	50 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - pain (NRS 0-10) <4 months in the control groups was 7.1	The mean with sciatica - pain (NRS 0-10) <4 months in the intervention groups was 0.7 lower (1.48 lower to 0.08 higher)
With sciatica - Pain (NRS 0-10) > 4 months	44 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - pain (NRS 0-10) > 4 months in the control groups was	The mean with sciatica - pain (NRS 0-10) > 4 months in the intervention groups was 2.3 lower (3.17 to 1.43 lower)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
				4.1	
With sciatica - Function (RMDQ 0-24) <4 months	44 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with sciatica - function (RMDQ 0-24) <4 months in the control groups was 13.4	The mean with sciatica - function (RMDQ 0-24) <4 months in the intervention groups was 1.2 higher (0.43 to 1.97 higher)
With sciatica - Function (RMDQ 0-24) > 4 months	44 (1 study)	LOW[a] due to risk of bias		The mean with sciatica - function (RMDQ 0-24) > 4 months in the control groups was 15.7	The mean with sciatica - function (RMDQ 0-24) > 4 months in the intervention groups was 6.6 higher (5.77 to 7.43 higher)

(a) *Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias*
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 106: Group mixed exercise versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
Without sciatica - Quality of life (SF-36 0-100) <4 months - general health	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 0-100) <4 months - general health in the control groups was -2.9	The mean without sciatica - quality of life (SF-36 0-100) <4 months - general health in the intervention groups was 3.8 higher (2.31 lower to 9.91 higher)
Without sciatica - Quality of life (SF-36 0-100) <4 months - vitality	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 0-100) <4 months - vitality in the control groups was	The mean without sciatica - quality of life (SF-36 0-100) <4 months - vitality in the intervention groups was 0.1 higher (9.47 lower to 9.67 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
				3.9	
Without sciatica - Quality of life (SF-36 0-100) <4 months - physical functioning	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 0-100) <4 months - physical functioning in the control groups was 6	The mean without sciatica - quality of life (SF-36 0-100) <4 months - physical functioning in the intervention groups was 0.5 higher (5.88 lower to 6.88 higher)
Without sciatica - Quality of life score (SF-36 0-100) <4 months - Pain	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life score (SF-36 0-100) <4 months - pain in the control groups was 12.6	The mean without sciatica - quality of life score (SF-36 0-100) <4 months - pain in the intervention groups was 2.1 higher (6.92 lower to 11.12 higher)
Without sciatica - Quality of life (SF-36 0-100) <4 months - physical role limitation	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 0-100) <4 months - physical role limitation in the control groups was 18.1	The mean without sciatica - quality of life (SF-36 0-100) <4 months - physical role limitation in the intervention groups was 12.7 higher (53.17 lower to 78.57 higher)
Without sciatica - Quality of life (SF-36 0-100) <4 months - emotional role limitation	36 (1 study)	LOW[a] due to risk of bias		The mean without sciatica - quality of life (SF-36 0-100) <4 months - emotional role limitation in the control groups was 11.5	The mean without sciatica - quality of life (SF-36 0-100) <4 months - emotional role limitation in the intervention groups was 7.4 higher (12.66 lower to 27.46 higher)
Without sciatica - Quality of life (SF-36 0-100) <4 months - social functioning	36 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean without sciatica - quality of life (SF-36 0-100) <4	The mean without sciatica - quality of life (SF-36 0-100) <4 months - social functioning in the intervention groups

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
		imprecision		months - social functioning in the control groups was 9.5	was 1.2 lower (11.2 lower to 8.8 higher)
Without sciatica - Quality of life (SF-36 0-100) <4 months - mental health	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - quality of life (SF-36 0-100) <4 months - mental health in the control groups was 5.6	The mean without sciatica - quality of life (SF-36 0-100) <4 months - mental health in the intervention groups was 0.9 lower (6.94 lower to 5.14 higher)
Without sciatica - Pain (VAS 0-10) <4 months	29 (1 study)	LOW[a] due to risk of bias		*	The mean without sciatica - pain (VAS 0-10) <4 months in the intervention groups was 0.95 lower (1.1 to 0.8 lower)
Without sciatica - Pain (VAS 0-10, change score) <4 months	59 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - pain (VAS 0-10, change score) <4 months in the control groups was -10	The mean without sciatica - pain (VAS 0-10, change score) <4 months in the intervention groups was 4.9 lower (15.73 lower to 5.93 higher)
Without sciatica - Function (ODI/RMDQ, change score) <4 months	88 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - function (ODI/RMDQ, change score) <4 months in the control groups was 4.87	The mean without sciatica - function (ODI/RMDQ, change score) <4 months in the intervention groups was 0.66 lower (1.09 to 0.22 lower)
Without sciatica - Psychological distress (HADS 0-21) <4 month - anxiety score	29 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean without sciatica - psychological distress (HADS 0-21)	The mean without sciatica - psychological distress (HADS 0-21) <4 month - anxiety score in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Group mixed exercise (95% CI)
		imprecision		<4 month - anxiety score in the control groups was -0.38	0.55 lower (2.21 lower to 1.11 higher)
Without sciatica - Psychological distress (HADS 0-21) <4 month - depression score	29 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean without sciatica - psychological distress (HADS 0-21) <4 month - depression score (copy) in the control groups was -0.08	The mean without sciatica - psychological distress (HADS 0-21) <4 month - depression score (copy) in the intervention groups was 0.99 lower (2.39 lower to 0.41 higher)
Without sciatica - Function (RMDQ 0-24) <4 months	125 (2 studies)	MODERATE[a] due to risk of bias		*	The mean without sciatica - function (RMDQ 0-24) <4 months in the intervention groups was 1.99 lower (2.96 to 1.02 lower)

** Control rate not given, only mean difference reported.*

(a) *Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias*
(b) *Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.*

Table 107: Group mixed exercise versus self-management in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active)	Risk difference with Group mixed exercise (95% CI)
Without sciatica - Responder criteria (improvement in function) <4 months	125 (1 study)	LOW[a,b] due to risk of bias,	RR 1.58 (1.1 to 2.27)	Not estimatable	Not estimatable

		imprecision			
Without sciatica - Function (RMDQ 0-24) > 4 months - without sciatica	164 (2 studies)	LOW[a,b] due to risk of bias, imprecision		*	The mean without sciatica - function (RMDQ 0-24) > 4 months - without sciatica in the intervention groups was 1.65 lower (2.72 to 0.57 lower)
Without sciatica - Healthcare utilisation - medication use > 4 months	61 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.85 (0.54 to 1.35)	586 per 1000	88 fewer per 1000 (from 270 fewer to 205 more)

** Control rate not given, only mean difference reported.*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 108: Group mixed exercise versus cognitive therapy in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Placebo/sham	Risk difference with Group mixed exercise (95% CI)
Without sciatica - Pain (VAS 0-10) <4 months	21 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean without sciatica - pain (VAS 0-10) <4 months in the intervention groups was 1.8 lower (5.16 lower to 1.56 higher)
Without sciatica - Pain (VAS 0-10) 4 months - 1 year> 4 months	27 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean without sciatica - pain (VAS 0-10) 4 months - 1 year> 4 months in the intervention groups was 1.3 lower (4.4 lower to 1.8 higher)
Without sciatica - Function (RMDQ 0-24) <4 months - without sciatica	21 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean without sciatica - function (RMDQ 0-24) <4 months - without sciatica in the intervention groups was 4.9 lower (9.08 to 0.72 lower)

Without sciatica - Psychological distress (BDI 0-63) <4 months	21 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean without sciatica - psychological distress (BDI 0-63) <4 months in the intervention groups was 6.3 lower (18.7 lower to 6.1 higher)

** Control rate not given, only mean difference reported.*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 109: Group mixed exercise versus cognitive behavioural approaches in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with cognitive behavioural approaches	Risk difference with Group mixed exercise (95% CI)
With/without sciatica - Pain (VAS 0-10) <4 months	107 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - pain (VAS 0-10) <4 months in the intervention groups was 0.56 lower (1.48 lower to 0.36 higher)
With/without sciatica - Pain (VAS 0-10) >4 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - pain (VAS 0-10) >4 months in the intervention groups was 0.09 lower (1.02 lower to 0.84 higher)
With/without sciatica - Function (RMDQ 0-24) <4 months	107 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - function (RMDQ) <4 months in the intervention groups was 0.62 lower (2.4 lower to 1.16 higher)
With/without sciatica - Function (RMDQ 0-24) >4 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - function (RMDQ) >4 months in the intervention groups was 0.46 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with cognitive behavioural approaches	Risk difference with Group mixed exercise (95% CI)
					(2.28 lower to 1.36 higher)
With/without sciatica - Psychological distress (BDI 0-63) <4 months	107 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - psychological distress (BDI 0-63) <4 months in the intervention groups was 0.55 higher (1.46 lower to 2.56 higher)
With/without sciatica - Psychological distress (BDI 0-63) >4 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - psychological distress (BDI 0-63) >4 months in the intervention groups was 1.15 higher (0.9 lower to 3.2 higher)
With/without sciatica - HC use (general practice - visits) >4 months	104 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean with or without sciatica - hc use (general practice - visits) >4 months in the intervention groups was 0.30 lower (2.27 lower to 1.67 higher)
With/without sciatica - HC use (specialist care - visits) >4 months	104 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean with or without sciatica - hc use (specialist care - visits) >4 months in the control groups was 1.12	The mean with or without sciatica - hc use (specialist care - visits) >4 months in the intervention groups was 0.58 higher (0.35 lower to 1.51 higher)
With/without sciatica - HC use (radiography - visits) >4 months	104 (1 study)	MODERATE[a] due to risk of bias		The mean with or without sciatica - hc use (radiography - visits) >4 months in the control groups	The mean with or without sciatica - hc use (radiography - visits) >4 months in the intervention groups was 0.10 lower (0.24 lower to 0.04 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with cognitive behavioural approaches	Risk difference with Group mixed exercise (95% CI)
				was 0.16	
With/without sciatica - HC use (occupational physician - visits) >4 months	104 (1 study)	MODERATE[a] due to risk of bias		The mean with or without sciatica - hc use (occupational physician - visits) >4 months in the control groups was 0.24	The mean with or without sciatica - hc use (occupational physician - visits) >4 months in the intervention groups was 0.14 lower (0.42 lower to 0.14 higher)
With/without sciatica - HC use (psychologist - visits) >4 months	104 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with or without sciatica - hc use (psychologist - visits) >4 months in the control groups was 0.29	The mean with or without sciatica - hc use (psychologist - visits) >4 months in the intervention groups was 0.28 higher (0.64 lower to 1.2 higher)
With/without sciatica - HC use (therapist -sessions) >4 months	104 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean with or without sciatica - hc use (therapist - sessions) >4 months in the control groups was 9.03	The mean with or without sciatica - hc use (therapist -sessions) >4 months in the intervention groups was 4.62 lower (10.23 lower to 0.99 higher)

** Control rate not given, only mean difference reported.*

(a) The majority of the evidence was at high risk of bias due to lack of blinding

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

9.3.9 Combinations – exercise therapy adjunct

9.3.9.1 Low back pain without sciatica population

Table 110: Exercise (biomechanical) plus electrotherapy (TENS) compared to electrotherapy (TENS) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with TENS	Risk difference with Exercise (biomechanical) + TENS (95% CI)
Pain severity (Borg verbal pain rating scale, 0-10) ≤4 months	44 (1 study) 8 weeks	LOW[a] due to risk of bias		The mean pain (Borg verbal pain rating scale 0-10) - <4 months in the control groups was -0.31	The mean pain (borg verbal pain rating scale 0-10) - <4 months in the intervention groups was 0.16 lower (0.21 to 0.11 lower)
Function (ODI, 0-100) ≤4 months	44 (1 study) 8 weeks	LOW[a] due to risk of bias		The mean function (ODI 0-100) - <4 months in the control groups was -4.2	The mean function (ODI 0-100) - <4 months in the intervention groups was MD 3.2 lower (4.4 to 2 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 111: Exercise (biomechanical plus aerobic) plus electrotherapy (PENS) compared to sham electrotherapy (PENS) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with sham PENS	Risk difference with Exercise (biomechanical + aerobic) + PENS (95% CI)
Quality of life (SF-36 Mental component summary score, 0-100) ≤4 months	93 (1 study) 6 weeks	LOW[a,b] due to risk of bias		The mean SF-36 (0-100) - <4 months: mental component summary score in the control groups was -0.1	The mean SF-36 (0-100) - <4 months: mental component summary score in the intervention groups was 0.2 lower (4.72 lower to 4.32 higher)
Quality of life (SF-36 Mental component summary score, 0-100) >4 months	93 (1 study) 6 months	LOW[a,b] due to risk of bias		The mean SF-36 (0-100) - >4 months: mental component summary score in the control groups was 1.2	The mean SF-36 (0-100) - >4 months: mental component summary score in the intervention groups was 1.4 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with sham PENS	Risk difference with Exercise (biomechanical + aerobic) + PENS (95% CI)
					(6.52 lower to 3.72 higher)
Quality of life (SF-36 Physical component summary score, 0-100) ≤4 months	93 (1 study) 6 weeks	LOW[a,b] due to risk of bias		The mean SF-36 (0-100) - <4 months: physical component summary score in the control groups was 5.9	The mean SF-36 (0-100) - <4 months: physical component summary score in the intervention groups was 2 lower (12.11 lower to 8.11 higher)
Quality of life (SF-36 Physical component summary score, 0-100) - >4 months	93 (1 study) 6 months	LOW[a,b] due to risk of bias		The mean SF-36 (0-100) - >4 months: physical component summary score in the control groups was 5.1	The mean SF-36 (0-100) - >4 months: physical component summary score in the intervention groups was 0.7 lower (10.87 lower to 9.47 higher)
Pain severity (McGill, 0-78) ≤4 months.	93 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill) - <4 months in the control groups was -2.3	The mean pain (McGill) - <4 months in the intervention groups was 1.8 lower (4.79 lower to 1.19 higher)
Pain severity (McGill, 0-78) >4 months	93 (1 study) 6 months	LOW[a,b] due to risk of bias		The mean pain (McGill) - >4 months in the control groups was -3.3	The mean pain (McGill) - >4 months in the intervention groups was 0.5 lower (3.84 lower to 2.84 higher)
Function (RMDQ, 0-24) ≤4 months	93 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean function (Roland Morris) - <4 months in the control groups was -2.7	The mean function (Roland Morris) - <4 months in the intervention groups was 0.1 higher (1.62 lower to 1.82 higher)
Function (RMDQ, 0-24) >4 months.	93 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Roland Morris) - >4 months in the control groups was -3	The mean function (Roland Morris) - >4 months in the intervention groups was 0.9 higher (0.93 lower to 2.73 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 112: Exercise (biomechanical plus aerobic) plus electrotherapy (PENS) compared to electrotherapy (PENS) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with PENS	Risk difference with Exercise (biomechanical + aerobic) + PENS (95% CI)
Quality of life (SF-36 Mental component summary score, 0-100) ≤ 4 months	92 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - <4 months: mental component summary score in the control groups was 1.5	The mean SF-36 (0-100) - <4 months: mental component summary score in the intervention groups was 1.8 lower (6.58 lower to 2.98 higher)
Quality of life (SF-36 Mental component summary score, 0-100) - >4 months	92 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: mental component summary score in the control groups was -1.8	The mean SF-36 (0-100) - >4 months: mental component summary score in the intervention groups was 1.6 higher (4.37 lower to 7.57 higher)
Quality of life (SF-36 Physical component summary score, 0-100) ≤4 months:	92 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - <4 months: physical component summary score in the control groups was -1.1	The mean SF-36 (0-100) - <4 months: physical component summary score in the intervention groups was 5 higher (4.58 lower to 14.58 higher)
Quality of life (SF-36 Physical component summary score, 0-100) >4 months:	92 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: physical component summary score in the control groups was -5.9	The mean SF-36 (0-100) - >4 months: physical component summary score in the intervention groups was 10.3 higher (0.78 to 19.82 higher)
Pain severity (McGill, 0-78) ≤4 months.	92 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill) - <4 months in the control groups was -2.9	The mean pain (McGill) - <4 months in the intervention groups was 1.2 lower (4.76 lower to 2.36 higher)
Pain severity (McGill, 0-78) >4 months	92 (1 study) 6 months	LOW[a,b] due to risk of bias		The mean pain (McGill) - >4 months in the control groups was -3.4	The mean pain (McGill) - >4 months in the intervention groups was 0.4 lower

					(3.75 lower to 2.95 higher)
Function (RMDQ, 0-24) ≤4 months	92 (1 study) 6 weeks	LOW[a] due to risk of bias		The mean function (Roland Morris) - <4 months in the control groups was -2.6	The mean function (Roland Morris) - <4 months in the intervention groups was 0 higher (1.86 lower to 1.86 higher)
Function (RMDQ, 0-24) >4 months	92 (1 study) 6 months	LOW[a] due to risk of bias		The mean function (Roland Morris) - >4 months in the control groups was -2.1	The mean function (Roland Morris) - >4 months in the intervention groups was 0 higher (1.74 lower to 1.74 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 113: Group exercise (biomechanical + aerobic) plus self-management (education) plus manual therapy (manipulation) compared to individual exercise (biomechanical) plus self-management (education) plus manual therapy (manipulation) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with individual exercise (biomechanical) + education + manipulation	Risk difference with Group exercise (biomechanical + aerobic) + education + manipulation (95% CI)
Healthcare utilisation (analgesic use) ≤4 months	62 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.9 (0.83 to 4.36)	Moderate	
				207 per 1000	186 more per 1000 (from 35 fewer to 696 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 114: Exercise (aerobic) + psychological intervention (behavioural therapy) compared to psychological intervention (behavioural therapy) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with behavioural therapy	Risk difference with Exercise (aerobic) + behavioural therapy (95% CI)

Pain severity (McGill, 0-78) ≤4 months	36 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill) - <4 months in the control groups was 17.71	The mean pain (McGill) - <4 months in the intervention groups was 2.93 lower (10.62 lower to 4.76 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 115: Exercise (aerobic) + psychological therapy (cognitive behavioural approaches) + self-management (education) compared to psychological therapy (cognitive behavioural approaches) + self-management (education) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with cognitive behavioural approaches + education	Risk difference with Exercise (aerobic) + cognitive behavioural approaches + education (95% CI)
Pain severity (NRS, 0-10) ≤4 months	27 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (0-10 NRS converted to 0-10) - <4 months in the control groups was 2.26	The mean pain (0-100 NRS converted to 0-10) - <4 months in the intervention groups was 0.35 lower (2.34 lower to 1.64 higher)
Function (RMDQ, 0-24) ≤4 months	27 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Roland Morris 0-24) - <4 months in the control groups was 4.3	The mean function (Roland Morris 0-24) - <4 months in the intervention groups was 2.1 higher (1.41 lower to 5.61 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 116: Exercise (biomechanical – Pilates) + self-management (education) compared to self-management for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Pilates + education + (95% CI)
Pain severity (NRS, 0-10) ≤4 months	86 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias,		The mean pain (NRS 0-10) - <4 months in the control groups was 5.2	The mean pain (NRS 0-10) - <4 months in the intervention groups was 2.1 lower

		imprecision			(3.07 to 1.13 lower)
Pain severity (NRS, 0-10) >4 months	86 (1 study) 6 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean pain (NRS 0-10) - >4 months in the control groups was 5.3	The mean pain (NRS 0-10) - >4 months in the intervention groups was 0.8 lower (1.75 lower to 0.15 higher)
Function (RMDQ, 0-24) ≤4 months	86 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Roland Morris 0-24) - <4 months in the control groups was 7.1	The mean function (Roland Morris 0-24) - <4 months in the intervention groups was 3.5 lower (5.48 to 1.52 lower)
Function (RMDQ, 0-24) >4 months	86 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Roland Morris 0-24) - >4 months in the control groups was 6.7	The mean function (Roland Morris 0-24) - >4 months in the intervention groups was 2.2 lower (4.35 to 0.05 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

9.3.9.2 Low back pain with sciatica population

Table 117: Exercise (biomechanical) + self-management (unsupervised exercise) compared to TENS + laser + massage + self-management (unsupervised exercise)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Exercise (biomechanical) + self-management (unsupervised exercise) (95% CI)
With sciatica - Pain (VAS 0-10) <4 months	40 (1 study)	MODERATE[a] due to risk of bias		The mean overall - pain (VAS 0-10) <4 months in the control groups was 5.29	The mean overall - pain (VAS 0-10) <4 months in the intervention groups was 3.19 lower (3.95 to 2.43 lower)
With sciatica - Function (revised ODI 0-100) < 4 months	40 (1 study)	MODERATE[a] due to risk of bias		The mean overall - function (revised ODI 0-100) < 4 months in	The mean overall - function (revised ODI 0-100) < 4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Exercise (biomechanical) + self-management (unsupervised exercise) (95% CI)
				the control groups was 28.26	18.21 lower (23.07 to 13.35 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

9.3.9.3 Low back pain with or without sciatica population

Table 118: Exercise + orthotics (orthoses) compared to orthotics (orthoses) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with orthoses	Risk difference with Exercise + orthoses (95% CI)
Responder criteria (remission of pain) - >4 months	48 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1 (0.38 to 2.66)	Moderate	
				250 per 1000	0 fewer per 1000 (from 155 fewer to 415 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 119: Exercise + self-management (education) compared to self-management for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Exercise + education (95% CI)
Responder: Number improving on Disability index - >4 months	90 (1 study)	LOW[a] due to risk of bias	RR 5.42 (1.71 to 17.22)	Moderate	
				68 per 1000	301 more per 1000 (from 48 more to 1000 more)

Responder: Number improving on Quality of life index - >4 months	90 (1 study)	LOW[a] due to risk of bias	RR 3.59 (2.21 to 5.82)	Moderate	
				273 per 1000	707 more per 1000 (from 330 more to 1000 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 120: Exercise + self-management (mixed modality - home exercise + education) + relaxation compared to self-management (education) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with education	Risk difference with Exercise + home exercise + relaxation + education (95% CI)
Function (Roland Morris 0-24) - <4 months	239 (1 study)	LOW[a] due to risk of bias		The mean function (roland morris 0-24) - <4 months in the control groups was -1.1	The mean function (roland morris 0-24) - <4 months in the intervention groups was 0 higher (0.48 lower to 0.48 higher)
Function (Roland Morris 0-24) - >4 months	239 (1 study)	LOW[a] due to risk of bias		The mean function (roland morris 0-24) - >4 months in the control groups was -1.6	The mean function (roland morris 0-24) - >4 months in the intervention groups was 0.4 lower (1.05 lower to 0.25 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 121: Exercise (biomechanical) + self-management (home exercise) compared to self-management (self-care advice based on the Back Book)) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Exercise (biomechanical) + home exercise (95% CI)
Quality of life (15D 0 to 1) - <4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (15d 0 to 1) - <4 months in the control groups was 0.89	The mean quality of life (15d 0 to 1) - <4 months in the intervention groups was 0.01 higher (0.02 lower to 0.04 higher)
Quality of life (15D 0 to 1) - >4	83	LOW[a,b]		The mean quality of life (15d 0 to 1) - >4	The mean quality of life (15d 0 to 1) - >4

months	(1 study)	due to risk of bias, imprecision		months in the control groups was 0.88	months in the intervention groups was 0.02 higher (0.01 lower to 0.05 higher)
Pain (0-100 VAS converted to 0-10) - <4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (0-100 VAS converted to 0-10) - <4 months in the control groups was 3.5	The mean pain (0-100 VAS converted to 0-10) - <4 months in the intervention groups was 0.4 lower (1.45 lower to 0.65 higher)
Pain (0-100 VAS converted to 0-10) - >4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (0-100 VAS converted to 0-10) - >4 months in the control groups was 3.9	The mean pain (0-100 VAS converted to 0-10) - >4 months in the intervention groups was 1 lower (2.02 lower to 0.02 higher)
Function (Roland Morris 18 item) - <4 months	83 (1 study)	MODERATE[a] due to risk of bias		The mean function (roland morris 18 item) - <4 months in the control groups was 4	The mean function (roland morris 18 item) - <4 months in the intervention groups was 0 higher (1.94 lower to 1.94 higher)
Function (Roland Morris 18 item) - >4 months	83 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (roland morris 18 item) - >4 months in the control groups was 5	The mean function (roland morris 18 item) - >4 months in the intervention groups was 1 lower (3.15 lower to 1.15 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 122: Exercise (biomechanical – core stability) + manual therapy (massage) compared to manual therapy (massage) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with manual therapy (massage)	Risk difference with Exercise (biomechanical - core stability) + manual therapy (massage) versus manual therapy (massage) (95% CI)
Pain severity (VAS, 0-10) < 4 months	92 (1 study)	LOW[a] due to risk of bias		The mean pain severity (VAS, 0-10) < 4 months in the control groups was	The mean pain severity (VAS, 0-10) < 4 months in the intervention groups was 1.39 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with manual therapy (massage)	Risk difference with Exercise (biomechanical - core stability) + manual therapy (massage) versus manual therapy (massage) (95% CI)
				2.85	(1.9 to 0.88 lower)
Function (ODI, 0-100) < 4 months	92 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI, 0-100) < 4 months in the control groups was 18.39	The mean function (ODI, 0-100) < 4 months in the intervention groups was 5.19 lower (6.46 to 3.92 lower)
Responder criteria (pain free interval > 30 days)	85 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1 (0.96 to 1.05)	Moderate	
				1000 per 1000	0 fewer per 1000 (from 40 fewer to 50 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 123: Exercise (core stability) + manual therapy (manipulation) compared to self-management (advice to stay active) + manual therapy (manipulation) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self-management (advice to stay active) + manipulation	Risk difference with Exercise (core stability) + manipulation (95% CI)
Overall - Quality of life (SF-12 0-100) <4 months - Physical	25 (1 study)	LOW[a] due to risk of bias		The mean overall - quality of life (sf-12 0-100) <4 months - physical in the control groups was 43.2	The mean overall - quality of life (sf-12 0-100) <4 months - physical in the intervention groups was 9.3 higher (3.12 to 15.48 higher)
Overall - Quality of life (SF-12 0-100) <4 months - Mental	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life (sf-12 0-100) <4 months - mental in the control groups was 50.2	The mean overall - quality of life (sf-12 0-100) <4 months - mental in the intervention groups was 2.6 higher (5.51 lower to 10.71 higher)

Overall - Quality of life (SF-12 0-100) > 4 months - Physical	25 (1 study)	LOW[a] due to risk of bias, imprecision		The mean overall - quality of life (sf-12 0-100) > 4 months - physical in the control groups was 48.8	The mean overall - quality of life (sf-12 0-100) > 4 months - physical in the intervention groups was 3.4 higher (1.94 lower to 8.74 higher)
Overall - Quality of life (SF-12 0-100) > 4 months - Mental	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - quality of life (sf-12 0-100) > 4 months - mental in the control groups was 45.1	The mean overall - quality of life (sf-12 0-100) > 4 months - mental in the intervention groups was 8.3 higher (0.59 to 16.01 higher)
Overall - Pain (McGill - sensory, 0-33) <4 months	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (McGill - sensory, 0-33) <4 months in the control groups was 7.1	The mean overall - pain (McGill - sensory, 0-33) <4 months in the intervention groups was 3.5 lower (6.9 to 0.1 lower)
Overall - Pain (McGill - sensory, 0-33) > 4 months	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (McGill - sensory, 0-33) > 4 months in the control groups was 6.3	The mean overall - pain (McGill - sensory, 0-33) > 4 months in the intervention groups was 2.3 lower (5.48 lower to 0.88 higher)
Overall - Pain (McGill - affective, 0-12) <4 months	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (McGill - affective, 0-12) <4 months in the control groups was 3.3	The mean overall - pain (McGill - affective, 0-12) <4 months in the intervention groups was 1.9 lower (4.97 lower to 1.17 higher)
Overall - Pain (McGill - affective, 0-12) > 4 months	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - pain (McGill - affective, 0-12) > 4 months in the control groups was 1.4	The mean overall - pain (McGill - affective, 0-12) > 4 months in the intervention groups was 0.6 lower (1.74 lower to 0.54 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 124: Mixed exercise (biomechanical + aerobic) + Alexander technique compared to Alexander technique for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Alexander technique	Risk difference with Mixed exercise + Alexander technique (95% CI)
Overall - Function (RMDQ 0-24) <4 months	30 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ 0-24) <4 months in the control groups was 5.57	The mean overall - function (RMDQ 0-24) <4 months in the intervention groups was 1.28 higher (2.8 lower to 5.36 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs.

Table 125: Exercise (individual biomechanical) + self management compared to self management

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self management	Risk difference with Individual biomechanical exercise + self management (95% CI)
Function (RMDQ 0-24) - < 4 months	481 (1 study)	LOW[a] due to risk of bias		The mean function (rmdq 0-24) - < 4 months in the control groups was 6.83	The mean function (rmdq 0-24) - < 4 months in the intervention groups was 1.36 lower (2.15 to 0.57 lower)
Function (RMDQ 0-24) - > 4 months	464 (1 study)	LOW[a] due to risk of bias		The mean function (rmdq 0-24) - > 4 months in the control groups was 6.13	The mean function (rmdq 0-24) - > 4 months in the intervention groups was 0.39 lower (1.24 lower to 0.46 higher)
Pain (Von Korf 0-10) - < 4 months	443 (1 study)	LOW[a] due to risk of bias		The mean pain (von korf 0-10) - < 4 months in the control groups was 4.932	The mean pain (von korf 0-10) - < 4 months in the intervention groups was 0.46 lower (0.85 to 0.07 lower)
Pain (Von Korf 0-10) - > 4 months	435	LOW[a]		The mean pain (von korf 0-10) - > 4	The mean pain (von korf 0-10) - > 4 months

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self management	Risk difference with Individual biomechanical exercise + self management (95% CI)
	(1 study)	due to risk of bias		months in the control groups was 4.844	in the intervention groups was 0.69 lower (1.18 to 0.2 lower)
Quality of life (SF36 0-100) - < 4 months: Physical component	418 (1 study)	LOW[a] due to risk of bias		The mean quality of life (sf36 0-100) - < 4 months: physical component in the control groups was 43.94	The mean quality of life (sf36 0-100) - < 4 months: physical component in the intervention groups was 2.41 higher (1.13 to 3.69 higher)
Quality of life (SF36 0-100) - > 4 months: Physical component	415 (1 study)	LOW[a] due to risk of bias		The mean quality of life (sf36 0-100) - > 4 months: physical component in the control groups was 42.84	The mean quality of life (sf36 0-100) - > 4 months: physical component in the intervention groups was 1.55 higher (0.14 lower to 3.24 higher)
Quality of life (SF36 0-100) - < 4 months: Mental component	418 (1 study)	LOW[a] due to risk of bias		The mean quality of life (sf36 0-100) - < 4 months: mental component in the control groups was 46.49	The mean quality of life (sf36 0-100) - < 4 months: mental component in the intervention groups was 0.75 higher (1.04 lower to 2.54 higher)
Quality of life (SF36 0-100) - > 4 months: Mental component	415 (1 study)	LOW[a] due to risk of bias		The mean quality of life (sf36 0-100) - > 4 months: mental component in the control groups was 46.44	The mean quality of life (sf36 0-100) - > 4 months: mental component in the intervention groups was 0 higher (1.86 lower to 2.52 higher)
Function (Von Korff disability, 0-100) - < 4 months	444 (1 study)	LOW[a] due to risk of bias		The mean function (von korff disability, 0-100) - < 4 months in the control groups was 3.473	The mean function (von korff disability, 0-100) - < 4 months in the intervention groups was 0.5 lower (0.94 to 0.06 lower)
Function (Von Korff disability, 0-100)	437	LOW[a]		The mean function (von korff disability,	The mean function (von korff disability, 0-

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Self management	Risk difference with Individual biomechanical exercise + self management (95% CI)
- > 4 months	(1 study)	due to risk of bias		0-100) - > 4 months in the control groups was 3.429	100) - > 4 months in the intervention groups was 0.46 lower (0.91 to 0.01 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

9.4 Economic evidence

Published literature

One economic evaluation was identified that included **mind and body exercise** as a comparator and has been included in this review.[87] This is summarised in the economic evidence profile below (Table 126) and the economic evidence table in Appendix I.

One economic evaluation was identified that included **mixed modality exercise** as a comparator and has been included in this review.[457] This is summarised in the economic evidence profile below (Table 127) and the economic evidence table in Appendix I.

No relevant economic evaluations were identified that included **biomechanical exercise** or **aerobic exercise** compared to placebo or sham, usual care or other single active interventions in the protocol. Three economic evaluations were identified that included **biomechanical exercise** as a comparator (Critchley 2007,[94] Beam 2004,[498] and Niemisto 2003 and 2005[387,388]) and this was part of the following interventions: 1) biomechanical exercise in combination with self-management or self-management and manual therapy (mixed modality), or self-management, biomechanical exercise and manual therapy (mixed modality) compared to self-management alone (Beam 2004[498]); 2) biomechanical exercise compared to mixed modality manual therapy plus self-management or compared to MBR programme (Critchley 2007[94]) 3) biomechanical exercise in combination with manual therapy (manipulation/mobilisation) and self-management compared to self-management alone (Niemisto 2003[388]/2005[387]).

One economic evaluation relating to biomechanical exercise, one relating to a mixed exercise intervention, and one relating to mind-body exercise were identified but excluded due to limited applicability and/or potentially serious methodological concerns.[3,210,444] These are listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 126: Economic evidence profile: Mind/body exercise interventions

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Chuang 2012[87] (UK)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-RCT analysis (Tilbrook 2011[488]) • Population: mixed (with and without sciatica) • Two comparators: 1. Usual care (UC) 2. UC + yoga (group) • Follow-up: 1 year	2-1: £507 [(c)]	2-1: 0.037 QALYs	2 versus 1: £13,606 per QALY gained	• Probability intervention 2 cost-effective (£20K/30K threshold): 72%/~87%. • Conclusion robust to sensitivity analyses.

(a) Study does not include all non-invasive treatment options. The EQ5D tariff used is not stated although as this is a UK study it is judged likely to be the UK tariff.

(b) Time horizon may not be sufficient to capture all benefits and costs - authors suggest that if participants continue to practice yoga it might continue to have an impact on their back function and they noted that 60% of participants in the yoga arm who answered the question continued practising yoga at home. Medication costs are not included. Within-trial analysis and so does not reflect full body available evidence for this comparison - Tilbrook is 1 of 7 studies that included this comparison. One other study (Cox) reported EQ-5D with a smaller benefit at 12 weeks but is a much smaller study with only short term outcomes. For other outcomes where Tilbrook reports data the overall estimate of effect is largely driven by this study as it is the largest. Therefore it is considered likely to reasonably reflect the overall body of evidence.

(c) 2008/9 costs. Cost components incorporated: Intervention, primary care contacts (GP, practice nurse, physiotherapist and other) and secondary care contacts (emergency service, outpatient appointments, inpatient hospital stays, physiotherapist, other).

Table 127: Economic evidence profile: Mixed modality exercise interventions

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Smeets 2009 [457] (Netherlands)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• With-RCT analysis (Smeets 2006a[461]) • Cost-utility analysis (QALYs) • Population: mixed (with or without sciatica) (> 3 months resulting in disability (RDQ >3) and ability to walk at least 100m) • Three comparators in full	2-1: £908[(c)]	2-1: 0.03 QALYs lost	cognitive behavioural approaches is dominant (lower costs and higher QALYs)	• Uncertainty not reported for cost effectiveness • Cost and QALY CIs not reported

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			analysis: 1. cognitive behavioural approaches 2. Mixed modality exercise (biomechanical + aerobic; group) 3. MBR (2 core elements: physical, psychological). Combination of interventions 1 and 2. • Follow-up: 62 weeks				

(a) Dutch resource use data (2002-2004) and unit costs (2003) may not reflect current NHS context. Study does not include all non-invasive treatment options.

(b) Within-trial analysis and so does not reflect full body of available evidence for this intervention; Smeets 2006a is 1 of 7 studies included in the clinical review for mixed modality exercise; 1 of 5 where the mix was biomechanical + aerobic; although is the only one compared with cognitive behavioural approaches.

(c) 2003 Netherlands euros converted to UK pounds.[394] Cost components incorporated: Interventions, GP, medical specialist including radiology, occupational physician, physiotherapist, manual therapist, Cesar or Mensensieck therapist, psychologist, medication, hospitalisation, medical procedures.

Table 128: Economic evidence profile: biomechanical exercise

Study	Applicability	Limitations	Other comments	Cost (a)	Effects (a)	Incremental costs (b)	Incremental effects (b)	Cost effectiveness (b)	Uncertainty
Beam 2004[498] (UK)	Partially applicable (c)	Potentially serious limitations (d)	• Within-RCT analysis (UK BEAM[48,499]) • Population: Low back pain mixed population (with and without sciatica) (1-2 months) • Four comparators in full analysis 1. Best care (self-management –	1. £346 (e)	1. 0.618 QALYs	Baseline			Prob. CE: 0%/0%
				2. £486 (e)	2. 0.635 QALYs	Dominated by 4			Prob. CE: ~7%/~7%
				4. £471 (e)	4. 0.651 QALYs	4 versus1: £126 (e)	0.033 QALYs	£3800 per QALY gained	Prob. CE:~38%/~37%
				3. £541 (e)	3. 0.659 QALYs	3 versus 4: £70 (e)	0.008 QALYs	£8700 per QALY gained	Prob. CE: ~54%/~57%

Study	Applicability	Limitations	Other comments	Cost [a]	Effects [a]	Incremental costs [b]	Incremental effects [b]	Cost effectiveness [b]	Uncertainty
			programme & advice to stay active [SM]) 2. Best care + 'Back to fitness programme' (SM + biomechanical exercise) 3. Best care + spinal manipulation therapy (SM + mixed modality manual therapy) 4. Best care + 'Back to fitness programme'+ spinal manipulation therapy (SM + biomechanical exercise + mixed modality manual therapy) • Follow-up: 1 year						
			• Subanalysis manipulation not available: 1. Best care 2. Best care + 'Back to fitness programme'			2-1:£140 (e)	2-1: 0.017 QALYs	2 versus 1: £8300 per QALY gained	Probability intervention 2 cost-effective (£20K/30K threshold): ~60%/~70% Increasing cost of manipulation to that of private provider did not change conclusions.

ICER = incremental cost effectiveness ratio; n/a = not available; RCT = randomised clinical trial; QALY = quality-adjusted life year; Prob. CE= Probability intervention is cost-effective at a £20,000/£30,000 threshold.

(a) When more than two comparators, Intervention number in order of least to most effective in terms of QALYs. When there are two comparators it will be blank.

(b) When more than two comparators, this is a full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option. The most cost effective option is that with the highest QALYs with an ICER below £20,000 per QALY gained.

(c) Resource use data (1999-2002) and unit costs (2000/01) may not reflect the current NHS context. Study does not include all non-invasive treatment options.

(d) A longer time horizon may be preferable given than interventions continued to show benefit at 12 months. Within-trial analysis and so does not reflect full body of available evidence for this intervention; although is the only study with these exact comparison of combinations.

(e) Cost components incorporated: interventions, primary care contacts (GP, practice nurse, physiotherapist, other), secondary care contacts (hospital admissions and outpatient appointments).

Table 129: Economic evidence profile: biomechanical exercise

Study	Applicability	Limitations	Other comments	Cost (a)	Effects (a)	Incremental costs (b)	Incremental effects (b)	Cost effectiveness (b)	Uncertainty
Critchley 2007[94] (UK)	Partially applicable (c)	Potentially serious limitations (d)	• Within-RCT analysis (same paper) • Population: Low back pain mixed population (with and without sciatica) (>12 weeks) • Three comparators in full analysis 1. Biomechanical exercise 2. Combination: Mixed modality manual therapy plus self-management. 3. MBR programme (3 elements: physical, psychological, education) • Follow-up: 18 months	3. £165 (e)	3. 1.00 QALYs	Baseline			Prob. CE: 67%/65%
				1. £379 (e)	1. 0.90 QALYs	Dominated by 3			Prob. CE: ~0%/ ~0%
				2. £474 (e)	2. 0.99 QALYs	Dominated by 3			Prob. CE: ~33%/~35%%

ICER = incremental cost effectiveness ratio; n/a = not available; NR = not reported; RCT = randomised clinical trial; QALY = quality-adjusted life year; Prob. CE= Probability intervention is cost-effective at a £20,000/£30,000 threshold.

(a) Cost/effect in order of least to most costly intervention.

(b) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

(c) Resource use data (2002-2005) and unit costs (2003/3) may not reflect the current NHS context. EQ-5D tariff used is not stated (although as UK study judged likely to be UK tariff). Study does not include all non-invasive treatment options.

(d) Time horizon may not be sufficient to capture all benefits and costs if benefits persist beyond 18 months. Within-trial analysis and so does not reflect full body of available evidence for this comparison; Critchley 2007 is one of several studies included in the clinical review for exercise.

(e) Cost components incorporated: interventions, primary care contacts (GP, practice nurse, physiotherapist, other), secondary care contacts (hospital admissions and outpatient appointments).

Table 130: Economic evidence profile: biomechanical exercise

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Niemisto 2003[388]/ Niemisto 2005[387] (Finland)	Partially applicable (a)	Potentially serious limitations (b)	• Within-RCT analysis (same paper) • Population: Low back pain mixed population (with or without sciatica) (>3 months with ODI >16%) • Two comparators in full analysis 1. Self-management programme 2. Combination: self-management programme, manipulation and biomechanical exercise • Follow-up: 1 year / 2 years	2-1: £25/£56 (c)	12 months: See clinical review 24 months: • VAS (MD) 4.97 • ODI (MD): 1.24 • 15D: Authors report no difference	n/a	Incremental costs were reported as not statistically significant. VAS (24m) 95% CI: 4.83 to 5.12 ODI (24m) 95% CI: 1.18 to 1.30

ICER = incremental cost effectiveness ratio; n/a = not available; RCT = randomised clinical trial; QALY = quality-adjusted life year

(a) *Finnish resource use data (1999-2001) and unit costs (2000) may not reflect the current NHS context. Non-NICE reference case utility measure used (15D) and this uses a non-comparable valuation method (VAS) from the Finnish population. QALYs were not calculated using area under the curve only mean difference in 15D reported. Discounting was not applied (24 month analysis). Study does not include all non-invasive treatment options.*

(b) *Within-trial analysis and so does not reflect full body of available evidence for this comparison; Niemisto 2003 is 1 of several studies included in the clinical review for individual combinations. Limited sensitivity analysis.2005 Finland converted to UK pounds.*[394]

(c) *Cost components incorporated: Visits to physicians, visits to physiotherapy, outpatient visits, inpatient care and x-ray examinations. Note: paper reported societal perspective; here only healthcare costs have been presented.*

Unit costs

Biomechanical and aerobic exercise interventions are generally conducted in group or individually by a physiotherapist. The relevant unit costs are provided below to aid consideration of cost-effectiveness.

Table 131: Unit costs of healthcare professionals

Healthcare professional	Costs per hour
Hospital physiotherapist (band 5)	£32
Community physiotherapist (band 5)	£30

Source: PSSRU 2013[99]

The unit costs of community physiotherapists do not account for travel costs, such as mileage and travel time. As a result, these estimates are probably an underestimate.

Mind and body exercise interventions are not currently provided by the NHS. These types of interventions are conducted by a therapist (for example, yoga instructor) rather than a physiotherapist. No published unit costs were identified.

Mind and body exercise interventions are not currently provided by the NHS. These types of interventions are conducted by a therapist (for example, yoga instructor) rather than a physiotherapist. No published unit costs were identified although the economic evaluation included in the review estimated the costs of yoga per person in the study to be £292.61. This included teaching and equipment costs for up to 12 group sessions (maximum 15 participants) of 75 minutes. They also noted that costs would be reduced if an NHS physiotherapist ran the class.

The cost of exercise interventions will be based on:

- The number of sessions required
- The length of each session
- The number of people each session is for
- The cost of the person who would provide the session
- The cost of any equipment or facilities required as part of the intervention.

9.5 Evidence statements

9.5.1 Clinical

9.5.1.1 Individual biomechanical exercise versus usual care

In the mixed population, individual biomechanical exercise showed a clinically important improvement compared with usual care for improvement of quality of life scores on all but one of the reported domains (2 studies; low and very low quality; n = 57), and psychological distress (1 study; very low quality; n = 54). No clinically important benefit was seen for short term pain in 5 studies (moderate quality; n = 317), however there was a clinically important benefit in pain at rest, pain during movement, and pain when walking (3 studies; moderate, moderate and very low quality; n = 30, 30 and 32 respectively). No clinical benefit was seen for longer term pain intensity (1 study; low quality; n = 99), function long term (2 studies; low quality; n = 159), or short term function (5 studies; low quality; n=253).

For this comparison in people with sciatica, there was a clinically important improvement in short-term pain (1 study; very low quality; n = 52) in those in the exercise group, but no other outcomes were reported that were relevant to this review.

In people without sciatica, there was a clinically important improvement in short term physical and mental quality of life in those undertaking biomechanical exercise compared with usual care (2 studies; low quality; n = 99). Evidence also showed a clinically important benefit for 5 other quality of life domains in the short term, and all quality of life domains in the long term (low and very low quality; 1 study; n = 60). There was a clinically important benefit in terms of short term pain from 6 studies, which could not be meta-analysed (very low and low quality; n = 17-246), however 4 studies found no benefit for this outcome (low quality; n = 260). A clinically important benefit was observed for long term pain (very low quality; 2 studies; n = 146), however further evidence that could not be pooled in the meta-analysis showed no clinically important benefit (low quality; 1 study; n = 271). Evidence for function was mixed, with evidence for a clinically important benefit for short term and long term function (2 studies; moderate quality evidence; n = 86 and very low quality; n = 60, respectively). However, evidence from 8 studies demonstrated no clinically important benefit for function at short term and long term (low and very low quality; n = 17 – 418). No evidence was available for psychological distress. Fewer adverse events were reported in those that received usual care than biomechanical exercise although only from 1 small study (very low quality; n= 40).

9.5.1.2 Individual biomechanical exercise versus active control

Evidence for individual biomechanical exercise compared with self-management, spinal manipulation, and interferential therapy was identified, mostly from small individual studies and of low or very low quality. The evidence only showed clinical benefit for biomechanical exercise for long-term leg pain (1 study; low quality; n = 71) and long-term function (1 study; very low quality; n= 71) when compared to self-management. The evidence also showed a clinical benefit of biomechanical exercise for long term, but not short term, physical quality of life when compared to spinal manipulation (1 study; low quality; n = 164). Clinical benefit of biomechanical exercise was also seen for short-term pain (1 study; moderate quality; n= 60) when compared to interferential therapy.

9.5.1.3 Group biomechanical exercise versus usual care

In the mixed population, when compared to usual care, a clinically important benefit of biomechanical exercise was demonstrated for pain in evidence from 1 study in the long term, but not in the short term (very low quality, n = 127). However, a short term clinically important benefit of pain for biomechanical exercise was suggested using core stability (1 study; moderate quality, n = 40).

In the population with low back pain without sciatica, a clinically important benefit of biomechanical exercise was found for physical and mental quality of life, when compared with usual care (1 study; moderate quality; n = 18). No clinical difference was demonstrated for short term pain, however there was a clinically important benefit for function (2 studies; very low quality; n = 52).

No evidence was available for psychological distress.

9.5.1.4 Group biomechanical exercise versus active comparators

One study compared supervised with unsupervised exercise in the mixed population, and demonstrated a clinical benefit of the supervised sessions for reducing pain intensity in the longer term but not the short term (very low quality; n = 170 and 141 for short and long term).

No evidence was available for other comparisons, populations or outcomes.

9.5.1.5 Individual aerobic exercise versus usual care

In the mixed population no clinical benefit was observed for pain or function (low quality; 1 study; n = 46). Other outcomes were not reported. However, in people without sciatica a clinical benefit of exercise was seen in terms of reducing pain intensity in the short and longer term in 1 study of deep water running (low and moderate quality; n = 49), but not in studies of treadmill walking or running (very low and low quality; n = 37 and 57). Aerobic exercise was also shown by 2 studies to improve short-term function (low quality; n = 86), but not psychological distress or quality of life (very low and low quality; n = 37and 57).

No evidence was available for the placebo comparison, nor for the sciatica population.

9.5.1.6 Individual aerobic exercise versus active comparators

One study compared individual aerobic exercise with individual biomechanical exercise in the mixed population and demonstrated no clinically important benefit for function (low quality; n = 52). Another small study compared individual aerobic exercise to group biomechanical exercise showing benefit for group biomechanical exercise at less than or equal to 4 months for SF-36 both physical and mental components, and greater than 4 months for average back pain (very low quality, n=30). No clinically significant difference was observed for depression or anxiety measured using HADS or other pain outcomes at either short or longer-term measures.

No evidence was available for other comparisons, populations or outcomes.

9.5.1.7 Group aerobic exercise versus usual care

A clinically important benefit of physical and mental quality of life was observed for group aerobic exercise when compared with usual care in people with low back pain without sciatica (2 studies; very low quality; n = 109). A clinical benefit was also found for two of the individual quality of life domains (very low quality; n = 20). No clinical benefit was observed for any exercise in any other the other critical outcomes (low and very low quality; range of n = 40-119).

No evidence was available for the placebo comparison or for the sciatica population.

9.5.1.8 Group aerobic exercise versus active comparators

When compared with self-management, a clinically important improvement in pain in the overall population was observed (1 study; very low quality; n = 18). No other outcomes were reported. When compared to group biomechanical exercise, no clinical benefit of group aerobic exercise was found for any of the critical outcomes (very low quality, n = 83-91).

One further study in the low back pain population without sciatica compared group aerobic exercise with group biomechanical exercise reported evidence demonstrating a clinical benefit for pain in the short term but not the long term for the group receiving aerobic exercise. No clinical benefit was found for function in either the short-term or long term (low quality; n = 64).

No evidence was available for other comparisons, populations or outcomes.

9.5.1.9 Individual mind-body exercise versus biomechanical exercise

Evidence from 1 small study showed short-term clinical benefit of yoga when compared to biomechanical exercise on pain and function (low quality; n= 30), whereas another study demonstrated no clinically important difference between tai chi and biomechanical exercise on short-term pain outcome (low quality; n= 40).

9.5.1.10 Group mind-body exercise versus usual care

In the people with low back pain with or without sciatica, evidence from 2 studies suggested a benefit in terms quality of life on EQ-5D for group mind-body exercise when compared with usual care at the short term (low quality; n = 325), but further evidence did not demonstrate benefit in the longer term (1 study; moderate quality; n = 313) and no clinical difference was seen at either time point when quality of life was assessed by SF12 in the same studies (moderate quality; n = 326, 313). In terms of pain, a clinical benefit with Iyengar yoga was seen when compared to usual care at greater than 4 months, but no clinical difference at less than or equal to 4 months (1 study; very low quality, n= 90). The same applied when hatha yoga was compared to usual care at either short term (2 studies, very low quality; n= 82) or longer-term (low quality; n=23). A benefit was seen for psychological distress for hatha (low and very low quality; n = 46 and 16) but not Iyengar yoga (moderate to very low quality; n = 418 and 96). Whereas no clinical difference of yoga was seen was by 6 studies for short-term function time points (low quality; n= 516) or by 3 studies for longer term time points (low quality; n= 426).

For the population without sciatica, a clinically important benefit in pain reduction in the short and longer term was found for group mind-body exercise when compared with usual care in a single study (very low quality; n = 42).

No evidence was available for the placebo comparison or for the population with sciatica.

9.5.1.11 Group mind-body exercise versus active comparators

In the low back pain population without sciatica, when compared with self-management, a clinically important benefit in short-term and long-term function was identified (2 studies; low and very low quality; n = 164). When compared with group mixed exercise, no clinically important difference between treatments was demonstrated for this outcome (2 studies; moderate and very low quality; n = 164).

In a mixed population of people with low back pain with or without sciatica, group mind-body exercise showed clinical benefit for pain at both short and long term when compared to individual biomechanical exercise in a single study (moderate quality, n= 60)

9.5.1.12 Individual mixed exercise versus waiting list

For this comparison in people with sciatica, there was a clinically important improvement in short-term back pain and leg pain (1 study; low quality; n = 30) in those in the exercise group. No other relevant outcomes were reported.

9.5.1.13 Individual mixed exercise versus active comparators

Evidence for individual mixed exercise compared to unsupervised exercise from a single study in the overall population demonstrated a clinically important reduction in pain for individual mixed exercise in the longer-term (low quality; n = 40). No other outcomes or time-points for the comparison of individual mixed exercise compared to unsupervised exercise were reported.

No clinical difference between mixed exercise or biomechanical exercise was observed in terms of short term pain or function (1 study; moderate quality; n= 63).

9.5.1.14 Group mixed exercise versus usual care

When compared with usual care in the low back pain population there was no clinical benefit for function (2 studies; very low quality; n = 88). There was evidence of no clinical benefit of short term

pain (1 study, low quality; n = 29), however a clinical benefit in favour of mixed exercise compared to usual care was observed (1 study; very low quality; n = 59). A benefit in terms of psychological distress measured using the HADS depression score, but not for the HADS anxiety score was observed (very low quality; n = 29). Additionally, 3 of the 8 domains of quality of life (general health, physical role and emotional role) showed a benefit of group mixed exercise (1 study; very low and low quality; n = 36).

When compared with usual care in the population with sciatica, the evidence was conflicting. A benefit of group mixed was seen for pain in the long-term, but for function in the short and long term a benefit was seen for usual care (1 study; low and very low quality; n = 44).

In people with low back pain with or without sciatica, clinical benefit in favour of exercise was demonstrated compared with usual care in the short and long-term for pain from small studies of population size less than 100 (moderate to very low quality), clinical benefit was also seen for function at less than or equal to 4 months from 2 small studies (low quality; n= 52). One study showed no clinical benefit for psychological distress (low quality; n = 29). Another small study (n= 38) demonstrated conflicting evidence for quality of life, with clinical benefit of mixed exercise on SF-35 mental (moderate quality) but no difference on SF-36 physical (low quality) when compared to usual care.

9.5.1.15 Group mixed exercise versus active comparators

In the population with low back pain without sciatica, evidence from 1 study suggested a clinical benefit for group mixed exercise for short term function (low quality; n = 21), psychological distress (low quality; n = 21), and both long term (very low quality; n = 27) and short term pain (very low quality; n = 21), when compared with cognitive therapy. Quality of life was not reported. There was no placebo/sham evidence for the mixed or sciatica populations. No clinically important benefits for mixed exercise were found when compared with self-management for function (2 studies; moderate to low quality; n = 125 and 164) or when compared with cognitive behavioural approaches in the overall population for pain, function or psychological distress (1 study; low and very low quality; n = 104).

No evidence was available for other comparisons, populations or outcomes.

9.5.1.16 Combinations of interventions – exercise therapy adjunct

The evidence (ranging from very low to moderate quality) showed that there was no clinical difference for nearly all outcomes and nearly all combinations of non-invasive interventions that had exercise therapy as an adjunct, with a few exceptions.

A single study in a low back pain population comparing exercise (biomechanical and aerobic) and electrotherapy (PENS) compared to sham electrotherapy (PENS) demonstrated evidence of clinical benefit favouring sham PENS for quality of life outcomeSF-36 physical, but clinical benefit for short-term pain (low quality; n=93). Comparing exercise (biomechanical and aerobic) and electrotherapy (PENS) to electrotherapy (PENS) showed clinical benefit for short and longer-term quality of life SF-36 physical outcomes in a single study in a low back pain population (very low quality; n= 92).

A study in a low back pain population demonstrated clinical benefit of cognitive behavioural approaches and self-management (education) over aerobic exercise, cognitive behavioural approaches and self-management (education) on short-term function (very low quality; n= 27).

Combining biomechanical exercise with self-management in a low back pain population showed clinical benefit when compared to self-management on short-term pain (1 study; very low quality; n= 86) and, short and long-term function (1 study; very low quality; n= 86).

In a mixed population of people with low back pain with or without sciatica, combining exercise with self-management demonstrated clinical benefit on long-term number improving on function (1 study; low quality; n= 90), quality of life index (1 study; low quality; n= 90), short term physical quality of life (1 study; low quality; n = 418) and long-term pain (low quality; 1 study; n= 83) when compared to self-management. Benefit of biomechanical exercise and manual therapy was seen over manual therapy alone in a single study on short-term pain (low quality; n= 92), and over combined self-management and manual therapy in one study on physical quality of life, long term mental quality of life and short term but not long term sensory and affective pain (very low quality, n = 25).

In the population with sciatica, the combination of biomechanical exercise with self-management (unsupervised exercise) demonstrated a clinically important benefit for short term pain and function, when compared to a combination of TENS, laser, massage and self-management (1 study; moderate quality; n = 40).

9.5.2 Economic

- No relevant economic evaluations were identified relating to individual mind-body exercise in people with low back pain or sciatica.
- One cost-utility analysis found that group mind-body exercise + usual care was cost effective compared to usual care alone for low back pain (with or without sciatica) (ICER: £13,606 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.
- No relevant economic evaluations were identified relating to individual or group aerobic exercise in people with low back pain or sciatica.
- No relevant economic evaluations were identified relating to individual or group biomechanical exercise in people with low back pain or sciatica.

One cost-utility analysis found that group mixed modality exercise (biomechanical + aerobic) was dominated (more costly and less effective) by cognitive behavioural approaches for treating low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.

No relevant economic evaluations were identified relating to individual mixed modality exercise in people with low back pain or sciatica.

- One cost-utility analysis found that biomechanical exercise was dominated (more effective and less costly) by a 3 element MBR programme (physical, psychological, educational) for treating low back pain (without or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost-utility analysis for the treatment of low back pain without sciatica found that:
  - the combination of manual therapy and self-management was the most cost-effective compared to a combination of biomechanical exercise, mixed modality manual therapy and self-management, biomechanical exercise in combination with self-management, and self-management alone (ICER: £8,700 per QALY gained when compared to the combination of self-management, biomechanical exercise, and manual therapy). It also found that the combination of biomechanical exercise and self-management was dominated (more effective and less costly) by the combination of biomechanical exercise, manual therapy and self-management.
  - if manual therapy (manipulation) is not available, the combination of biomechanical exercise and self-management was cost effective compared to self-management alone (ICER: £8,300 per QALY gained).

This analysis was assessed as partially applicable with minor limitations.

- One cost-consequence analysis was identified relating to mixed modality manual therapy in combination with self-management and biomechanical exercise in people with low back pain or

sciatica: the combination did not show any statistically significant increase in costs or outcomes compared to self-management (education and advice to stay active). This was assessed as partially applicable with potentially serious limitations.

9.6 Recommendations and link to evidence

Recommendations	**8. Consider a group exercise programme (biomechanical, aerobic, mind–body or a combination of approaches) within the NHS for people with a specific episode or flare-up of low back pain with or without sciatica. Take people's specific needs, preferences and capabilities into account when choosing the type of exercise.**
Relative values of different outcomes	The GDG agreed that the most critical outcomes for decision making would be health-related quality of life; with pain severity, function and psychological distress being individually critical outcomes as well as components of quality of life measures. Adverse events were considered important for decision making because experience of adverse events may outweigh the possible benefits gained from an exercise therapy, similarly, any differences in healthcare utilisation was considered an important outcome likely to reflect any benefits in quality of life experienced. Mortality was not considered as a relevant treatment related outcome for this review and so was not included in the protocol. The GDG discussed the importance of responder criteria as an outcome and agreed that although important in decision making, due to the inherent difficulties in dichotomising continuous outcomes this was not a critical outcome.
Trade-off between clinical benefits and harms	The GDG discussed the necessity of a body of evidence to show specific intervention effects, that is, over and above any contextual or placebo effects. It was therefore agreed that if placebo or sham-controlled evidence is available, this should inform decision making in preference to contextual effects. However, if there was a lack of placebo or sham-controlled evidence, evidence against usual care will be given priority when decision making. Although some trials were identified that had sham exercise as a comparator, on consideration of these, the GDG agreed none met the protocol criteria for appropriate sham interventions for this review. Some shams were interventions being considered elsewhere within the guideline, and are considered under the relevant comparators, whereas others were comparing different forms of exercise and have been excluded. There was consequently no evidence available for exercise compared to placebo/sham. The GDG noted that there was some evidence of benefit for all exercise types compared to usual care or other active comparators, but no clear evidence for one type being superior to another and benefits were seen inconsistently across critical outcomes. The GDG agreed that there are known benefits to general health and wellbeing from exercise and whilst data on adverse events was very limited there was no evidence of harm and exercise, conducted appropriately, should be safe. The GDG agreed that there was both uncertainty around the effect size and the clinical importance of the comparisons supporting aerobic exercise for low back pain with or without sciatica. They discussed and agreed that aerobic exercise has many additional health benefits and therefore, would not discourage anyone from partaking in such exercise programmes, but were not able to support a recommendation for aerobic exercise alone to be specifically offered by the NHS ahead of other forms of exercise as a treatment for low back pain or sciatica from the evidence reviewed. Mind-body exercise, such as yoga, showed some clinically important benefits in pain and function but with inconsistency across trials, outcome measures and time

	points. As with individual biomechanical exercise, some improvements in quality of life were observed, but due to methodological concerns regarding the trial designs, the GDG were not confident in the effect. No evidence was found for the use of mind-body exercise in the sciatica population. Similarly for mixed exercise, some clinically important benefits in pain, function and quality of life were found compared to usual care/waiting list. The evidence for the sciatica population was inconsistent, showing a benefit in pain reduction, but deterioration in function. Overall, the GDG felt that there was evidence of clinically important effects for critical outcomes, such as health-related quality of life, pain and function although noted the variability in comparators and study designs made it difficult to clearly determine which form of exercise was most beneficial. The GDG considered that the effect of exercise compared with usual care or self-management could be due, at least in part, to an imbalance of therapeutic attention inherent to such trials and may not necessarily or solely reflect a specific effect of the exercises given, particularly when waiting list controls were used as the comparator groups. The GDG agreed that there was insufficient evidence that one form of exercise was superior to another and a recommendation for a specific exercise modality was not supported from the current evidence base. However they agreed that the evidence compared to usual care did show that exercise is likely to be of value, although with some uncertainty about the effect size. In the absence of a feasible sham control, the GDG agreed that this was sufficient evidence for a recommendation to consider exercise should be made for people with low back pain with or without sciatica.
Trade-off between net clinical effects and costs	**Individual mind-body exercise** No economic evaluations were identified. The cost of providing this intervention will largely depend on the number of sessions provided but individual sessions will be more costly that group sessions. There was no evidence regarding the clinical benefit of individual sessions either compared to usual care or group sessions. **Group mind-body exercise** One relevant economic evaluation was included that considered yoga as an adjunct to usual care in a mixed population of low back pain with or without sciatica. This was based on the RCT reported by Tilbrook and colleagues included in the clinical review. This within-trial analysis found that the addition of yoga to usual care increased costs and improved health (increased QALYs) with an incremental cost-effectiveness ratio of £13,606 per QALY gained. The probability cost effective was 72% at a £20,000 cost effectiveness threshold. This study suggests that group mind-body exercise may be a cost-effective intervention for the NHS because, compared with usual care, the additional health benefits appear to justify the additional costs. However, other treatment options (for example, other exercise modalities, acupuncture, spinal manipulation and pharmacological treatment) are not included in the analysis and so we cannot tell from this if yoga is the most cost-effective option available. The economic evaluation included in the review estimated the costs of yoga per person in the study to be £292.61. This included teaching and equipment costs for up to 12 group sessions (maximum 15 participants) of 75 minutes. They also noted that if the yoga teaching fee in the trial was replaced with the cost of teaching by a physiotherapist (£38 per hour) with a resulting cost per patient of £63, assuming the participant buys their own yoga mat, manual and CD, the probability of yoga intervention being cost effective increased from 72% to 88%. This analysis only reflects the effectiveness evidence from one RCT of mind-body exercise whereas a number were included in the clinical review. In this study people received up to 12 group sessions of yoga (75 minutes, maximum 15 participants) over 12 weeks and benefits to patients in terms of QALYs were evaluated over one year. Across the studies included in the clinical review the majority of studies had a

similar intensity (range 4 to 48 sessions) and treatment duration (range 4 to 24 weeks). One other study (reported by Cox and colleagues) also reported EQ-5D with a smaller benefit at 12 weeks but is a much smaller study with only short term outcomes.

Biomechanical exercise

One relevant economic evaluation was included that compared biomechanical exercise to manual therapy plus self-management and to MBR in a mixed population of low back pain with or without sciatica. In this study MBR was the least costly and more effective strategy, therefore biomechanical exercise was a dominated option.

Some evidence was available for biomechanical exercise in combination. The economic evaluation based on the UK BEAM study found that biomechanical exercise in combination with self-management was cost effective compared to usual care.[498] However, when compared to other active interventions spinal manipulation plus self-management was the most cost effective option. This suggests that biomechanical exercise may be cost effective if spinal manipulation is not an option but when both are available spinal manipulation would be a more cost effective treatment than biomechanical exercise (in combination with self-management).

Individual aerobic exercise

No economic evaluations were identified. The cost of providing this intervention will largely depend on the number of sessions provided but individual sessions will be more costly than group sessions. As the clinical evidence did not show any clear benefit for individual aerobic exercise, the GDG considered this intervention unlikely to be cost effective.

Group aerobic exercise

No economic evaluations were identified. The cost of providing this intervention will largely depend on the number of sessions and the number of people per group. The clinical evidence did not show any clear benefit for group aerobic exercise, however considering the lower cost of group exercise compared to individual exercise, the GDG concluded there was uncertainty around the cost effectiveness of this intervention and it could be recommended as part of an exercise programme.

Individual mixed exercise

No economic evaluations were identified. The cost of providing this intervention will largely depend on the number of sessions provided but individual sessions will be more costly that group sessions. The clinical evidence showed no benefit associated with this intervention, therefore the GDG considered it unlikely to be cost effective.

Group mixed exercise

One relevant economic evaluation (Smeets 2009[457] based on the clinical trial Smeets 2006A[461]) was included that considered group mixed modality exercise (biomechanical + aerobic) was dominated (more costly and less effective) by cognitive behavioural approaches for treating low back pain (with or without sciatica). This analysis only reflects the effectiveness evidence from one RCT of mixed modality exercise comprising biomechanical and aerobic exercise. The rest of the body of evidence showed some clinical benefit for group mixed exercise for pain when compared with placebo/sham. When compared to usual care there was benefit for both long and short term pain, short term function, HADs depression and for 3 of the 8 domains of quality of life. There was also evidence of some benefit on pain at both short and long-term, and function at short-term over usual care in the mixed population.

When compared with usual care in the population with sciatica, there was a clinically important benefit in pain in the long-term, but not short term, and benefit favouring usual care for function in the short and long term. In the overall population, clinical benefit was demonstrated in the short and long-term for pain, and in the short-term for function. For this reason, the GDG considered that group mixed exercise could be

	cost effective compared to usual care. **Summary** The GDG concluded that there was uncertainty about the cost effectiveness of exercise programmes. There will be a cost to the NHS of providing exercise programmes for people with low back pain and sciatica; this will largely depend on the number of sessions provided and whether delivered as a group or individually. If exercise programmes are effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. As described in the previous section, the GDG concluded that overall exercise programmes were likely to be of benefit to people with low back pain and that while the evidence varied between specific types of exercise they did not feel that the evidence was sufficient to support a strong recommendation with regards the optimal type, dose or duration of any exercise programme. They also noted that exercise has well established benefits to health beyond any effect seen in the outcomes for treating low back pain. Given this the GDG concluded that despite the uncertainties it was likely that the benefits of exercise to people with a specific episode or flare-up of low back pain with or without sciatica would justify the costs. Costs of delivering group exercise will be lower than costs of delivering individual exercise therapy. Given the additional cost and uncertainties regarding benefits of individual exercise, it was considered appropriate to recommend group exercise.
Quality of evidence	Quality of evidence in the review ranged from a GRADE rating of moderate to very low. No studies included in the review were assessed as being at low risk of bias, reflecting the inherent difficulty of ensuring plausible blinding to exercise interventions and therefore, the risk of overestimating effects in subjective outcomes, such as pain, function and quality of life. It was also noted that the trials were relatively short term in nature, with the average exercise intervention lasting just 9.5 weeks. In relation to the difficulties of ensuring blinding in such trials, the quality of evidence could be considered as the best possible for these interventions. The GDG considered the likelihood of effects occurring in exercise groups due to contextual factors, such as the attention given by the therapist or the expectation of success of an active treatment that might explain, at least in part, the observed effects to the likelihood of over-estimating the effect. There were also comparisons with waiting list controls included in the review, which were further down-graded for risk of bias due to the likelihood of over-estimating the effect. The GDG recognised the difficulties in splitting the comparisons, as well as the group and individual exercise programmes, thereby creating numerous comparisons and outcomes with fewer studies in each. However, the GDG agreed that the pooling of studies with widely differing interventions, despite strengthening the body of evidence, would make it difficult to draw a conclusion about what type of exercise to offer, and to which populations. The economic evidence was assessed as partially applicable with potentially serious limitations.
Other considerations	For recommendations on manual therapy, psychological interventions and multidisciplinary biopsychosocial rehabilitation programmes, please see chapters 12, 15, and 17, respectively. The GDG noted that currently exercise is offered within the NHS, most commonly delivered by physiotherapists. The type of exercise currently offered to people is very variable and depends on the person's preferences, their health care professional's preferences, the local availability of different exercise interventions as well as local commissioning policy. The local provision may include elements of some or all of the types of exercise considered in this review, and may be delivered individually or in a group environment. The recommendation to consider offering

	exercise in a group environment was based on the likely cost savings of that approach and the lack of clear evidence for the superior efficacy of individually delivered exercise. However the GDG discussed that there are various instances where group exercise may not be suitable or acceptable for the patient and the GDG recognised the need for clinicians to be sensitive to this, for example cultural, psychological or functional ability. The GDG considered the evidence pertaining to exercise that came from the review of combinations of non-invasive interventions. Exercise was given both as an intervention and in some instances as a comparator. The GDG found it difficult to tease out which type of exercise modality was effective and the frequency and duration of the exercise to be given. They agreed that it would be useful to recommend an intervention that the person with back pain would be likely to participate in and that promotes self-management. This review was unable to inform on the intensity of exercise programme, and the GDG agreed it was important to consider tailoring the programme to the individual, including taking into account an intensity that was feasible for the individual to be able to undertake and sustain. It was noted that the majority of exercise considered in this review was delivered by clinical providers.

10 Postural therapies

10.1 Introduction

Postural therapies aim to prevent or reduce low back pain by focusing on the correction of postures that are theorised to be suboptimal and place excessive or damaging loads upon the spine. They generally involve the encouragement of postures considered by the therapist or discipline to be healthier with a focus on education regarding which postures are considered optimal and detrimental. Postural therapy also focuses on exercises and practice at adopting the postures and movements that are considered healthy. There are various disciplines of postural therapy and, while they share similarities, they may differ on aspects of what are considered optimal and suboptimal postures and the techniques used to address this.

The Alexander technique is a specific approach to postural therapy delivered to patients in an individualised form. It involves tailored education, movement and breathing retraining over a number of treatment sessions with an instructor, supplemented by practice with a focus on reducing muscle tension and spinal load.[310]

This evidence review will look at the evidence for the use of such postural therapies in the management of people with low back pain and / or sciatica.

10.2 Review question: What is the clinical and cost effectiveness of postural therapies in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 132: PICO characteristics of review question

Population	People aged 16 years or above with non-specific low back pain People aged 16 years or above with sciatica.
Intervention(s)	Postural therapies: • Postural education/exercise • Alexander technique
Comparison(s)	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland Morris Disability Questionnaire or the Oswestry disability index). • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (≥30% improvement in pain or function) • Adverse events:

	1. morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs. If evidence limited, cohort studies will be considered.

10.3 Clinical evidence

10.3.1 Summary of studies included – single interventions

Randomised trials comparing the effectiveness of postural therapies (postural education/exercise and Alexander technique) with either placebo, usual care, or other non-invasive treatments in the management of people with low back pain or sciatica were searched for.

Two randomised trials were identified comparing Alexander technique lessons (of various durations) with usual care, massage or mixed exercise in people with a recurrent episode of low back pain, in a population without sciatica,[310] and an overall population with or without sciatica.[309] Details of these studies are summarised in **Table 133** below. Evidence from the study is summarised in the GRADE clinical evidence profile and clinical evidence summary below (Section 10.3.3). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Having only identified 2 RCTs, a further search for cohort studies was conducted, from which 2 studies were identified and full copies ordered. Both these cohorts were excluded, the first due to inappropriate outcomes (physiological measures of muscle activity) and the second due to the study design (non-comparative study).

10.3.2 Summary of studies included – combined interventions (postural therapy adjunct)

Three studies looking at combinations of non-invasive interventions (with postural therapy as the adjunct) were also included in this review. [309,311,361] These are summarised in **Table 134**. Evidence from these studies is summarised in the GRADE clinical evidence profile and clinical evidence summary (Section 10.3.3). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Table 133: Summary of studies included in the review – single interventions

Study	Intervention/comparison	Population	Outcomes	Comments
Little 2008 [310] (ATEAM trial) Subsidiary papers Ehrlich 2009[129], Hollinghurst 2008[225]	Factorial design Patients randomised to: • Usual care (9 months)[(a)] • Massage (6 weeks) • 6 lessons of Alexander technique (4 weeks) • 24 lessons of Alexander technique (20 weeks + revision lessons at 7 and 9 months) Then subsequently	Aged 18-65 Back pain (excluding radicular pain) for ≥3 weeks with previous back pain episode, scoring 4 or more on the Roland disability scale at time of recruitment. n=579	Quality of life (SF-36 score)[(b)] Von Korff pain scale Function (Roland Disability score) Healthcare utilisation (prescriptions) Adverse events (Primary care contacts)	Usual care not described. No sham or attention control. High rate of loss to follow-up, but low differential rate.

Study	Intervention/comparison	Population	Outcomes	Comments
	randomised to receive either exercise prescription or usual care Concomitant treatment = not stated	Treatment + follow-up: 1 year		
Little 2014[309] (ASPEN feasibility trial)	Patients randomised to: • Usual care • Alexander technique (10 sessions) • Group mixed exercise (stretching, strengthening, aerobic exercise)	Aged 18-65 years Back pain for ≥3 weeks with previous back pain episode, currently scoring 4 or more on the Roland disability scale n = 51 Treatment + follow-up: 1 year	Von Korff pain scale Function (Roland Disability score)	Concomitant treatment: not stated Usual care group: No treatment or exercise prescribed.

(a) Usual care details were not specified in the published paper
(b) EQ-5D was collected but not reported by study apart from as QALYs in economic analysis (see 10.4)

Table 134: Summary of studies included in the review – combined interventions (postural therapy adjunct)

Study	Intervention/comparison	Population	Outcomes	Comments
Moustafa 2015[361]	Combination of intervention: Multidisciplinary biopsychosocial rehabilitation (MBR) physical + psychological + educational + postural therapy MBR physical + psychological + educational	Low back pain with sciatica n=154 2 years treatment Egypt	Pain (NRS) Function (ODI)	MBR 3 element: • Physical = mixed modality individual and group exercise (after 6 weeks participants carry out exercise at home) • Psychological = group cognitive behavioural approaches • Education = group sessions about low back pain, self-management strategies and coping strategies for stress and catastrophizing thoughts, relaxation techniques

Study	Intervention/comparison	Population	Outcomes	Comments
				Combination interventions: • MBR as for intervention groups • Postural therapy (postural control) Concomitant treatment: avoidance of other exercise programs that could interfere with the results.
Little 2008 [310] (ATEAM trial) Subsidiary papers Ehrlich 2009[129], Hollinghurst 2008[225]	Factorial design Patients randomised to: • Usual care (9 months)[(a)] • Massage (6 weeks) • 6 lessons of Alexander technique (4 weeks) • 24 lessons of Alexander technique (20 weeks + revision lessons at 7 and 9 months) Then subsequently randomised to receive either exercise prescription or usual care Concomitant treatment = not stated	Aged 18-65 Back pain (excluding radicular pain) for ≥3 weeks with previous back pain episode, scoring 4 or more on the Roland disability scale at time of recruitment. n=579 Treatment + follow-up: 1 year	Quality of life (SF-36 score)[(b)] Von Korff pain scale Function (Roland Disability score) Healthcare utilisation (prescriptions) Adverse events (Primary care contacts)	Usual care not described. No sham or attention control. High rate of loss to follow-up, but low differential rate.
Little 2014[309] (ASPEN feasibility trial)	Alexander technique (10 sessions) + group mixed exercise (stretching, strengthening, aerobic exercise) versus usual care Alexander technique (10 sessions) + group mixed exercise (stretching, strengthening, aerobic exercise) versus group mixed exercise (stretching, strengthening, aerobic exercise)	Aged 18-65 years Back pain for ≥3 weeks with previous back pain episode, currently scoring 4 or more on the Roland disability scale n = 52 Treatment + follow-up: 1 year	Von Korff pain scale Function (Roland Disability score)	Concomitant treatment: not stated Usual care group: No treatment or exercise prescribed.

10.3.3 Clinical evidence summary tables

10.3.3.1 Alexander technique versus usual care (without sciatica population)

Table 135: Clinical evidence summary: Alexander technique (6 lessons) versus usual care (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (6 lessons) versus usual care (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 56.1	The mean SF-36 physical (1 year) in the intervention groups was 2.04 higher (5.58 lower to 9.66 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 mental (1 year) in the control groups was 64.8	The mean SF-36 mental (1 year) in the intervention groups was 4.1 higher (3.27 lower to 11.47 higher)
Pain severity (Von Korff pain scale, 0-10) (1 year)	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean von Korff pain scale (1 year) in the control groups was 4.74	The mean von Korff pain scale (1 year) in the intervention groups was 0.44 lower (1.31 lower to 0.43 higher)
Function (RMDQ, 0-24) (1 year)	118 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean roland morris disability scale (1 year) in the control groups was 9.23	The mean roland morris disability scale (1 year) in the intervention groups was 1.44 lower (3.34 lower to 0.46 higher)
Primary care contacts	118 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.43	The mean primary care contacts in the intervention groups was 0.05 higher (0.25 lower to 0.35 higher)
Prescriptions	118 (1 study)	MODERATE[a] due to risk of bias		The mean prescriptions in the control groups was 0.85	The mean prescriptions in the intervention groups was 0.21 lower

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (6 lessons) versus usual care (95% CI)
					(0.72 lower to 0.3 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 136: Clinical evidence summary: Alexander technique (10 lessons) versus usual care (overall population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (10 lessons) versus usual care (95% CI)
Overall - Function (RMDQ 0-24) <4 months [mean difference from control]	28 (1 study)	VERY LOW[a,b] due to risk of bias, inconsistency, imprecision		*	The mean overall - function (RMDQ 0-24) <4 months [mean difference from control] in the intervention groups was 1.38 lower (4.82 lower to 2.07 higher)
Overall - Pain (von Korff 0-100) <4 months [mean difference from control]	28 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (von Korff 0-100) <4 months [mean difference from control] in the intervention groups was 0.63 lower (1.99 lower to 0.73 higher)
Overall - Function (RMDQ 0-24) > 4 months [mean difference from control]	28 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) > 4 months [mean difference from control] in the intervention groups was 2.86 lower (6.53 lower to 0.81 higher)
Overall - Pain (von Korff 0-100) > 4 months [mean difference from control]	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (von Korff 0-100) > 4 months [mean difference from control] in the intervention groups was 0.09 higher (1.35 lower to 1.52 higher)

** No control group risk reported, study only reports mean difference*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 137: Clinical evidence summary: Alexander technique (24 lessons) versus usual care (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (24 lessons) versus usual care (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	121 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 56.1	The mean SF-36 physical (1 year) in the intervention groups was 11.83 higher (4.42 to 19.24 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	121 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 mental (1 year) in the control groups was 64.8	The mean SF-36 mental (1 year) in the intervention groups was 3.74 higher (3.56 lower to 11.04 higher)
Pain severity (Von Korff pain scale, 0-10) (1 year)	121 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean von Korff pain scale (1 year) in the control groups was 4.74	The mean von Korff pain scale (1 year) in the intervention groups was 1.34 lower (2.2 to 0.48 lower)
Function (RMDQ, 0-24) (1 year)	121 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean roland morris disability scale (1 year) in the control groups was 9.23	The mean roland morris disability scale (1 year) in the intervention groups was 4.14 lower (6.01 to 2.27 lower)
Primary care contacts	121 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.43	The mean primary care contacts in the intervention groups was 0.01 higher (0.28 lower to 0.3 higher)
Prescriptions	121 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean prescriptions in the control groups was 0.85	The mean prescriptions in the intervention groups was 0.22 higher (0.48 lower to 0.92 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

10.3.3.2 Alexander technique versus self-management (exercise prescription) (without sciatica population)

Table 138: Clinical evidence summary: Alexander technique (6 lessons) versus self-management (exercise prescription) (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (6 lessons) versus exercise prescription (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	109 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 54.02	The mean SF-36 physical (1 year) in the intervention groups was 4.12 higher (5.17 lower to 13.41 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	109 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 mental (1 year) in the control groups was 65.52	The mean SF-36 mental (1 year) in the intervention groups was 3.38 higher (5.2 lower to 11.96 higher)
Pain severity (Von Korff pain scale, 0-10) (1 year)	109 (1 study)	MODERATE[a] due to risk of bias		The mean von Korff pain scale (1 year) in the control groups was 4.43	The mean von Korff pain scale (1 year) in the intervention groups was 0.13 lower (1.15 lower to 0.89 higher)
Function (RMDQ, 0-24) (1 year)	109 (1 study)	MODERATE[a] due to risk of bias		The mean roland morris disability scale (1 year) in the control groups was 7.58	The mean roland morris disability scale (1 year) in the intervention groups was 0.21 higher (1.76 lower to 2.18 higher)
Primary care contacts	109 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.5	The mean primary care contacts in the intervention groups was 0.02 lower (0.38 lower to 0.34 higher)
Prescriptions	109 (1 study)	MODERATE[a] due to risk of bias		The mean prescriptions in the control groups was 0.88	The mean prescriptions in the intervention groups was 0.24 lower (0.76 lower to 0.28 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 139: Clinical evidence summary: Alexander technique (24 lessons) versus self-management (exercise prescription) (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (24 lessons) versus exercise prescription (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	112 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 54.02	The mean SF-36 physical (1 year) in the intervention groups was 13.91 higher (4.79 to 23.03 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	112 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 mental (1 year) in the control groups was 65.52	The mean SF-36 mental (1 year) in the intervention groups was 3.02 higher (5.91 lower to 11.95 higher
Pain severity (Von Korff pain scale, 0-10) (1 year)	112 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean von Korff pain scale (1 year) in the control groups was 4.43	The mean von Korff pain scale (1 year) in the intervention groups was 1.03 lower (2.04 to 0.02 lower)
Function (RMDQ, 0-24) (1 year)	112 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean roland morris disability scale (1 year) in the control groups was 7.58	The mean roland morris disability scale (1 year) in the intervention groups was 2.49 lower (4.43 to 0.55 lower)
Primary care contacts	112 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.5	The mean primary care contacts in the intervention groups was 0.06 lower (0.41 lower to 0.29 higher)
Prescriptions	112 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean prescriptions in the control groups was 0.88	The mean prescriptions in the intervention groups was 0.19 higher (0.52 lower to 0.9 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

10.3.3.3 Alexander technique versus Alexander technique (without sciatica population)

Table 140: Clinical evidence summary: Alexander technique (24 lessons) versus Alexander technique (6 lessons) (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (24 lessons) versus Alexander technique (6 lessons) (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	119 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 58.14	The mean SF-36 physical (1 year) in the intervention groups was 9.79 higher (18.08 to 1.5 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	119 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 mental (1 year) in the control groups was 68.9	The mean SF-36 mental (1 year) in the intervention groups was 0.36 lower (7.47 higher to 8.19 lower)
Pain severity (Von Korff pain scale, 0-10) (1 year)	119 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean von Korff pain scale (1 year) in the control groups was 4.3	The mean von Korff pain scale (1 year) in the intervention groups was 0.9 lower (0.03 higher to 1.83 lower)
Function (RMDQ, 0-24) (1 year)	119 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean roland morris disability scale (1 year) in the control groups was 7.79	The mean roland morris disability scale (1 year) in the intervention groups was 2.7 lower (0.83 to 4.57 lower)
Primary care contacts	119 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.48	The mean primary care contacts in the intervention groups was 0.04 lower (0.29 higher to 0.37 lower)
Prescriptions	119 (1 study)	MODERATE[a] due to risk of bias		The mean prescriptions in the control groups was 0.64	The mean prescriptions in the intervention groups was 0.43 higher (1.07 higher to 0.21 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

10.3.3.4 Alexander technique versus massage (without sciatica population)

Table 141: Clinical evidence summary: Alexander technique (6 lessons) versus massage (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (6 lessons) versus massage (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	122 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 54.65	The mean SF-36 physical (1 year) in the intervention groups was 3.49 higher (4.96 lower to 11.94 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	122 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 mental (1 year) in the control groups was 62.69	The mean SF-36 mental (1 year) in the intervention groups was 6.21 higher (1.58 lower to 14 higher)
Pain severity (Von Korff pain scale, 0-10) (1 year)	122 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean von Korff pain scale (1 year) in the control groups was 5.03	The mean von Korff pain scale (1 year) in the intervention groups was 0.73 lower (1.67 lower to 0.21 higher)
Function (RMDQ, 0-24) (1 year)	122 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean roland morris disability scale (1 year) in the control groups was 8.78	The mean roland morris disability scale (1 year) in the intervention groups was 0.99 lower (2.84 lower to 0.86 higher)
Primary care contacts	122 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.67	The mean primary care contacts in the intervention groups was 0.19 lower (0.6 lower to 0.22 higher)
Prescriptions	122 (1 study)	MODERATE[a] due to risk of bias		The mean prescriptions in the control groups was 0.77	The mean prescriptions in the intervention groups was 0.13 lower (0.63 lower to 0.37 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 142: Clinical evidence summary: Alexander technique (24 lessons) versus massage (> > 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with control	Risk difference with Alexander technique (24 lessons) versus massage (95% CI)
Quality of life (SF-36 physical, 0-100) (1 year)	125 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical (1 year) in the control groups was 54.65	The mean SF-36 physical (1 year) in the intervention groups was 13.28 higher (5.02 to 21.54 higher)
Quality of life (SF-36 mental, 0-100) (1 year)	125 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 mental (1 year) in the control groups was 62.69	The mean SF-36 mental (1 year) in the intervention groups was 5.85 higher (2.32 lower to 14.02 higher)
Pain severity (Von Korff pain scale, 0-10) (1 year)	125 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean von Korff pain scale (1 year) in the control groups was 5.03	The mean von Korff pain scale (1 year) in the intervention groups was 1.63 lower (2.56 to 0.7 lower)
Function (RMDQ, 0-24) (1 year)	125 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean roland morris disability scale (1 year) in the control groups was 8.78	The mean roland morris disability scale (1 year) in the intervention groups was 3.69 lower (5.51 to 1.87 lower)
Primary care contacts	125 (1 study)	MODERATE[a] due to risk of bias		The mean primary care contacts in the control groups was 0.67	The mean primary care contacts in the intervention groups was 0.23 lower (0.63 lower to 0.17 higher)
Prescriptions	125 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean prescriptions in the control groups was 0.77	The mean prescriptions in the intervention groups was 0.3 higher (0.39 lower to 0.99 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 143: Alexander technique (10 sessions) versus mixed exercise (overall population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (10 lessons) versus mixed exercise (95% CI)
Overall - Function (RMDQ 0-24) <4 months	29 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ 0-24) <4 months in the control groups was 5.45	The mean overall - function (RMDQ 0-24) <4 months in the intervention groups was 0.12 higher (3.06 lower to 3.3 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

10.3.3.5 Combined interventions: MBR + Postural therapy versus MBR (with sciatica population)

Table 144: Clinical evidence summary: Combined intervention Postural therapy + MBR versus MBR only (< 4 months)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with MBR programme 3 elements: physical + psychological + education	Risk difference with combined intervention: Postural therapy + MBR programme 3 elements: physical + psychological + education (95% CI)
Back pain severity (NRS, 0-10) < 4 months	154 (1 study) 2 years	MODERATE[a] due to risk of bias		The mean back pain severity (NRS, 0-10) < 4 months in the control groups was 3.1	The mean back pain severity (NRS, 0-10) < 4 months in the intervention groups was 0.1 higher (0.3 lower to 0.5 higher)
Leg pain severity (NRS, 0-10) < 4 months	154 (1 study) 2 years	MODERATE[a] due to risk of bias		The mean leg pain severity (NRS, 0-10) < 4 months in the control groups was 4.4	The mean leg pain severity (NRS, 0-10) < 4 months in the intervention groups was 0.2 higher (0.34 lower to 0.74 higher)
Function (ODI, 0-100) < 4 months	154 (1 study) 2 years	MODERATE[a] due to risk of bias		The mean function (ODI, 0-100) < 4 months in the control groups was 19.4	The mean function (ODI, 0-100) < 4 months in the intervention groups was 2.8 lower (4.63 to 0.97 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 145: Combined interventions: Alexander technique (6 lessons) + self-management (exercise prescription) versus usual care (without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Alexander techniques (6 lessons) + self management (exercise prescription) (95% CI)
Function (RMDQ 0-24) - Function (RMDQ 0-24)	143 (1 study)	LOWa,b due to risk of bias, imprecision		*	The mean function (rmdq 0-24) - function (rmdq 0-24) in the intervention groups was 2.98 lower (4.88 to 1.08 lower)
Pain (Von Korff scale 0-10) - Pain (Von Korff scale 0-10)	143 (1 study)	LOWa,b due to risk of bias, imprecision		*	The mean pain (von korff scale 0-10) - pain (von korff scale 0-10) in the intervention groups was 1.08 lower (1.96 to 0.2 lower)
Quality of life: SF-36 mental - Quality of life: SF-36 mental	143 (1 study)	VERY LOWa,b due to risk of bias, imprecision		*	The mean quality of life: sf-36 mental - quality of life: sf-36 mental in the intervention groups was 0.64 higher (6.79 lower to 8.07 higher)
Quality of life: SF-36 physical - Quality of life: SF-36 physical	143 (1 study)	LOWa,b due to risk of bias, imprecision		*	The mean quality of life: sf-36 physical - quality of life: sf-36 physical in the intervention groups was 8.53 higher (0.86 to 16.2 higher)

** No control group risk reported, study only reports mean difference*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 146: Combined interventions: Alexander technique (24 lessons) + self-management (exercise prescription) versus usual care (without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Alexander techniques (24 lessons) + self management (exercise prescription) (95% CI)
Function (RMDQ 0-24) - Function (RMDQ 0-24)	143 (1 study)	MODERATE[a] due to risk of bias		*	The mean function (rmdq 0-24) - function (rmdq 0-24) in the intervention groups was 4.22 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Alexander techniques (24 lessons) + self management (exercise prescription) (95% CI)
					(6.13 to 2.31 lower)
Pain (Von Korff scale 0-10) - Pain (Von Korff scale 0-10)	143 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean pain (von korff scale 0-10) - pain (von korff scale 0-10) in the intervention groups was 1.63 lower (2.49 to 0.77 lower)
Quality of life: SF-36 mental - Quality of life: SF-36 mental	143 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean quality of life: sf-36 mental - quality of life: sf-36 mental in the intervention groups was 4.99 higher (2.31 lower to 12.29 higher)
Quality of life: SF-36 physical - Quality of life: SF-36 physical	143 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean quality of life: sf-36 physical - quality of life: sf-36 physical in the intervention groups was 9.43 higher (1.88 to 16.98 higher)

** No control group risk reported, study only reports mean difference*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 147: Combined interventions: Alexander technique (10 sessions) + mixed exercise versus usual care (overall population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (10 lessons) + mixed exercise versus usual care (95% CI)
Overall - Function (RMDQ 0-24) <4 months [mean difference from control]	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) <4 months [mean difference from control] in the intervention groups was 0.75 lower (4.21 lower to 2.72 higher)
Overall - Pain (von Korff 0-100) <4 months [mean	28	LOW[a,b]		*	The mean overall - pain (von Korff 0-100) <4 months

difference from control]	(1 study)	due to risk of bias, imprecision			[mean difference from control] in the intervention groups was 1.27 lower (2.63 lower to 0.1 higher)
Overall - Function (RMDQ 0-24) > 4 months [mean difference from control]	28 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - function (RMDQ 0-24) > 4 months [mean difference from control] in the intervention groups was 2.51 lower (6.21 lower to 1.19 higher)
Overall - Pain (von Korff 0-100) > 4 months [mean difference from control]	28 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean overall - pain (von Korff 0-100) > 4 months [mean difference from control] in the intervention groups was 0.59 lower (2.04 lower to 0.86 higher)

** No control group risk reported, study only reports mean difference*

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 148: Combined interventions: Alexander technique (10 sessions) + mixed exercise versus mixed exercise (overall population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Alexander technique (10 sessions) + mixed exercise versus mixed exercise (95% CI)
Overall - Function (RMDQ 0-24) <4 months	29 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean overall - function (RMDQ 0-24) <4 months in the control groups was 5.45	The mean overall - function (RMDQ 0-24) <4 months in the intervention groups was 0.45 higher (3.4 lower to 4.3 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

10.4 Economic evidence

Published literature

One economic evaluation was identified that included Alexander technique lessons as a comparator and has been included in this review.[225] This is summarised in the economic evidence profiles below (see **Table 149** and **Table 150**) and the economic evidence table in Appendix I.

This is a within-trial economic analysis of the ATEAM RCT, also included in the clinical review.[310] The analysis included 8 comparators with combinations of usual care, self-management (unsupervised exercise - exercise prescription), manual therapy (soft tissue techniques – massage) and Alexander technique lessons. Results are summarised for the Alexander technique comparators as an adjunct to other care first (**Table 149**) followed by the full incremental analysis including all comparator in the study (this includes other active interventions and also combinations of interventions) (**Table 150**).

No economic evaluations were identified that included other postural education/exercise as a comparator.

See also the economic article selection flow chart in Appendix F.

Table 149: Economic evidence profile: Alexander technique studies – normal care comparisons only

Study	Applicability	Limitations	Other comments	Incremental cost[c]	Incremental effects	Cost effectiveness	Uncertainty
Hollinghurst 2008[225] (UK)	Partially applicable[a]	Potentially serious limitations[b]	• Within-RCT analysis (ATEAM[310]) • Population: low back pain (without sciatica) (>3 months) • Eight comparators in full analysis (see **Table 69**) • In this comparison: 1. Usual care (UC) 2. UC + AT (6 lessons) 3. UC + AT (24 lessons) • Follow-up: 1 year	Groups that did not receive exercise prescription			
				2 v 1: £163 3 v 2: £392	2 v 1: 0.03 QALYs 3 v 2: 0.02 QALYs	2 v 1: £5899 per QALY 3 v 2: £20,993 per QALY	Probability cost effective: NR Assuming 100% adherence increased ICER 3 versus 2 to £26,550
				Groups that received exercise prescription			
				2 v 1: £86 3 v 2: £421	2 v 1: 0.02 QALYs 3 v 2: 0.03 QALYs	2 v 1: £5332 per QALY 3 v 2: £13,914 per QALY	Probability cost effective: NR for full analysis shown (for 3v2 only: ~95%) Complete case only analysis results in 6 AT lessons having lower QALYs that normal care.
				Combined groups with and without exercise prescription			
				2 v 1: £124 3 v 2: £407	2 v 1: 0.02 QALYs 3 v 2: 0.02 QALYs	2 v 1: £5704 per QALY 3 v 2: £17,454 per QALY	Probability cost effective: NR

Abbreviations: AT, Alexander technique; ICER, incremental cost effectiveness ratio; RCT, randomised clinical trial; QALY, quality-adjusted life year

(a) Study does not include all available non-invasive treatment options; resource use data (2002-2004) and unit costs (2005) may not reflect current NHS context.

(b) Time horizon may not be sufficient to capture all benefits and costs - authors suggest that the effects of Alexander technique lessons may be longer lasting than massage or an exercise prescription. Uncertainty has not been quantified for all analyses.

(c) Cost components incorporated: interventions, primary care contacts, outpatient appointments, inpatient hospital stays and medication.

Table 150: Economic evidence profile: Alexander technique studies – full incremental analysis of all comparators

Study	Applicability	Limitations	Other comments	Cost[c,d]	Effects[c]	Incremental costs[e]	Incremental effects[e]	Cost effectiveness[e]	Uncertainty
Hollinghurst 2008[225] (UK)	Partially applicable[a]	Potentially serious limitations [b]	• Within-RCT analysis (ATEAM[310]) • Population: low back pain (without sciatica) (3 months or more) • Eight comparators in full analysis: 1. Usual care (UC) 2. UC + soft tissue techniques (massage 6 sessions) 3. UC + AT (6 lessons) 4. UC + AT (24 lessons) 5. UC + self-management (exercise prescription) 6. UC + self-management (exercise prescription) + soft tissue techniques (massage 6 sessions) 7. UC + self-management (exercise prescription) + AT (6 lessons) 8. UC + self-management (exercise prescription) + AT (24 lessons) • Follow-up: 1 year	2. £204	2. -0.01 QALYs	Dominated (1 has lower costs and greater effects)			• Probability cost effective: NR • Complete case only QALY analysis results in fewer QALYs than usual care for exercise prescription, massage or AT (6 lessons).
				1. £0	1. 0 QALYs	Baseline			
				3. £163	3. 0.03 QALYs	Dominated (5 has lower costs and greater effects)			
				5. £100	5. 0.04 QALYs	5 v 1: £100	0.04 QALYs	£2497 per QALY	
				4. £556	4. 0.05 QALYs	Dominated (6 has lower costs and greater effects)			
				6. £213	6. 0.06 QALYs	Dominated (7 has lower costs and equal effects)			
				7. £185	7. 0.06 QALYs	7 v 5: £86	0.02 QALYs	£4280 per QALY	
				8. £607	8. 0.09 QALYs	8 v 7: £421	0.03 QALYs	£14,042 per QALY	

Abbreviations: AT, Alexander technique; RCT, randomised clinical trial; QALY, quality-adjusted life year

(a) Study does not include all available non-invasive treatment options; resource use data (2002-2004) and unit costs (2005) may not reflect current NHS context.

(b) Time horizon may not be sufficient to capture all benefits and costs - authors suggest that the effects of Alexander technique lessons may be longer lasting than massage or an exercise prescription. Within-trial analysis and so does not reflect full body of available evidence for all the included comparators. Uncertainty has not been quantified for all analyses.

(c) Cost/effect over usual care in order of least to most effective intervention.

(d) Cost components incorporated: interventions, primary care contacts, outpatient appointments, inpatient hospital stays and medication.

(e) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

Unit costs

Alexander technique lessons are not currently provided by NHS employees. An estimate of their cost was made based on expert opinion and was in the region of £40-£80 per hour.

10.5 Evidence statements

10.5.1 Clinical

10.5.1.1 Postural exercise/education

No evidence was identified relating to the effectiveness of this intervention.

10.5.1.2 Alexander technique versus placebo/sham

No evidence was identified relating to this comparison.

10.5.1.3 Alexander technique versus usual care, exercise prescription or massage

In the people without sciatica, the same pattern of findings was seen in one study for all 3 comparisons. A programme of 6 Alexander technique lessons showed a clinically important benefit in quality of life, but not for pain intensity or function (moderate to low quality; n = 118, 109 or 122). When 10 lessons of the Alexander technique were compared to usual care in people with low back pain with or without sciatica, a clinically important benefit of long term, but not short term, function was demonstrated (1 study; low to very low quality; n = 28). However, no clinically important benefit was found for pain at any time points. When the number of Alexander technique lessons was increased to 24, improvements were seen for each of quality of life, pain and function (low to moderate quality; n = 111, 112 or 122). No evidence was available to assess the clinical benefit of Alexander technique in terms of psychological distress.

10.5.1.4 Alexander technique (24 lessons) versus Alexander technique (6 lessons)

When 6 and 24 lessons of Alexander technique were compared directly in one study in people without sciatica, 24 lessons showed a clinically important benefit for the physical domain of quality of life and for function as measured by the Roland Morris Disability Questionnaire (low quality; n = 118). However, no clinically important difference was seen for the mental health domain of quality of life or for pain intensity (moderate to low quality; n = 118). No evidence was available to assess clinical benefit in terms of psychological distress.

10.5.1.5 Alexander technique (10 lessons) versus group mixed exercise

In the mixed population of low back pain with or without sciatica, no clinically important benefit of 10 lessons of Alexander technique compared to group mixed exercise was found for short term function (1 study; very low quality; n = 29). No other outcomes were measured.

10.5.1.6 Combined interventions (postural therapy adjunct)

No clinically important difference in back pain, leg pain or function was observed when postural therapy was combined with 3 element MBR (physical, psychological and education components) compared with 3 element MBR alone, in the population with sciatica (1 study; moderate quality; n=154).

In the population without sciatica, a combination of 6 lessons of Alexander technique and exercise prescription showed a clinically important benefit for pain, function and physical quality of life compared to usual care (1 study; low quality; n = 143). The combination of 24 lessons and exercise prescription demonstrated a clinically important benefit for pain, function, mental and physical quality of life compared to usual care (1 study; low-moderate quality; n = 143). When compared with usual care, the combination of 10 lessons of Alexander technique and mixed group exercise in the mixed population of low back pain with or without sciatica, demonstrated a clinically important benefit for long term function (1 study; low and very low quality; n = 28). However, no clinically important benefit was found for short term function or pain at any time points.

The combination of 10 lessons of Alexander technique and mixed group exercise demonstrated no clinically important benefit for short term function when compared to group mixed exercise in the population with or without sciatica (1 study; very low quality; n = 29). No other outcomes were measured.

10.5.2 Economic

- No relevant economic evaluations were identified relating to postural exercise/education in people with low back pain or sciatica.
- One cost-utility analysis (partially applicable; potentially serious limitations) in people with low back pain (without sciatica) found:
  - Compared to usual care, Alexander technique lessons were cost effective (both alone and as an adjunct to an exercise prescription). There was some uncertainty (depending on concurrent treatment) but 24 lessons is probably the most cost effective option (over 6 lessons).
  - When considered amongst a selection of active treatments, the combination of Alexander technique (24 lessons) with unsupervised exercise (exercise prescription) was the most effective (highest QALYs) and most cost effective option from usual care, unsupervised exercise (exercise prescription), soft tissue techniques (massage), exercise prescription + massage, Alexander technique lessons (6 lessons), exercise prescription + Alexander technique lessons (6 lessons), Alexander technique (24 lessons), and exercise prescription + Alexander technique (24 lessons).
- No relevant economic evaluations were identified relating to Alexander technique in people with sciatica.

10.6 Recommendations and link to evidence

Recommendations	No recommendation.
Relative values of different outcomes	The GDG agreed that health-related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision-making. Responder criteria, healthcare utilisation and adverse events were also considered as important outcomes. Within adverse events, it was acknowledged that the Alexander technique and other postural therapies are recognised as safe interventions in general, and therefore morbidity was a less relevant outcome in this case. The GDG agreed that mortality was not relevant as an outcome for this review and so was not included within the review protocol.
Trade-off between clinical benefits and harms	**Postural exercise/education** No RCT or observational study evidence was identified relating to the effectiveness of postural education/exercise and so the GDG agreed a recommendation should not be made. **Alexander technique**

No evidence was identified for Alexander technique compared to placebo or sham therapy. When compared with usual care in people with low back pain (without sciatica), a programme of 6 Alexander technique lessons showed a clinically important improvement in quality of life. This was accompanied by only a very small reduction in pain and improvement in function as well as a small increase in primary care contacts and a reduction in prescription use. However, these differences were considered too small to be clinically important.

When 10 lessons of Alexander technique was provided in the people with low back pain (with or without sciatica), a clinically important benefit of long term function was demonstrated compared to usual care. However, no other clinically important benefits were demonstrated. The GDG noted that this evidence was from a feasibility trial with a small number of participants.

When 24 Alexander technique lessons were provided however, an improvement in physical quality of life, pain and function was demonstrated. This was agreed by the GDG to be clinically important and was accompanied by a very small increase in healthcare utilisation. The GDG considered the benefits of a longer course of treatment to outweigh the harms.

Active interventions

When compared with provision of an exercise prescription, a programme of 6 Alexander technique lessons showed a small improvement in quality of life, pain, and function, and only the change in pain and quality of life was considered to be clinically meaningful, together with a very small improvement in healthcare utilisation. The programme of 24 lessons of Alexander technique, again, showed an improvement in quality of life, pain and function at the longer term follow-up, which was considered by the GDG to be clinically important and to outweigh the very small increase in prescriptions associated. In the overall population, no benefit for short term function was found for 10 lessons of Alexander technique compared to mixed exercise, however no other outcomes were measured.

When compared with massage sessions, a programme of 6 Alexander technique lessons showed a small improvement in quality of life, pain and function, although only the change in quality of life was considered a clinically appreciable difference, together with a very small improvement in healthcare utilisation. While the programme of 24 lessons of Alexander technique showed a small increase in prescriptions, the clinically important benefit in improvement of quality of life, pain, and function outweighed this.

Although no evidence was reported in the included study on occurrence of adverse events, the GDG highlighted that the Alexander technique was a low risk treatment for patients, and serious adverse events were unlikely.

Combinations of interventions

Three studies were identified looking at postural therapies in combination with other interventions. One study investigated the effects of combing postural therapy with a package of treatment including physical, psychological and educational components, however postural therapy showed no clinically important additional benefit.

In people with low back pain without sciatica, a combination of 6 or 24 Alexander lessons plus exercise prescription demonstrated a clinical benefit for pain, function and quality of life when compared to usual care.

In the mixed population of low back pain with or without sciatica, the Alexander technique was combined with mixed exercise, a clinically important benefit of long term function was found, compared with usual care. However, no benefits were found for pain.

When Alexander technique and mixed exercise were compared with mixed exercise, no clinically important benefit was observed.

	The GDG agreed that the evidence reviewed was promising in terms of potential quality of life for people with low back pain, however the evidence in favour of the Alexander technique was taken from a single study. The GDG agreed that further research was warranted to test this further. It was highlighted that there was no evidence for people with sciatica.
Trade-off between net clinical effects and costs	**Postural exercise/education** No economic evaluations were identified relating to postural education/exercise. **Alexander technique** A cost-utility analysis based on the ATEAM RCT (the only study included the clinical review) suggested that Alexander technique lessons may be cost effective for the NHS. However, the GDG concluded that the evidence of cost-effectiveness was only relevant if they were confident in the evidence for effectiveness of the Alexander technique from the ATEAM RCT and this was not the case for the reasons described in other sections of this table. While there is evidence of effectiveness for the Alexander technique, this was based only on a single trial and since recommending the intervention would lead to a significant change in practice, the GDG decided more evidence was required before making a recommendation.
Quality of evidence	Three pragmatic RCTs met the criteria for inclusion in this review. The quality of the evidence for all outcomes reported by these 3 studies ranged from moderate to very low quality due to high risk of bias and in some cases significant imprecision in the effect estimate. The reason for the high risk of bias included the absence of a description of usual care, a high rate of missing data (>20%), and difficulties surrounding the issue of adequate blinding with such interventions. The GDG noted that for the usual care comparisons it is not possible to tell if it is the technique itself or simply the contact with a teacher that is causing any effects seen. All the data reported from this trial were longer-term follow-up data (more than 4 months), and none of the outcomes were measured at up to 4 months. It was recognised that the nature of the intervention itself may preclude designing an adequate placebo-controlled study, however, it was agreed that concurrence of results in more than one pragmatic trial with clear descriptions of comparator interventions and intention to treat analyses would give greater confidence to the GDG in recommending the intervention than the single trial currently available. Although the GDG acknowledge that the improvement in function, pain and quality of life scores demonstrated in the intervention group of 24 lessons of Alexander technique were clinically significant and represent a very promising finding in favour of the Alexander technique, it was felt that to recommend a therapy not currently available on the NHS (and so to recommend a significant change in practice) based on limited evidence was not appropriate. Further, given that a second study did not support these results, and the fact that all evidence came from single studies of a small sample size, it was decided that no recommendation would be given for postural therapies. The economic analysis was judged to be partially applicable with potentially serious limitations. The latter largely due to the limitations in the reporting of uncertainty within the analysis. However, the available information does suggest that the conclusion is probably reasonable robust.
Other considerations	Overall the GDG concluded that while the evidence for the Alexander technique was promising they were not sufficiently confident in the effectiveness of the intervention to make a recommendation. Given the potential benefit demonstrated for the Alexander technique in the evidence reviewed, the GDG considered making a research recommendation on this therapy to be conducted in order to re-evaluate its use in the future. It was however noted that following completion of the ASPEN feasibility trial (included in this

	review), it is likely that a larger trial will follow and therefore a research recommendation was not prioritised for this topic.

11 Orthotics and appliances

11.1 Introduction

Orthotics are commonly insoles placed in shoes with the aim of altering the biomechanics of the foot. Orthotics can be generic or bespoke following the assessment of an individual's foot posture or leg length. There is a broad range of products, and the materials used vary, with soft, semi-rigid and rigid orthotics available. Similar but distinct from orthotics are specialised footwear. An example of these is rocker sole shoes.

Orthotics and specialist footwear may be used for a number of reasons to treat or prevent back pain. This includes the correction of proposed leg length or foot posture abnormalities, with the goal of normalising or altering lower limb, pelvis and trunk mechanics and load, training and enhancing balance and proprioception or reducing the lumbar lordosis.[431]

There is also a wide range of lumbar corset, belts and supports available, which are considered as appliances or devices. Devices vary widely in design, materials, the degree of rigidity and the area to which they are designed to provide support. The devices are commonly used with the aim of providing support to or reducing the load on the lower back and/or pelvic joints.[509] They can also be used to attempt to correct deformity, limit motion or provide a type of massage or heat to the area.[365]

This review intends to ascertain the evidence base for these in the management of low back pain and sciatica.

11.2 Review question: What is the clinical and cost effectiveness of orthotics and appliances in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 151: PICO characteristics of review question

Population	People aged 16 years or above with non-specific low back pain People aged 16 years or above with sciatica
Intervention(s)	• Orthopaedic shoes • Belts/corsets
Comparison(s)	• Placebo/sham/attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland Morris disability questionnaire or the Oswestry Disability Index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI)

	Important • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

11.3 Clinical evidence

11.3.1 Summary of studies included

11.3.1.1 Single interventions

A search was undertaken for randomised trials comparing the effectiveness of orthotics and appliances with either placebo, usual care, or other non-invasive treatments in the management of people with low back pain or sciatica.

Twelve randomised controlled trials were included in the review.[6,11,59,62,65,118,230,319,357,408,425,437] These are summarised in **Table 152** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (Section 11.3.3 – 11.3.4). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Three of the trials compared foot orthotics to placebo, sham or usual care.[65, 425,62] Seven of the trials compared a variety of corsets and belts to either usual care,[11,59,357,437] analgesics,[118] massage[230,408] or manual therapy.[118,230,408] Each trial was investigating the effectiveness of orthotics and appliances in people with low back pain with or without sciatica.

Of the twelve included studies, the outcomes from 2 of the studies could not be included in the analysis as they were incompletely reported in the publications.[5,437]

Due to the limited data available from randomised trials included in this review, the search was widened to include cohort studies. One cohort study relevant to the protocol was identified which compared foot orthotics and usual care and has been included in the review.[136] Another study comparing plaster corsets with usual medicinal care was also included but the relevant outcomes could not be analysed due to incomplete reporting.[563]

11.3.1.2 Combined interventions

One study looking at combinations of non-invasive interventions (with orthotics as the adjunct) was also included in this review.[207] This study is summarised in **Table 153** below. Evidence from this is summarised in the GRADE clinical evidence profile/clinical evidence summary below (Section 1.3.5). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Five Cochrane reviews [249,431,509,510,517] were identified but they could not be included for the following reasons:

- the review combined data from RCTs with observational studies and therefore could not be included;[249,511]
- the review included cross-over studies;[431]

- the review included interventions which were not relevant to the review (not orthotics/appliances specified in the protocol);[517]
- unclear whether sciatic was included/excluded.[509]

The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol.

For evidence on electrotherapies, please see section 14.

Table 152: Summary of studies included in the review – single interventions

Study	Intervention/ comparison	Population	Outcomes	Comments
Alexander 1995[11]	Back belt/usual care	Low back pain without sciatica Overall n=60, USA	Responder criteria (pain: completely improved)	Control group received no intervention Study length 3 months
Calmels 2009 [59]	Lumbar belt/usual care	Low back pain without sciatica Overall n=197 France	Pain (Visual analogue scale) Function (EIFEL-French version of the Roland Morris disability questionnaire)	Control group received no intervention Study length 3 months
Cambron 2011 [62]	Foot orthotics/usual care	Low back pain with sciatica Overall n=50 USA	Pain (VAS) Function (ODI)	Control group were on a waiting list for the intervention. Foot orthotics were provided by Foot levelers Inc. Study length 6 weeks
Castro-mendez 2013 [65]	Foot orthotics/placebo	Low back pain with sciatica Overall n=60 Spain	Pain (VAS) Function (ODI)	Control group received placebo foot orthotics Study length 4 weeks
Doran 1975 [118]	Corset/manual therapy Corset/non-opioid analgesics	Low back pain without sciatica Overall n=456 UK	Responder criteria (pain markedly and completely improved – combined)	The non-opioid analgesics group were given paracetamol. Manual therapy group received any sort of manual therapy at discretion of manipulator. Any type of corset was used. The manual therapy group and corset group were allowed to take paracetamol if they needed for pain relief. Study length 3 weeks

Study	Intervention/ comparison	Population	Outcomes	Comments
Ferrari 2013[136]	Foot orthotics/usual care	Low back pain with sciatica Overall n=64, Canada	Function (ODI)	Non-randomised controlled study. Shoe orthotics custom made Both intervention and control group received usual care (education, exercise programme and analgesics) Study length 8 weeks
Hsieh 1992 [230]	Lumbosacral corset/massage Lumbosacral corset/manual therapy	Low back pain without sciatica Overall n= 53 USA	Function (ODI)	Massage group received hot packs and gentle stroking massage of the whole back area and no deep tissue massage. Manual therapy group received hot packs and manipulation of the lumbar and/or sacroiliac joint areas. Study length 3 weeks
MacRae 2013[320]	Foot orthotics/usual care	Low back pain without sciatica Overall n=115 UK	Function (RMDQ) Pain (NRS) Quality of life (EQ-5D-3L) Anxiety (HADS) Depression (HADS)	All participants received exercise, 1 hour session once a week for 4 weeks, as well as either rocker sole shoes or flat sole shoes. Intervention time 6 weeks, follow-up 1 year
Morrisette 2014[357]	Extensible corsets/usual care Inextensible corsets/usual care	Low back pain without sciatica Overall n=98 USA	Function (ODI) Pain (NRS)	Patients in all groups received standard medicinal and physical therapy. Study length 2 weeks
Pope 1994[408]	Lumbosacral corset/massage Lumbosacral corset/manual therapy	Low back pain without sciatica Overall n=164 USA	Pain (VAS)	Massage group received soft tissue massage. Manual therapy group received spinal manipulation of the lumbar spine and/or sacroiliac joint. Study length 3 weeks
Rosner 2014 [425]	Foot orthotics/sham	Low back pain without sciatica Overall n=46	Pain (quadruple NRS) Function	All orthotics, equipment and funding for this study

Study	Intervention/ comparison	Population	Outcomes	Comments
		USA	(RMDQ)	was provided by Foot Levelers Inc. Control group received sham foot orthotics. Both groups also received chiropractic manipulation Study length 4 weeks
Zomalheto 2015 [563]	Corsets/usual care	Low back pain without sciatica Overall n=67 Nigeria	Function (EIFEL scale - Functional Disability Scale for the Evaluation of Low Back Pain) Pain (VAS)	Both groups received usual medical drugs (analgesics, anti-inflammatory and myorelaxant). Outcomes presented in graph form only with no associated variance. Study length 30 days with 6 month follow-up

Table 153: Summary of studies included in the review –combination of interventions (orthotics adjunct)

Study	Intervention/comparison	Population	Outcomes	Comments
He 2006[207]	Orthotics (corset) + manual therapy (traction + massage) +electrotherapy Manual therapy (Traction + massage) + electrotherapy	Low back pain with or without sciatica N=60 4 weeks intervention China	Pain severity (VAS) Function (Lumbar disease grade)	Concomitant treatment: Information about disc disease and instructions about daily activities

11.3.2 Clinical evidence summary tables

11.3.2.1 Belts/corsets

Table 154: Clinical evidence summary: belts versus usual care ≤4 months (low back pain population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Belts/corsets (95% CI)
Function EIFEL (French version of RMDQ). Scale from: 0 to 24.	190 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function in the control groups was -7.6	The mean function in the intervention groups was 1.5 lower (2.8 to 0.2 lower)
Pain severity Pain visual analogue scale. Scale from: 0 to 10.	190 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity in the control groups was 3.2	The mean pain severity in the intervention groups was 0.95 lower (1.54 to 0.36 lower)
Responder criteria (pain completely improved)	59 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.61 (0.42 to 6.14)	103 per 1000	63 more per 1000 (from 60 fewer to 532 more)
(a)					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 155: Clinical evidence summary: corsets versus usual care ≤4 months (low back pain population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Corsets/belts v. usual care (95% CI)
Change in function (all corsets) ODI. Scale from: 0 to 100.	127 (1 study) 2 weeks	LOW[a,b] due to risk of bias, imprecision		The mean change in function (all corsets) in the control groups was	The mean change in function (all corsets) in the intervention groups was

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Corsets/belts v. usual care (95% CI)
				2.4	8.48 higher (3.59 to 13.38 higher)
Change in function - Inextensible orthotics ODI. Scale from: 0 to 100.	66 (1 study) 2 weeks	LOW[a,b] due to risk of bias, imprecision		The mean change in function - inextensible orthotics in the control groups was 2.4	The mean change in function - inextensible orthotics in the intervention groups was 11.6 higher (4.47 to 18.73 higher)
Change in function - Extensible orthotics ODI. Scale from: 0 to 100.	61 (1 study) 2 weeks	LOW[a,b] due to risk of bias, imprecision		The mean change in function - extensible orthotics in the control groups was 2.4	The mean change in function - extensible orthotics in the intervention groups was 5.7 higher (1.03 lower to 12.43 higher)
Change in pain (all corsets) NRS. Scale from: 0 to 10.	137 (1 study) 2 weeks	LOW[a,b] due to risk of bias, imprecision		The mean change in pain (all corsets) in the control groups was 2.4	The mean change in pain (all corsets) in the intervention groups was 0.9 higher (0.09 lower to 1.89 higher)
Change in pain - Inextensible orthotics NRS. Scale from: 0 to 10.	76 (1 study) 2 weeks	LOW[a,b] due to risk of bias, imprecision		The mean change in pain - inextensible orthotics in the control groups was 2.4	The mean change in pain - inextensible orthotics in the intervention groups was 0.9 higher (0.47 lower to 2.27 higher)
Change in pain - Extensible orthotics NRS. Scale from: 0 to 10.	61 (1 study) 2 weeks	LOW[a,b] due to risk of bias, imprecision		The mean change in pain - extensible orthotics in the control groups was 2.4	The mean change in pain - extensible orthotics in the intervention groups was 0.9 higher (0.53 lower to 2.33 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 156: Clinical evidence summary: belts/ corsets versus spinal manipulation ≤4 months (low back pain population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Manipulation	Risk difference with Belts/corsets (95% CI)
Function Revised ODI. Scale from: 0 to 100.	38 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function in the control groups was 10.15	The mean function in the intervention groups was 10.85 higher (1.77 to 19.93 higher)
Pain severity Pain visual analogue scale 1-10. Scale from: 0 to 100.	90 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain severity in the control groups was -2.41	The mean pain severity in the intervention groups was 0.82 higher (0.43 lower to 2.65 higher)
Responder criteria (improved pain)	191 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.65 (0.44 to 0.95)	449 per 1000	157 fewer per 1000 (from 22 fewer to 251 fewer)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 157: Clinical evidence summary: belts/ corsets versus massage ≤4 months (low back pain population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Massage	Risk difference with Belts/corsets (95% CI)
Function Revised ODI. Scale from: 0 to 100.	27 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function in the control groups was 32.67	The mean function in the intervention groups was 11.67 lower (23.69 lower to 0.35 higher)
Pain severity Pain visual analogue scale. Scale from: 0 to 100.	57 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain severity in the control groups was -1.72	The mean pain severity in the intervention groups was 0.13 higher (1.24 lower to 1.5 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 158: Clinical evidence summary: corsets versus non-opioid analgesic ≤4 months (low back pain population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Corsets versus paracetamol (95% CI)
Responder criteria (improved pain)	193 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.88 (0.58 to 1.34)	330 per 1000	40 fewer per 1000 (from 139 fewer to 112 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

11.3.2.2 Foot orthotics

Table 159: Clinical evidence summary: foot orthotics versus placebo/sham ≤4 months (low back pain with sciatica population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Placebo/sham	Risk difference with Foot orthotics (95% CI)
Function ODI. Scale from: 0 to 100	51 (1 study) 4 weeks	MODERATE[a] due to risk of bias		The mean function in the control groups was 21.64	The mean function in the intervention groups was 12.95 lower (17.88 to 8.02 lower)
Pain severity Pain visual analogue scale. Scale from: 0 to 100.* **Error in the study: reports 0-100 pain scale for pain but should be 0-10*	51 (1 study) 4 weeks	MODERATE[a] due to risk of bias		The mean pain severity in the control groups was 6.64	The mean pain severity in the intervention groups was 3.47 lower (4.43 to 2.51 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 160: Clinical evidence summary: rocker sole shoes versus placebo (flat sole shoes) (low back pain population)

Outcomes	No of Participants	Quality of the evidence	Relative effect	Anticipated absolute effects	
				Risk with Control	Risk difference with Foot orthotics

	(studies) Follow-up	(GRADE)	(95% CI)		versus usual care (95% CI)
Function ≤4 months Scale from: 0 to 24.	100 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean function ≤4 months in the control groups was 6.1	The mean function ≤4 months in the intervention groups was 1.2 lower (3.07 lower to 0.67 higher)
Function > 4 months Scale from: 0 to 24.	93 (1 study) 12 months	LOW[a,b] due to risk of bias, imprecision		The mean function > 4 months in the control groups was 4.8	The mean function > 4 months in the intervention groups was 0.8 lower (2.8 lower to 1.2 higher)
Pain ≤4 months Scale from: 0 to 10.	100 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain ≤4 months in the control groups was 4.9	The mean pain ≤4 months in the intervention groups was 0.30 lower (1.2 lower to 0.6 higher)
Pain > 4 months Scale from: 0 to 10.	93 (1 study) 12 months	MODERATE[a] due to risk of bias		The mean pain > 4 months in the control groups was 4.2	The mean pain > 4 months in the intervention groups was 0 higher (1.25 lower to 1.25 higher)
Anxiety ≤4 months Scale from: 0 to 21.	100 (1 study) 6 weeks	LOW[a] due to risk of bias, imprecision		The mean anxiety ≤4 months in the control groups was 6.1	The mean anxiety ≤4 months in the intervention groups was 1.3 higher (0.62 lower to 3.22 higher)
Anxiety > 4 months	93 (1 study) 12 months	MODERATE[a] due to risk of bias		The mean anxiety > 4 months in the control groups was 6.0	The mean anxiety > 4 months in the intervention groups was 0.3 higher (1.59 lower to 2.19 higher)
Depression ≤4 months Scale from: 0 to 21.	100 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean depression ≤4 months in the control groups was 3.2	The mean depression ≤4 months in the intervention groups was 0.9 higher (0.81 lower to 2.61 higher)
Depression > 4 months	93 (1 study) 12 months	LOW[a,b] due to risk of bias, imprecision		The mean depression > 4 months in the control groups was	The mean depression > 4 months in the intervention groups was 0.8 higher

				3.5	(0.94 lower to 2.54 higher)
EQ-5D ≤4 months Scale from: 0 to 1.	99 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean eq-5d ≤4 months in the control groups was 0.7	The mean eq-5d ≤4 months in the intervention groups was 0.1 lower (0.24 lower to 0.04 higher)
EQ-5D > 4 months Scale from: 0 to 1.	93 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean eq-5d > 4 months in the control groups was 0.8	The mean eq-5d > 4 months in the intervention groups was 0.10 lower (0.24 lower to 0.4 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 161: Clinical evidence summary: foot orthotics versus usual care ≤4 months (low back pain with sciatica population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Foot orthotics (95% CI)
Function ODI. Scale from: 0 to 50.	48 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function in the control groups was 20.4	The mean function in the intervention groups was 8 lower (14 to 2 lower)
Pain severity Pain visual analogue scale. Scale from: 0 to 10.	48 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity in the control groups was 4.1	The mean pain severity in the intervention groups was 1.3 lower (2.69 lower to 0.09 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 162: Clinical evidence summary (non-randomised study): foot orthotics versus usual care ≤4 months (low back pain with sciatica population)

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Time frame is 8 weeks	
				Risk with Usual care	Risk difference with Foot orthotics (95% CI)

Function ODI. Scale from: 0 to 100.	64 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function in the control groups was 16.2	The mean function in the intervention groups was 6.9 lower (12.2 to 1.6 lower) No clinical benefit

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

11.3.2.3 Combinations of interventions – orthotics adjunct

11.3.2.3.1 Low back pain with or without sciatica

Table 163: Orthotics (corset) + electrotherapy + manual therapy (mixed modality -massage + traction) compared to electrotherapy + manual therapy (mixed modality -massage + traction) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with electrotherapy + massage + traction	Risk difference with Corset + electrotherapy + massage + traction (95% CI)
Pain (0-100 VAS converted to 0-10 scale) - ≤4 months	58 (1 study)	LOW[a] due to risk of bias		The mean pain (0-100 VAS converted to 0-10 scale) - <4 months in the control groups was 2.383	The mean pain (0-100 VAS converted to 0-10 scale) - ≤4 months in the intervention groups was 1.02 lower (1.7 to 0.33 lower)
Function (Japanese Orthopaedics Academic Association) lumbar disease grade (0-29) - ≤4 months	58 (1 study)	LOW[a] due to risk of bias		The mean function (Japanese orthopaedics academic association) lumbar disease grade (0-29) - <4 months in the control groups was 21.5	The mean function (Japanese orthopaedics academic association) lumbar disease grade (0-29) - ≤4 months in the intervention groups was 3.17 higher (1.5 to 4.84 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

11.4 Economic evidence

No relevant economic evaluations were identified.

See also the economic article selection flow chart in Appendix F.

Unit costs

Relevant unit costs for back and foot orthotics from the NHS supply chain catalogue are provided below to aid consideration of cost effectiveness. For foot orthotics, the least and most expensive full length insole is listed to provide a range of unit costs.

Table 164: Unit costs of orthotics

Item	Brand/Manufacturer	Unit cost
Lumbar/sacral spine orthotics	Chris Hanley & Partners	£144
Full length insoles (pair)	Footmedics Basics Superflex	£2
Full length insoles (pair)	Equiflex	£49

Source: NHS supply chain code April 2014[1]

Custom made orthotics will be more expensive. In addition to the cost of the orthotics, people may be referred for a fitting. This would typically be one appointment with a podiatrist, orthotist or physiotherapist. The cost of a non-admitted face to face first attendance in podiatry is £52, and a follow-up attendance costs £36 (NHS reference costs 2012-2013).[110]

11.5 Evidence statements

11.5.1 Clinical

11.5.1.1 Belts/corsets

11.5.1.1.1 Low back pain population (without sciatica)

Very low quality evidence from single studies (n = 38, 90, 190 and 456) reporting on the short term (less or equal to 4 months) use of lumbar corsets compared with usual care, spinal manipulation or paracetamol, demonstrated no clinically important benefit for function or pain severity. However, compared with massage, 1 study demonstrated that the short-term use of lumbosacral belts had a clinically important benefit on function (very low quality; n =27), although no clinically important benefit for improving pain severity compared with massage was observed in another single study (low quality; n = 57). Low quality evidence from 1 very short term study (2 weeks; n=127) comparing both inextensible and extensible corsets with standard care showed no clinically important benefit for improving function for corsets in general and extensible corsets, however when focusing on inextensible corsets a small clinical benefit was observed. However there is serious imprecision associated with this result. No benefit was observed for any corset type with respect to improvement in pain severity.

No evidence was available to assess the clinical benefit of belts/corsets in terms of quality of life, nor in the population of people with sciatica. No comparison with sham or placebo was available.

11.5.1.2 Foot orthotics

11.5.1.2.1 Low back pain population (with sciatica)

When compared with placebo insoles, evidence from 1 study (n = 51) demonstrated a clinical benefit of wearing customised insoles on pain severity (moderate quality) and function (low quality). There was also low quality evidence from 1 study (n = 48) to suggest the use of foot orthotics has a clinically important benefit on pain severity when compared to usual care; however, no clinically important difference in function was observed (very low quality).

No evidence was available to assess the clinical benefit of foot orthotics in terms of quality or life or psychological distress. No comparison with sham was available.

11.5.1.2.2 Low back pain population (without sciatica)

There was no clinically important benefit observed with rocker sole shoes when compared with flat sole shoes for function, pain, anxiety or depression at either short or longer term (low to moderate quality; 1 study; n = 100). Additionally, low quality evidence from the same study suggested a clinically important benefit favouring the flat sole shoes, rather than rocker sole shoes, for health-related quality of life in both the short and longer term. One non-randomised study also found no clinical benefit of foot orthotics compared with usual care for function (very low quality; n = 48).

No comparison with usual care was available in this population.

11.5.1.3 Combinations – orthotics

11.5.1.3.1 Low back pain population (with or without sciatica)

When compared with electrotherapy and mixed modality manual therapy, evidence from 1 study (n = 58) demonstrated a clinical benefit of using orthotics (corsets) as an adjunct on pain and function (low quality) at less or equal to 4 months. No other relevant outcome measures were reported.

11.5.2 Economic

No relevant economic evaluations were identified.

11.6 Recommendations and link to evidence

Recommendations	**9. Do not offer belts or corsets for managing low back pain with or without sciatica.** **10. Do not offer foot orthotics for managing low back pain with or without sciatica.** **11. Do not offer rocker sole shoes for managing low back pain with or without sciatica.**
Relative values of different outcomes	The most critical outcomes for decision-making agreed by the GDG for this review question were pain severity, function, psychological distress and health-related quality of life. Responder criteria for pain and function, healthcare utilisation and adverse events were considered important to decision-making, but no evidence was identified for these outcomes. Mortality was not considered a relevant outcome for this review by the GDG and therefore wasn't included as an outcome in the review protocol.

Trade-off between clinical benefits and harms	**Belts/corsets** All of the evidence identified in the review was for people with low back pain rather than sciatica. Overall, the GDG concluded that there was very limited evidence of clinical benefit for belts or corsets. The majority of evidence did not demonstrate a difference between treatments including usual care, spinal manipulation and paracetamol for pain or function. The only benefit observed was for lumbosacral belts when compared to massage in terms of function but not pain. The evidence for the use of corsets when given as part of a combined treatment with electrotherapy, massage and traction did indicate some benefit for pain and function. However the GDG considered that this evidence was all from single small studies. The GDG therefore agreed there was insufficient evidence to support a positive recommendation for the use of belts or corsets as a treatment for low back pain, and no evidence for their use in people with sciatica. The evidence identified was agreed as sufficient to recommend that belts and corsets should not be used for the management of low back pain with or without sciatica. **Foot orthotics** The GDG noted that there was some evidence of benefit from the use of customised insoles compared to placebo in improving pain and function for people with low back pain and sciatica. However, it was noted that this evidence was from a small single study. There was evidence to suggest the use of foot orthotics may have a clinically important benefit on pain severity when compared to usual care in patients with low back pain and sciatica, however the evidence was of low quality and from a single study and no clinically important difference in function was observed. When rocker sole shoes were compared with flat sole shoes no benefit was observed favouring rocker sole shoes for any of the reported outcomes in either the short or long term follow-up. It was noted that health-related quality of life was in fact, worse in the rocker sole group at both the short and longer term time points. The GDG therefore agreed that there was no good evidence that foot orthotics or rocker soles were of benefit to people with low back pain with or without sciatica, and recommended against their use.
Trade-off between net clinical effects and costs	No economic evaluations were identified from the published literature. The GDG noted that orthotics are currently often purchased by the patient. However, if prescribed by the NHS, there will be a cost associated with the orthotics themselves and potentially healthcare professional time if a referral is made to a podiatrist, orthotics or similar. If orthotics are effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. Given the lack of sufficient evidence of clinical benefit for belt/corset, intervention costs were not considered justified. Although some indications of possible benefit were seen for foot orthotics, overall the GDG concluded that it was insufficient to support a conclusion of clinical benefit and thus also insufficient to justify intervention costs.
Quality of evidence	The quality of evidence in this review ranged from moderate to very low. All the studies included in this review were assessed as having serious or very serious risk of bias. A contributing factor to the risk of bias rating is the difficulty of adequate blinding with such interventions. There was also a lack of detail provided about the care that the 2 study groups received apart from the intervention, and therefore, it was not possible in some cases to assess whether the care in the 2 groups was comparable. This introduces a risk of overestimating effects on subjective outcomes such as pain and function. The attempt to achieve blinding by the use of a placebo foot insole in one study was considered insufficient to resolve this risk of bias due to the explicit visual differences between the placebo and customised foot insoles that would have a negative impact on the blinding of participants. There was a possible error in outcome reporting when comparing foot orthotics to placebo. In this study

	pain severity appears to be reported on a scale of 0-10, but reported as a scale of 0-100. In this review we have assumed the outcome to be reported on a scale of 0-10.
Other considerations	The GDG agreed that a research recommendation was not a priority for this intervention.

12 Manual therapies

12.1 Introduction

Manual therapy interventions use passive or active assisted movements, usually delivered by the hands of the practitioner. Typically, they aim to act on the neuromusculoskeletal system focussing on joints and soft tissues to improve mobility and function, and to decrease pain. Techniques include spinal manipulation (a gapping motion of a synovial joint within a spinal segment in response to a force of typically short duration), spinal mobilisation (joint movement within the normal range of movement) and soft tissue techniques (manual manipulation/mobilisation of soft tissues).[133]

Mobilisation and soft tissue techniques are performed by a wide variety of practitioners; whereas spinal manipulation is usually performed by chiropractors or osteopaths, and by doctors or physiotherapists who have undergone additional training in spinal manipulation. Manual therapists often combine a range of techniques in their approach and may also include exercise interventions and advice about self-management.

Research into manual therapy often uses pragmatic trials to determine effectiveness. This reflects the complex nature of the intervention, the inability to blind the practitioner, and the challenges of blinding participants and designing suitable sham or placebo controls.

In addition to the descriptions above, the GDG classified interventions as mixed modality manual therapy where they included more than one type of manual therapy.

12.2 Review question: What is the clinical and cost effectiveness of manual therapies in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 165: PICO characteristics of review question

Population	• People aged 16 or above with non-specific low back pain • People aged 16 or above with sciatica.
Intervention(s)	• Soft tissue technique • Traction • Manipulation/mobilisation (including Spinal Manipulation Therapy (SMT) and Maitland Technique)) • Mixed modality manual therapy (soft tissue technique +/- traction +/- manipulation/mobilisation)
Comparison(s)	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).

	• Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. morbidity 2. mortality • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

12.3 Clinical evidence

12.3.1 Summary of studies included

12.3.1.1 Single interventions

Forty eight studies, of which 3 reported in multiple studies for a total of 55 papers, were included in the review.[5,41-43,46,52-54,60,61,74,76,119,129,137,152,154,163,185,187,197,198,203,224-226,231,236-238,258,275,280,303-305,307,344,345,354,360,393,397,408,412,434,440,442,445492,506,522,528,562,564] These are summarised in **Table 166** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (Table 171). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L. A comparison between electrotherapy and manual therapy [538] is included in the electrotherapy chapter (See Chapter 14). Other comparisons from the Little et al. [311] and Ferreira et al. [137] can be found in the self-management chapter (See Chapter 8). Other comparisons from Zylbergold et al.[344,564] and Petersen et al.[404] are included in the exercise chapter (See Chapter 9). Seven Cochrane reviews were identified on manual therapies but could not be included for the following reasons:

- the review was withdrawn from publication;[20]
- the review excluded spinal manipulation interventions if not in combination with other interventions, and included comparator interventions that were not considered in this guideline, for example nutritional advice;[530]
- the review included intra-class comparison and applied no language restrictions to the included studies; [88,158,534]
- the stratification of people with low back pain, low back pain with or without sciatica and sciatica did not match the guideline stratification [426,427] were not included.

The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol.

12.3.1.2 Combination of interventions

Eighteen studies, of which 5 reported in multiple reports for a total of 25 papers looking at combinations of non-invasive interventions (with manual therapy as the adjunct) were also included in this review.[24,45,50,77,113,131,155,195,199,311,386,388,389,405,418,439,479,498,499] Evidence from Szulc et al. [344,479] and from UK BEAM Trail Team 2004[499] is also included in the exercise chapter (See Chapter 9). These are summarised in **Table 167** below. Evidence from these studies is summarised in the GRADE clinical

evidence profile/clinical evidence summary below (**Table 201**) See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

12.3.1.3 Heterogeneity

For the comparison of manipulation/mobilisation versus usual care, in the mixed population, there was substantial heterogeneity between the studies when they were meta-analysed for the outcome of function (RMDQ) at ≤4 months. Pre-specified subgroup analysis (different within-class modalities, i.e. high velocity thrust; spinal adjusting – mobilisation; traction gap spinal manipulation) explained the heterogeneity; however, this was because there was only 1 study in each of these modalities. The other pre-specified subgroup analysis (chronicity of pain) was unable to be performed on this outcome because the studies were not different in terms of this factor.

For the comparison of mixed modality manual therapy versus sham, in the mixed population, there was substantial heterogeneity between the studies when they were meta-analysed for the outcome of pain (NRS) at > 4 months. Pre-specified subgroup analysis (different within-class modalities) explained the heterogeneity; however this was because there was only 1 study in each of these modalities. The other pre-specified subgroup analysis (chronicity of pain) was unable to be performed on this outcome because the studies were not different in terms of this factor.

Table 166: Summary of studies included in the review: single intervention

Study	Intervention/ comparison	Population	Outcomes	Comments
Soft tissue techniques				
Ajimsha 2014[5]	Soft tissue techniques (massage: myofascial release 24 sessions) Shamras	Low back pain without sciatica >3 months duration n=80 India 8 weeks treatment	Pain (McGill score) Function (Quebec Back Pain Disability scale)	Sham massage: hands placed gently over treatment areas All participants were advised to take medications only when there were any exacerbations.
Cherkin 2001[74]	Soft tissue techniques (massage - including Swedish, deep-tissue, neuromuscular and trigger-point techniques for up to 10 sessions) acupuncture Self-management	Low back pain without sciatica n=262 USA 10 weeks treatment	Function (RMDQ)	Self-management: education session Acupuncture: Traditional Chinese Medicine Acupuncture
Cherkin 2011 [76]	Soft tissue techniques (massage - structural massage consisting of myofascial, neuromuscular and other soft-tissue techniques for 10 sessions)	Low back pain without sciatica >3 months n=401 USA 10 weeks treatment	Quality of life (SF-36) Function (RMDQ)	Usual care: Standard care with medical practitioner permitted At each visit, therapists could recommend up to 3 home exercises from a predefined list of 7 exercises, 6 of

Study	Intervention/ comparison	Population	Outcomes	Comments
	Usual care			which were common to both treatments.
Geisser 2005-1[163]	Soft tissue techniques (massage - manual therapy consisting muscle energy technique primarily) Usual care	Low back pain without sciatica >3 months n=50 USA 6 weeks treatment	Pain (VAS)/(McGill score) Function (Quebec Back Pain Disability Score)	Usual care: both groups received specific exercises (designed to help improve specific musculoskeletal dysfunctions) Some patients received a special adjunct exercise program designed to help improve specific musculoskeletal dysfunctions observed during the standardised manual medicine screening evaluation. Patients in both groups were asked to do stretches and/or self-corrections twice daily (usually 10 repetitions each day).
Geisser 2005-2[163]	Soft tissue techniques (massage - manual therapy consisting muscle energy technique primarily) Usual care	Low back pain without sciatica >3 months n=50 USA 6 weeks treatment	Pain (VAS)/(McGill score) Function (Quebec Back Pain Disability Score)	Usual care: both groups received non-specific exercises(not targeted at particular dysfunction, general back strengthening and stretching)
Little 2008 (ATEAM trial)[310] Subsidiary papers Ehrlich 2009[129], Hollinghurst 2008[225]	Soft tissue techniques (massage - various methods) Usual care Factorial design (+/- exercise prescription)	Low back pain without sciatica >3 months treatment	Quality of life (SF-36 score)* Pain (Von Korff pain scale) Function (RMDQ)	Usual care: Usual care with medical practitioner (+/- exercise prescription)
**EQ-5D was collected but not reported by study apart from as QALYs in economic analysis (see 12.4 Economic evidence)*				
Traction				
Beurskens 1997[42] (Beurskens 1995[41])	Traction (mechanical traction using 35-50% body weight force for 12 sessions) sham	Mixed population: low back pain with or without sciatica >6 weeks n=151	Pain (VAS) Function (RMDQ) Healthcare utilisation	Sham traction: force limited to 20% body weight. Tightening brace used to give impression of traction force

Study	Intervention/ comparison	Population	Outcomes	Comments
		Netherlands (Radiation below the knee: traction 36%, sham traction 30%) 5 weeks treatment		Patients were allowed to continue taking pain medication they had used before entry into the study, that is, non-narcotic analgesic or NSAIDs.
Borman 2003[46]	Traction (mechanical traction using up to 50% body weight force for 10 sessions) usual care	Mixed population: low back pain with or without sciatica >6 months n=42 Turkey (Patients with radiation: traction 67%, usual care 62%) 2 weeks treatment	Pain (VAS) Function (ODI)	Usual care: both groups received standard physiotherapy (consisting of hot packs, ultrasound therapy, active exercise programme) All patients had received instructions on correct posture and ergonomic principles in activities of daily living, associated with descriptions of recommended therapeutic exercises.
Cambron 2006[63]	Traction (Flexion-distraction procedures by a chiropractor up to 16 sessions) mixed exercise	Mixed population: low back pain with or without sciatica >3 months n=235 USA (Radiculopathy at baseline: flexion distraction 18%, mixed exercise 21%) 4 weeks treatment	Healthcare utilisation (visits to other health professionals)	Mixed exercise Both groups also received ultrasound and cryotherapy as well as instructions for self-care.
Fritz 2008[152]	Traction (Mechanical traction using 40-50% body weight force for up to 12 sessions) usual care	Low back pain with sciatica n=64 USA 6 weeks treatment	Pain (NRS) Function (ODI)	Usual care: both groups received extension-oriented treatment During treatment sessions, subjects also received a series of 10 to 20 grade 3 or 4 oscillations of posterior

Study	Intervention/ comparison	Population	Outcomes	Comments
				to anterior mobilisation.
Kim 2013[275]	Traction (inversion traction to 60 degrees with motorised gravitational machine) 32 sessions sham	Mixed population: low back pain with or without sciatica >3 months n=47 South Korea 8 weeks treatment	Pain (VAS)	Sham: participants strapped to gravitational machine but not inverted, instead lay supine Concomitant treatment not specified.
Moret 1998 [354]	Traction (vertical traction 4 (45 minutes) or 6 (30 minutes) times a day for 2 weeks + bed rest bed rest	Sciatica only n=16 The Netherlands 2 weeks treatment	Outcomes reported inadequately for pooling/analysis (mean value only with no SD or CI)	Usual care: both groups were prescribed bed rest, and were allowed medications If the patients attending physician insisted on physical therapy, the therapist was allowed to give instructions concerning the best way to use the back only. If the physician wished to prescribe pain medication, an analgesic was prescribed first. In case of severe pain NSAIDs could be prescribed. If the effect of the NSAID was not sufficient, the physician could add diazepam, or they could then change to an alternative NSAID. Finally the physician was allowed to prescribe an opioid.
Olah 2008[393]	Traction (weightbath traction) for 15 sessions usual care	Low back pain with sciatica n=36 Hungary Unclear treatment duration	Quality of life (SF-36) Function (RMDQ) Pain (VAS)	Usual care: both groups received Mckenzie exercises, electrotherapy and continued their usual medications All subjects continued on their previously prescribed medication

Study	Intervention/ comparison	Population	Outcomes	Comments
				at unchanged doses. No adjustment of the dosage of analgesic and anti-inflammatory drugs was allowed after day 3 before the start of treatment. When necessary, paracetamol was used as a rescue analgesic.
Pal 1986[397]	Continuous traction as in-patient (tilted bed with pelvic harness using foot weights of 5.5 to 8.2kg) sham	Low back pain with sciatica (hospitalised) n=41 UK (Patients with neurological deficits in their legs: intervention group 50%, control group 73%) Unclear treatment duration	Outcomes reported inadequately for pooling/ analysis (median values and interquartile ranges)	Sham: 1.4-1.8 kg of traction only Concomitant treatment not specified.
Schimmel 2009[440]	Traction (mechanical traction using Accu-Spina device with up to 50% body weight force) over 20 sessions sham	Low back pain without sciatica >3 months n=60 The Netherlands 6 weeks treatment (12 weeks graded activity)	Pain (VAS)	Sham: traction with the same apparatus using only 10 lb/<10% body weight force All patients received standard conservative therapeutic care (graded activity) and 20 sessions in the Accu-SPINA device. This program consisted of 1-h training for 2 days per week during a total of 12 weeks. In addition to the traction, the Accu-SPINA device accomplished a massage, heat, blue relaxing light and music during the treatment sessions in both groups.
Manipulation/mobilisation				
Bialosky	Mobilisation (2 times	Mixed	Outcomes reported	Concomitant

Study	Intervention/ comparison	Population	Outcomes	Comments
2014[43]	on each side; 6 sessions over 2 weeks) Placebo/sham Enhanced placebo/sham Usual care	population: low back pain with or without sciatica n=36 USA 2 weeks treatment	inadequately for pooling/analysis	treatment not specified. Sham = motion of spine mimicking intervention but differing biomechanically Enhanced sham = sham mobilisation provided with instructional set to enhance expectation
Bronfort 1990[52]	Manipulation (chiropractic adjustive therapy – 10 x 1-hour treatment sessions over 4 weeks) sham	Mixed population: low back pain with or without sciatica >6 weeks n=16 USA 4 weeks treatment	No relevant outcomes reported	Sham: Sham adjustments plus both groups received high intensity strengthening exercises (45 minutes in each session) Concomitant treatment not specified.
Bronfort 1996[53]	Manipulation (Spinal manipulation, most commonly short-lever high-velocity low-amplitude thrust; 10 x 15 minute sessions over 5 weeks) NSAIDs	Mixed population: low back pain with or without sciatica >6 weeks n=174 USA (Radiating pain: manipulation 54.9%, NSAID 53.8%) 5 weeks treatment (+ 6 weeks exercise)	Pain (VAS) Function (RMDQ)	NSAIDs: Naproxen 500mg twice daily No adjunctive physiotherapy was allowed, except for brief pre-treatment heat and manual muscle relaxation techniques.
Bronfort 2014[54]	Manipulation and mobilisation (high-velocity, low amplitude thrust procedures or low-velocity, variable amplitude mobilisation manoeuvres) plus self-management; 20 visits were allowed, each 10 to 20 minutes.	Low back pain with sciatica n=192 USA 12 weeks Treatment	Pain (NRS) Function (RMDQ) Quality of Life (SF-36) Adverse events	NOTE: Light soft-tissue techniques (active and passive muscle stretching and ischemic compression of tender points) and hot or cold packs were used to facilitate manipulation therapy if needed Usual care given to

Study	Intervention/ comparison	Population	Outcomes	Comments
	Usual care (home exercise and advice).			both arms Concomitant treatment: patients were instructed in methods for developing spine posture awareness related to their activities of daily living. Information about pain-management techniques were provided along with printed material about exercises. To facilitate adherence, providers called or emailed patients 3 times (1, 4, 9 weeks) to reaffirm main messages and answer questions.
Dougherty 2014B[119]	Manipulation / mobilisation (high-velocity, low-amplitude spinal manipulation, and/or flexion distraction therapy and/or mobilisation). 2x/week for 4 weeks. Placebo/sham (detuned ultrasound	Low back pain without sciatica n=136 USA 4 weeks Treatment	Pain (VAS) Function (ODI) Quality of life (SF-36)	Concomitant treatment not specified.
Ferreira 2010[137]	Manipulation Exercise (biomechanical - motor control) Combination of interventions (exercise plus education)	Low back pain with or without sciatica 8 weeks intervention N=34 Australia	Pain severity (NRS) Function (RMDQ)	Concomitant treatment: not stated Exercise versus combination of interventions is included in the self-management chapter
Fritz 2005[154]	Manipulation (two sessions of manipulation consisting of thrusts as described by Flynn et al and Delitto et al) Also included low-stress aerobic activity (goal 10 minutes/day) usual care	Low back pain without sciatica n=131 USA 4 weeks treatment	Function (ODI)	Usual care: both groups received three sessions of stabilisation exercises Subjects in both groups completed a home exercise program on the days they did not attend a therapy session. All subjects

Study	Intervention/ comparison	Population	Outcomes	Comments
				were advised to maintain their usual activity within the limits of pain.
Haas 2014[187]	Manipulation (High-velocity low-amplitude thrust to the lumbar and transition thoracic regions for 12 sessions). 18 treatment visits 3/week for 6 weeks. 12 visits for SMT + 6 visits for light massage. Each session was 15 minutes long with 5 minutes of hot pack, 5 minutes manipulation and 5 minutes of very low dose (sham) ultrasound sham	Low back pain without sciatica >3 months n=391 USA 6 weeks treatment	Quality of life (Euroqol, SF-12) Pain severity (Von-Korff Pain scale) Function (Von Korff disability scale)	Sham: Sham manipulation consisted of light massage (effleurage) and petrissage Participants received a hot pack for 5 minutes to relax spinal muscles prior to intervention. The visit was completed with 5 minutes of very low-dose pulsed ultrasound (20% duty cycle with 0.5 watts/cm^2).
Hancock 2007[197]	Manipulation (spinal manipulation therapy) NSAIDs (Diclofenac twice daily for 2 weeks)	Low back pain without sciatica N=119 Australia 2 weeks intervention + 12 weeks follow up	Pain severity (VAS) Function (RMDQ)	Concomitant treatment in intervention group: usual care (paracetamol and advice) and placebo for diclofenac Concomitant treatment in NSAIDs group: usual care (paracetamol and advice) and sham manipulation
Hoiriis 2004[224]	Manipulation (chiropractic adjustments using specific high-velocity low-amplitude thrusts). 7 chiropractic visits over 2 weeks. sham	Low back pain without sciatica 2- 6 weeks n=192 USA 2 weeks treatment	Pain (VAS) Function (ODI) Psychological distress (Zung depression score)	Sham: participants in same position on table as treatment group, light pressure applied only All subjects received acetaminophen as a rescue medication.
Hondras 2009[226]	Manipulation (high-velocity low-amplitude thrust group extracted only)	Mixed population: low back pain with or without	Quality of life (SF-36) Pain (VAS) Function (RMDQ)	Usual care: Minimal conservative medical care. Both groups received 30

Study	Intervention/ comparison	Population	Outcomes	Comments
	for a maximum of 12 sessions (not to exceed 3/week for first 2 weeks, 2/week for third and fourth weeks, and once/week for fifth and sixth week. usual care	sciatica >4 weeks n=240 USA (Radiating pain: manipulation 33.4%, usual care 38.8%) 6 weeks Treatment		minutes instruction for home exercise, and met medical provider at least 3 times during the 6 weeks during week 1, 3 and 6.` If medications were deemed necessary at any visit, the first option was paracetamol (acetaminophen). If the participant was unsuited to paracetamol, NSAIDs were considered next. Muscle relaxants were only considered if the pain was associated with significant muscle spasm.
Hsieh 2002[231]	Manipulation (joint manipulation consisting of high-velocity low-amplitude thrusts to the lumbar and/or sacroiliac regions) Massage Manipulation and myofascial therapy techniques	Low back pain without sciatica 6 months intervention + follow up N=200 USA	Pain (VAS) Function (RMDQ)	Concomitant treatment: participants advised to avoid any unusual activities, were discouraged from using any other treatments for the low back including external applications and pain medication Fourth arm of trial participants randomised to receive “back school” training. This data not extracted as not a relevant comparator If necessary, only over the counter medications, such as acetaminophen, were used.
Hurley 2004[236]	Maitland Technique (manipulation or mobilisation as described by Maitland or Cyriax) over 4-10 sessions	Mixed population: low back pain with or without sciatica 4 - 12 weeks	Quality of life (SF-36) Pain (VAS) Function (RMDQ)	Electrotherapy: Interferential therapy Study participants were requested to continue normal

Study	Intervention/ comparison	Population	Outcomes	Comments
	electrotherapy	n=240 UK 8 weeks Treatment		activities and to avoid other forms of treatment for the duration of the study, apart from routine physical management and analgesics. All subjects received the Back Book from their treating physiotherapist, who reinforced its positive messages during the first visit, by encouraging low impact activities such as walking, swimming and cycling.
Hurwitz 2002[237]	Manipulation (diversified technique or another spinal-adjusting technique, for example, mobilization). Number of sessions at discretion of therapist usual care	Mixed population: low back pain with or without sciatica n=681 USA (Leg pain below knee: manipulation 34.9%, usual care 32.9%) Unclear Treatment duration	Pain (VAS) Function (RMDQ) Healthcare utilisation	Usual care: medical care only including instruction in back care and back exercises, prescriptions for analgesics, anti-inflammatories, muscle relaxants and other medications Concomitant treatment not specified.
Hussain 2013[238]	Manipulation/mobilisation (according to Maitland); 2 or 3 treatments/week, for a maximum of 12 treatments over 4 weeks. exercise	Mixed population: with or without sciatica "acute" n=60 Pakistan 4 weeks Treatment	Outcomes reported inadequately for pooling/ analysis	Exercise: Individual Biomechanical exercise Concomitant treatment not specified.
Koes 1992[280]	Manipulation/mobilisation (no details of duration of sessions and number of sessions is reported but placebo treatment was twice/week for 6 weeks) "physiotherapy"	Mixed population: low back pain with or without sciatica >6 weeks n=256 The Netherlands 3 months	No suitable outcomes reported	Concomitant treatment not specified.

Study	Intervention/ comparison	Population	Outcomes	Comments
	standard GP care sham ultrasound	Treatment		
Mohseni-bandpei 2006[345]	Maitland Technique for 2-7 sessions (mean 4 sessions attended over 2 weeks). electrotherapy	Low back pain without sciatica >3 months n=120 Iran 2 weeks Treatment	Pain (VAS) Function (ODI)	Electrotherapy: ultrasound therapy using frequency of 1mHz Both groups were given a written program of back exercises generated by PhysioTools computer package (PhysioTools, Finland). The physiotherapist chose exercises most appropriate for each individual patient's condition.
Morton 1999[360]	Manipulation (L1-L5 or L5-S1 traction-gap manipulation); 8 sessions (ie. twice/week) over 4 weeks usual care	Mixed population: low back pain with or without sciatica ≤4 weeks n=29 Australia 4 weeks Treatment	Function (RMDQ)	Usual care: both group received exercise therapy with aid of biofeedback Analgesics and NSAIDs were allowed.
Pope1994[408]	Manipulation (short lever high-velocity low-amplitude thrust); 3 sessions/week for 3 weeks. Massage corset	Low back pain without sciatica n=70 USA 3 weeks Treatment	Pain (VAS)	Massage: soft tissue massage or effleurage Corset: Freeman lumbosacral corset Concomitant treatment not specified.
Rasmussen 2008[412]	Manipulation (high-velocity low-amplitude thrust at the level of dysfunction); 3 sessions at 0, 2 and 4 weeks. usual care	Low back pain without sciatica >3 months n=72 Denmark (Extension of pain into the leg: manipulation 54%, usual care 78%) 1 day	Outcomes reported inadequately for pooling/ analysis (median values)	Usual care: Both groups were instructed in two simple extension exercises (as often as possible every day; at least once/hour)

Study	Intervention/ comparison	Population	Outcomes	Comments
		Treatment		
Santilli 2006[434]	Manipulation (techniques as described by Herbst and Plaughter) 5 days/week, each session lasting 5 minutes, for up to 20 sessions over 1 month. sham	With sciatica (hospitalised) <10 days n=102 Italy 1 months Treatment	Quality of life (SF-36) Responder criteria (pain) Pain and adverse events outcomes reported inadequately for pooling/ analysis	Sham: soft muscle pressing apparently similar to manipulations but not following any specific patterns and not involving rapid thrusts Each patient received an ad hoc diary in which to record number and type of NSAIDs and number of prescription drugs (opiates and steroids were not allowed).
Senna 2011[445]	Manipulation (high-velocity thrusts) for 12 sessions, 3 times/week over 4 weeks. sham	Low back pain without sciatica >6 months n=93 Egypt 4 weeks Treatment	Pain (VAS) Function (ODI)	Sham: manually applied forces of diminished magnitude. Patients in all treatment groups were instructed in a pelvic tilt ROM exercise after sham/manipulation. Patients were instructed to perform 10 repetitions after each manipulation and 10 repetitions 3 times daily on the days they did not attend the session.
Schneider 2015[442]	Manipulation – manual (high velocity, low amplitude thrust); 8 x 15 minute sessions, twice/week for 4 weeks Usual care (analgesics including NSAIDs, advice to stay active and avoid prolonged bed rest; 3 visits, 15-30 minutes each at week 2 and week 4. The third arm (Mechanical-assisted manipulation) has	Low back pain without sciatica n=112 USA 4 weeks Treatment	Pain (NRS) Function (ODI) Responder criteria (>30% and >50% reduction in function, ODI)	Usual care: only given to the UC arm. Concomitant treatment: all patients received a copy of the same education booklet (information on proper posture and movements during activities of daily living). NOTE: in the UC arm Patients were free to pursue rehabilitation or manipulative treatment after the 4

Study	Intervention/ comparison	Population	Outcomes	Comments
	been excluded from this review as it does not meet the protocol for manual therapy.			weeks.
Triano 1995[492]	Manipulation (high-velocity low-amplitude thrust spinal manipulation) for 12 sessions, 6 days/ week for two weeks self-management sham	Low back pain without sciatica >6 weeks n=200 USA 2 weeks Treatment	Pain (VAS) Function (ODI)	Self-management: education sessions Sham: low-force high-velocity thrust Concomitant treatment not specified.
Von heymann 2013[522]	Manipulation (high-velocity low-amplitude thrust); duration of treatment not reported. sham	Mixed population: with or without sciatica <2 days n=101 Germany Unclear Treatment duration	Function (RMDQ)	Sham: HVLA technique, however, at an 'incorrect' position All subjects were supplied with paracetamol 500mg tablets to be taken whenever needed, but no more than 6 tablets a day.
Waagen 1986[528]	Manipulation (chiropractic spinal adjustive therapy with full-spine adjustments administered to each patient); 2-3 times/ week for 2 weeks. sham	Low back pain without sciatica >3 months n=29 USA 2 weeks Treatment	Outcomes reported inadequately for pooling/ analysis	Sham: adjustment using minimal force and drop-piece on adjusting table set to minimal tension No adjunctive or concurrent therapy, either chiropractic or medical, was given during the trial.
Mixed modality manual therapy				
Cambron 2014[61]	Manual therapy (flexion-distraction technique plus mobilisation and traction, 20 minutes/session Sham (Laser light away from body and sham manipulation)	Low back pain with or without sciatica N=60 USA 6 weeks Treatment	Pain (Swiss Spinal Severity Score 0-10) Function (ODI)	Concomitant treatment: Hot and/or cold packs were permitted to be used before or after the F-D treatment for a maximum of 8 minutes.
Hawk 2000[203] Factorial design (interventions	Manual therapy (flexion-distraction technique plus trigger-point therapy	Low back pain without sciatica >4 weeks n=32	Outcomes reported inadequately for pooling/analysis (median values and	Concomitant treatment not specified.

Study	Intervention/ comparison	Population	Outcomes	Comments
are compared singly and in combination against control intervention)	Manipulation (flexion-distraction technique) Massage (trigger-point therapy) sham [all over 14 sessions] ALL: 3 sessions/week for the first week and 2/week thereafter. Duration 6 weeks	USA 6 weeks	interquartile ranges)	
Hsieh 2002[231]	Manual therapy (combination of manipulation using diversified technique and myofascial therapy); 9 sessions (3/week for 3 weeks) manipulation (using diversified technique); 9 sessions (3/week for 3 weeks) massage (myofascial therapy)	Low back pain without sciatica 3 weeks - 6 months n=200 USA 3 weeks Treatment	Pain (VAS) Function (RMDQ)	Fourth arm of trial participants randomised to receive "back school" training. This data not extracted as not a relevant comparator If necessary, only over the counter medications, such as acetaminophen, were used.
Juni 2009[258]	Manual therapy (Combination of high velocity low amplitude thrusts, spinal mobilisation and muscle energy techniques) for a maximum of 5 sessions over 2 weeks usual care	Low back pain without sciatica ≤4 months n=104 Switzerland 2 weeks Treatment	Outcomes reported inadequately for pooling/ analysis	Usual care: general advice on return to normal activities and avoidance of bed rest, use of paracetamol, diclofenac and dihydrocodeine as required

OSTEOPATHIC trial: Licciardone 2013[303-307] Factorial design	Manual therapy (combination of techniques including HVLA thrusts, myofascial therapy, stretching); 6 x 15 minute sessions over 8 weeks (sessions given at weeks 0, 1, 2, 4, 6, and 8) sham	Low back pain without sciatica >3 months n=455 USA 8 weeks	Quality of life (SF-36) Pain (VAS) Function (RMDQ) Responder criteria (>30% reduction in pain)	Sham: Hand contact, active and passive range of motion Patients were allowed to receive their usual low back pain care and other co-treatments during the study with the exception of manual therapies. Patients could self-initiate low back pain co-treatments, such as non-prescription drugs and complementary and alternative medicine therapies.
Zheng 2012[562]	Manual therapy (combination of deep massage to tender points for 8-10 minutes and intermittent traction for 20mins using forces of 40-50%) twice/week for 3 weeks. Traction	Low back pain without sciatica >3 months n=64 China 3 weeks	Pain (VAS)	Traction: using 40-50% total body weight Concomitant treatment not specified.
Zylbergold 1981[564], Moffett 2000 [344]	Manual therapy (combination of rotational mobilisations posterior-anterior pressures and manual traction) Exercise (biomechanical) Usual care The third arm of this trial (biomechanical exercise versus home care) has been included in the exercise review	Low back pain without sciatica n=28 Canada 1 month	Pain (Melzack pain score)	Exercise: Individual biomechanical exercise All participants received education on back care and proper body mechanics as background care (before randomisation).

Table 167: Summary of studies included in the review: combinations – manual therapy adjunct

Study	Intervention and comparator(s)	Population	Outcomes	Comments
Aure 2003[24]	Manual therapy (manipulation/mobilisation) + self-management (home exercise)	Low back pain with or without sciatica N=49 8 weeks	Pain severity (VAS/NRS) Function (ODI)	Concomitant treatment: No restriction on medication. Other forms of treatment

Study	Intervention and comparator(s)	Population	Outcomes	Comments
	Exercise + self-management (home exercise)	intervention + 1 year follow-up Norway		e.g. acupuncture, chiropractic or alternative medicine was not allowed during treatment period but there were no restrictions during follow up period. For the control group, group training and massage were not allowed during the treatment period.
Bishop 2010[45]	Manual therapy (manipulation) + self-management (advice) + pharmacological therapy (NSAIDs) Usual care	Acute low back pain with or without sciatica N=88 4 weeks intervention + 16 and 24 weeks follow-up Canada	Quality of life (SF-36) Function (RMDQ)	Usual care: advised of their diagnosis and referred back to their family physician with a letter explaining the protocol of the present study. Family physicians were provided with a standardised consultation report containing information that confirmed a diagnosis of acute mechanical low back pain. Family physicians were not offered specific treatment recommendations but were simply advised to treat at their own discretion. Concomitant treatment: not stated.
Brennan 2006[50]	Manual therapy (Manipulation) + exercise Individual exercise (Biomechanical – Stretching) Individual exercise – (Biomechanical Core	Low back pain without sciatica N=123 4 weeks intervention + 1 year follow-up USA	Function (ODI)	Concomitant treatment: not stated

Study	Intervention and comparator(s)	Population	Outcomes	Comments
	stability)			
Bronfort 1996[53]	Manipulation/mobilisation (spinal manipulative therapy, SMT) + exercise (trunk strengthening exercises, TSE) Pharmacological treatment (NSAID) + exercise (trunk strengthening exercises, TSE) Manipulation/mobilisation (spinal manipulative therapy, SMT) + exercise (trunk stretching exercise)	Low back pain with or without sciatica N=174 11 weeks intervention + 1 year follow-up USA	Pain severity (VAS/NRS) Function (RMDQ)	Concomitant treatment: no adjunctive physiotherapy allowed except brief pre-manipulation heat and manual muscle relaxation techniques. No other prescription NSAIDs or analgesics allowed.
Childs 2004[77]	Manual therapy (manipulation) + exercise Exercise (biomechanical - Core stability)	Low back pain with or without sciatica N=131 4 weeks intervention + 6 months follow-up USA	Function (ODI) Healthcare utilisation (medications for back pain in last week, currently seeking treatment for back pain)	Concomitant treatment: advice to maintain usual activity within limits of pain Function was reported only as mean (95% CI) difference in change scores
Diab 2013[113]	Manual therapy (traction) + exercise (biomechanical – stretching) + physical (infra-red) Exercise (biomechanical – stretching) + physical (infra-red)	Low back pain with or without sciatica N=80 10 weeks intervention = up to 6 months follow up Egypt	Pain severity (NRS) Function (ODI) Healthcare utilisation (medication use)	Concomitant treatment: avoidance of other exercise programme
Erhard 1994[131]	Manipulation + exercise (biomechanical – McKenzie) Individual exercise (biomechanical – McKenzie)	Low back pain with or without sciatica N=24 7 days intervention + 1 month follow up USA	Function (ODI)	Concomitant treatment: not stated Results only shown graphically – data not suitable for meta-analysis
Geisser 2005[163]	Manual therapy + exercise	Low back pain without sciatica	Pain severity (VAS; McGill)	Concomitant treatment: usual use of pain

Study	Intervention and comparator(s)	Population	Outcomes	Comments
	(biomechanical) Manual therapy + exercise (aerobic) Individual exercise – (biomechanical - Core stability) + sham manual therapy Exercise (aerobic) + sham manual therapy	N=100 6 weeks intervention + follow up USA	Function (Multidimensional Pain Inventory Interference subscale; Quebec Pain disability scale)	medications, with no change in their usage during the course of the study.
Hallegraeff 2009[195]	Manual therapy + physiotherapy + self-management (education + advice to stay active) Physiotherapy + self-management (education +advice to stay active)	Low back pain with or without sciatica N=64 2.5 weeks follow up Netherlands	Pain severity (VAS) Function (ODI)	Concomitant treatment: not stated
Hansen 1993[199]	Manual therapy + exercise + self-management (education) Individual exercise (biomechanical - McKenzie) Sham	Low back pain with or without sciatica N=180 4 weeks intervention + 1 year follow up Denmark	Pain severity (VAS/NRS) Function (disability days in last year)	Concomitant treatment: not stated Data was reported in a format not suitable for meta-analysis
Hawk 2005[204]	Manual therapy + massage Sham	Low back pain without sciatica N=111 3 weeks intervention USA	Pain severity (Pain disability index) Function (RMDQ)	Concomitant treatment: no other types of manual therapy during study
Hurley 2004[236]	Manual therapy (manipulation) + electrotherapy (interferential therapy) Manual therapy (Manipulation) Electrotherapy (Interferential)	Low back pain with or without sciatica N=240 5 weeks intervention + 1 year follow up UK	Quality of life (EQ-5D; SF-36) Pain severity (VAS; McGill) Function (RMDQ)	Concomitant treatment: participants requested to continue normal activities and avoid other forms of treatment for the duration of the study, apart from routine physician management and analgesics. All subjects received the Back Book from the

Study	Intervention and comparator(s)	Population	Outcomes	Comments
				physiotherapists, who reinforced its message of early return to normal activities and participation in low impact activities such as walking, swimming and cycling.
Little 2008a (ATEAM) Hollingshurt 2009 [225,310]	Self-management (exercise prescription) + 6 sessions Alexander technique Self-management (exercise prescription)+ 24 sessions Alexander technique 6 Alexander Technique lessons 24 Alexander Technique lessons Self-management (exercise prescription)Manual therapy (soft tissue techniques – massage) Usual care: details not specified Manual therapy (massage) + self-management (home exercise)	Low back pain without sciatica N=579 9 months intervention + 1 year follow up) UK	Quality of life (SF-36 and EQ-5D)[(a)] Pain severity (Von Korff pain scores) Function (RMDQ) Healthcare utilisation (Primary care contacts, number of prescriptions)	Concomitant treatment: not stated. For usual care: no exercise prescription given Comparisons available : EXERCISE + 6 SESSIONS ALEXANDER versus USUAL CARE EXERCISE + 24 SESSIONS ALEXANDER versus USUAL CARE Outcomes reported as mean difference from usual care group, not final score or change from baseline
Niemisto 2003[388] + Niemisto 2004, Niemisto 2005, Riipinen 2005[386,389,418]	Self-management + Manual therapy ((manipulation/mobilisation) + exercise (biomechanical) Self-management	Low back pain with or without sciatica N=204 4 weeks intervention + 1 year follow up Finland	Quality of life (HRQoL 15D) Pain severity (VAS) Function (ODI) s Psychological distress (DEPS) Healthcare utilisation (visit to physician; visit to physio or other therapists)	Concomitant treatment: during follow up, patients free to use other health care services for low back pain Depression outcome not eligible (DEPS not a listed outcome)
Peterson	Manual therapy	Low back pain	Quality of life (SF-36)	Concomitant

Study	Intervention and comparator(s)	Population	Outcomes	Comments
2013, Petersen 2015 [404,405]	(Manipulation) + exercise + self-management (education) Exercise + self-management (education)	with or without sciatica N=350 12 weeks intervention + 1 year follow up Denmark	Pain severity (VAS/NRS) Function (RMDQ) Healthcare utilisation (contact to healthcare in previous two months) Responder criteria ("Success" (decrease 5 points or absolute score below 5 points on RMDQ)	treatment: if considered necessary, instruction in stabilising and strengthening home exercises provided at end of treatment period. All patients educated in self-administered mobilising, stretching, stabilising and/or strengthening exercises; patients instructed to continue the exercises at home or in the gym for minimum 2 months after completion of treatment at the back centre. Patients encouraged not to seek any other kind of treatment for the 2 months period of self-administered exercises. Manual vertebral mobilisation (including high velocity thrust) not allowed in the intervention group. No SDs given for quality of life scores
Schenk 2003[439]	Manual therapy (manipulation) + postural therapy (education -postural correction) + exercise (aerobic) Postural therapy (education - postural correction) + exercise (mixed: biomechanical - McKenzie + aerobic)	Low back pain with sciatica N=25 Intervention: 3 visits (time between visits not stated) USA	Pain severity (VAS) Function (ODI)	Concomitant treatment: not stated

Study	Intervention and comparator(s)	Population	Outcomes	Comments
Szulc 2015 [344,479]	Manual therapy (soft tissue techniques – muscular energy technique) + biomechanical exercise (McKenzie) + self-management (unsupervised exercise) Biomechanical exercise (McKenzie) + self-management (unsupervised exercise) Standard care (massage +laser + TENS) + self-management	Low back pain with sciatica N=60 2 weeks intervention + 3 months follow up Poland	Pain severity (VAS) Function (ODI)	The comparison between exercise and standard care is reported in the exercise chapter Concomitant treatment: not stated
UK BEAM Trail Team 2004 [155,498,499]	Self-management Self-management + exercise (biomechanical) Self-management +manual therapy (mixed modality) Self-management + exercise (biomechanical) + manual therapy (mixed modality)	Low back pain with or without sciatica N=1334 12 weeks intervention + 12 months follow up UK	Quality of life (SF-36 and EQ-5D) Pain severity (VAS/NRS) Function (disability scores) Responder criteria (for RMDQ)	Concomitant treatment: not stated

(i) EQ-5D was collected but not reported by the study apart from as QALYs in the economic analysis (Hollinghurst).

12.3.1.4 Data unsuitable for meta-analysis

Table 168: Spinal manipulation versus sham for low back pain with sciatica population

Study	Outcome	Results	Risk of bias
Santilli 2006	Pain (VAS 0-10, back pain) at ≤4 months	Mean difference between groups: -1.8	HIGH
	Adverse events at > 4 months	No adverse events in either group.	LOW

Table 169: Mixed modality manual therapy versus sham for low back pain without sciatica population

Study	Outcome	Results	Risk of bias
OSTEOPATHIC trial: Licciardone 2013[303-307]	Pain (NRS 0-10) at ≤4 months Change score [median (IQR)]	Manipulation group: -1.8 (-3.1 to 0). Sham group: -0.9 (-2.5 to 0.3)	LOW
	Function (RMDQ 0-24) at ≤4 months [median (IQR)]	Manipulation group: 2 (1-6). Sham group: 3 (1-7)	LOW
	Quality of life (SF-36, general health domain) at ≤4 months [median (IQR)]	Manipulation group: 72 (52-87). Sham group: 72 (57-87)	LOW

Table 170: Combination interventions – manual therapy adjunct

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Hansen 1993[199]	Manual therapy + exercise + education versus Mckenzie: Pain severity > 4 months	Throughout the observation period, a significant (p<0.01) reduction of pain was registered within all three treatment groups but no significant differences between groups at any time.				VERY HIGH
Hansen 1993[199]	Manual therapy + exercise + education versus Sham: Pain severity > 4 months	Throughout the observation period, a significant (p<0.01) reduction of pain was registered within all three treatment groups but no significant differences between groups at any time.				VERY HIGH
Hansen 1993[199]	Manual therapy + exercise + education versus Mckenzie: Function (days of disability in the last year) > 4 months	Mean (IQR): 3 (0-15)	59	Mean (IQR): 0.3 (0-10)	60	VERY HIGH

Hansen 1993[199]	Manual therapy + exercise + education versus Sham: Function (days of disability in the last year) > 4 months	Mean (IQR): 3 (0-15)	59	Mean (IQR): 0.4 (0-14)	61	VERY HIGH
Peterson 2011, Petersen 2015 [404,405]	Combined non-invasive interventions: manipulation + massage + exercise (biomechanical) + self-management versus exercise (McKenzie) + self-management: Quality of life (SF36 general health domain, 0-100) < 4 months	Mean: 66.6	161	Mean: 70.4	168	HIGH
Peterson 2011, Petersen 2015 [404,405]	Combined non-invasive interventions: manipulation + massage + exercise (biomechanical) + self-management versus exercise (McKenzie) + self-management: Quality of life (SF36 mental health domain, 0-100) < 4 months	Mean: 73.5	161	Mean: 76.5	168	HIGH
Peterson 2011, Petersen 2015 [404,405]	Combined non-invasive interventions: manipulation + massage + exercise (biomechanical) + self-management versus exercise (McKenzie) + self-management: Quality of life (SF36 general health domain, 0-100) > 4 months	Mean: 65.3	163	Mean: 69.5	161	HIGH
Peterson 2011, Petersen 2015 [404,405]	Combined non-invasive interventions: manipulation + massage + exercise (biomechanical) + self-management versus exercise (McKenzie) + self-management: Quality of life (SF36 mental health domain, 0-100) > 4 months	Mean: 73.8	163	Mean: 76.2	161	HIGH

12.3.2 Clinical evidence summary tables

12.3.2.1 Soft tissue technique

Table 171: Clinical evidence summary: soft tissue technique versus sham in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Soft tissue technique versus sham (95% CI)
Pain severity (VAS, 0-10) ≤4 months	72 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was 3.86	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 1.01 lower (2.03 lower to 0.02 higher)
Pain severity (McGill score, 0-78) ≤4 months	146 (3 studies)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (McGill score 0-78) <4 months in the control groups was 19.47	The mean pain severity (McGill score 0-78) ≤4 months in the intervention groups was 4.73 lower (7.56 to 1.9 lower)
Function (Quebec Disability Score, 0-100) ≤4 months	146 (3 studies)	LOW[a] due to risk of bias	The mean function (Quebec disability score 0-100) <4 months in the control groups was 36.09	The mean function (Quebec disability score 0-100) ≤4 months in the intervention groups was 4.3 lower (8.28 to 0.32 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 172: Clinical evidence summary: Soft tissue technique versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Soft tissue technique versus usual care (95% CI)

Pain severity (Von Korff scale 0-10) <4 months	223 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (von Korff scale 0-10) ≤4 months in the control groups was 4.62	The mean pain severity (von Korff scale 0-10) <4 months in the intervention groups was 0.41 lower (0.91 lower to 0.09 higher)
Pain severity (Von Korff scale 0-10) > 4 months	231 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (von Korff scale 0-10) > 4 months in the control groups was 4.54	The mean pain severity (von Korff scale 0-10) > 4 months in the intervention groups was 0.01 lower (0.65 lower to 0.63 higher)
Quality of life (SF-36 physical component summary score, 0-100) ≤4 months	473 (2 studies)	VERY LOW[a,c] due to risk of bias, inconsistency	The mean quality of life composite scores (SF-36 0-100) <4 months physical component in the control groups was 46.4	The mean quality of life composite scores (SF-36 0-100) ≤4 months - physical component in the intervention groups was 0.53 lower (1.62 lower to 0.56 higher)
Quality of life (SF-36 mental component summary score, 0-100) ≤4 months	473 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life composite scores (SF-36 0-100) <4 months - mental component in the control groups was 56.7	The mean quality of life composite scores (SF-36 0-100) ≤4 months - mental component in the intervention groups was 2.43 higher (0.71 to 4.14 higher)
Quality of life (SF-36physical component summary score, 0-100) > 4 months	474 (2 studies)	LOW[a] due to risk of bias	The mean quality of life composite scores (SF-36 0-100) >4 months physical component in the control groups was 47.05	The mean quality of life composite scores (SF-36 0-100) > 4 months physical component in the intervention groups was 0.08 higher (1.15 lower to 1.31 higher)
Quality of life (SF-36 mental component summary score, 0-100) > 4 months	474 (2 studies)	LOW[a] due to risk of bias	The mean quality of life composite scores (SF-36 0-100) > 4 months - mental component in the control groups was 58.55	The mean quality of life composite scores (SF-36 0-100) > 4 months - mental component in the intervention groups was 0.41 higher (1.66 lower to 2.48 higher)

Function (RMDQ, 0-24) ≤4 months	473 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) ≤4 months in the control groups was 9.19	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 2.27 lower (3.07 to 1.47 lower)
Function (RMDQ, 0-24) > 4 months	474 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) >4 months in the control groups was 7.74	The mean function (RMDQ 0-24) >4 months in the intervention groups was 0.35 lower (1.22 lower to 0.51 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs
(c) Downgraded by 1 increment because of heterogeneity, I^2=42%, p=0.19

Table 173: Clinical evidence summary: Soft tissue technique versus acupuncture in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Soft tissue technique versus acupuncture (95% CI)
Function (RMDQ, 0-24) ≤4 months	166 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) ≤4 months in the control groups was 7.9	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 1.6 lower (3.44 lower to 0.24 higher)
Function (RMDQ, 0-24) > 4 months	166 (1 study)	LOW[a] due to risk of bias	The mean function (RMDQ 0-24) > 4 months in the control groups was 8	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 1.2 lower (3.12 lower to 0.72 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 174: Clinical evidence summary: Soft tissue technique versus self-management in low back pain without sciatica

Outcomes	No of	Quality of the	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	Risk with Control	Risk difference with Soft tissue technique versus self-management (95% CI)
Function (RMDQ, 0-24) ≤4 months	160 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) ≤4 months in the control groups was 8.8	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 2.5 lower (4.35 to 0.65 lower)
Function (RMDQ, 0-24) > 4 months	159 (1 study)	LOW[a] due to risk of bias	The mean function (RMDQ 0-24) > 4 months in the control groups was 6.4	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 0.4 higher (1.43 lower to 2.23 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

12.3.2.2 Traction

Table 175: Clinical evidence summary: Traction versus sham in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Traction versus sham (95% CI)
Pain severity (VAS, 0-10) ≤4 months (mechanical traction)	150 (1 study)	MODERATE[b] due to imprecision		The pain severity (VAS 0-10) ≤4 months (mechanical traction) in the control groups was 3.73	The mean pain severity (VAS 0-10) ≤4 months (mechanical traction) in the intervention groups was 0.56 higher (0.46 lower to 1.58 higher)
Pain severity (VAS, 0-10) ≤4 months (inversion traction)	29 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (VAS 0-10) ≤4 months (inversion traction) in the control groups was 2.29	The mean pain severity (VAS 0-10) ≤4 months (inversion traction) in the intervention groups was 1.59 lower (2.44 to 0.74 lower)
Pain severity (VAS, 0-10) > 4 months	148 (1 study)	HIGH		The mean pain severity (VAS 0-10) > 4 months in the control groups was 2.01	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 0.37 higher (0.84 lower to 1.58 higher)
Function (RMDQ, 0-24) ≤4 months	150 (1 study)	MODERATE[a] due to risk of bias		The mean function (RMDQ 0-24) ≤4 months in the control groups was 4.3	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 0.10 higher (1.8 lower to 2 higher)
Function (RMDQ, 0-24) > 4 months	148 (1 study)	HIGH		The mean function (RMDQ 0-24) > 4 months in the control groups was 4	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 0.7 higher (1.1 lower to 2.5 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Traction versus sham (95% CI)
Healthcare utilisation (other medical treatments sought) ≤4 months	150 (1 study)	MODERATE[b] due to imprecision	RR 1.37 (0.82 to 2.28)	Study population	
				247 per 1000	91 more per 1000 (from 44 fewer to 316 more)
Healthcare utilisation (other medical treatments sought) > 4 months	148 (1 study)	LOW[b] due to imprecision	RR 1.07 (0.74 to 1.55)	Study population	
				417 per 1000	29 more per 1000 (from 108 fewer to 229 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 176: Clinical evidence summary: Traction versus sham in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Traction versus sham (95% CI)
Pain severity (VAS 0-10) ≤4 months	60 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (VAS 0-10) <4 months in the control groups was 3.6	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.40 lower (1.76 lower to 0.96 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 177: Clinical evidence summary: Traction versus usual care in low back pain with or without sciatica (mixed population)

Outcomes	No of	Quality of the	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	Risk with Control	Risk difference with Traction versus usual care (95% CI)
Pain severity (VAS 0-10) ≤4 months	39 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months - in the control groups was 3.6	The mean pain (VAS 0-10) ≤4 months in the intervention groups was 0.5 higher (0.57 lower to 1.57 higher)
Function (ODI, 0-100) ≤4 months.	39 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-24) <4 months in the control groups was 19.7	The mean function (ODI 0-24) ≤4 months in the intervention groups was 4 higher (2.78 lower to 10.78 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 178: Clinical evidence summary: Traction versus usual care in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Traction versus usual care (95% CI)
Quality of Life (SF-36- General health, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - general health in the control groups was 35.44	The mean quality of life (SF-36 0-100) ≤4 months - general health in the intervention groups was 21.91 higher (6.82 to 37 higher)
Quality of Life (SF-36 - Physical function, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - physical function in the control groups was 53.33	The mean quality of life (SF-36 0-100) ≤4 months - physical function in the intervention groups was 14.91 higher (1.22 lower to 31.04 higher)
Quality of Life (SF-36 - Physical role limitation, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias,	The mean quality of life (SF-36 0-100) <4 months - physical role limitation in	The mean quality of life (SF-36 0-100) ≤4 months - physical role limitation in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Traction versus usual care (95% CI)
		imprecision	the control groups was 31.94	26.88 higher (1.46 to 52.3 higher)
Quality of Life (SF-36- Bodily pain, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - bodily pain in the control groups was 48.11	The mean quality of life (SF-36 0-100) ≤4 months - bodily pain in the intervention groups was 16.07 higher (3.91 to 28.23 higher)
Quality of Life (SF-36 – Vitality, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - vitality in the control groups was 56.33	The mean quality of life (SF-36 0-100) ≤4 months - vitality in the intervention groups was 20.67 higher (3.08 to 38.26 higher)
Quality of Life (SF-36- Social function, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - social function in the control groups was 56.33	The mean quality of life (SF-36 0-100) ≤4 months - social function in the intervention groups was 18.55 higher (0.43 to 36.67 higher)
Quality of Life (SF-36 - Mental health, 0-100) ≤4 months	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - mental health in the control groups was 53	The mean quality of life (SF-36 0-100) ≤4 months - mental health in the intervention groups was 20.65 higher (2.17 to 39.13 higher)
Quality of Life (SF-36 - Emotional role limitation, 0-100) ≤4 months.	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (SF-36 0-100) <4 months - emotional role limitation in the control groups was 27.72	The mean quality of life (SF-36 0-100) ≤4 months - emotional role limitation in the intervention groups was 36.87 higher (9.13 to 64.61 higher)
Function (ODI, 0-100) ≤4 months	100 (2 studies)	LOW[a,b] due to risk of	The mean function (ODI 0-100) <4 months in the	The mean function (ODI 0-100) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Traction versus usual care (95% CI)
		bias, imprecision	control groups was 48.97	5.98 higher (0.82 lower to 12.77 higher)
Pain (VAS, 0-10) ≤4 months (mechanical traction)	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain (VAS 0-10) <4 months in the control groups was 3	The mean pain (VAS 0-10) ≤4 months in the intervention groups was 0.20 lower (1 lower to 1.40 higher)
Pain (VAS, 0-10) ≤4 months (weightbath traction)	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain (VAS 0-10) <4 months in the control groups was 5.39	The mean pain (VAS 0-10) ≤4 months in the intervention groups was 2.98 lower (4.51 to 1.45 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 179: Clinical evidence summary: Traction versus biomechanical exercise in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Traction versus biomechanical exercise (95% CI)
Healthcare utilisation - visited other healthcare practitioners > 4 months	191 (1 study)	MODERATE[a] due to imprecision	RR 0.72 (0.52 to 0.98)	Moderate	
				536 per 1000	150 fewer per 1000 (from 11 fewer to 257 fewer)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

12.3.2.3 Manipulation/mobilisation

Table 180: Clinical evidence summary: Manipulation/mobilisation versus sham in low back pain without sciatica

Outcomes	No of	Quality of the	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	Risk with Control	Risk difference with Manipulation/mobilisation versus sham (95% CI)
Quality of life (Euroqol health state 0-100) ≤4 months	174 (1 study)	MODERATE[a] due to imprecision	The mean quality of life (euroqol health state 0-100) ≤4 months - euroqol health state in the control groups was 73.5	The mean quality of life (euroqol health state 0-100) ≤4 months - euroqol health state in the intervention groups was 4.4 higher (0.42 lower to 9.22 higher)
Quality of life (Euroqol health state 0-100) > 4 months	166 (1 study)	HIGH	The quality of life (euroqol health state 0-100) > 4 months - euroqol health state in the control groups was 74.8	The mean quality of life (euroqol health state 0-100) > 4 months euroqol health state in the intervention groups was 2.5 higher (2.43 lower to 7.43 higher)
Quality of life (SF-12/SF36 - Physical composite score 0-100) ≤4 months	174 (1 study)	MODERATE[a] due to imprecision	The mean quality of life (sf-12/sf36 0-100) ≤4 months - physical composite score in the control groups was 45.5	The mean quality of life (sf-12/sf36 0-100) ≤4 months - physical composite score in the intervention groups was 4.1 higher (1.29 to 6.91 higher)
Quality of life (SF-12/SF36 - Mental composite score 0-100) ≤4 months	174 (1 study)	MODERATE[a] due to imprecision	The mean quality of life (sf-12/sf36 0-100) ≤4 months - mental composite score in the control groups was 50.2	The mean quality of life (sf-12/sf36 0-100) ≤4 months - mental composite score in the intervention groups was 2.4 lower (5.64 lower to 0.84 higher)
Quality of life (SF-12/SF36 - Pain subscale 0-100) ≤4 months	136 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life (sf-12/sf36 0-100) ≤4 months - pain subscale in the control groups was 6.62	The mean quality of life (sf-12/sf36 0-100) ≤4 months - pain subscale in the intervention groups was 0.11 higher (0.48 lower to 0.7 higher)
Quality of life (SF-12/SF36 - Physical function subscale 0-100) ≤4 months	136 (1 study)	LOW[b] due to risk of bias	The mean quality of life (sf-12/sf36 0-100) ≤4 months - physical function subscale	The mean quality of life (sf-12/sf36 0-100) ≤4 months - physical function subscale in the intervention groups

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus sham (95% CI)
			in the control groups was 1.93	was 0.01 lower (0.18 lower to 0.16 higher)
Quality of life (SF-12 - Physical composite score 0-100) > 4 months	166 (1 study)	HIGH	The mean quality of life (sf-12 0-100) > 4 months - physical composite score in the control groups was 50.7	The mean quality of life (sf-12 0-100) > 4 months - physical composite score in the intervention groups was 1.9 higher (1.51 lower to 5.31 higher)
Quality of life (SF-12 - Mental composite score 0 -100) > 4 months	166 (1 study)	HIGH	The mean quality of life (sf-12 0-100) > 4 months - mental composite score in the control groups was 51.3	The mean quality of life (sf-12 0-100) > 4 months - mental composite score in the intervention groups was 0.7 lower (4.46 lower to 3.06 higher)
Pain (VAS 0-10) ≤4 months	533 (5 studies)	MODERATE[b] due to risk of bias	The mean pain (VAS 0-10) ≤4 months in the control groups was 3.17	The mean pain (VAS 0-10) ≤4 months in the intervention groups was 0.30 lower (0.56 to 0.04 lower)
Pain (VAS 0-10) > 4 months	229 (2 studies)	HIGH	The mean pain (VAS 0-10) > 4 months in the control groups was 3.77	The mean pain (VAS 0-10) > 4 months in the intervention groups was 0.2 lower (0.67 lower to 0.26 higher)
Function (ODI 0-100) ≤4 months	374 (4 studies)	LOW[a,b] due to risk of bias, imprecision	The mean function (odI 0-100) ≤4 months in the control groups was 23.9	The mean without sciatica - function (ODI 0-100) ≤4 months in the intervention groups was 3.91 lower (6.47 to 1.34 lower)
Function (Von Korff, 0-100) < 4 months	174 (1 study)	MODERATE[a] due to imprecision	The mean function (Von Korff, 0-100) < 4 months in the control group was	The mean function (Von Korff, 0-100) < 4 months in the intervention was 7.2 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus sham (95% CI)
			29.2	(13.82 to 0.58 lower)
Function (ODI 0-100) > 4 months	63 (1 study)	MODERATE[a] due to imprecision	The mean function (ODI 0-100) > 4 months in the control groups was 37.4	The mean function (ODI 0-100) > 4 months in the intervention groups was 2.53 lower (8.85 lower to 3.79 higher)
Function (Von Korff, 0-100) > 4 months	166 (1 study)	MODERATE[a] due to imprecision	The mean function (Von Korff, 0-100) > 4 months in the control group was 28	The mean function (Von Korff, 0-100) > 4 months in the intervention group was 5.6 lower (12.45 to 1.25 lower)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs
(b) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 181: Clinical evidence summary: Manipulation/mobilisation versus sham in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Sham	Risk difference with Manipulation/mobilisation (95% CI)
Quality of life (SF-36 0-100 - Physical functioning) >4 months	96 (1 study)	MODERATE due to imprecision		The mean quality of life (sf-36 0-100 - physical functioning) >4 months in the control groups was 60.5	The mean quality of life (sf-36 0-100 - physical functioning) >4 months in the intervention groups was 6.9 higher (1.23 lower to 15.03 higher)
Quality of life (SF-36 0-100 - Physical role limitation) >4 months.	96 (1 study)	HIGH		The mean quality of life (sf-36 0-100 - physical role limitation) >4 months in the control groups was 29.1	The mean quality of life (sf-36 0-100 - physical role limitation) >4 months in the intervention groups was 2 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Sham	Risk difference with Manipulation/mobilisation (95% CI)
					(13.04 lower to 17.04 higher)
Quality of life (SF-36 0-100 - Bodily pain) >4 months.	96 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (sf-36 0-100 - bodily pain) >4 months in the control groups was 31.9	The mean quality of life (sf-36 0-100 - bodily pain) >4 months in the intervention groups was 1.9 higher (3.33 lower to 7.13 higher)
Quality of life (SF-36 0-100 - General health) >4 months	96 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (sf-36 0-100 - general health) >4 months in the control groups was 57.5	The mean quality of life (sf-36 0-100 - general health) >4 months in the intervention groups was 3.7 lower (11.09 lower to 3.69 higher)
Quality of life (SF-36 0-100 - Vitality) >4 months	96 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (sf-36 0-100 - vitality) >4 months in the control groups was 52.1	The mean quality of life (sf-36 0-100 - vitality) >4 months in the intervention groups was 5.6 higher (0.52 lower to 11.72 higher)
Quality of life (SF-36 0-100 - Social functioning) >4 months.	96 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (sf-36 0-100 - social functioning) >4 months in the control groups was 52.1	The mean quality of life (sf-36 0-100 - social functioning) >4 months in the intervention groups was 5.7 higher (0.31 lower to 11.71 higher)
Quality of life (SF-36 0-100 - Emotional role limitation) >4 months	96 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (sf-36 0-100 - emotional role limitation) >4 months in the control groups was 37.4	The mean quality of life (sf-36 0-100 - emotional role limitation) >4 months in the intervention groups was 7.2 higher (9.72 lower to 24.12 higher)
Quality of life (SF-36 0-100 - Mental health) >4 months	96 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (sf-36 0-100 - mental health) >4 months in the control groups was 70.2	The mean quality of life (sf-36 0-100 - mental health) >4 months in the intervention groups was 3.3 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Sham	Risk difference with Manipulation/mobilisation (95% CI)
					(3.04 lower to 9.64 higher)
Responder criteria (>30% VAS pain - Local back pain) > 4 months	96 (1 study)	LOW[a] due to imprecision	RR 5 (1.55 to 16.16)	Moderate	
				63 per 1000	252 more per 1000 (from 35 more to 955 more)
Responder criteria (>30% VAS pain - Radiating pain) > 4 months	96 (1 study)	LOW[a] due to imprecision	RR 2.9 (1.6 to 5.27)	Moderate	
				208 per 1000	395 more per 1000 (from 125 more to 888 more)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 182: Clinical evidence summary: Manipulation/mobilisation versus usual care in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Manipulation/mobilisation versus usual care (95% CI)
Pain severity (VAS, 0-10) ≤ 4 months	921 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean pain severity (VAS 0-10) ≤ 4 months in the intervention groups was 0.03 higher (0.55 lower to 0.61 higher)
Pain severity (VAS, 0-10) > 4 months	681 (1 study)	MODERATE[a] due to risk of bias		*	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 0.22 higher (0.25 lower to 0.69 higher)
Function (RMDQ, 0-24) ≤4 months (high velocity thrust)	145 (1 study)	VERY LOW[a,b] due to risk of		*	The mean function (RMDQ 0-24) ≤4 months (high velocity thrust) in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Manipulation/mobilisation versus usual care (95% CI)
		bias, imprecision			intervention groups was 1.5 lower (3.10 lower to 0.10 higher)
Function (RMDQ, 0-24) ≤4 months (spinal adjusting - mobilisation)	339 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean function (RMDQ 0-24) ≤4 months (spinal adjusting - mobilisation) in the intervention groups was 0.75 higher (0.29 lower to 1.79 higher)
Function (RMDQ, 0-24) ≤4 months (traction gap manipulation)	29 (1 study)	LOW[a] due to risk of bias		*	The mean function (RMDQ 0-24) ≤4 months (traction gap manipulation) in the intervention groups was 3.31 lower (4.83 to 1.79 lower)
Function (RMDQ, 0-24) > 4 months	240 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 1.3 lower (2.9 lower to 0.3 higher)
Quality of life (SF-36 - Physical function, 0-100) ≤4 months	240 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean quality of life (SF-36 0-100) ≤4 months - physical function in the intervention groups was 4.3 higher (1.2 lower to 9.8 higher)
Healthcare utilisation (number of healthcare visits) ≤4 months	338 (1 study)	MODERATE[a] due to risk of bias		The mean mixed population - healthcare utilisation ≤4 months - number of healthcare visits in the control	The mean healthcare utilisation ≤4 months - number of healthcare visits in the intervention groups was 1.5 higher (1.22 to 1.78 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Manipulation/mobilisation versus usual care (95% CI)
				groups was 1.7	
Healthcare utilisation (number of healthcare visits) > 4 months	330 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean mixed population - healthcare utilisation > > 4 months - number of healthcare visits in the control groups was 2.9	The mean healthcare utilisation > 4 months - number of healthcare visits in the intervention groups was 2.4 higher (1.63 to 3.17 higher)
Adverse events ≤4 months	145 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.28 (0.42 to 3.86)	Moderate	
				82 per 1000	23 more per 1000 (from 47 fewer to 233 more)
**No control rate reported in study, only mean difference given*					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 183: Clinical evidence summary: Manipulation/mobilisation versus usual care in low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Manipulation/mobilisation versus usual care (95% CI)
Pain severity (VAS, 0-10) ≤4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (0-10) ≤4 months in the control groups was 4.6	The mean pain severity (0-10) ≤4 months in the intervention groups was 0.9 lower (2.57 lower to 0.77 higher)

Pain severity (VAS, 0-10) > 4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (0-10) > 4 months in the control groups was 4.6	The mean pain severity (0-10) > 4 months in the intervention groups was 0.4 lower (2.15 lower to 1.35 higher)
Quality of life (SF-36- Physical health composite, 0-100) ≤4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36) ≤4 months - physical health composite in the control groups was 40.8	The mean quality of life (SF-36) ≤4 months - physical health composite in the intervention groups was 3.4 higher (3.23 lower to 10.03 higher)
Quality of life (SF-36- Mental health composite, 0-100) ≤4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36) ≤4 months - mental health composite in the control groups was 52.4	The mean quality of life (SF-36) ≤4 months - mental health composite in the intervention groups was 0 higher (4.76 lower to 4.76 higher)
Quality of life (SF-36 - Physical health composite, 0-100) > 4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36) > 4 months - physical health composite in the control groups was 41.7	The mean quality of life (SF-36) > 4 months - physical health composite in the intervention groups was 1.5 higher (4.85 lower to 7.85 higher)
Quality of life (SF-36- Mental health composite, 0-100) > 4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36) > 4 months - mental health composite in the control groups was 50.9	The mean quality of life (SF-36) > 4 months - mental health composite in the intervention groups was 0.7 higher (4.88 lower to 6.28 higher)
Function (RMDQ 0-24) ≤4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ 0-24) ≤4 months in the control groups was 10.4	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 2.5 lower (6.27 lower to 1.27 higher)

Function (RMDQ, 0-24) > 4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ 0-24) > 4 months in the control groups was 10.2	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 1.3 lower (5.07 lower to 2.47 higher)
Adverse events ≤4 months	192 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.72 (0.49 to 1.07)	Moderate	
				816 per 1000	229 fewer per 1000 (from 416 fewer to 57 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 184: Clinical evidence summary: Manipulation/mobilisation versus usual care in low back pain without sciatica

Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Relative effect (95% CI)**	**Anticipated absolute effects**	
				Risk with Control	**Risk difference with Manipulation/mobilisation versus usual care (95% CI)**
Pain severity (NRS, 0-10) ≤4 months	72 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (NRS 0-10) ≤4 months in the control groups was 3.9	The mean pain severity (NRS 0-10) ≤4 months in the intervention groups was 1.2 lower (2.26 to 0.14 lower)
Pain severity (NRS, 0-10) > 4 months	72 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (NRS 0-10) > 4 months in the control groups was 3.4	The mean pain severity (NRS 0-10) > 4 months in the intervention groups was 0.9 lower (1.98 lower to 0.18 higher)
Function (ODI, 0-100) ≤4 months	197 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI 0-100) ≤4 months in the control groups was 24.5	The mean function (ODI 0-100) ≤4 months in the intervention groups was 6.43 lower (10.93 to 1.93 lower)
Function (ODI, 0-100) > 4 months	72	VERY LOW[a,b]		The mean function (ODI	The mean function (ODI 0-100) > 4

	(1 study)	due to risk of bias, imprecision		0-100) > 4 months in the control groups was 22.1	months in the intervention groups was 2.3 lower (9.14 lower to 4.54 higher)
Responder criteria (>30% reduction pain) ≤4 months	72 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.66 (1.23 to 2.23)	Moderate	
				571 per 1000	377 more per 1000 (from 131 more to 703 more)
Responder criteria (>50% reduction pain) ≤4 months	72 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.89 (1.21 to 2.95)	Moderate	
				400 per 1000	356 more per 1000 (from 84 more to 780 more)
Responder criteria (>30% reduction ODI) ≤4 months	72 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.56 (1.06 to 2.29)	Moderate	
				486 per 1000	272 more per 1000 (from 29 more to 627 more)
Responder criteria (>50% reduction ODI) ≤4 months	72 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.28 (0.77 to 2.14)	Moderate	
				400 per 1000	112 more per 1000 (from 92 fewer to 456 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 185: Clinical evidence summary: Manipulation/mobilisation versus soft tissue technique (massage) in low back pain without sciatica

Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Anticipated absolute effects**	
			Risk with Control	**Risk difference with Manipulation/mobilisation versus soft tissue technique (95% CI)**
Pain severity (VAS, 0-10) ≤4 months	191 (2 studies)	LOW[a] due to risk of bias	The mean pain severity (VAS 0-10) <4 months in the control groups was 0.53	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.36 lower (0.98 lower to 0.26 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus soft tissue technique (95% CI)
Pain severity (VAS, 0-10) > 4 months	87 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) > 4 months in the control groups was 2.99	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 0.59 lower (1.58 lower to 0.4 higher)
Function (RMDQ, 0-24) ≤4 months	94 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) <4 months in the control groups was 5.8	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 1.38 lower (3.41 lower to 0.65 higher)
Function (RMDQ, 0-24) > 4 months	88 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) > 4 months in the control groups was 5.06	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 1.77 lower (3.76 lower to 0.22 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 186: Clinical evidence summary: Manipulation/mobilisation versus belts/corset in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus belts/corsets (95% CI)
Pain severity (VAS, 0-10) ≤4 months	90 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was -1.59	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.82 lower (2.07 lower to 0.43 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by two increments if the confidence interval crossed both MIDs

Table 187: Clinical evidence summary: Manipulation/mobilisation versus exercise in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus exercise (95% CI)
Pain severity (NRS, 0-10) ≤4 months	24 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (NRS 0-10) <4 months in the control groups was 4	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 1.08 lower (2.76 lower to 0.6 higher)
Function (RMDQ, 0-24) < 4 months	24 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) <4 months in the control groups was 7.36	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 3.21 lower (7.38 lower to 0.96 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 188: Clinical evidence summary: Manipulation/mobilisation versus interferential therapy in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus interferential therapy (95% CI)
Quality of life (EQ-5D, 0-1) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life eq-5d (0-1) <4 months in the control groups was 0.16	The mean quality of life eq-5d (0-1) ≤4 months in the intervention groups was 0 higher (0.22 lower to 0.22 higher)
Quality of life (EQ-5D, 0-1) > 4 months	107 (1 study)	LOW[a] due to risk of bias	The mean quality of life eq-5d (0-1) > 4 months in the control groups was	The mean quality of life eq-5d (0-1) > 4 months in the intervention groups was 0.05 lower

			0.20	(0.23 lower to 0.13 higher)
Quality of life (SF-36 General health, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months - general health in the control groups was -0.87	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - general health in the intervention groups was 0.38 lower (6.05 lower to 5.29 higher)
Quality of life (SF-36 - Physical function, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months - physical function in the control groups was 10.62	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - physical function in the intervention groups was 4.64 higher (20.63 lower to 29.91 higher)
Quality of life (SF-36 - Physical role limitation, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months - physical role limitation in the control groups was 31.37	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - physical role limitation in the intervention groups was 2.79 lower (16.97 lower to 11.39 higher)
Quality of life (SF-36- Bodily pain, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months - bodily pain in the control groups was 22.68	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - bodily pain in the intervention groups was 0.21 higher (7.61 lower to 8.03 higher)
Quality of life (SF-36 – Vitality, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months - vitality in the control groups was 6.32	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - vitality in the intervention groups was 1.85 higher (4.73 lower to 8.43 higher)
Quality of life (SF-36 - Social function, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months -	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - social function in the intervention

			social function in the control groups was 12.51	groups was 3.05 higher (5.74 lower to 11.84 higher)
Quality of life (SF-36 - Mental health, 0-100) ≤4 months	128 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) <4 months - mental health in the control groups was 1.54	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - mental health in the intervention groups was 2.35 higher (3.01 lower to 7.71 higher)
Quality of life (SF-36 - Emotional role limitation, 0-100) ≤4 months	128 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life individual domain score (SF-36 0-100) <4 months - emotional role limitation in the control groups was 18.03	The mean quality of life individual domain score (SF-36 0-100) ≤4 months - emotional role limitation in the intervention groups was 7.83 lower (22.61 lower to 6.95 higher)
Quality of life (SF-36 - General health, 0-100) > 4 months	107 (1 study)	LOW[a,b] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) > 4 months - general health in the control groups was -0.87	The mean quality of life individual domain score (SF-36 0-100) > 4 months - general health in the intervention groups was 1.66 lower (10.42 lower to 7.1 higher)
Quality of life (SF-36 - Physical function, 0-100) > 4 months	107 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) > 4 months - physical function in the control groups was 10.62	The mean quality of life individual domain score (SF-36 0-100) > 4 months - physical function in the intervention groups was 1.26 lower (9.65 lower to 7.13 higher)
Quality of life (SF-36 - Physical role limitation, 0-100) > 4 months	107 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) > 4 months - physical role limitation in the control groups was 37.7	The mean quality of life individual domain score (SF-36 0-100) > 4 months physical role limitation in the intervention groups was 0.8 lower (17.79 lower to 16.19 higher)
Quality of life (SF-36 - Bodily pain, 0-100) > 4 months	107	VERY LOW[a,b]	The mean quality of life	The mean quality of life individual

	(1 study)	due to risk of bias, imprecision	individual domain score (SF-36 0-100) > 4 months - bodily pain in the control groups was 30.4	domain score (SF-36 0-100) > 4 months - bodily pain in the intervention groups was 6.6 lower (15.86 lower to 2.66 higher)
Quality of life (SF-36 – Vitality, 0-100) > 4 months	107 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) > 4 months - vitality in the control groups was 9.4	The mean quality of life individual domain score (SF-36 0-100) > 4 months - vitality in the intervention groups was 1.83 higher (5.86 lower to 9.52 higher)
Quality of life (SF-36 - Social function, 0-100) > 4 months	107 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life individual domain score (SF-36 0-100) > 4 months - social function in the control groups was 16.1	The mean mixed population - quality of life individual domain score (SF-36 0-100) > 4 months social function in the intervention groups was 8.3 higher (4.97 lower to 21.57 higher)
Quality of life (SF-36 - Mental health, 0-100) > 4 months	107 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean quality of life individual domain score (SF-36 0-100) > 4 months - mental health in the control groups was 0.84	The mean mixed population - quality of life individual domain score (SF-36 0-100) > 4 months - mental health in the intervention groups was 3.88 higher (2.86 lower to 10.62 higher)
Quality of life (SF-36 Emotional role limitation, 0-100) > 4 months	107 (1 study)	LOW[a] due to risk of bias	The mean quality of life individual domain score (SF-36 0-100) > 4 months - emotional role limitation in the control groups was 18.7	The mean quality of life individual domain score (SF-36 0-100) > 4 months - emotional role limitation in the intervention groups was 2.6 higher (11.98 lower to 17.18 higher)
Pain severity (VAS, 0-10) < 4 months	128 (1 study)	LOW[a] due to risk of bias	The mean pain severity (VAS 0-10) < 4 months in the control groups was -2.14	The mean pain severity (VAS 0-10) < 4 months in the intervention groups was 0.15 higher (0.71 lower to 1.01 higher)
Pain severity (VAS, 0-10) > 4 months	107	VERY LOW[a,b]	The mean pain severity	The mean pain severity (VAS 0-10) > 4

	(1 study)	due to risk of bias, imprecision	(VAS 0-10) > 4 months in the control groups was -2.65	months in the intervention groups was 0.83 higher (0.19 lower to 1.85 higher)
Function (RMDQ, 0-24) ≤4 months	128 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) <4 months in the control groups was -3.56	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 0.97 lower (2.64 lower to 0.7 higher)
Function (RMDQ, 0-24) > 4 months	128 (1 study)	LOW[a] due to risk of bias	The mean function (RMDQ 0-24) > 4 months in the control groups was -4.9	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 0.19 higher (1.68 lower to 2.06 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 189: Clinical evidence summary: Manipulation/mobilisation versus ultrasound therapy in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus ultrasound therapy (95% CI)
Pain severity (VAS, 0-10) ≤4 months	112 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was -2.51	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 1.65 higher (0.63 to 2.67 higher)
Pain severity (VAS, 0-10) > 4 months	73 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) > 4 months in the control groups was -2.28	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 1.51 higher (0.1 to 2.92 higher)
Function (ODI, 0-100) ≤4 months	112 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) <4 months in the control groups was -10.10	The mean function (ODI 0-100) ≤4 months in the intervention groups was 7.8 higher (2.41 to 13.19 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus ultrasound therapy (95% CI)
Function (ODI, 0-100) > 4 months	73 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) > 4 months in the control groups was -11.5	The mean function (ODI 0-100) > 4 months in the intervention groups was 5.2 higher (2.65 lower to 13.05 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 190: Clinical evidence summary: Manipulation/mobilisation versus self-management in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Manipulation/mobilisation versus self- management (95% CI)
Pain severity (VAS, 0-10) ≤4 months	(1 study)	HIGH		*	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.18 lower (0.92 lower to 0.56 higher)
Function (ODI, 0-100) ≤4 months	77 (1 study)	MODERATE[a] due to imprecision		The mean function (ODI 0-100) <4 months in the control groups was 11.4	The mean function (ODI 0-100) ≤4 months in the intervention groups was 5.4 lower (10.32 to 0.48 lower)
*No control rate reported in study, only mean difference given					

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by t2 increments if the confidence interval crossed both MIDs

Table 191: Clinical evidence summary: Manipulation/mobilisation versus NSAIDs in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus NSAIDs (95% CI)
Pain severity (VAS, 0-10) ≤4 months	115 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (VAS 0-10) <4 months in the control groups was 0	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.2 lower (0.89 lower to 0.49 higher)
Function (RMDQ, 0-24) ≤4 months	115 (1 study)	MODERATE[a] due to risk of bias	The mean function (RMDQ 0-24) <4 months in the control groups was -0.1	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 0.4 lower (2.06 to 1.26 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 192: Clinical evidence summary: Manipulation/mobilisation versus NSAIDs in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus NSAIDs (95% CI)
Pain severity (VAS, 0-10) ≤4 months	96 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (VAS 0-10) <4 months in the control groups was 3.5	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.80 lower (1.66 lower to 0.06 higher)
Function (RMDQ, 0-24) ≤4 months	171 (2 studies)	MODERATE[a] due to risk of bias	The mean function (RMDQ 0-24) <4 months in the control groups was 0.13	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 1.96 lower (3.92 to 0.62 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 193: Clinical evidence summary: Manipulation/mobilisation versus combination of interventions (exercise + education) in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Manipulation/mobilisation versus combination of interventions (exercise + education) (95% CI)
Pain severity (VAS 0-10) ≤4 months	23 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was 4.7	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 1.78 lower (3.22 to 0.34 lower)
Function (RMDQ, 0-24) ≤4 months	23 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) <4 months in the control groups was 9	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 4.85 lower (8.88 to 0.82 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

12.3.2.4 Mixed modality manual therapy

Table 194: Clinical evidence summary: Mixed modality manual therapy versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus usual care (95% CI)
Pain severity (melzak pain scale, 0-5) ≤4 months	18 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (melzack pain score 0-5) ≤4 months in the control group was -0.6	The mean pain severity (melzack pain score 0-5) ≤4 months in the intervention groups was 0.9 lower (1.4 lower to 0.39 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by one increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 195: Clinical evidence summary: Mixed modality manual therapy versus sham in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Mixed modality manual therapy versus sham (95% CI)
Responder criteria (pain) ≤4 months	455 (1 study)	MODERATE[a] due to imprecision	RR 1.38 (1.16 to 1.64)	Moderate	
				*	

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 196: Clinical evidence summary: Mixed modality manual therapy versus sham in low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus sham (95% CI)
Pain severity (NRS, 0-10) ≤4 months	29 (1 study)	MODERATE[a] due to imprecision	The mean pain severity (NRS 0-10) <4 months in the control groups was 5.66	The mean pain severity (NRS 0-10) ≤4 months in the intervention groups was 0.28 higher (0.46 lower to 1.02 higher)
Pain severity (NRS, 0-10) > 4 months	29 (1 study)	LOW[b] due to imprecision	The mean pain severity (VAS 0-10) > 4 months in the control groups was 6.14	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 0.32 lower (1.24 lower to 0.60 higher)
Function (ODI change score 0-100) ≤4 months	29 (1 study)	MODERATE[a] due to	The mean function (odI change score 0-100) <4 months in the	The mean function (odI change score 0-100) ≤4 months in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus sham (95% CI)
		imprecision	control groups was -2.78	groups was 2.03 lower (8.54 lower to 4.48 higher)
Function (ODI change score 0-100) > 4 months	29 (1 study)	MODERATE[a] due to imprecision	The mean function (ODI change score 0-100) >4 months in the control groups was -1.45	The mean function (ODI change score 0-100) > 4 months in the intervention groups was 1.26 lower (8.44 lower to 5.92 higher)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(b) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 197: Clinical evidence summary: Mixed modality manual therapy versus manipulation/mobilisation in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus manipulation/mobilisation (95% CI)
Pain severity (VAS, 0-10) ≤4 months	93 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS, 0-10) ≤4 months in the control groups was 2.58	The mean pain severity (VAS, 0-10) ≤4 months in the intervention groups was 0.54 lower (1.89 lower to 0.81 higher)
Pain severity (VAS, 0-10) > 4 months	89 (1 study)	LOW[a] due to risk of bias	The mean pain severity (VAS 0-10) > 4 months in the control groups was 2.4	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 0.16 lower (1.1 lower to 0.78 higher)
Function (RMDQ, 0-24) ≤4 months	93 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) <4 months in the control groups was	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 0.69 lower

			4.42	(2.48 lower to 1.1 higher)
Function (RMDQ, 0-24) > 4 months	89 (1 study)	LOW[a] due to risk of bias	The mean function (RMDQ 0-24) > 4 months in the control groups was 4.73	The mean function (RMDQ 0-24)> 4 months in the intervention groups was 0.27 higher (1.48 lower to 2.02 higher)

(a) Downgraded by one increment if the majority of the evidence was at high risk of bias, and downgraded by two increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 198: Clinical evidence summary: Mixed modality manual therapy versus soft tissue technique (massage) in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus soft tissue technique (95% CI)
Pain severity (VAS, 0-10) ≤4 months	97 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was 2.78	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.74 lower (1.38 to 0.1 lower)
Pain severity (VAS, 0-10) > 4 months	96 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) > 4 months in the control groups was 2.99	The mean pain severity (VAS 0-10) > 4 months in the intervention groups was 0.75 lower (1.61 lower to 0.11 higher)
Function (RMDQ, 0-24) ≤4 months	97 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) <4 months in the control groups was 5.8	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was 2.07 lower (3.86 to 0.28 lower)
Function (RMDQ, 0-24)> 4 months	95 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ 0-24) > 4 months in the control groups was 5.06	The mean function (RMDQ 0-24) > 4 months in the intervention groups was 1.5 lower (3.18 lower to 0.18 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 199: Clinical evidence summary: Mixed modality manual therapy versus traction in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus traction (95% CI)
Pain severity (VAS, 0-10) ≤4 months	60 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was 5.9	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 1 lower (1.66 to 0.34 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 200: Clinical evidence summary: Mixed modality manual therapy versus biomechanical exercise in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Mixed modality manual therapy versus biomechanical exercise (95% CI)
Pain severity (Melzak pain score, 0-5) ≤4 months	18 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) <4 months in the control groups was -1	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.5 lower (1.03 lower to 0.03 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

12.3.2.5 Combinations – manual therapy adjunct

Table 201: Clinical evidence summary: Manual therapy (spinal manipulation) + self-management (education) + exercise (aerobic) compared to self-management (education) + exercise (aerobic + McKenzie) for low back pain with sciatica

Outcomes	No of	Quality of the	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	Risk with education + exercise (aerobic + McKenzie)	Risk difference with Manipulation + education + exercise (aerobic) versus self-management (education) + exercise (aerobic + McKenzie) (95% CI)
Pain severity (VAS, 0-10, change score) ≤4 months	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS change score) ≤4 months in the control groups was -2.1	The mean pain severity (VAS change score) - ≤4 months in the intervention groups was 0.9 lower (2.49 lower to 0.69 higher)
Function (ODI, 0-100) ≤4 months	25 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI, 0-100) ≤4 months in the control groups was -9.06	The mean function (ODI, 0-100) ≤4 months in the intervention groups was 2.86 higher (4.44 lower to 10.16 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 202: Clinical evidence summary: Manual therapy (soft tissue techniques – muscular energy technique) + biomechanical exercise (McKenzie) + self-management (unsupervised exercise) compared to biomechanical exercise (McKenzie) + self-management (unsupervised exercise) for low back pain with sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with biomechanical exercise (McKenzie) + self-management (unsupervised exercise)	Risk difference with Manual therapy (soft tissue techniques – muscular energy technique) + biomechanical exercise (McKenzie) + self-management (unsupervised exercise) versus biomechanical exercise (McKenzie) + self-management (unsupervised exercise) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS, 0-10) - ≤4 months in the control groups was 2.1	The mean pain severity (VAS, 0-10) - ≤4 months in the intervention groups was 0.1 lower (0.72 lower to 0.52 higher)

Function (ODI, 0-100) ≤4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI) - ≤4 months in the control groups was 10.5	The mean function (ODI) - ≤4 months in the intervention groups was 0.86 lower (4.12 lower to 2.4 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 203: Clinical evidence summary: Manual therapy (soft tissue techniques – muscular energy technique) + biomechanical exercise (McKenzie) + self-management (unsupervised exercise) compared to standard treatment (TENS + laser + massage) + self-management for low back pain with sciatica

			Anticipated absolute effects	
Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Risk with standard treatment (TENS + laser + massage) + self-management**	**Risk difference with Manual therapy (soft tissue techniques – muscular energy technique) + biomechanical exercise (McKenzie) + self-management (unsupervised exercise) versus standard treatment (TENS + laser + massage) + self-management (95% CI)**
Pain severity (VAS, 0-10) ≤4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS, 0-10) ≤4 months in the control groups was 5.29	The mean pain severity (VAS, 0-10) ≤4 months in the intervention groups was 3.29 lower (4.03 to 2.55 lower)
Function (ODI, 0-100) ≤4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI) ≤4 months in the control groups was 28.36	The mean function (ODI) ≤4 months in the intervention groups was 19.07 lower (24.26 to 13.86 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 204: Clinical evidence summary: manual therapy (soft tissue technique - massage) + self-management (exercise prescription) versus postural therapy (Alexander technique - 6 lessons) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with manual therapy (Soft tissue technique – massage) + self-management (exercise prescription) versus postural therapy (Alexander technique - 6 lessons) (95% CI)
Quality of life (SF-36 physical component summary score, 0-100) >4 months	114 (1 study) 1 year	MODERATE[a] due to risk of bias	The mean Quality of life (SF-36 physical component summary score, 0-100) >4 months in the control groups was 58.14	The mean Quality of life (SF-36 physical component summary score, 0-100) >4 months in the intervention groups was 1.59 higher (7.27 lower to 10.45 higher)
Quality of life (SF-36 mental component summary score, 0-100) >4 months	114 (1 study) 1 year	MODERATE[a] due to risk of bias	The mean Quality of life (SF-36 mental component summary score, 0-100) >4 months in the control groups was 68.9	The mean Quality of life (SF-36 mental component summary score, 0-100) >4 months in the intervention groups was 1.37 lower (9.31 lower to 6.57 higher)
Pain severity (Von Korff pain scale, 0-10) >4months	114 (1 study) 1 year	MODERATE[a] due to risk of bias	The mean pain severity (von Korff pain scale) >4months in the control groups was 4.3	The mean pain severity (von Korff pain scale) >4months in the intervention groups was 0.22 lower (1.19 lower to 0.75 higher)
Function (RMDQ, 0-24) >4 months	114 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ) > 4 months in the control groups was 7.79	The mean function (RMDQ) > 4 months in the intervention groups was 0.93 lower (2.84 lower to 0.98 higher)
Healthcare utilisation (primary care contacts) >4months	114 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean Healthcare utilisation (primary care contacts) >4months in the control groups was 0.48	The mean Healthcare utilisation (primary care contacts) >4months in the intervention groups was 0.16 lower (0.47 lower to 0.15 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with manual therapy (Soft tissue technique – massage) + self-management (exercise prescription) versus postural therapy (Alexander technique - 6 lessons) (95% CI)
Healthcare utilisation (prescriptions) >4months	114 (1 study) 1 year	MODERATE[a] due to risk of bias	The mean Healthcare utilisation (prescriptions) >4months in the control groups was 0.64	The Healthcare utilisation (prescriptions) >4months in the intervention groups was 0.04 lower (0.55 lower to 0.47 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 205: Clinical evidence summary: manual therapy (soft tissue technique - massage) + self-management (exercise prescription) versus Postural therapy (Alexander technique - 24 lessons) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Control	Risk difference with Soft tissue technique + self-management (exercise prescription) versus Alexander technique (24 lessons) (95% CI)
Quality of life (SF-36 physical component summary score, 0-100) >4 months	117 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean Quality of life (SF-36 physical component summary score, 0-100) >4 months in the control groups was 67.93	The mean Quality of life (SF-36 physical component summary score, 0-100) >4 months in the intervention groups was 8.47 lower (17.15 lower to 0.21 higher)
Quality of life (SF-36 mental component summary score, 0-100) >4 months	117 (1 study) 1 year	MODERATE[a] due to risk of bias	The mean Quality of life (SF-36 mental component summary score, 0-100) >4 months in the control groups was	The mean Quality of life (SF-36 mental component summary score, 0-100) >4 months in the intervention groups was 1.01 lower

			68.54	(9.32 lower to 7.3 higher)
Pain severity (Von Korff pain scale, 0-10) >4 months	118 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean pain severity (von Korff pain scale) >4 months in the control groups was 3.4	The mean pain severity (von Korff pain scale) >4 months in the intervention groups was 0.68 higher (0.28 lower to 1.64 higher)
Function (RMDQ, 0-24) >4 months	117 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ) >4 months in the control groups was 5.09	The mean function (RMDQ) >4 months in the intervention groups was 1.77 higher (0.11 lower to 3.65 higher)
Healthcare utilisation (primary care contacts) > 4 months	117 (1 study) 1 year	MODERATE[a] due to risk of bias	The mean Healthcare utilisation (primary care contacts) > 4 months in the control groups was 0.44	The mean Healthcare utilisation (primary care contacts) > 4 months in the intervention groups was 0.12 lower (0.42 lower to 0.18 higher)
Healthcare utilisation (prescriptions) >4 months	93 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean Healthcare utilisation (prescriptions) >4 months in the control groups was 1.07	The mean Healthcare utilisation (prescriptions) >4 months in the intervention groups was 0.49 lower (1.14 lower to 0.16 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 206: Clinical evidence summary: Manual therapy (manipulation) + exercise (biomechanical - McKenzie) compared to exercise (biomechanical - core stability) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (biomechanical - core stability)	Risk difference with Manipulation + exercise (biomechanical - McKenzie) (95% CI)
Function (ODI, 0-100) ≤4 months	86 (1 study) 4 weeks	LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) ≤4 months in the control groups was	The mean function (ODI 0-100) ≤4 months in the intervention groups was 4 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (biomechanical - core stability)	Risk difference with Manipulation + exercise (biomechanical - McKenzie) (95% CI)
			21.9	(11.34 lower to 3.34 higher)
Function (ODI, 0-100) > 4 months	86 (1 study) 1 year	LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) > 4 months in the control groups was 20.5	The mean function (ODI 0-100) > 4 months in the intervention groups was 3.7 lower (11.46 lower to 4.06 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 207: Clinical evidence summary: Manual therapy (Manipulation) + exercise (biomechanical - McKenzie) + compared to exercise (biomechanical – stretching) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with stretching	Risk difference with Manipulation + exercise (McKenzie) + (95% CI)
Function (ODI, 0-100) ≤4 months	77 (1 study) 4 weeks	LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) ≤4 months in the control groups was 20.6	The mean function (ODI 0-100) ≤4 months in the intervention groups was 2.7 lower (10.29 lower to 4.89 higher)
Function (ODI, 0-100) > 4 months	77 (1 study) 12 months	LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) > 4 months in the control groups was 14.8	The mean function (ODI 0-100) - > 4 months in the intervention groups was 2 higher (5.46 lower to 9.46 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 208: Clinical evidence summary: Manual therapy (Manipulation) + exercise (aerobic) compared to exercise (aerobic) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (aerobic)	Risk difference with Manipulation + exercise (aerobic) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	33 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) - ≤4 months in the control groups was 4.29	The mean pain severity (VAS 0-10) - ≤4 months in the intervention groups was 0.9 lower (2.68 lower to 0.88 higher)
Function (Quebec back pain disability scale, 20-100) ≤4 months	33 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (Quebec back pain disability scale) - ≤4 months in the control groups was 42.5	The mean function (Quebec back pain disability scale) - ≤4 months in the intervention groups was 10.7 lower (23.45 lower to 2.05 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 209: Clinical evidence summary: Manual therapy (Manipulation) + exercise (aerobic) compared to exercise (biomechanical) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (biomechanical)	Risk difference with Manipulation + exercise (aerobic) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	33 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) - ≤4 months in the control groups was 3.46	The mean pain severity (VAS 0-10) - ≤4 months in the intervention groups was 0.07 lower (1.64 lower to 1.5 higher)
Function (Quebec back pain disability scale, 20-100) ≤4 months	33 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (Quebec back pain disability scale 0-100) - ≤4 months in the control	The mean function (Quebec back pain disability scale 0-100) - ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (biomechanical)	Risk difference with Manipulation + exercise (aerobic) (95% CI)
			groups was 33.28	1.48 lower (14.26 lower to 11.3 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.

Table 210: Clinical evidence summary: Manual therapy (Manipulation) + exercise (biomechanical) compared to exercise (aerobic) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (aerobic)	Risk difference with Manipulation + exercise (biomechanical) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) - ≤4 months in the control groups was 4.29	The mean pain severity (VAS 0-10) - ≤4 months in the intervention groups was 1.89 lower (3.4 to 0.38 lower)
Function (Quebec back pain disability scale, 20-100) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (Quebec back pain disability scale 0-100) - ≤4 months in the control groups was 42.5	The mean function (Quebec back pain disability scale 0-100) - ≤4 months in the intervention groups was 11.45 lower (23.54 lower to 0.64 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 211: Clinical evidence summary: Manual therapy (Manipulation) + exercise (biomechanical) compared to exercise (biomechanical) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with exercise (biomechanical)	Risk difference with Manipulation + exercise (biomechanical) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) ≤4 months in the control groups was 3.46	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 1.06 lower (2.32 lower to 0.2 higher)
Function (Quebec back pain disability scale, 0-100) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (Quebec back pain disability scale 0-100) ≤4 months in the control groups was 33.28	The mean function (Quebec back pain disability scale 0-100) ≤4 months in the intervention groups was 2.23 lower (14.36 lower to 9.9 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 212: Clinical evidence summary: Manual therapy (Manipulation) + exercise (biomechanical) compared to manual therapy (manipulation) + exercise (aerobic) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with manipulation + exercise (aerobic)	Risk difference with Manipulation + exercise (biomechanical) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	36 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (VAS 0-10) - ≤4 months in the control groups was 3.39	The mean pain severity (VAS 0-10) - ≤4 months in the intervention groups was 0.99 lower (2.52 lower to 0.54 higher)
Function (Quebec back pain disability scale, 0-100) ≤4 months	36 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (Quebec back pain disability scale 0-100) ≤4 months in the control	The mean function (Quebec back pain disability scale 0-100) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with manipulation + exercise (aerobic)	Risk difference with Manipulation + exercise (biomechanical) (95% CI)
			groups was 31.8	0.75 lower (12.99 lower to 11.49 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 213: Clinical evidence summary: Manual therapy (spinal manipulation + soft tissue technique-massage) compared to sham for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with sham	Risk difference with Manipulation + soft tissue techniques - massage (95% CI)
Pain severity (Pain disability index) ≤4 months	106 (1 study) 3 weeks	HIGH	The mean pain severity (pain disability index) - ≤4 months in the control groups was -8.2	The mean pain severity (pain disability index) - ≤4 months in the intervention groups was 0.6 lower (4.26 lower to 3.06 higher)
Function (RMDQ, 0-24) ≤4 months	106 (1 study) 3 weeks	MODERATE[a] due to imprecision	The mean function (RMDQ, 0-24) ≤4 months in the control groups was -2.1	The mean function (RMDQ, 0-24) ≤4 months in the intervention groups was 0.5 higher (0.74 lower to 1.74 higher)

(a) Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs.

Table 214: Manual therapy (manipulation/mobilisation) + self-management (home exercise) compared to self-management (home exercise) + exercise for low back pain with or without sciatica (mixed population)

Outcomes	No of	Quality of the	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	Risk with home exercise + exercise	Risk difference with Manual therapy + home exercise (95% CI)
Pain severity (0-100 VAS converted to 0-10) ≤4 months	48 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (0-100 VAS converted to 0-10) - <4 months in the control groups was 2.2	The mean pain severity (0-100 VAS converted to 0-10) - ≤4 months in the intervention groups was 1.7 higher (0.55 to 2.85 higher)
Pain severity (0-100 VAS converted to 0-10) > 4 months	49 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (0-100 VAS converted to 0-10) - >4 months in the control groups was 2.1	The mean pain severity (0-100 VAS converted to 0-10) - > > 4 months in the intervention groups was 1.4 higher (0.26 to 2.54 higher)
Function (ODI, 0-100) ≤4 months	48 (1 study)	MODERATE[a] due to risk of bias	The mean function (ODI 0-100) <4 months in the control groups was 18	The mean function (ODI 0-100) - ≤4 months in the intervention groups was 12 higher (4.5 to 19.5 higher)
Function (ODI, 0-100) > 4 months	49 (1 study)	MODERATE[a] due to risk of bias	The mean function (ODI 0-100) - >4 months in the control groups was 17	The mean function (ODI 0-100) - > > 4 months in the intervention groups was 9 higher (1.19 to 16.81 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 215: Manual therapy (traction) + physical (infra-red) + exercise (biomechanical–stretching) compared to physical (infra-red) + exercise (biomechanical – stretching) for low back pain with or without sciatica (mixed population)

Outcomes	No of	Quality of the	Relative	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	effect (95% CI)	Risk with infra-red + stretch	Risk difference with Traction + infra-red + stretch (95% CI)
Pain severity (NRS 0-10) - ≤4 months	71 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (NRS 0-10) <4 months in the control groups was 3.5	The mean pain severity (NRS 0-10) - ≤4 months in the intervention groups was 0.3 lower (0.91 lower to 0.31 higher)
Pain severity (NRS 0-10) > 4 months	67 (1 study)	LOW[a] due to risk of bias		The mean pain severity (NRS 0-10) >4 months in the control groups was 3.5	The mean pain severity (NRS 0-10) > 4 months in the intervention groups was 0.9 lower (1.45 to 0.35 lower)
Function (ODI, 0-100) - ≤4 months	71 (1 study)	LOW[a] due to risk of bias		The mean function (ODI 0-100) - <4 months in the control groups was 23.4	The mean function (ODI 0-100) ≤4 months in the intervention groups was 1.6 lower (3.11 to 0.09 lower)
Function (ODI, 0-100) > 4 months	67 (1 study)	LOW[a] due to risk of bias		The mean function (ODI 0-100) >4 months in the control groups was 27.1	The mean function (ODI 0-100) > 4 months in the intervention groups was 3.3 lower (4.66 to 1.94 lower)
Healthcare utilisation (Medication use) ≤4 months	71 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.79 (0.36 to 1.73)	Moderate	
				297 per 1000	62 fewer per 1000 (from 190 fewer to 217 more)
Healthcare utilisation (Medication use) > 4 months	68 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.66 (0.24 to 1.82)	Moderate	
				229 per 1000	78 fewer per 1000 (from 174 fewer to 187 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 216: Manual therapy (Manipulation) + electrotherapy (interferential) compared to electrotherapy (interferential) for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with interferential	Risk difference with Manipulation + interferential (95% CI)
Quality of life (EQ-5D, 0-1) ≤4 months	131 (1 study)	MODERATE[a] due to risk of bias	The mean quality of life (eq-5d) <4 months in the control groups was 0.16	The mean quality of life (eq-5d) ≤4 months in the intervention groups was 0.01 lower (0.15 lower to 0.13 higher)
Quality of life (EQ-5D, 0-1) > 4 months	106 (1 study)	LOW[a,b] due to risk of bias, imprecision	The mean quality of life (eq-5d) >4 months in the control groups was 0.2	The mean quality of life (eq-5d) > 4 months in the intervention groups was 0.05 higher (0.06 lower to 0.16 higher)
Quality of life (SF-36 Physical functioning, 0-100) - ≤4 months:	131 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: physical functioning in the control groups was 10.62	The mean SF-36 (0-100) - ≤4 months: physical functioning in the intervention groups was 3.69 higher (3.56 lower to 10.94 higher)
Quality of life (SF-36 Physical functioning, 0-100) > 4 months	106 (1 study)	MODERATE[a] due to risk of bias	The mean SF-36 (0-100) - >4 months: physical functioning in the control groups was 11.71	The mean SF-36 (0-100) - > 4 months: physical functioning in the intervention groups was 9.69 higher (0.32 to 19.06 higher)
Quality of life (SF-36 Role physical, 0-100) ≤4 months	131 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: role physical in the control groups was 31.37	The mean SF-36 (0-100) - ≤4 months: role physical in the intervention groups was 1.36 lower (15.64 lower to 12.92 higher)

Quality of life (SF-36 Role physical, 0-100) > 4 months	106 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - >4 months: role physical in the control groups was 37.7	The mean SF-36 (0-100) - > 4 months: role physical in the intervention groups was 11.4 higher (6.1 lower to 28.9 higher)
Quality of life (SF-36 Bodily pain, 0-100) ≤4 months	131 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: bodily pain in the control groups was 22.68	The mean SF-36 (0-100) - ≤4 months: bodily pain in the intervention groups was 0.48 lower (8.33 lower to 7.37 higher)
Quality of life (SF-36 Bodily pain, 0-100) > 4 months	106 (1 study)	VERY LOW[a] due to risk of bias, imprecision	The mean SF-36 (0-100) - >4 months: bodily pain in the control groups was 30.4	The mean SF-36 (0-100) - > 4 months: bodily pain in the intervention groups was 6 higher (3.8 lower to 15.8 higher)
Quality of life (SF-36 General health, 0-100) ≤4 months	131 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: general health in the control groups was -0.87	The mean SF-36 (0-100) - ≤4 months: general health in the intervention groups was 1.89 higher (3.87 lower to 7.65 higher)
Quality of life (SF-General health, 0-100) > 4 months	106 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - >4 months: general health in the control groups was -2.69	The mean SF-36 (0-100) - > 4 months: general health in the intervention groups was 3.43 higher (4.21 lower to 11.07 higher)
Quality of life (SF-36 Vitality, 0-100) ≤4 months	131 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: vitality in the control groups was 6.32	The mean SF-36 (0-100) - ≤4 months: vitality in the intervention groups was 0.89 higher (5.72 lower to 7.5 higher)
Quality of life (SF-36 Vitality, 0-100) > 4 months	106 (1 study)	LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - >4 months: vitality in the control groups was 9.4	The mean SF-36 (0-100) - > 4 months: vitality in the intervention groups was 7 higher (0.89 lower to 14.89 higher)
Quality of life (SF-36 Social functioning, 0-100) ≤4 months	131	VERY LOW[a,b]	The mean SF-36 (0-100) - <4	The mean SF-36 (0-100) - ≤4 months:

	(1 study)	due to risk of bias, imprecision	months: social functioning in the control groups was 12.51	social functioning in the intervention groups was 2.88 higher (5.96 lower to 11.72 higher)
Quality of life (SF-36 Social functioning, 0-100) > 4 months	106 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - >4 months: social functioning in the control groups was 16.1	The mean SF-36 (0-100) - > 4 months: social functioning in the intervention groups was 8.1 higher (5.44 lower to 21.64 higher)
Quality of life (SF-36 Role emotional, 0-100) ≤4 months	131 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: role emotional in the control groups was 18.03	The mean SF-36 (0-100) - ≤4 months: role emotional in the intervention groups was 4.02 higher (10.94 lower to 18.98 higher)
Quality of life (SF-36 Role emotional, 0-100) > 4 months	106 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - >4 months: role emotional in the control groups was 18.7	The mean SF-36 (0-100) - > 4 months: role emotional in the intervention groups was 10.8 higher (4.34 lower to 25.94 higher)
Quality of life (SF-36 Mental health domain, 0-100) ≤4 months	131 (1 study)	LOW[a,b] due to risk of bias, imprecision	The mean SF-36 (0-100) - <4 months: mental health domain in the control groups was 1.54	The mean SF-36 (0-100) - ≤4 months: mental health domain in the intervention groups was 4.81 higher (0.78 lower to 10.4 higher)
Quality of life (SF-36 Mental health domain, 0-100) > 4 months	106 (1 study)	MODERATE[a] due to risk of bias	The mean SF-36 (0-100) - >4 months: mental health domain in the control groups was 0.84	The mean SF-36 (0-100) - > 4 months: mental health domain in the intervention groups was 9.46 higher (2.53 to 16.39 higher)
Pain severity (0-100 VAS converted to 0-10) ≤4 months	131 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (0-100 VAS converted to 0-10) - <4 months in the control groups was -2.138	The mean pain severity (0-100 VAS converted to 0-10) - ≤4 months in the intervention groups was 0.33 lower (1.2 lower to 0.54 higher)

Pain severity (0-100 VAS converted to 0-10) > 4 months	106 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (0-100 VAS converted to 0-10) - >4 months in the control groups was -2.65	The mean pain severity (0-100 VAS converted to 0-10) - > 4 months in the intervention groups was 0.08 higher (0.97 lower to 1.13 higher)
Pain severity (McGill Pain Rating Index, range not stated) ≤4 months	131 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (McGill pain rating index (range not stated)) <4 months in the control groups was -5.87	The mean pain severity (McGill pain rating index (range not stated)) ≤4 months in the intervention groups was 0.77 lower (4.41 lower to 2.87 higher)
Pain severity (McGill Pain Rating Index, range not stated) > 4 months	106 (1 study)	MODERATE[a] due to risk of bias	The mean pain severity (McGill pain rating index (range not stated)) >4 months in the control groups was -8.32	The mean pain severity (McGill pain rating index (range not stated)) > 4 months in the intervention groups was 0.9 lower (5.21 lower to 3.41 higher)
Function (RMDQ, 0-24) ≤4 months	131 (1 study)	LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ, 0-24) - <4 months in the control groups was -3.56	The mean function (RMDQ, 0-24) - ≤4 months in the intervention groups was 1.09 lower (2.75 lower to 0.57 higher)
Function (RMDQ, 0-24) > 4 months	106 (1 study)	LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ, 0-24) - >4 months in the control groups was -4.9	The mean function (RMDQ, 0-24) - > 4 months in the intervention groups was 1.6 lower (3.51 lower to 0.31 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 217: Manual therapy (manipulation) + exercise (strength) compared to exercise (strength) for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (strength)	Risk difference with Manipulation + exercise (strength) (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (strength)	Risk difference with Manipulation + exercise (strength) (95% CI)
Medication use - >4 months	92 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.61 (0.39 to 0.94)	Moderate	
				600 per 1000	234 fewer per 1000 (from 36 fewer to 366 fewer)
Function (ODI 0-100) >4 months	92 (1 study)	LOW[a] due to risk of bias			The mean function (ODI 0-100) >4 months in the intervention groups was 10.3 higher (4.3 to 16.3 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 218: Manual therapy (manipulation) + exercise (strength) compared to pharmacological (NSAIDs) + exercise (strength) for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with NSAIDs + exercise (strength)	Risk difference with Manipulation + exercise (strength) (95% CI)
Pain severity (11-box scale 0-10) - ≤4 months	96 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (11-box scale 0-10) - <4 months in the control groups was 3.5	The mean pain severity (11-box scale 0-10) - ≤4 months in the intervention groups was 0.8 lower (1.66 lower to 0.06 higher)
Function (RMDQ, 0-24) ≤4 months	96 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (RMDQ, 0-24) <4 months in the control groups was 20.9	The mean function (RMDQ, 0-24) ≤4 months in the intervention groups was 5.8 lower (12.77 lower to 1.17 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 219: Manual therapy (manipulation) + exercise (stretch) compared to pharmacological (NSAID) + exercise (strength) for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with NSAID + exercise (strength)	Risk difference with Manipulation + exercise (stretch) (95% CI)
Pain severity (11-box scale 0-10) ≤4 months	76 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (11-box scale 0-10) <4 months in the control groups was 3.5	The mean pain severity (11-box scale 0-10) ≤4 months in the intervention groups was 0.2 lower (1.21 lower to 0.81 higher)
Function (RMDQ, 0-24) ≤4 months	76 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean Function (RMDQ, 0-24) <4 months in the control groups was 20.9	The mean Function (RMDQ, 0-24) - ≤4 months in the intervention groups was 2.5 lower (10.18 lower to 5.18 higher)

(a) a Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 220: Mixed modality manual therapy + self-management compared to self-management for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + self-management (95% CI)
Quality of life (SF-36 Physical component summary score, 0-100) ≤4 months	486 (1 study)	LOW[a] due to risk of bias		The mean SF-36 (physical component summary score 0-100) - <4 months: in the control groups was 44.04	The mean SF-36 (physical component summary score 0-100) ≤4 months: in the intervention groups was 2.52 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + self-management (95% CI)
					(1.23 to 3.81 higher)
Quality of life (SF-36 Physical component summary score, 0-100) > 4 months	473 (1 study)	LOW[a] due to risk of bias		The mean SF-36 (physical component summary score 0-100) - >4 months: in the control groups was 42.5	The mean SF-36 (physical component summary score 0-100) > 4 months - physical component summary score in the intervention groups was 1.68 higher (0.08 to 3.28 higher)
Quality of life (SF-36 Mental component summary score, 0-100) ≤4 months	486 (1 study)	LOW[a] due to risk of bias		The mean SF-36 (0-100) - <4 months: mental component summary score in the control groups was 46.77	The mean SF-36 (0-100) - ≤4 months: mental component summary score in the intervention groups was 2.87 higher (1.26 to 4.48 higher)
Quality of life (SF-36 Mental component summary score, 0- 100) > 4 months:	473 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: mental component summary score in the control groups was 46.41	The mean SF-36 (0-100) - > 4 months: mental component summary score in the intervention groups was 1.68 higher (0.32 lower to 3.68 higher)
Quality of life (EQ-5D, 0-10) ≤4 months	688 (1 study)	LOW[a] due to risk of bias		The mean quality of life (EQ-5D 0-10) <4 months in the control groups was 0.626	The mean quality of life (EQ-5D 0-10) - ≤4 months in the intervention groups was 0.05 higher (0.01 to 0.09 higher)
Quality of life (EQ-5D, 0-10) > 4 months	688 (1 study)	LOW[a] due to risk of bias		The mean quality of life (EQ-5D 0-10) >4 months in the control groups was	The mean quality of life (EQ-5D 0-10) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + self-management (95% CI)
				0.629	0.04 higher (0.01 to 0.08 higher)
Pain severity (Modified Von Korff scale 0-100, converted to 0-10) ≤4 months	514 (1 study)	LOW[a] due to risk of bias		The mean pain severity (modified von Korff scale 0-100 converted to 0-10) - ≤4 months in the control groups was 4.959	The mean pain severity (modified von Korff scale 0-100 converted to 0-10) - ≤4 months in the intervention groups was 0.87 lower (1.3 to 0.44 lower)
Pain severity (Modified Von Korff scale, 0-100 converted to 0-10) > 4 months	499 (1 study)	LOW[a] due to risk of bias		The mean pain severity (modified von Korff scale 0-100 converted to 0-10) >4 months in the control groups was 4.756	The mean pain severity (modified von Korff scale 0-100 converted to 0-10) > 4 months in the intervention groups was 0.59 lower (1.04 to 0.13 lower)
Function (RMDQ, 0-24) - ≤4 months	543 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ 0-24) <4 months in the control groups was 6.66	The mean function (RMDQ 0-24) <4 months in the intervention groups was 1.57 lower (2.37 to 0.77 lower)
Function (RMDQ, 0-24) > 4 months	521 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ 0-24) >4 months in the control groups was 6.16	The mean function (RMDQ 0-24) >4 months in the intervention groups was 1.01 lower (1.84 to 0.18 lower)
Function (Modified Von Korff scale, 0-100 converted to 0-10) ≤4 months	514 (1 study)	LOW[a] due to risk of bias		The mean function (Modified Von Korff scale 0-100 converted to 0-10) <4 months in the control groups was	The mean function (Modified Von Korff scale 0-100 converted to 0-10) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + self-management (95% CI)
				3.511	0.4 lower (0.83 lower to 0.03 higher)
Function (Modified Von Korff scale, 0-100 converted to 0-10) > 4 months	497 (1 study)	LOW[a] due to risk of bias		The mean Function (Modified Von Korff scale 0-100 converted to 0-10) >4 months in the control groups was 3.55	The mean Function (Modified Von Korff scale 0-100 converted to 0-10) > 4 months in the intervention groups was 0.57 lower (0.99 to 0.14 lower)
Responder criteria (≥30% improvement in RMDQ) ≤4 months	480 (1 study)	LOW[a] due to risk of bias	RR 1.47 (1.27 to 1.70)	Moderate	
				46 per 1000	221 more per 1000 (from 123 more to 333 more)
Responder criteria (≥30% improvement in RMDQ) > 4 months	480 (1 study)	VERY LOW[a,b] due to risk of bias and imprecision	RR 1.21 (1.06 to 1.39)	Moderate	
				560 per 1000j	118 more per 1000 (from 34 more to 219 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 221: Mixed modality manual therapy + exercise (biomechanical) + self-management compared to self-management for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + cognitive behavioural approaches + exercise + self-management (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + cognitive behavioural approaches + exercise + self-management (95% CI)
Pain severity (modified Von Korff 0-100, converted to 0-10 scale) ≤4 months	485 (1 study)	LOW[a] due to risk of bias		The mean Pain severity (modified Von Korff 0-100 converted to 0-10 scale) <4 months in the control groups was 4.896	The mean pain severity (modified von Korff 0-100 converted to 0-10 scale) - ≤4 months in the intervention groups was 0.82 lower (1.26 to 0.38 lower)
Pain (modified Von Korff 0-100, converted to 0-10 scale) > 4 months	480 (1 study)	LOW[a] due to risk of bias		The mean Pain severity (modified Von Korff 0-100 converted to 0-10 scale) >4 months in the control groups was 4.639	The mean pain severity (modified von Korff 0-100 converted to 0-10 scale) - > 4 months in the intervention groups was 0.67 lower (1.13 to 0.21 lower)
Quality of life (SF-36 Physical component summary score, 0-100) ≤4 months	458 (1 study)	LOW[a] due to risk of bias		The mean SF-36 (0-100) - <4 months: physical component summary score in the control groups was 43.91	The mean SF-36 (0-100) - ≤4 months: physical component summary score in the intervention groups was 2.55 higher (1.22 to 3.88 higher)
Quality of life (SF-36 Physical component summary score, 0-100) >4 months	442 (1 study)	LOW[a] due to risk of bias		The mean SF-36 (0-100) - >4 months: physical component summary score in the control groups was 42.58	The mean SF-36 (0-100) - > 4 months: physical component summary score in the intervention groups was 2.53 higher (0.78 to 4.28 higher)
Quality of life (SF-36 Mental component summary score, 0-100) ≤4 months	458 (1 study)	LOW[a] due to risk of bias		The mean SF-36 (0-100) - <4 months: mental component summary score in the control groups was	The mean SF-36 (0-100) - ≤4 months: mental component summary score in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + cognitive behavioural approaches + exercise + self-management (95% CI)
				46.59	2.3 higher (0.68 to 3.92 higher)
Quality of life (SF-36 Mental component summary score, 0-100) >4 months	442 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: mental component summary score in the control groups was 46.71	The mean SF-36 (0-100) - > 4 months: mental component summary score in the intervention groups was 1.3 higher (0.75 lower to 3.35 higher)
Quality of life (EQ-5D, 0-10) ≤4 months	648 (1 study)	LOW[a] due to risk of bias		The mean eq-5d (0-10) ≤4 months <4 months in the control groups was 0.626	The mean eq-5d (0-10) ≤4 months in the intervention groups was 0.03 higher (0.00 to 0.07 higher)
Quality of life (EQ-5D, 0-10) > 4 months	648 (1 study)	LOW[a] due to risk of bias		The mean quality of life (eq5d) >4 months in the control groups was 0.639	The mean eq-5d (0-10) - ≤4 months in the intervention groups was 0.05 higher (0.00 to 0.10 higher)
Function (RMDQ, 0-24) ≤4 months	514 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) <4 months in the control groups was 36.71	The mean function (RMDQ, 0-24- ≤4 months in the intervention groups was 1.87 lower (2.65 to 1.09 lower)
Function (RMDQ, 0-24) > 4 months	505 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) >4 months in the control groups was 6.02	The mean function (RMDQ, 0-24) >4 months in the intervention groups was 1.3 lower (2.12 to 0.48 lower)
Function (modified Von Korff 0-100 converted to 0-10	485	LOW[a]		The mean function (modified	The mean function (modified von

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with Manipulation + cognitive behavioural approaches + exercise + self-management (95% CI)
scale) - ≤4 months	(1 study)	due to risk of bias		von Korff 0-100 converted to 0-10 scale) <4 months in the control groups was 3.456	Korff 0-100 converted to 0-10 scale) - ≤4 months in the intervention groups was 0.55 lower (0.97 to 0.14 lower)
Function (modified Von Korff 0-100 converted to 0-10 scale) > 4 months	481 (1 study)	LOW[a] due to risk of bias		The mean function (modified von Korff 0-100 converted to 0-10 scale) >4 months in the control groups was 3.48	The mean function (modified von Korff 0-100 converted to 0-10 scale) > 4 months in the intervention groups was 0.67 lower (1.11 to 0.23 lower)
Responder criteria (≥30% improvement in RMDQ) ≤4 months	480 (1 study)	LOW[a] due to risk of bias	RR 1.45 (1.25 to 1.68)	Moderate	
				490 per 1000	221 more per 1000 (from 123 more to 333 more)
Responder criteria (≥30% improvement in RMDQ) > 4 months	480 (1 study)	VERY LOW[a,b] due to risk of bias and imprecision	RR 1.31 (1.14 to 1.49)	Moderate	
				560 per 1000	174 more per 1000 (from 78 more to 275 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 222: Mixed modality manual therapy + exercise (biomechanical) compared to exercise (biomechanical) + self-management for low back pain with or without sciatica (mixed population)

Outcomes	No of	Quality of	Anticipated absolute effects

	Participants (studies) Follow up	the evidence (GRADE)	Risk with self management + manual therapy	Risk difference with Exercise + self management (95% CI)
Function (RMDQ 0-24) - < 4 months	512 (1 study)	LOW[a] due to risk of bias	The mean function (rmdq 0-24) - < 4 months in the control groups was 5.47	The mean function (rmdq 0-24) - < 4 months in the intervention groups was 0.38 lower (1.17 lower to 0.41 higher)
Function (RMDQ 0-24) - > 4 months	489 (1 study)	LOW[a] due to risk of bias	The mean function (rmdq 0-24) - > 4 months in the control groups was 5.74	The mean function (rmdq 0-24) - > 4 months in the intervention groups was 0.59 lower (1.42 lower to 0.24 higher)
Pain (Von Korff 0-10) - < 4 months	479 (1 study)	LOW[a] due to risk of bias	The mean pain (von korff 0-10) - < 4 months in the control groups was 4.47	The mean pain (von korff 0-10) - < 4 months in the intervention groups was 0.38 lower (0.83 lower to 0.06 higher)
Pain (Von Korff 0-10) - > 4 months	464 (1 study)	LOW[a] due to risk of bias	The mean pain (von korff 0-10) - > 4 months in the control groups was 4.15	The mean pain (von korff 0-10) - > 4 months in the intervention groups was 0.01 higher (0.46 lower to 0.49 higher)
Quality of life (SF36 0-100) - < 4 months: Physical component	450 (1 study)	LOW[a] due to risk of bias	The mean quality of life (sf36 0-100) - < 4 months: physical component in the control groups was 46.35	The mean quality of life (sf36 0-100) - < 4 months: physical component in the intervention groups was 0.21 higher (1.08 lower to 1.5 higher)
Quality of life (SF36 0-100) - > 4 months: Physical component	446 (1 study)	LOW[a] due to risk of bias	The mean quality of life (sf36 0-100) - > 4 months: physical component in the control groups was 44.39	The mean quality of life (sf36 0-100) - > 4 months: physical component in the intervention groups was 0.21 lower (1.85 lower to 1.43 higher)
Quality of life (SF36 0-100) - < 4 months: Mental component	450 (1 study)	LOW[a] due to risk of bias	The mean quality of life (sf36 0-100) - < 4 months: mental component in the control groups was 47.24	The mean quality of life (sf36 0-100) - < 4 months: mental component in the intervention groups was 2.4 higher (0.69 to 4.11 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with self management + manual therapy	Risk difference with Exercise + self management (95% CI)
Quality of life (SF36 0-100) - > 4 months: Mental component	446 (1 study)	LOW[a] due to risk of bias	The mean quality of life (sf36 0-100) - > 4 months: mental component in the control groups was 46.77	The mean quality of life (sf36 0-100) - > 4 months: mental component in the intervention groups was 1.32 higher (0.77 lower to 3.41 higher)
Function (Von Korff 0-10) - < 4 months	480 (1 study)	LOW[a] due to risk of bias	The mean function (von korff 0-10) - < 4 months in the control groups was 2.973	The mean function (von korff 0-10) - < 4 months in the intervention groups was 0.14 higher (0.29 lower to 0.57 higher)
Function (Von Korff 0-10) - > 4 months	464 (1 study)	LOW[a] due to risk of bias	The mean function (von korff 0-10) - > 4 months in the control groups was 2.973	The mean function (von korff 0-10) - > 4 months in the intervention groups was 0.01 higher (0.43 lower to 0.45 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 223: Manual therapy (manipulation/mobilisation) + exercise (biomechanical) + self-management compared to self-management for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with self-management	Risk difference with Manipulation + exercise (biomechanical) + self-management (95% CI)
Quality of life (15D 0 to 1) > 4 months	130 (1 study)	LOW[a] due to risk of bias	The mean quality of life (15d 0 to 1) >4 months in the control groups was 0.9	The mean quality of life (15d 0 to 1) - > 4 months in the intervention groups was 0.01 lower (0.03 lower to 0.01 higher)
Pain severity (0-100 VAS converted to 0-10) > 4 months	196 (1 study)	VERY LOW[a,b] due to risk of bias,	The mean pain severity (0-100 VAS converted to 0-10) - >4 months in the control groups	The mean pain severity (0-100 VAS converted to 0-10) - > 4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with self-management	Risk difference with Manipulation + exercise (biomechanical) + self-management (95% CI)
		imprecision	was 3.22	0.65 lower (1.3 lower to 0 higher)
Function (ODI, 0-100) > 4 months	196 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI 0-100) - >4 months in the control groups was 16.5	The mean function (ODI 0-100) - > 4 months in the intervention groups was 2.8 lower (6.05 lower to 0.45 higher)
Healthcare utilisation (Visits to physicians) > 4 months	196 (1 study)	LOW[a] due to risk of bias	The mean visits to physicians - >4 months in the control groups was 2.4	The mean visits to physicians - > 4 months in the intervention groups was 0.3 lower (1.13 lower to 0.53 higher)
Healthcare utilisation (Visits to physiotherapy or other therapies) > 4 months	196 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean visits to physiotherapy or other therapies - >4 months in the control groups was 6	The mean visits to physiotherapy or other therapies - > 4 months in the intervention groups was 1.6 higher (0.5 lower to 3.7 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 224: Mixed modality manual therapy (spinal manipulation plus soft tissue technique-massage) + exercise (biomechanical) + self-management compared to exercise (McKenzie) + self-management for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (McKenzie) + self-management	Risk difference with Manipulation + massage + exercise (biomechanical) + self-management (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (McKenzie) + self-management	Risk difference with Manipulation + massage + exercise (biomechanical) + self-management (95% CI)
Pain severity (back and leg pain 0-60) ≤4 months	329 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (back and leg pain 0-60) - <4 months in the control groups was 14.4	The mean pain severity (back and leg pain 0-60) - ≤4 months in the intervention groups was 1.4 lower (4.14 lower to 1.34 higher)
Pain severity (back and leg pain 0-60) > 4 months	324 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (back and leg pain 0-60) - >4 months in the control groups was 15	The mean pain severity (back and leg pain 0-60) - > 4 months in the intervention groups was 2.8 lower (5.77 lower to 0.17 higher)
Function (RMDQ, 0-24) ≤4 months	329 (1 study)	MODERATE[a] due to risk of bias		The mean function (RMDQ, 0-24) <4 months in the control groups was 6.7	The mean function (RMDQ, 0-24) ≤4 months in the intervention groups was 1.5 lower (2.76 to 0.24 lower)
Function (RMDQ, 0-24) > 4 months	324 (1 study)	MODERATE[a] due to risk of bias		The function (RMDQ, 0-24) >4 months in the control groups was 7.1	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was 1.5 lower (2.87 to 0.13 lower)
Healthcare utilisation (Contact with healthcare in previous 2 months) ≤4 months	330 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.24 (0.95 to 1.62)	Moderate	
				353 per 1000	85 more per 1000 (from 18 fewer to 219 more)
Healthcare utilisation (Contact with healthcare in previous 2 months) > 4 months	325 (1 study)	MODERATE[a] due to risk of bias	RR 1.02 (0.83 to 1.24)	Moderate	
				537 per 1000	11 more per 1000 (from 91 fewer to 129 more)
"Success" (decrease 5 points or absolute score below 5	329	MODERATE[a]	RR 0.83	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (McKenzie) + self-management	Risk difference with Manipulation + massage + exercise (biomechanical) + self-management (95% CI)
points on RMDQ) ≤4 months	(1 study)	due to risk of bias	(0.7 to 0.97)	714 per 1000	121 fewer per 1000 (from 21 fewer to 214 fewer)
"Success" (decrease 5 points or absolute score below 5 points on RMDQ) > 4 months	324 (1 study)	MODERATE[a] due to risk of bias	RR 0.88 (0.75 to 1.03)	Moderate	
				702 per 1000	84 fewer per 1000 (from 175 fewer to 21 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 225: Manual therapy (manipulation) + self-management (education + advice to stay active) + exercise compared to exercise + self-management (education + advice to stay active) for low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with education + exercise + self-management	Risk difference with Manipulation + education + exercise + self-management (95% CI)
Pain severity (0-100 VAS converted to 0-10) - ≤4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean pain severity (0-100 VAS converted to 0-10) - <4 months in the control groups was 2.48	The mean pain severity (0-100 VAS converted to 0-10) - ≤4 months in the intervention groups was 0.58 lower (1.49 lower to 0.33 higher)
Function (ODI, 0-100) - ≤4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	The mean function (ODI) - <4 months in the control groups was 14	The mean function (ODI) - ≤4 months in the intervention groups was 0 higher (7.25 lower to 7.25 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 226: Manual therapy (manipulation) + self-management (advice) + pharmacological therapy (NSAIDs) compared to usual care for acute low back pain with or without sciatica (mixed population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Anticipated absolute effects	
			Risk with Usual care	Risk difference with Manipulation + self-management + NSAIDS (95% CI)
Function (RMDQ change score, 0-24) < 4 months	72 (1 study) 16 weeks	MODERATE[a] due to imprecision	The mean function (RMDQ, 0-24 change score) < 4 months in the control groups was 0.04	The mean function (RMDQ, 0-24 change score) < 4 months in the intervention groups was 2.54 lower (4.37 to 0.71 lower)
Function (RMDQ change score, 0-24) > 4 months	71 (1 study) 24 weeks	MODERATE[a] due to imprecision	The mean function (RMDQ, 0-24 change score) > 4 months in the control groups was 0.06	The mean function (RMDQ, 0-24 change score) > 4 months in the intervention groups was 2.58 lower (4.41 to 0.75 lower)
Quality of life (SF-36 Bodily Pain change score, 0-100) < 4 months	72 (1 study) 16 weeks	LOW[a] due to imprecision	The mean quality of life (SF-36 bodily pain change score) < 4 months in the control groups was 6.55	The mean quality of life (SF-36 bodily pain change score) < 4 months in the intervention groups was 1.83 higher (3.54 lower to 7.2 higher)
Quality of life (SF-36 Physical Function change score, 0-100) < 4 months	72 (1 study) 16 weeks	MODERATE[a] due to imprecision	The mean quality of life (SF-36 Physical Function change score, 0-100)< 4 months in the control groups was 7.41	The mean quality of life (SF-36 Physical Function change score, 0-100)< 4 months in the intervention groups was 4.77 higher (1.96 lower to 11.5 higher)
Quality of life (SF-36 Bodily Pain change score, 0-100) > 4 months	71 (1 study) 24 weeks	MODERATE[a] due to imprecision	The mean Quality of life (SF-36 Bodily Pain change score, 0-100) > 4 months in the control groups was	The mean Quality of life (SF-36 Bodily Pain change score, 0-100) > 4 months in the intervention groups was 3.38 higher

			4.71	(1.99 lower to 8.75 higher)
Quality of life (SF-36 Physical Function change score, 0-100) > 4 months	71 (1 study) 24 weeks	LOW[a] due to imprecision	The mean Quality of life (SF-36 Physical Function change score, 0-100) > 4 months in the control groups was 11.67	The mean Quality of life (SF-36 Physical Function change score, 0-100) > 4 months in the intervention groups was 3 lower (9.73 lower to 3.73 higher)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

12.4 Economic evidence

Published literature

One economic evaluation was identified that included **soft tissue techniques** as a comparator and has been included in this review.[225] This is summarised in the economic evidence profile below (**Table 227**) and the economic evidence table in Appendix I. This was a within-trial analysis of the ATEAM RCT also included in the clinical review.[310] The analysis included eight comparators with combinations of usual care, self-management (unsupervised exercise - exercise prescription), manual therapy (soft tissue techniques – massage) sessions and Alexander technique lessons. Results are summarised here for the soft tissue technique comparator as an adjunct to other care only. Other comparators are presented as part of the relevant sections of the non-invasive interventions review. The full incremental analysis including all comparators in the study is presented in **Table 228** below.

One economic evaluation was identified that included **manipulation/mobilisation** as a comparator and has been included in this review.[516] This is summarised in the economic evidence profile below (**Table 229**) and the economic evidence table in Appendix I.

One economic evaluation was identified that compared manipulation/mobilisation in combination with biomechanical exercise and self-management compared to self-management alone (Niemisto 2003[388]/Niemisto 2005[387]). In addition, two economic evaluations were identified that included **mixed manual therapy** – one includes mixed manual therapy in combination with self-management and in combination with both self-management and biomechanical exercise compared to self-management alone and a combination of self-management and biomechanical exercise (Beam 2004[498]) and the other looks at biomechanical exercise, a combination of mixed manual therapy and self-management, and an MBR programme.[94] These are summarised in the economic evidence profile below (**Table 230** and **Table 231**) and the economic evidence table in Appendix I.

No relevant economic evaluations were identified that included **traction** or **mixed modality manual therapy** as a comparator.

One economic evaluation relating to soft tissue techniques, four relating to manipulation/mobilisation and one relating to mixed modality manual therapy were identified but excluded due to limited applicability.[74,85,91,208,284,444] One economic analysis (with two publications) relating to traction was identified but excluded due to serious methodological limitations.[140,302] A further two economic evaluations relating to manipulation/mobilisation were identified but selectively excluded due to a combination of limited applicability and methodological limitations.[96,150] These are listed in Appendix M, with reasons for exclusion given.

One economic evaluation was identified that included manipulation/mobilisation as a comparator but compared to injection therapies.[405] This study was therefore considered as part of the injection therapy review as per the protocol.

See also the economic article selection flow chart in Appendix F.

Table 227: Economic evidence profile: soft-tissue techniques – usual care comparisons only

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Hollinghurst 2008[225] (UK)	Partially applicable (a)	Potentially serious limitations (b)	• Within-RCT analysis (ATEAM[310]) • Population: low back pain (without sciatica) (3 months or more) • In this comparison: 1. Usual care (UC) 2. UC + soft tissue techniques (massage) (STT) • Follow-up: 1 year	Groups that did not receive exercise prescription			
				2 v 1: £204 (c)	2 v 1: -0.01 QALYs	Massage dominated by usual care (higher cost and worse health outcome)	Probability cost effective (£5K) ~30%
				Groups that received exercise prescription			
				2 versus 1: £113 (c)	2 versus 1: 0.02 QALYs	2 versus 1: £5304 per QALY	Probability cost effective (£5K) >90%
				Combined groups with and without exercise prescription			
				2 versus 1: £158 (c)	2 versus 1: 0.015 QALYs	2 versus 1: £10,793 per QALY	Probability cost effective: NR

ICER = incremental cost effectiveness ratio; RCT = randomised clinical trial; QALY = quality-adjusted life year

(a) Study does not include all available non-invasive treatment options. Resource use data (2002-2004) and unit costs (2005) may not reflect current NHS context.

(b) A longer time horizon may be preferable if effects may persist beyond 1 year. Within-trial analysis and so does not reflect full body of available evidence for this comparison; ATEAM is 1 of 4 included studies comparing massage to usual care (although no others collected EQ-5D). Uncertainty has not been quantified for all analyses.

(c) Cost components incorporated: interventions, primary care contacts, outpatient appointments, inpatient hospital stays and medication.

Table 228: Economic evidence profile: soft-tissue techniques – full incremental analysis of all comparators

Study	Applicability	Limitations	Other comments	Cost[c,d]	Effects[c]	Incremental costs[e]	Incremental effects[e]	Cost effectiveness[e]	Uncertainty
Hollinghurst 2008[225] (UK)	Partially applicable[a]	Potentially serious limitations [b]	• Within-RCT analysis (ATEAM[310]) • Population: low back pain (without sciatica) (3 months or more) • Eight comparators in full	2. £204	2. -0.01 QALYs	Dominated (1 has lower costs and greater effects)			• Probability cost effective: NR • Complete case only QALY analysis results in fewer QALYs
				1. £0	1. 0 QALYs	Baseline			
				3. £163	3. 0.03 QALYs	Dominated (5 has lower costs and greater effects)			

Study	Applicability	Limitations	Other comments	Cost[c,d]	Effects[c]	Incremental costs[e]	Incremental effects[e]	Cost effectiveness[e]	Uncertainty
			analysis: 1. Usual care (UC) 2. UC + soft tissue techniques (massage 6 sessions) 3. UC + AT (6 lessons) 4. UC + AT (24 lessons) 5. UC + self-management (exercise prescription) 6. UC + self-management (exercise prescription) + soft tissue techniques (massage 6 sessions) 7. UC + self-management (exercise prescription) + AT (6 lessons) 8. UC + self-management (exercise prescription) + AT (24 lessons) • Follow-up: 1 year	5. £100	5. 0.04 QALYs	5 v 1: £100	0.04 QALYs	£2497 per QALY	than usual care for exercise prescription, massage or AT (6 lessons).
				4. £556	4. 0.05 QALYs	Dominated (6 has lower costs and greater effects)			
				6. £213	6. 0.06 QALYs	Dominated (7 has lower costs and equal effects)			
				7. £185	7. 0.06 QALYs	7 v 5: £86	0.02 QALYs	£4280 per QALY	
				8. £607	8. 0.09 QALYs	8 v 7: £421	0.03 QALYs	£14,042 per QALY	

Abbreviations: AT, Alexander technique; RCT, randomised clinical trial; QALY, quality-adjusted life year

(a) Study does not include all available non-invasive treatment options; resource use data (2002-2004) and unit costs (2005) may not reflect current NHS context.

(b) Time horizon may not be sufficient to capture all benefits and costs - authors suggest that the effects of Alexander technique lessons may be longer lasting than massage or an exercise prescription. Within-trial analysis and so does not reflect full body of available evidence for all the included comparators. Uncertainty has not been quantified for all analyses.

(c) Cost/effect over usual care in order of least to most effective intervention.

(d) Cost components incorporated: interventions, primary care contacts, outpatient appointments, inpatient hospital stays and medication.

(e) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

Table 229: Economic evidence profile: manipulation/mobilisation studies – usual care comparisons only

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Vavrek 2014[516] (USA)	Partially applicable[(a)]	Potentially serious limitations[(b)]	• Within-trial analysis (Haas 2014[187]) • Population: low back pain (without sciatica) (at least 3 months) • In this comparison: 1. Sham 2. SMT 12 session • Follow-up: 1 year	2-1: £296[(c)] (adjusted analysis: cost ratio 1.18)	0.02 QALYs (adjusted analysis: unclear, range 0.0 to 0.02 QALYs)	£14,800 per QALY gained (adjusted analysis: NR)	• Uncertainty not reported for ICER • Cost CI: NR; Adjusted cost ratio 95% CI: (0.64 to 2.18) • QALYs CI NR but reported as no significant difference between groups and QALY difference from adjusted analysis potentially lower than in unadjusted analysis • A sensitivity analysis was conducted where the weeks not covered by patient reports were excluded from the cost analysis. The results were similar to the base case.

Abbreviations: ICER, incremental cost effectiveness ratio; n/a, not available; RCT, randomised clinical trial; QALY, quality-adjusted life year; SMT, spinal manipulation therapy

(a) Study does not include all non-invasive treatment options. USA resource use data (2007-2011) and unit costs (2009) may not reflect current NHS context. Cost per QALY results were not reported (although QALYs were estimated); here the ICER has been calculated based on the reported unadjusted cost and QALY result however authors undertake a regression analysis to adjust costs and QALYs. EQ-5D tariff used unclear.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Haas 2014 is 1 of 8 included studies comparing manipulation/mobilisation to sham. A full incremental analysis was not presented and only minimal sensitivity analyses were carried out to quantify uncertainty.

(c) 2009 US dollars converted to UK pounds.[394] Cost components incorporated: Interventions, primary care contacts (GP, practice nurse, physiotherapist, other), secondary care contacts (surgeon/neurologist and psychologist/psychiatrist consultations, emergency department visits and other), chiropractic manipulation, massage therapy and patient reported medication for low back pain.

Table 230: Economic evidence profile: spinal manipulation therapy and self-management versus self-management

Study	Applicability	Limitations	Other comments	Cost [(a)]	Effects [(a)]	Incremental costs [(b)]	Incremental effects [(b)]	Cost effectiveness [(b)]	Uncertainty

Study	Applicability	Limitations	Other comments	Cost [a]	Effects [a]	Incremental costs [b]	Incremental effects [b]	Cost effectiveness [b]	Uncertainty
Beam 2004[498] (UK)	Partially applicable [c]	Potentially serious limitations [d]	• Within-RCT analysis (UK BEAM[48,499]) • Population: Low back pain mixed population (with and without sciatica) (1-2 months) • Four comparators in full analysis 1. Best care (self-management – programme & advice to stay active [SM]) 2. Best care + 'Back to fitness programme' (SM + biomechanical exercise) 3. Best care + spinal manipulation therapy (SM + mixed modality manual therapy) 4. Best care + 'Back to fitness programme'+ spinal manipulation therapy (SM + biomechanical exercise + mixed modality manual therapy) • Follow-up: 1 year	1. £346 [e]	1. 0.618 QALYs	Baseline			Prob. CE: 0%/0%
				2. £486 [e]	2. 0.635 QALYs	Dominated by 4			Prob. CE: ~7%/~7%
				4. £471 [e]	4. 0.651 QALYs	4 vs1: £126 [e]	0.033 QALYs	£3800 per QALY gained	Prob. CE:~38%/~37%
				3. £541 [e]	3. 0.659 QALYs	3 versus 4: £70 [e]	0.008 QALYs	£8700 per QALY gained	Prob. CE: ~54%/~57%
			• Subanalysis exercise not available: 1. Best care			2-1:£195 [e]	2-1: 0.041 QALYs	2 versus 1: £4800 per QALY gained	Probability intervention 2 cost-effective

Study	Applicability	Limitations	Other comments	Cost [a]	Effects [a]	Incremental costs [b]	Incremental effects [b]	Cost effectiveness [b]	Uncertainty
			2. Best care + manual therapy						(£20K/30K threshold): >95%/100% Increasing cost of manipulation to that of private provider did not change conclusions.
			• Subanalysis manipulation not available: 1. Best care 2. Best care + 'Back to fitness programme'			2-1:£140 [e]	2-1: 0.017 QALYs	2 versus 1: £8300 per QALY gained	Probability intervention 2 cost-effective (£20K/30K threshold): ~60%/~70% Increasing cost of manipulation to that of private provider did not change conclusions.

ICER = incremental cost effectiveness ratio; n/a = not available; RCT = randomised clinical trial; QALY = quality-adjusted life year; Prob. CE= Probability intervention is cost-effective at a £20,000/£30,000 threshold.

(a) When more than two comparators, Intervention number in order of least to most effective in terms of QALYs. When there are two comparators it will be blank.

(b) When more than two comparators, this is a full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option. The most cost effective option is that with the highest QALYs with an ICER below £20,000 per QALY gained.

(c) Resource use data (1999-2002) and unit costs (2000/01) may not reflect the current NHS context. Study does not include all non-invasive treatment options.

(d) A longer time horizon may be preferable given than interventions continued to show benefit at 12 months. Within-trial analysis and so does not reflect full body of available evidence for this intervention; although is the only study with these exact comparison of combinations.

(e) Cost components incorporated: interventions, primary care contacts (GP, practice nurse, physiotherapist, other), secondary care contacts (hospital admissions and outpatient appointments).

Table 231: Economic evidence profile: manual therapy versus self-management programme

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Niemisto 2003[388]/ Niemisto 2005[387] (Finland)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-RCT analysis (same paper) • Population: Low back pain mixed population (with or without sciatica) (>3 months with ODI >16%) • Two comparators in full analysis 1. Self-management programme 2. Combination: self-management programme, manipulation and biomechanical exercise • Follow-up: 1 year / 2 years	2-1: 12 months: £25[(c)] 24 months: £56[(c)]	12 months: See clinical review 24 months: • VAS (MD) 4.97 • ODI (MD): 1.24 • 15D: Authors report no difference	n/a	Incremental costs were reported as not statistically significant. VAS (24m) 95% CI: 4.83 to 5.12 ODI (24m) 95% CI: 1.18 to 1.30

ICER = incremental cost effectiveness ratio; n/a = not available; RCT = randomised clinical trial; QALY = quality-adjusted life year

(a) Finnish resource use data (1999-2001) and unit costs (2000) may not reflect the current NHS context. Non-NICE reference case utility measure used (15D) and this uses a non-comparable valuation method (VAS) from the Finnish population. QALYs were not calculated using area under the curve only mean difference in 15D reported. Discounting was not applied (24 month analysis). Study does not include all non-invasive treatment options.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Niemisto 2003 is 1 of several studies included in the clinical review for individual combinations. Limited sensitivity analysis.

2005 Finland converted to UK pounds.[394] Cost components incorporated: Visits to physicians, visits to physiotherapy, outpatient visits, inpatient care and x-ray examinations. Note: paper reported societal perspective; here only healthcare costs have been presented.

Table 232: Economic evidence profile: mixed manual therapy plus self-management

Study	Applicability	Limitations	Other comments	Cost [a]	Effects [a]	Incremental costs [b]	Incremental effects [b]	Cost effectiveness [b]	Uncertainty
Critchley 2007[94] (UK)	Partially applicable [c]	Potentially serious limitations [d]	• Within-RCT analysis (same paper) • Population: Low back pain mixed population (with and without sciatica) (>12 weeks) • Three comparators in full analysis 1. Biomechanical exercise 2. Combination: Mixed manual therapy plus self-management. 3. MBR programme (3 elements: physical, psychological, education) • Follow-up: 18 months	3. £165 [e]	3. 1.00 QALYs	Baseline			Prob. CE: 67%/65%
				1. £379 [e]	1. 0.90 QALYs	Dominated by 3			Prob. CE: ~0%/ ~0%
				2. £474 [e]	2. 0.99 QALYs	Dominated by 3			Prob. CE: ~33%/~35%%

ICER = incremental cost effectiveness ratio; n/a = not available; NR = not reported; RCT = randomised clinical trial; QALY = quality-adjusted life year; Prob. CE= Probability intervention is cost-effective at a £20,000/£30,000 threshold.

(a) Cost/effect in order of least to most costly intervention.

(b) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

(c) Resource use data (2002-2005) and unit costs (2003/3) may not reflect the current NHS context. EQ-5D tariff used is not stated (although as UK study judged likely to be UK tariff). Study does not include all non-invasive treatment options.

(d) Time horizon may not be sufficient to capture all benefits and costs if benefits persist beyond 18 months. Within-trial analysis and so does not reflect full body of available evidence for this comparison.

(e) *Cost components incorporated: interventions, primary care contacts (GP, practice nurse, physiotherapist, other), secondary care contacts (hospital admissions and outpatient appointments).*

Unit costs

Relevant unit costs are provided below to aid consideration of cost effectiveness.

For manual therapy interventions the relevant unit costs will be personnel time. An appointment with a physiotherapist would be required. The cost of a non-admitted face to face first attendance in physiotherapy costs £51, and a follow-up attendance costs £39 .[110] Other healthcare professionals may provide these interventions including an osteopath, chiropractor or muscular skeletal physician.

12.5 Evidence statements

12.5.1 Clinical

12.5.1.1 Soft-tissue techniques

Evidence for soft-tissue techniques was exclusively from a population of low back pain without sciatica. Data from 1 study (2 distinct populations) suggested a borderline clinically important reduction in pain as measured by VAS at 4 months for soft-tissue techniques (massage) when compared with sham (very low quality; n = 72). However, this benefit was not demonstrated by further evidence from 2 studies using the McGill pain scale (very low quality; n = 146) nor was any difference between soft tissue techniques (massage) and sham observed for function at less than 4 months (low quality; n = 146). When compared with usual care, no clinically important improvement was seen in quality of life (2 studies; very low quality; n = 473) or pain (1 study; moderate quality; range of n = 223 - 231), at either short or long term. There was a clinically important improvement in function (RMDQ) at less or equal to 4 months, but this was not sustained at greater than 4 months (2 studies; very low quality; range of n = 473 - 474). When soft tissue techniques (massage) was compared with acupuncture and with self-management, no clinical difference in function (RMDQ) was observed for the acupuncture comparison (1 study; very low to low quality; n = 166); however, there was clinical benefit of soft tissue techniques (massage) over self-management at less or equal to 4 months but not in the longer-term follow up (1 study; very low to low quality; range of n = 159 - 160).

No data were identified for other outcomes in these comparisons.

12.5.1.2 Traction

When compared with sham, evidence demonstrated a clinically important reduction in pain at less than 4 months for patients receiving inversion traction in a mixed population of people with low back pain with or without sciatica (1 study; moderate quality; n = 29), but not among those who received mechanical traction (1 study; moderate quality n=150), nor in the longer term (1 study; high quality; n=148). Similarly, no clinically important difference was observed for function (1 study; moderate and high quality; range of n= 148-150). Use of other medical treatments was increased in the traction group compared to sham treatment in the short term, but this between group difference was not sustained at the longer term follow-up (1 study; low-moderate quality; range of n= 148-150). Additionally, the benefit for pain intensity was not replicated for those without sciatica (1 study; moderate quality; n=60).

When compared with usual care, a clinically important benefit in each individual quality of life domain score was demonstrated for people with low back pain and sciatica in favour of traction, but only in the subgroup of participants who received weight-bath traction (1 study; very low quality; n = 36) and not mechanical traction (1 study; very low quality; n=64), and no clinical benefit was seen for

function measured with ODI (2 studies, low quality; n = 100). Similarly, no clinical benefit was seen for traction compared with usual care in 1 small study for pain or function (very low quality; n = 39) in a mixed population with low back pain with or without sciatica.

In comparison with biomechanical exercise, evidence from 1 study suggested that there was a lower number of visits to other healthcare practitioners in those receiving traction (moderate quality; n=191).

No data were identified for other outcomes in these comparisons.

12.5.1.3 Manipulation/mobilisation

In the population of low back pain without sciatica, no clinically important difference between manipulation/mobilisation and sham was demonstrated for pain in the short term (5 studies; moderate quality; n = 533) or long term (2 studies; high quality; n=229), function in the short (ODI: 4 studies; low quality; n = 374. Von Korff: 1 study; moderate quality; n=174) and long term (ODI: 1 study; moderate quality; n=63. Von Korff: 1 study; moderate quality; n=166), or quality of life at any time point (very low to high quality), with the exception of SF-36 physical composite at less or equal to 4 months (moderate quality, 1 study, n=174). No data for other outcomes were identified. When spinal manipulation was compared to sham in the population of low back pain with sciatica, a single study showed long-term clinical benefit of spinal manipulation for quality of life in the majority of domains, except for the general health domain, where a clinical benefit of sham was observed, and the role physical and bodily pain domains, where no difference between groups was observed (1 study, moderate-high quality evidence; n=98). Evidence from the same study also showed clinical benefit of spinal manipulation in terms of responder criteria (>30% improvement in pain) in the long term (low quality; n-98).

For the population of low back pain with or without sciatica, evidence mainly from individual studies suggested clinical benefit with uncertainty around the effect size for manipulation/mobilisation when compared with usual care on function (RMDQ at less or equal to 4 months, only in the subgroup receiving traction gap manipulation: 1 study; low quality; n=29) and quality of life (physical function domain at less or equal to 4 months: 1 study; low quality; n=240). No improvement in pain between the groups was seen at either time point (very low to moderate quality; range of n = 681 - 921). The number of healthcare visits was increased in the population receiving spinal manipulation compared to usual care in both the short and long term (1 study, low-moderate quality, n= 330 - 338). No data were identified for other outcomes.

When manipulation/mobilisation was compared with usual care in people with low back pain and sciatica, one study (very low quality; n=192) showed no clinical benefit for pain and quality of life (except for the physical health composite), but fewer adverse events were reported in the spinal manipulation group. The same study showed clinical benefit for function at less or equal to 4 months but not at greater than 4 months (very low quality, n=192).

For people with low back pain only (without sciatica), no clinically important differences were seen compared to usual care for function at either short (2 studies, very low quality, n=197,) or long term (1 study; very low quality; n=72), pain (1 study; low quality; n=72) or occurrence of adverse events (1 study, n =72, low quality) in the long term. However, clinically important benefits in terms of pain at less or equal to 4 months (1 study; low quality; n=72) and responder criteria (pain and function) were demonstrated (1 study; low quality; n = 72).

When compared with other active treatments (soft tissue technique (massage), belts/corsets, interferential therapy, ultrasound, self-management, NSAIDs), the majority of outcomes demonstrated no clinically important difference. In the population of low back pain with or without sciatica, evidence showed clinical benefit of manipulation/mobilisation compared to exercise in pain

and function at less or equal to 4 months (1 study; very low quality; n=24). When manipulation/mobilisation was compared to interferential therapy in the population of low back pain with or without sciatica, some evidence showed a clinically important improvement in quality of life in the group receiving manual therapy (SF-36 domains of physical function and social function at less than 4 months; bodily pain, social function and mental health at greater than 4 months; 1 study; very low to low quality; n= 107 - 128); however, there was also evidence favouring interferential therapy (EQ-5D greater than 4 months; 1 study; low quality; n=128). In people with low back pain without sciatica, there was clinical benefit for pain (but not function) both in the short and long term when manipulation/mobilisation was compared to ultrasound (1 study; very low quality; n = 73 - 112). When manipulation/mobilisation was compared to a combination of interventions (exercise + education) in low back pain with or without sciatica, clinical benefit was reported by a small study for pain and function at less or equal to 4 months (very low quality; n=23).

12.5.1.4 Mixed modality manual therapy

Evidence from one small study comparing mixed modality manual therapy to usual care in a population with low back pain showed clinical benefit for pain severity (n=18; very low quality). Mixed modality manual therapy compared with sham treatment in people without sciatica demonstrated a clinically important benefit in the responder criteria (pain reduction) at less or equal to 4 months (moderate quality, n=455). In the mixed population of low back pain with or without sciatica there was no clinical benefit in terms of pain or function (1 study; moderate quality; n=29). In the population with low back pain only (without sciatica), mixed modality manual therapy showed a benefit for pain at less than 4 months, when compared to traction (1 study, very low quality n=60) and when compared to biomechanical exercise (1 study, very low quality, n=18). Single studies comparing mixed modality manual therapy to spinal manipulation and soft tissue technique (massage) did not show any clinically important difference (very low to low quality; range of n=89 – 97).

12.5.1.5 Combinations of interventions – manual therapy adjunct

The evidence (ranging from very low to high quality) showed that there was no clinical benefit or difference between active treatments for the majority of outcomes and nearly all combinations of non-invasive interventions that had manual therapy as an adjunct, with a few exceptions as detailed below.

12.5.1.5.1 Low back pain with sciatica

The combination of manual therapy (soft tissue techniques – muscle energy technique) plus biomechanical exercise (McKenzie) plus self-management (unsupervised exercise) compared to a combination of massage, TENS, laser and self-management showed a benefit for pain and function at less than 4 months (1 study; very low quality; n=40).

12.5.1.5.2 Low back pain without sciatica

Manual therapy (massage) with self-management (exercise prescription) versus postural therapy (Alexander technique – 24 lessons) showed long-term benefit in terms of quality of life favouring postural therapy (1 study, low quality, n=117). For manual therapy (manipulation) plus exercise (either biomechanical or aerobic) versus exercise, clinical benefit favouring the addition of spinal manipulation was observed for short term pain (spinal manipulation plus biomechanical exercise versus aerobic or biomechanical exercise, very low quality, 1 study, n=39) and for short term function (spinal manipulation plus biomechanical or aerobic exercise versus aerobic exercise, very low quality, 1 study, n=36).

12.5.1.5.3 Low back pain with or without sciatica (mixed population)

Manual therapy (manipulation/mobilisation) plus self-management (home exercise) compared to self-management plus exercise showed clinical benefit of the comparator (self-management plus exercise) for pain when measured both at short and long term follow up, and function only in the short-term (moderate quality, 1 study, n=48).

No benefit was seen when traction was combined with infra-red therapy and exercise except for a reduction in medication use both in the short and long term (1 study, very low quality, n=71).

Manual therapy (manipulation) plus electrotherapy (interferential) compared with electrotherapy (interferential) showed clinical benefit for several quality of life measures (low quality, 1 study, n=106 or n=131) but these differences were inconsistent across domains and in terms of whether they occurred in the short or long term. No difference between treatments in terms of pain or function was observed for this comparison.

A decrease in medication use and an improvement in function was observed when manual therapy (manipulation) plus biomechanical exercise was compared to biomechanical exercise in 1 study (n=92, very low quality).

Mixed modality manual therapy when combined with either self-management, or when combined with biomechanical exercise and self-management demonstrated clinical benefit for quality of life measures - EQ-5D in the short and long-term (low quality, 1 study, n=543-688), SF-36 physical composite in the short and long term (including biomechanical exercise, low quality, 1 study, n=442-458), and SF-36 physical composite in the short term (without biomechanical exercise, low quality, 1 study, n=486) when compared against self-management. No difference was seen in critical outcomes for pain or function, but responder criteria for improvement in function demonstrated a benefit in both comparisons in the short and long term (1 study, low-very low quality, n=480-515). No difference was seen in any outcomes when mixed modality manual therapy combined with self-management was compared against biomechanical exercise combined with self-management (moderate quality, 1 study, n=49).

When manual therapy (spinal manipulation plus massage) was compared against self-management and exercise (biomechanical – McKenzie), a benefit in the responder criteria for improvement in function in the short term favouring self-management and exercise was observed (1 study; moderate quality; n=329).

Manual therapy (manipulation) with self-management (advice) and pharmacological therapy (NSAIDs) demonstrated clinical benefit on short and long-term function, short term quality of life (SF-36 physical function domains) and long term quality of life (SF-36 bodily pain domain) (low and moderate quality, 1 study, n=71 or 72) when compared to usual care.

12.5.2 Economic

- One cost-utility analysis (partially applicable; potentially serious limitations) in people with low back pain (without sciatica) found:
  - Compared to usual care, soft tissue techniques (massage) in combination with usual care was not cost effective (lower QALYs and higher costs), but was cost effective when used as an adjunct to unsupervised exercise (exercise prescription).
  - When considered amongst a selection of active treatments (each in combination with usual care), the combination of Alexander technique (24 lessons) with unsupervised exercise (exercise prescription) was the most effective (highest QALYs) and most cost effective option from usual care, unsupervised exercise (exercise prescription), soft tissue techniques (massage), exercise prescription with massage, Alexander technique lessons (6 lessons),

exercise prescription and Alexander technique lessons (6 lessons), Alexander technique (24 lessons), and exercise prescription with Alexander technique (24 lessons).

- One cost–utility analysis found that spinal manipulation (12 sessions) was cost effective compared to sham spinal manipulation for treating low back pain (without sciatica) (ICER: £14,800 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost-consequence analysis was identified relating to mixed modality manual therapy in combination with self-management and biomechanical exercise compared to self-management alone in people with low back pain or sciatica: the combination did not show any statistically significant increase in costs or outcomes. This was assessed as partially applicable with potentially serious limitations.
- One cost-utility analysis found that mixed modality manual therapy plus self-management was cost-effective compared to a combination of mixed modality manual therapy, biomechanical exercise and self-management, self-management in combination with biomechanical exercise, and self-management alone for the treatment of low back pain without sciatica (ICER: £8,700 per QALY gained). This analysis was assessed as partially applicable with minor limitations.
- One cost-utility analysis found that manual therapy plus self-management was dominated (more effective and less costly) by a 3 element MBR programme (physical, psychological, educational) for treating low back pain (without or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.
- No relevant economic evaluations were identified relating to soft tissue techniques or manipulation/mobilisation in people with sciatica.
- No relevant economic evaluations were identified relating to traction in people with low back pain or sciatica.

12.6 Recommendations and link to evidence

Recommendations	**12. Do not offer traction for managing low back pain with or without sciatica.** **13. Consider manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage) for managing low back pain with or without sciatica, but only as part of a treatment package including exercise, with or without psychological therapy.**
Relative values of different outcomes	The GDG agreed that the most critical outcome for decision making were health-related quality of life, pain severity, function and psychological distress. It was noted that the latter 3 were individually critical outcomes as well as components of quality of life measures. Adverse events were considered important for decision making because experience of adverse events may outweigh the possible benefits gained from manual therapy. Similarly, any difference in healthcare utilisation was considered an important outcome likely to reflect any benefits in quality of life experienced. The GDG discussed the importance of responder criteria as an outcome and agreed that although important in decision making, due to the inherent difficulties in dichotomising continuous outcomes this was not a critical outcome.
Trade-off between clinical benefits and harms	The GDG discussed the necessity of a body of evidence to show specific intervention effects, that is, over and above any contextual or placebo effects. It was therefore agreed that if placebo or sham-controlled evidence is available, this should inform decision making in preference to contextual effects. However, if there was a lack of placebo or sham-controlled evidence, evidence against usual care will be given

priority when decision making.

There was mixed evidence for the effectiveness of manual therapy modalities, particularly with function outcomes not correlating with quality of life outcomes. It was also difficult to assess evidence from a wide variety of interventions for traction, and for manipulation/mobilisation.

The GDG discussed that there was some albeit limited evidence of benefit of soft tissue techniques, spinal manipulation and mixed modality manual therapies compared to sham treatments in terms of improving pain or quality of life. Where these benefits were observed in the short term follow up they were somewhat inconsistent, and were not maintained in the longer term. Evidence compared to usual care was conflicting and did not consistently show benefit when manual therapy was offered as a single treatment. However, when offered in combination with self-management and exercise, evidence from a large multicentre study demonstrated benefits in terms of quality of life and in terms of responder criteria for function. The GDG agreed the benefits seen by the package of therapy including mixed modality manual therapy was supportive of the evidence observed from evidence of mixed modality manual therapy from smaller trials in the review.

For the critical outcomes where manual therapy was a single intervention, there was little effect seen beyond four months. One mixed modality trial in combination with other treatments did report positive outcomes for quality of life in both short and longer term and similarly for responder analysis for functional improvement. The GDG discussed whether the passive nature of manual therapies might explain why effects were not usually seen beyond four months.

Adverse events were common, minor and transient, consisting mainly of muscle soreness for a few days following treatment. No serious events attributable to manual therapy were reported by the studies reviewed. The GDG were aware of possible serious but very rare adverse events that may be related to spinal manipulation and took this into account when making a recommendation.

The GDG discussed that when considered alongside the body of evidence for soft-tissue techniques, manipulation/mobilisation or mixed modality manual therapies, there was very limited evidence of benefit for traction as a single therapy. Some benefit was observed in people with low back pain and sciatica when compared to usual care, but the GDG did not consider this as sufficient evidence of effect as it was from a small single study (n=36) and the evidence was rated as very low quality. Further benefits were seen from a group who received weight-bath traction when compared to usual care (separated from a group receiving mechanical traction). However, it was discussed that all of the participants in this trial were inpatients admitted due to sciatica and therefore were unlikely to be representative of the broader population with sciatica. Furthermore, there was also an indication from one study in people with low back pain with or without sciatica that healthcare utilisation was increased in the group that received traction compared to sham treatment in the short term. Although when compared to biomechanical exercise the converse was true, the GDG noted that this healthcare utilisation data should be interpreted with care as it did not include the resource use associated with provision of the intervention itself. Therefore the GDG agreed that traction should not be offered for low back pain or sciatica.

Combinations of interventions

The majority of the evidence for combinations of interventions was from a mixed population of those with low back pain with or without sciatica.

The GDG noted that evidence suggested manual therapy was possibly potentiated when provided in combination with exercise in terms of providing benefit in pain and function for people with low back pain. However, it was noted that the evidence for this was limited and mostly came from single studies.

The evidence for these combined interventions was challenging to unravel, because

	the combinations themselves and the comparator groups differed widely in terms of the intervention that they comprised. The studies used any one (or a combination) of a number of different modalities/types of manual therapy. The interventions were also often given in combination with other interventions, which differed in each trial, and were also compared to single or combinations of various different interventions. It was therefore very difficult to pick out which type of adjunct and combination of interventions was most effective. However, there was some inconsistent evidence of clinical benefit (in terms of pain, function, quality of life or responder criteria) when the intervention contained mixed modality manual therapy or a spinal manipulation component. The large multicentre study in particular showed that mixed modality manual therapy demonstrated clinical benefit for quality of life (SF-36 physical and EQ-5D) as well as for responder criteria (improvement in RMDQ function) in both the short and longer term. The GDG noted that the responder evidence for mixed manual therapy came from post-hoc analyses of 2 trials. In addition one of these trials demonstrated benefit in terms of responder analysis for pain, but not for function, whereas the other trial only presented the (positive) results of responder analysis for function; demonstrating a lack of consistency across important outcomes. Post hoc analyses present a further risk of bias. The GDG felt that, for these reasons, the evidence from the responder analyses should be considered with caution. **Summary** Overall the GDG concluded that there was mixed evidence for the effectiveness of manual therapy modalities. For soft-tissue techniques, the evidence was based on massage. Considering that a comparison with usual care should result in a greater effect estimate than the specific effect of the intervention (as demonstrated in placebo comparisons), the GDG felt that the absence of a clinically important improvement in quality of life and pain in this comparison indicated sufficient evidence of absence of effect to recommend against the use of soft tissue techniques (massage) on its own. Similarly, based on the limited clinical benefit seen for mobilisation/manipulation, the GDG felt this form of manual therapy could not be recommended for low back pain or sciatica as an independent intervention. The GDG concluded that soft-tissue techniques (e.g. massage) and manipulation/mobilisation should only be considered as part of treatment packages, where benefits were observed and seen to be maintained in the longer term. The GDG were aware of possible risk of adverse events, and due to the conflicting nature of the evidence, the GDG agreed that this recommendation should be to consider manual therapy as part of treatment package, rather than to offer manual therapy alone as a sole intervention to all people with low back pain with or without sciatica. The GDG did not feel that manual therapy should be a mandatory component of a treatment package, but that it is one optional modality that might be considered alongside exercise.
Trade-off between net clinical effects and costs	**Soft tissue techniques** One relevant economic evaluation was included that considered soft tissue techniques (massage) in a population with low back pain without sciatica. This was based on the RCT reported by Little et al. included in the clinical review. This within-trial analysis found that, compared to usual care, soft tissue techniques (massage) was found not to be cost effective when given alone (it had lower QALYs and higher costs), but was cost effective when used as an adjunct to self-management (unsupervised exercise - exercise prescription). Given the wide use of self-management in low back pain these results suggest uncertainty in the cost effectiveness of massage. In addition, when considered amongst a selection of active treatments, the combination of Alexander technique (24 lessons) with unsupervised exercise (exercise prescription) was found to be the most cost effective option from usual care, unsupervised exercise (exercise prescription), soft tissue techniques (massage), exercise prescription with massage, Alexander technique lessons (6

lessons), exercise prescription and Alexander technique lessons (6 lessons), Alexander technique (24 lessons), exercise prescription with Alexander technique lessons (24 lessons). Given the uncertainty around cost effectiveness from this study and the overall lack of evidence relating to soft tissue techniques from the clinical review, the GDG concluded there was insufficient evidence to conclude that it would be cost effective for the NHS.

Traction

No economic evaluations were identified from the published literature. Use of traction will be associated with costs relating to the equipment and personnel time required to deliver the therapy. If effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. Although some indications of possible benefit were seen for traction in a sciatica population, overall the GDG concluded that it was insufficient to support a conclusion of evidence of clinical benefit and thus also insufficient to justify intervention costs.

Manipulation/mobilisation

One relevant economic evaluation was included that considered manipulation/mobilisation in a population with low back pain without sciatica. This was based on the RCT reported by Haas et al. 2014 included in the clinical review. This within-trial analysis suggests, based on unadjusted data, that manipulation (12 sessions) may be cost-effective (£14,800 per QALY gained). It used a sham comparator but note that the cost of providing the sham is appropriately not included in this calculation. However, the authors also undertook a regression analysis to adjust costs and QALYs and in this analysis the QALY gain was reduced – this is not fully reported but appears that it may be as low as no difference – this would potentially reduce the cost effectiveness estimate. However, also of note the sham comparator would be expected to underestimate treatment benefits compared to a usual care comparator and this may improve cost effectiveness. Uncertainty around cost effectiveness was not reported. The adjusted costs analysis reported the difference as not statistically significant however this analysis excluded the intervention costs. QALY differences were also reported as not statistically significant. The study limitations include the setting which is the USA – this has low applicability to the UK due to the differences in the health care systems which can translate to differences in resource use and costs. Overall, while this study suggests that manipulation could potentially be cost effective but there are a large number of uncertainties in this evidence.

One study by Niemisto et al (2003) compared manual therapy as part of a combination manual therapy, self-management, and biomechanical exercise with self-management alone. The authors reported no difference in health-related quality of life at 2 years between the two interventions and the increase in costs with the combination intervention was £25 after 1 year and £56 after 2 years. However this increase was reported as not statistically significant. Therefore it was not possible to make any definite conclusions from this study.

Mixed modality manual therapy

In the UK BEAM analysis, the self-management and mixed modality manual therapy arm had most QALYs and the most costs. Sub-analysis showed that with mixed modality manual therapy unavailable it would be cost-effective to add exercise and vice versa. This study was deemed to have minor limitations. Another UK study showed that mixed manual therapy plus self-management is more cost effective than biomechanical exercise alone; however when all the comparisons evaluated in the study were considered, a three-element MBR programme with physical, psychological and education components was the cheapest and more effective option.

	The GDG considered the uncertainty in the economic evidence and felt that manual therapy may not be cost effective as a standalone intervention; however, the GDG considered that cost effectiveness might be more likely if manual therapy is provided as part of a treatment package including exercise with or without psychological therapy.
Quality of evidence	The majority of the evidence on soft tissue techniques was of low to very low quality. The quality was downgraded in most cases due to a combination of imprecision of the effect estimate and the risk of bias, which in most cases was high due to unclear allocation concealment and lack of blinding for subjective outcomes. The majority of the evidence informing the comparison of traction with sham was of moderate to high quality. The quality was downgraded in most cases due to imprecision of the effect estimate while the risk of bias was felt to be low. The evidence for traction compared with usual care or other active therapies ranged from low to very low quality, in most cases this was due to imprecision of effect estimate along with a high risk of bias. The majority of the evidence informing the comparison of spinal manipulation with sham was of moderate to high quality. Quality was downgraded in most cases due to imprecision of the effect estimate while the risk of bias was felt to be low. The evidence for spinal manipulation compared with usual care or other active therapies ranged from moderate to very low quality, in most cases this was due to imprecision of effect estimate along with a high risk of bias. The majority of the evidence for mixed modality manual therapy was of low to very low quality. In most cases quality was downgraded due to a high risk of bias (e.g. selection bias, lack of blinding), and in some cases was further downgraded due to imprecision of the effect estimate. The GDG noted that a large trial included in the combinations evidence was helpful in informing the manual therapy recommendation, because this large study showed clinical benefit of mixed modality manual therapy. However, the GDG did note that the evidence from this study was mostly rated as low quality (due to high drop-out rates and lack of blinding) and that the clinical benefit for function came from a post hoc analysis of the data. The responder analyses for pain and function from two large trials of manual therapy informed the GDG's recommendation. The trials had evidence varying from medium to very low quality, and with some uncertainty about the magnitude of the differences between the groups. The GDG were aware of the limitations of responder analyses: responder analyses have reduced power to detect differences compared to analyses on the original scales, that there is a natural recovery rate observed in both intervention and comparator arms and 'responders' have not necessarily improved due to the intervention, and that the distribution functions of the dependent variables are similar in both groups. The GDG considered that the cut-offs chosen for the responder analyses reflected clinically important differences in the mean responses between the groups but were mindful that some patients may have had worse outcomes in both the intervention group and comparator groups. As well as the concerns of responder criteria, the GDG further noted that 2 of these were post-hoc analyses which raised further concerns about the reliability of this analysis. The GDG discussed that the post hoc nature of the responder analyses in these 2 trials introduces a risk of bias due to the potential for data mining. The GDG reflected their concerns about responder analyses in the strength of their recommendation and chose to advise 'consider' manual therapies as part of a treatment package. The GDG were aware of the difficulties with providing adequate patient blinding to manual therapy treatments as sham or placebo interventions may have contextual or primary therapeutic effects, which may reduce the differences between groups. Conversely, subjects may be able to detect if they are receiving sham treatment and

	this may amplify a true difference between groups because subjects in the sham group may be adversely affected psychologically.
Other considerations	For recommendations on exercise therapies, psychological interventions, and multidisciplinary biopsychosocial rehabilitation, please see chapters 9, 15 and 17, respectively. It was noted that the evidence was mixed as to whether it related to people with low back pain only, low back pain and sciatica, or mixed populations with or without sciatica, with the exception of soft-tissue therapies offered in isolation where evidence was only identified for people without sciatica. The GDG agreed that there was sufficient evidence to assume the effects for a combination of therapies would apply equally to those with low back pain with or without sciatica and therefore recommended these should be considered for either condition.

13 Acupuncture

13.1 Introduction

Acupuncture originated in China approximately 2000 years ago, and the explanation of how it works has changed over time, as world views have evolved. In the 1950s, all these explanations were combined into the system currently known as 'traditional Chinese acupuncture'. This approach uses concepts that cannot be explained by conventional physiology, but remains the most common form of acupuncture practised throughout the world. In the UK, doctors, physiotherapists and manual therapists are increasingly using acupuncture on the basis of neurophysiological mechanisms, known as 'Western medical acupuncture'.

Acupuncture involves treatment with needles, and is most commonly used for pain relief. The needles are either manipulated to produce a particular 'needle sensation', or stimulated electrically (electroacupuncture) for up to 20 minutes. Some practitioners also use moxa, a dried herb which is burned near the point to provide heat. A course of treatment usually consists of six or more sessions during which time, if a response occurs, pain relief gradually accumulates.

The proposed mechanisms of action of acupuncture are complex in terms of neurophysiology, and involve various effects including the release of endogenous opioids. There has been considerable research into the use of acupuncture for pain relief; however uncertainty remains as to the benefit of acupuncture in the management of low back pain and sciatica. This review therefore intends to investigate the evidence for its use in these conditions.

13.2 Review question: What is the clinical and cost-effectiveness of acupuncture in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 233: PICO characteristics of review question

Population	• People aged 16 years or above with non-specific low back pain • People aged 16 years or above with sciatica
Intervention(s)	Acupuncture
Comparison(s)	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D) • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]) • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function)

	• Adverse events: 1. Morbidity 2. Mortality • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	Randomised controlled trials (RCTs) and systematic reviews (SRs) will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included

13.3 Clinical evidence

13.3.1 Summary of studies included – single interventions

Twenty nine RCTs (reported in 32 papers) were included in the review. These are summarised in

Table 234 below.[51,74,75,83,90,128,177,181,184,202,241,243,269,287,299,300,312,327,337,347,363,450,485 483,486,493,515,537,551,557-559] Evidence from these studies is summarised in the clinical evidence summary below (See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L).

Coan 1980[90,90] and Lehmann 1986[299] were included in this review, however these studies had no relevant outcomes to the protocol, therefore they could not be analysed.

Itoh et al. 2009 [243], Grant et al. 2009[177], Lehman et al. 1986[299] and Tsukayama et al. 2002[493] are also included in the electrotherapy chapter (See Chapter 14) as the comparator interventions are relevant to both reviews.

Two Cochrane reviews were identified but could not be included since the stratification of the population, i.e. low back pain only, low back pain with or without sciatica and low back pain with sciatica, did not match that of the review protocol.[157,159] However the studies included in the Cochrane reviews were individually assessed and included if they matched the review protocol.

13.3.2 Summary of studies included – combined interventions (acupuncture adjunct)

Three studies looking at combinations of non-invasive interventions (with acupuncture as the adjunct) were also included in this review. [234,243,555] These are summarised in Table 235 below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (Section 0). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

13.3.3 Heterogeneity

For the comparison of Acupuncture versus sham/placebo, there was substantial heterogeneity for the following outcomes:

- Quality of life SF-36/SF12 physical composite measure at less or equal to 4 months.
- Quality of life SF-36/SF12 mental composite measure at greater than 4 months.

The pre-specified subgroups (chronic back pain, and type of acupuncture) did not explain this heterogeneity as both studies were conducted in a chronic population and used similar types of acupuncture.[51,184] A random effects meta-analysis was therefore applied, and the outcomes were downgraded in the GRADE quality rating for inconsistency.

13.3.4 Sensitivity analysis

An individual patient data (IPD) meta-analysis was identified that was relevant to this review, but did not meet the protocol criteria for inclusion.[519] However, as individual patient data was available for some outcomes relevant to this review for a number of studies, a sensitivity analysis was carried out for the outcomes where this data was available (pain for acupuncture versus sham and acupuncture versus usual care, for populations without sciatica and mixed with and without sciatica). The results of these sensitivity-analyses are reported in the forest plots in Appendix K.9.

Table 234: Summary of studies included in the review

Study name	Intervention/ comparison	Population	Outcomes	Comments
Acupuncture Randomized Trial in Low Back Pain trial: Brinkhaus 2006A[51]	Acupuncture (12 sessions) Placebo/sham Usual care	n=301 Low back pain without sciatica for >6 months Mean age: 58.8 years (SD 9.1) Germany	Quality of life (SF-36) Pain (VAS) Function (Hannover functional ability questionnaire (FFbH-R)) Function (pain disability index, PDI) Psychological distress (depression) Adverse effects Healthcare utilisation (days with analgesics)	Placebo/sham: non-acupuncture points were needled bilaterally using superficial insertion of fine needles), not in the area of the lower back where patients were experiencing pain; de qi and manual stimulation were avoided Usual care: Waiting list - no acupuncture for 8 weeks Concurrent Treatment: oral NSAID if required but not corticosteroids or central nervous system (CNS) pain-relieving drugs Study length: 8 weeks treatment (follow-up at 1 year)
Cherkin 2009[75]	Acupuncture Placebo/sham Usual care	n=638 Low back pain without sciatica for 3–12 months Mean age: 47 years (SD 13) USA	Pain (pain bothersomeness scale 0-10) Function (RMDQ) Healthcare utilisation	Placebo/sham: simulated acupuncture using a toothpick in a needle guide tube, including tapping and twisting at acupuncture points Usual care: no study-related care, only care (if any) that the patient and their physicians chose (mostly medications, primary care and physical therapy) Concurrent Treatment: self-care book with information on managing flare-ups, exercise and lifestyle

Study name	Intervention/ comparison	Population	Outcomes	Comments
				modifications. Study length: 7 weeks treatment
Cho 2013[83]	Acupuncture (2x per week) Placebo/sham	n=130 Mean age: 42 years (SD 14) South Korea	Quality of life (SF-36) Pain (VAS) Function (ODQ) Psychological distress (BDI)	Placebo/Sham: use of a semi-blunt needle on non-acupuncture points without penetration Concurrent Treatment: exercise manual with appropriate postures and exercises for low back pain, to be done every day. Study length: 6 weeks treatment
Coan 1980[90]	Acupuncture (mean 11.4 treatments) Usual care	n=50 Mixed population (with or without sciatica) Mean age: 47 years; range 18–67 years USA	Responder criteria (inadequate definition: 'improvement')	Usual care: waiting list. Delayed acupuncture (around 15 weeks after enrolment) Concurrent treatment: not stated Study length: 10–15 weeks treatment
Edelist 1976[128]	Acupuncture (3 treatments) Placebo/sham	n=30 Mixed population (with or without sciatica) Mean age: not reported Canada	Responder criteria (inadequate definition: 'global evaluation')	Placebo/sham: needles inserted at non-acupuncture points); Te Chi not searched for; electrical stimulation as for true acupuncture group Concurrent Treatment: not stated Study length: 6 days treatment
GERAC trial: Haake 2007[184]	Acupuncture (10 sessions) Placebo/sham Usual care	n=1162 Low back pain without sciatica >6 months Mean age: 50 years (SD 15) Germany	Quality of life (SF-12) Pain (Von Korff Chronic Pain Grade Scale) Function (FFbH-R) Adverse effects Responder criteria (inadequate definition: 'treatment response')	Placebo/sham: avoiding acupuncture points or meridians without electrical stimulation or moxibustion; on either side of the lateral part of the back and on the lower limbs Usual care: according to German guidelines, including sessions with a

Study name	Intervention/ comparison	Population	Outcomes	Comments
				physician/physiotherapist who administered physiotherapy and exercise Concurrent Treatment: NSAIDs or pain medication up to maximum daily dose. Study length: 6–9 weeks treatment
Grant 1999[177]	Acupuncture (2x per week) Electrotherapy	n=60 Mixed population (with or without sciatica) >6 months Mean age: 73.5 years UK	Pain (unable to analyse data: reported as median values and interquartile range)	Electrotherapy: Transcutaneous electrical nerve stimulation (TENS) Concurrent Treatment: Advised to continue existing medication but not start new analgesics or physical treatment Study length: 4 weeks treatment
Gunn 1980[181]	Acupuncture (maximum of 15 treatments) Usual care	n=56 Mixed population (with or without sciatica) >3 months Mean age: 40.6 years Canada	Quality of life	Usual care: standard clinic regimen: physiotherapy, exercise, occupational therapy and industrial assessment Concurrent treatment: As for usual care. Study length: 4 weeks treatment
Hasegawa 2014[202]	Acupuncture (5 sessions) Placebo/sham	n=80 Mixed population (with or without sciatica) acute pain <1 months Mean age: 46 years Brazil	Quality of life (SF-36) Pain (VAS) Function (RMDQ)	Placebo/sham: non-penetrating sessions of 30 minutes each (only the handle came into contact with the skin at the same points) Concurrent Treatment: 50 mg sodium diclofenac every 8 hours for lumbar pain if needed, but not other medications or therapies. Study length: 5 sessions (Treatment duration unclear)

Study name	Intervention/ comparison	Population	Outcomes	Comments
				VAS pain was measured at 28 days before the last acupuncture session.
Inoue 2006[241]	Acupuncture Placebo/sham	n=31 Low back pain without sciatica Mean age: 69 years (SD 7) Japan	Pain (VAS)	Placebo/sham: Therapist tapped the end of a guide tube on the skin at the most painful point without a needle, then acted as though they were inserting a needle there. Concurrent Treatment: not stated Study length: One-off Treatment
Itoh 2009[243]	Acupuncture (frequency unclear) Electrotherapy Usual care	n=32 Low back pain without sciatica >6 months Age range:61–81 years Japan	Pain (VAS) Function (RMDQ)	Electrotherapy: TENS treatment for 15 minutes Usual care: no specific treatment except topical poultice containing methylsalicylic acid if necessary. Concurrent Treatment: No co-interventions (except drugs at stable doses). Study length: 5 weeks treatment
Kennedy 2008[269]	Acupuncture (3–12 sessions) Placebo/sham	n=48 Mixed population (with or without sciatica) for >3 months Mean age: 45.5 years (SD 11) UK	Pain (VAS) Function (RMDQ)	Placebo/Sham: Western medical approach; non-penetrating sham needles that only touched the skin; 30 minutes per treatment; guide tube 0.3 mm x 40 mm. Concurrent Treatment: Continue normal activities; avoid other forms of treatment apart from routine physician management and analgesics. Advice to remain active (The Back Book). Study length: 4–6 weeks

Study name	Intervention/ comparison	Population	Outcomes	Comments
				treatment
Kwon 2007[287]	Acupuncture (12 sessions) Placebo/sham	n=50 Mixed population (with or without sciatica) for >3 months Mean age: 45.5 years (SD 11) South Korea	Pain (VAS) Function (RMDQ) Adverse effects	Placebo/sham: needles inserted into non-acupuncture points (10–20 mm away from acupoints used in acupuncture group); no manual stimulation; no qi. Concurrent treatment: not stated. Study length: 4 weeks treatment
Leibing 2002[300]	Acupuncture (20 sessions) Placebo/sham Usual care	n=131 Low back pain without sciatica >6 months Mean age:48.1 years (SD 9.7) Germany	Pain (VAS) Function (Pain disability index) Psychological distress (HADS)	Placebo/sham: needles inserted superficially 10–20 mm distant to acupuncture points, outside meridians; not stimulated; Usual care: standardised active physiotherapy of 26 sessions (each 30 minutes) over 12 weeks. Concurrent treatment: as for usual care. Study length: 12 weeks treatment
Lehmann 1986[299]	Acupuncture (2x per week) electrotherapy	n=54 Mixed population (with or without sciatica) acute pain for <3 months Mean age: 40 years; range, 25–55 years USA	No relevant outcomes reported	Electrotherapy: TENS over centre of pain Concurrent treatment: not stated. Study length: 3 weeks treatment
Liu 2010[312]	Acupuncture (Once a day) Acupuncture plus NSAIDs NSAIDs	n=69 Mixed population (with or without sciatica) acute pain for <2 weeks Mean age: 36.5	Pain (NRS) Function (RMDQ)	Pharmacological therapy: Diclofenac sodium orally 50 mg twice a day. Concurrent treatment: not stated. Study length: 5 days

Study name	Intervention/ comparison	Population	Outcomes	Comments
		years China		treatment
Marignan 2014[327]	Acupuncture (ear, verum auriculotherapy ; electrical at 5 points performed once) Placebo	N=12 Low back pain >2 years Mean age: not reported France	Pain (VAS) Data reported as mean and range, so unable to include in meta-analysis	Placebo: same procedure as acupuncture group, but given at non-acupuncture points of the ear All participants were male Concurrent treatment: not stated. Study length: immediate follow-up (post-treatment)
Meng 2003[337]	Acupuncture (2x per week) Usual care	n=66 Mixed population (with or without sciatica) for >6 weeks Mean age: 71 years USA	Function (RMDQ)	Usual care: both groups received standard therapy: NSAIDs, aspirin and non-narcotic analgesics allowed; patients asked to stay on same medications and not start new ones. Concurrent treatment: as for usual care. Study length: 6 weeks
Molsberger 2002[347]	Acupuncture (12 sessions 3x per week) Placebo/sham Usual care	n=186 Low back pain without sciatica for > 3 months Mean age: 50 years (SD 7) Germany	Pain (VAS) Responder criteria – inappropriate definition of response (50% improvement)	Placebo/sham: Needles applied superficially (<1 cm) at non-acupuncture points of the lumbar region (5 on either side of the back) Usual care: physiotherapy, physical exercise, back school, mud packs, infra-red heat therapy; on demand they received 50 mg diclofenac three times a day. Concurrent treatment: as for usual care. Study length: 4 weeks
Muller 2005[363]	Acupuncture (2x per week) Non-opioid analgesics Manual therapy	n=115 Low back pain without sciatica for > 13 weeks Median age: 39	Quality of life (SF-36) Pain (VAS) (unable to analyse data: reported as median value and	Pharmacological therapy: patients given celecoxib unless celecoxib had previously been tried; the next drug of choice was

Study name	Intervention/ comparison	Population	Outcomes	Comments
		years Australia	interquartile range)	rofecoxib, followed by paracetamol Manual therapy: high-velocity low-amplitude spinal manipulative thrust to a joint was performed as judged safe. Concurrent treatment: none stated. Study length: 9 weeks
Shin 2013[450]	Acupuncture (1 20 minute session) NSAID	n=58 Mixed population (with or without sciatica) acute for < 4 weeks Mean age: 38 years (SD 8) South Korea	Pain (VAS) Function (ODQ) Healthcare utilisation	Pharmacological therapy: intramuscular injection of diclofenac sodium (75 mg in gluteal region). Concurrent treatment: Advice to remain active if possible within the range of non-aggravation of symptoms. Study length: One-off treatment follow up at 4 weeks
Thomas 2006[483,485,486]	Acupuncture (up to 10 sessions) Usual care	n=241 Mixed population (with or without sciatica) acute for 4 weeks - 1 year Mean age: 43 years UK	Pain (McGill) Function (ODQ) Quality of life (SF-36) Quality of life (EQ-5D)	Usual care: NHS treatment according to GP assessment of need. Concurrent treatment: not stated Study length: 3 months treatment
Tsukayama 2002[493]	Acupuncture (2x per week) Electrotherapy	n=20 Low back pain without sciatica for >2 weeks Mean age: 45 years Japan	Pain (VAS) Adverse effects Function (Japanese orthopaedic association [JOA] score)	Electrotherapy: TENS Concurrent treatment: not stated. Study length: 2 weeks treatment
Vas 2012[515]	Acupuncture (5 sessions) Placebo/sham (different sham types) Usual care	n=275 Mixed population (with or without sciatica) acute for <2 weeks Mean age: 43	Adverse effects Responder criteria (improvement in RMDQ function >35%)	Sham 1: non-specific points selected and punctured as for true acupuncture group Placebo 2: Points selected and momentary pressure applied with semi-blunted needle fitted with guide

Study name	Intervention/ comparison	Population	Outcomes	Comments
		years Spain		tube.* Usual care: conventional treatment (analgesics, NSAIDs, myorelaxant drugs, posture recommendations). Concurrent treatment: as for usual care. Study length: 2 weeks **The placebo and sham groups were defined separately in the study, but have been combined in the review as per our protocol*
Weiss 2013[537]	Acupuncture (2x per week) Usual care	n=156 Mixed population (with or without sciatica) for > 6 months Mean age: 51 years (SD 8) Germany	Quality of life (SF-36)	Usual care: standardised 21-day inpatient rehabilitation programme according to current guidelines. Concurrent treatment: as for usual care. Study length: 3 weeks
Witt 2006[551]	Acupuncture (Maximum of 15 sessions) Usual care	n=3093 Low back pain with/without sciatica for >6 months Mean age: 53 years (SD 14) Germany	Quality of life (SF-36) Function (Hannover Functional Ability Questionnaire [HFAQ]) Pain (low back pain rating scale) Healthcare utilisation (prescription for analgesics)	Usual care: waiting list. Concurrent treatment: use additional conventional treatments as needed. Study length: 6 months
Yun 2012[558]	Acupuncture (Every other day) Usual care	n=187 Low back pain without sciatica for >3 months Mean age: 34 years (SD 11) Participants recruited from army health care delivery system. China	Pain (VAS) Function(RMDQ)	Usual care: both groups received massage, physical therapy and medication (mostly NSAIDs). Concurrent treatment: as for usual care + all groups received additional self-care book with information about managing flare-ups, exercise and lifestyle modification.

Study name	Intervention/ comparison	Population	Outcomes	Comments
				Study length: 7 weeks treatment
Yun 2012[557]	Acupuncture (Every other day) Usual care	n=236 Low back pain without sciatica for 3–12 months Mean age: 33 years (SD 11) Country: China	Pain (VAS) Function(RMDQ)	Usual care: both groups received massage and physical therapy. Concurrent treatment: as for usual care + all groups received self-care book with information on managing flare-ups, exercise and lifestyle modification. Usual care also allowed to continue medication (ibuprofen). Study length: 4 weeks treatment
Zaringhalam 2010[559]	Acupuncture (2x per week) Acupuncture plus baclofen baclofen	n=84 Low back pain without sciatica for >2 weeks Mean age: 45 years Japan	Pain (VAS) Function(RMDQ)	Usual care 1: no treatment - pharmacological therapy: both groups received Baclofen 30 mg/day orally (15 mg twice daily). Usual care 2: waiting list Concurrent treatment: As for usual care plus advised to maintain normal lifestyle and not start new medications. Study length: 5 weeks treatment

Table 235: Combined interventions - acupuncture adjunct

Study name	Intervention/ comparison	Population	Outcomes	Comments
Hunter 2012[234]	Acupuncture + exercise (biomechanical + aerobic) + self-management (education – Back Book + unsupervised exercise) Exercise (biomechanical + aerobic) +	Low back pain without sciatica N=52 12 weeks intervention + 6 months follow up UK	Quality of life (EQ-5D) Pain severity (VAS) Function (ODI)	Frequency of acupuncture sessions unclear Concomitant treatment: advised to continue normal daily activities and medication.

Study name	Intervention/ comparison	Population	Outcomes	Comments
	self-management (education – Back Book + unsupervised exercise)			
Itoh 2009[243]	Acupuncture + electrotherapy (TENS) Acupuncture Electrotherapy (TENS) Usual care: No specific treatment except allowed to use topical poultice containing methylsalicylic acid.	Low back pain without sciatica N=32 5 weeks intervention + 10 weeks follow up Japan	Pain severity (VAS) Function (RMDQ)	Concomitant treatment: allowed to continue medication if no change in dose for 1 month or longer
Yip 2004[555]	Acupuncture + manual therapy (massage) Usual care: "Conventional treatment" not further defined	Low back pain without sciatica N=61 3 weeks intervention + 1 week follow up China	Pain severity (proportion of baseline value)	Concomitant treatment: not stated

13.3.5 Data unsuitable for meta-analysis

Table 236: Acupuncture (ear) versus placebo (low back pain with or without sciatica)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
MARIGNAN 2014[327]	Pain (VAS 0–10, change from baseline) at ≤ 4 months	-0.6 (range +1 to -3), p>0.28	6	-4.3 (range -1 to -6), p<0.002	6	VERY HIGH
	Pain (VAS 0–10) at > 4 months	Median (IQR): 3.9 (1.8–6.1),	6	Median (IQR): 3.7 (1.4–6.8)	6	VERY HIGH

Table 237: Acupuncture versus TENS (low back pain with or without sciatica)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
GRANT 1999[177]	Pain (VAS 0–10) at ≤ 4 months	Median (IQR): 3 (1.5 - 5.9)	32	Median (IQR): 3.2 (1.3–5.5)	28	HIGH

Table 238: Acupuncture versus spinal manipulation (low back pain without sciatica)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
MULLER 2005 [363]	Pain (VAS 0–10) at > 4 months	Median (IQR): 3.9 (1.8–6.1),	36	Median (IQR): 3.7 (1.4–6.8)	36	VERY HIGH
	Function (ODI) at > 4 months	Median (IQR): 13 (2–33)	36	Median (IQR): 16 (6–30)	36	VERY HIGH
	Quality of life (SF-36) > 4 months	Median (IQR): 55 (40–76)	36	Median (IQR): 77 (54–86)	36	VERY HIGH

Table 239: Acupuncture versus non-opioid analgesics (low back pain without sciatica)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
MULLER 2005	Pain (VAS 0–10) at > 4 months	Median (IQR): 3.9 (1.8–	36	Median (IQR): 3.9 (2 –	43	VERY HIGH

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
[363]		6.1),		6.4)		
	Function (ODI) at > 4 months	Median (IQR): 13 (2–33)	36	Median (IQR): 24 (8–42)	43	VERY HIGH
	Quality of life (SF-36) > 4 months	Median (IQR): 55 (40–76)	36	Median (IQR): 66 (29–78)	43	VERY HIGH

Table 240: Acupuncture versus waiting list (low back pain with/without sciatica)

Study	Outcome	Intervention results Percentage reduction (95% CIs)	Intervention group (n)	Comparison results Percentage reduction (95% CIs)	Comparison group (n)	Risk of bias
Witt 2006[551,551]	Function (HFAQ) at ≤ 4 months	33.3 (31.4, 35.3	1350	11.3 (9.5, 13.1)	1244	HIGH
	Function (HFAQ) at > 4 months	32.4 (30.3, 34.4)	1309	28.6 (26.5, 30.8)	1183	HIGH
	Pain (low back pain rating scale) at ≤ 4 months	37 (35.2, 38.9)	1350	9.8 (7.9, 11.7)	1244	HIGH
	Pain (low back pain rating scale) at > 4 months	33.5 (31.4, 35.7)	1309	30.8 (28.7, 33)	1183	HIGH

13.3.6 Clinical evidence summary tables

Table 241: Clinical evidence summary: Acupuncture versus sham/placebo in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Placebo/sham	Risk difference with Acupuncture (95% CI)
Quality of life (SF-36 Physical component summary score 0–100) ≤4 months	952 (2 studies)	LOW[a,b] due to inconsistency, imprecision		The mean quality of life (SF-36 physical component summary score 0–100) ≤4 months in the control groups was 37.7	The mean quality of life (SF-36 physical component summary score 0–100) ≤4 months in the intervention groups was 2.44 higher (0.65 lower to 5.54 higher)
Quality of life (SF-36 Mental component summary score 0–100) ≤4 months	952 (2 studies)	HIGH		The mean quality of life (SF-36 mental component summary score 0–100) ≤4 months in the control groups was 50.6	The mean quality of life (SF-36 mental component summary score 0–100) ≤4 months in the intervention groups was 0.13 lower (1.25 lower to 1.51 higher)
Quality of life (SF-36 Physical component summary score 0–100) > 4 months	950 (2 studies)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 physical component summary score 0–100) > 4 months in the control groups was 37.8	The mean quality of life (SF-36 physical component summary score 0–100) > 4 months in the intervention groups was 2.24 higher (0.92 to 3.56 higher)
Quality of life (SF-36 Mental component summary score 0–100) > 4 months	950 (2 studies)	MODERATE[b] due to inconsistency		The mean quality of life (SF-36 mental component summary score 0–100) > 4 months in the control groups was 4.05	The mean quality of life (SF-36 mental component summary score 0–100) > 4 months in the intervention groups was 1.23 higher (2.14 lower to 4.6 higher)
Quality of life (SF-36 General health 0–100) ≤4 months	80 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 general health 0–100) ≤4 months in the control groups was 63.4	The mean quality of life (SF-36 general health 0–100) ≤4 months in the intervention groups was 5.6 higher (4.37 lower to 15.57 higher)

Quality of life (SF-36 Physical function 0–100) ≤4 months	80 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 physical function 0–100) ≤4 months in the control groups was 70.9	The mean quality of life (SF-36 physical function 0–100) ≤4 months in the intervention groups was 13.1 higher (3.81 to 22.39 higher)
Quality of life (SF-36 Physical role limitation 0–100) ≤4 months	80 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 physical role limitation 0–100) ≤4 months in the control groups was 55.8	The mean quality of life (SF-36 physical role limitation 0–100) ≤4 months in the intervention groups was 23 higher (7.57 to 38.43 higher)
Quality of life (SF-36 Bodily pain 0–100) ≤4 months	290 (2 studies)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 bodily pain 0–100) ≤4 months in the control groups was 53.6	The mean quality of life (SF-36 bodily pain 0–100) ≤4 months in the intervention groups was 8.85 higher (3.58 to 14.12 higher)
Quality of life (SF-36 Vitality 0–100) ≤4 months	80 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 vitality 0–100) ≤4 months in the control groups was 58.8	The mean quality of life (SF-36 vitality 0–100) ≤4 months in the intervention groups was 10.8 higher (0.46 to 21.14 higher)
Quality of life (SF-36 Social function 0–100)≤4 months	80 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 social function 0–100)≤4 months in the control groups was 82.5	The mean quality of life (SF-36 social function 0–100)≤4 months in the intervention groups was 7.2 higher (2.47 lower to 16.87 higher)
Quality of life (SF-36 Mental health 0–100) ≤4 months	80 (1 study)	HIGH		The mean quality of life (SF-36 mental health 0–100) ≤4 months in the control groups was 65.2	The mean quality of life (SF-36 mental health 0–100) ≤4 months in the intervention groups was 1.2 higher (8.73 lower to 11.13 higher)

Pain severity (VAS 0–10) ≤4 months	1670 (8 studies)	LOW[a,b] due to inconsistency, imprecision		The median pain severity (VAS 0–10) ≤4 months in the control groups was 4.18	The mean pain severity (VAS 0–10) ≤4 months in the intervention groups was 0.8 lower (1.29 to 0.32 lower)
Pain severity (VAS 0–10) > 4 months	1458 (5 studies)	HIGH		The median pain severity (VAS 0–10) > 4 months in the control groups was 3.52	The mean pain severity (VAS 0–10) > 4 months in the intervention groups was 0.26 lower (0.51 lower to 0.01 lower)
Function (ODI) ≤4 months [change score]	115 (1 study)	MODERATE[a] due to imprecision		The mean function (ODI) ≤4 months [change score] in the control groups was -0.28	The mean function (ODI) ≤4 months [change score] in the intervention groups was 0.15 lower (0.30 lower to 0.00 higher)
Quality of life (SF-36 Emotional role limitation 0–100) ≤4 months	80 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 emotional role limitation 0–100) ≤4 months in the control groups was 76.7	The mean quality of life (SF-36 emotional role limitation 0–100) ≤4 months in the intervention groups was 5 higher (9.64 lower to 19.64 higher)
Quality of life (SF-36 Bodily pain 0–100) > 4 months	205 (1 study)	MODERATE[a] due to imprecision		The mean quality of life (SF-36 bodily pain 0–100) > 4 months in the control groups was 44	The mean quality of life (SF-36 bodily pain 0–100) > 4 months in the intervention groups was 8.4 higher (1.71 to 15.09 higher)
Function (RMDQ, 0–24) >4 months	299 (2 studies)	LOW[a] due to imprecision		The mean function (RMDQ, 0–24) >4 months in the control groups was 6.2	The mean function (RMDQ, 0–24) >4 months in the intervention groups was 0.20 lower (1.52 lower to 1.12 higher)
Function (RMDQ, 0–24) ≤4 months	391 (1 study)	LOW[b] due to inconsistency		The mean function (RMDQ, 0–24) ≤4 months in the control groups was 6.7	The mean function (RMDQ, 0–24) ≤4 months in the intervention groups was 1.38 lower (6.08 lower to 3.31 higher)
Function (ODI) > 4 months [change score]	116 (1 study)	MODERATE[a] due to imprecision		The mean function (ODI) > 4 months [change score] in the control groups was -0.24	The mean function (ODI) > 4 months [change score] in the intervention groups was 0.2 lower (0.5 lower to 0.1 higher)
Function (FFbH-R/HFAQ) <4 months	959	HIGH		The mean without sciatica - function	The mean without sciatica - function

	(2 studies)			(ffbh-r/hfaq) <4 months in the control groups was 62.1	(ffbh-r/hfaq) <4 months in the intervention groups was 4.05 higher (1.22 to 6.88 higher)
Function (FFbH-R/HFAQ) >4 months	958 (2 studies)	HIGH		The mean without sciatica - function (ffbh-r/hfaq) >4 months in the control groups was 62.65	The mean without sciatica - function (ffbh-r/hfaq) >4 months in the intervention groups was 4.22 higher (1.32 to 7.13 higher)
Function (PDI) ≤4 months	295 (2 studies)	HIGH		The mean function (PDI) ≤4 months in the control groups was 5.9 mix of change and final value	The mean function (PDI) ≤4 months in the intervention groups was 3.17 lower (6.3 to 0.05 lower)
Function (PDI) > 4 months	310 (2 studies)	HIGH		The mean function (PDI) >4 months in the control groups was 7.25	The mean function (PDI) >4 months in the intervention groups was 2.58 lower (5.82 lower to 0.67 higher)
Psychological distress (BDI) ≤4 months	115 (1 study)	MODERATE[a] due to imprecision		The mean psychological distress (BDI) ≤4 months in the control groups was -0.18	The mean psychological distress (BDI) ≤4 months in the intervention groups was 0.18 lower (0.38 to 0.02 lower)
Psychological distress (BDI) > 4 months	116 (1 study)	HIGH		The mean psychological distress (BDI) > 4 months in the control groups was -0.36	The mean psychological distress (BDI) > 4 months in the intervention groups was 0.08 lower (0.31 lower to 0.15 higher)
Psychological distress (HADS) ≤ 4 months	85 (1 study)	HIGH		The mean psychological distress (HADS) ≤4 months in the control groups was -1.4	The mean psychological distress (HADS) ≤4 months in the intervention groups was 2.60 lower (4.86 to 0.34 lower)
Psychological distress (HADS) > 4 months	85 (1 study)	HIGH		The mean psychological distress (HADS) > 4 months in the control groups was -2.1	The mean psychological distress (HADS) > 4 months in the intervention groups was 1.5 lower

					(3.63 lower to 0.63 higher)
Psychological distress (CES-D) > 4 months	205 (1 study)	MODERATE[a] due to imprecision		The mean psychological distress (ces-d) > 4 months in the control groups was 50.7	The mean psychological distress (ces-d) > 4 months in the intervention groups was 2.5 lower (5.26 lower to 0.26 higher)
Days with analgesics <4 months	210 (1 study)	MODERATE[a] due to imprecision		The mean days with analgesics <4 months in the control groups was 4.9	The mean days with analgesics <4 months in the intervention groups was 2.9 lower (5 to 0.8 lower)
Responder criteria (50%)	88 (1 study)	MODERATE[a] due to risk of bias	RR 2.62 (1.59 to 4.32)	293 per 1000	475 more per 1000 (from 173 more to 973 more)
Serious adverse events (not treatment related)	984 (2 studies)	LOW[a] due to imprecision	RR 1.19 (0.63 to 2.25)	Moderate	
				57 per 1000	11 more per 1000 (from 21 fewer to 71 more)
Adverse effects (possibly related to treatment)	530 (2 studies)	LOW[a] due to imprecision	RR 2.19 (0.09 to 53.93)	Moderate	
				86 per 1000	102 more per 1000 (from 78 fewer to 1000 more)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs
(b) I^2 >75%; unexplained heterogeneity. Random effects analysis used

Table 242: Clinical evidence summary: Acupuncture versus sham/placebo in low back pain with or without sciatica (overall population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Placebo/sham	Risk difference with Acupuncture (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Placebo/sham	Risk difference with Acupuncture (95% CI)
Pain severity (VAS 0–10) ≤4 months	90 (2 studies)	MODERATE[a] due to imprecision		The mean pain severity (VAS 0–10) ≤4 months in the control groups was 3.8	The mean pain severity (VAS 0–10) ≤4 months in the intervention groups was 0.52 lower (1.27 lower to 0.24 higher)
Function (RMDQ, 0–24) ≤4 months	90 (2 studies)	MODERATE[a] due to imprecision		The mean function (RMDQ, 0–24) ≤4 months in the control groups was 6.31	The mean function (RMDQ, 0–24) ≤4 months in the intervention groups was 0.83 lower (2.97 lower to 1.31 higher)
Responder criteria (improvement in function >35%) <4 months	205 (1 study)	MODERATE[a] due to imprecision	OR 1.19 (0.62 to 2.28)	701 per 1000	35 more per 1000 (from 109 fewer to 142 more)
Adverse effects possibly related to treatment	256 (2 studies)	MODERATE[a] due to imprecision	RR 0.95 (0.29 to 3.08)	43 per 1000	2 fewer per 1000 (from 30 fewer to 89 more)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 243: Clinical evidence summary: acupuncture versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
Quality of life (SF-36 Physical component score 0–100) ≤4 months	945 (2 studies)	HIGH		The mean quality of life (SF-36 physical component score 0–100) ≤4 months in the control groups was 35	The mean quality of life (SF-36 physical component score 0–100) ≤4 months in the intervention groups was 5.11 higher (2.83 to 7.39 higher)
Quality of life (SF-36 Mental component score 0–100) ≤4 months	1011 (3 studies)	MODERATE[b] due to		The mean quality of life (SF-36 mental component score 0–100) ≤4 months in	The mean quality of life (SF-36 mental component score 0–100) ≤4 months in

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
		imprecision		the control groups was 11.55	the intervention groups was 1.74 higher (0.29 to 3.19 higher)
Quality of life (SF-36 Bodily pain 0–100)≤4 months	214 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 bodily pain 0–100)≤4 months in the control groups was 39.9	The mean quality of life (SF-36 bodily pain 0–100)≤4 months in the intervention groups was 18.9 higher (13.37 to 24.43 higher)
Quality of life (SF-12 Physical component score 0–100) > 4 months	737 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-12 physical component score 0–100) > 4 months in the control groups was 35.8	The mean quality of life (sf-12 physical component score 0–100) > 4 months in the intervention groups was 5.8 higher (4.36 to 7.24 higher)
Quality of life (SF-12 Mental component score 0–100) > 4 months	737 (1 study)	HIGH		The mean quality of life (sf-12 mental component score 0–100) > 4 months in the control groups was 49.2	The mean quality of life (sf-12 mental component score 0–100) > 4 months in the intervention groups was 1.5 higher (0.15 lower to 3.15 higher)
Pain severity (VAS 0–10) ≤4 months	1334 (8 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean pain severity (VAS 0–10) ≤4 months in the control groups was 5.73	The mean pain severity (VAS 0–10) ≤4 months in the intervention groups was 1.61 lower (2.23 to 0.99 lower)
Pain severity (VAS 0–10) > 4 months	950 (3 studies)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0–10) > 4 months in the control groups was 4.5	The mean pain severity (VAS 0–10) > 4 months in the intervention groups was 0.90 lower (1.35 to 0.45 lower)
Function (RMDQ, 0–24) ≤4 months	633 (5 studies)	MODERATE[b] due to		The mean function (RMDQ, 0–24) ≤4 months in the control groups was	The mean function (RMDQ, 0–24) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
		imprecision		8.9	2.26 lower (2.74 to 1.77 lower)
Function (RMDQ, 0–24) >4 months	569 (3 studies)	MODERATE[d] due to imprecision		The mean function (RMDQ, 0–24) >4 months in the control groups was 7.7	The mean function (RMDQ, 0–24) >4 months in the intervention groups was 1.14 lower (1.60 lower to 0.68 higher)
Function (FFbH-R) ≤4 months	214 (1 study)	MODERATE[b] due to imprecision		The mean function (FFbH-r) ≤4 months in the control groups was 57.7	The mean function (FFbH-r) ≤4 months in the intervention groups was 9.10 higher (3.65 to 14.55 higher)
Function (PDI) ≤4 months	300 (2 studies)	MODERATE[b] due to imprecision		The mean function (PDI) ≤4 months in the control groups was 12.25 mix of change and final scores	The mean function (PDI) ≤4 months in the intervention groups was 9.38 lower (12.48 to 6.28 lower)
Function (PDI) > 4 months	86 (1 study)	MODERATE[b] due to imprecision		The mean function (PDI) 4 months in the control groups was 2.3	The mean function (PDI) 4 months in the intervention groups was 6.7 lower (11.53 to 1.87 lower)
Function (HFAQ, 0-100) <4 months	734 (1 study)	MODERATE[b] due to imprecision		The mean without sciatica - function (hfaq, 0-100) <4 months in the control groups was -56	The mean without sciatica - function (hfaq, 0-100) <4 months in the intervention groups was 9.4 lower (12.65 to 6.15 lower)
Function (FFbH-R) > 4 months	701 (1 study)	MODERATE[b] due to imprecision		The mean function (HFAQ) > 4 months in the control groups was -55.7	The mean function (HFAQ) > 4 months in the intervention groups was 11.10 lower (14.49 to 7.71 lower)
Psychological distress (CES-D 0–100) ≤	214	MODERATE[a] due to risk of		The mean psychological distress (ces-d 0–100) ≤ 4 months in the control	The mean psychological distress (ces-d 0–100) ≤ 4 months in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
4 months	(1 study)	bias		groups was 49.7	groups was 0.8 lower (3.6 lower to 2 higher)
Psychological distress (HADS 0–42) ≤ 4 months	86 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (HADS 0–42) ≤ 4 months in the control groups was -1.2	The mean psychological distress (HADS 0–42) ≤ 4 months in the intervention groups was 2.8 lower (4.91 to 0.69 lower)
Psychological distress (HADS 0–42) > 4 months	86 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (HADS 0–42) > 4 months in the control groups was -1.3	The mean psychological distress (HADS 0–42) > 4 months in the intervention groups was 2.3 lower (4.48 to 0.12 lower)
Serious adverse events (not treatment related) > 4 months	988 (2 studies)	LOW[b] due to imprecision	RR 0.93 (0.52 to 1.67)	Moderate	
				68 per 1000	5 fewer per 1000 (from 33 fewer to 46 more)
Days with analgesics ≤ 4 months	214 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean days with analgesics ≤ 4 months in the control groups was 6.3	The mean days with analgesics ≤ 4 months in the intervention groups was 4.3 lower (6.44 to 2.16 lower)
Responder criteria (50%)	83 (1 study)	MODERATE[a] due to risk of bias	RR 4.75 (2.05 to 10.99)	Moderate	
				139 per 1000	521 more per 1000 (from 146 to 1000 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs
(c) Heterogeneity, I^2=81%, unexplained by subgroup analysis.
(d) Heterogeneity, I^2 >50% and ≤75%; unexplained by subgroup analysis.
(e) Heterogeneity, I^2 >75%; unexplained by subgroup analysis.

Table 244: Clinical evidence summary: acupuncture versus usual care in low back pain with or without sciatica (overall population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
Quality of life (EQ5D 0–1) ≤4 months	138 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (eq5d 0–1) ≤4 months in the control groups was 0.655	The mean quality of life (eq5d 0–1) ≤4 months in the intervention groups was 0.1 higher (0.01 to 0.19 higher)
Quality of life (EQ5D 0–1) > 4 months	213 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (eq5d 0–1) > 4 months in the control groups was 0.726	The mean quality of life (eq5d 0–1) > 4 months in the intervention groups was 0.01 higher (0.05 lower to 0.08 higher)
Quality of life (SF-36 General health 0–100) ≤4 months	143 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 general health 0–100) ≤4 months in the control groups was -9.4	The mean quality of life (SF-36 general health 0–100) ≤4 months in the intervention groups was 7.4 higher (1.35 to 13.45 higher)
Quality of life (SF-36 Physical role limitation 0–100) ≤4 months	143 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 physical role limitation 0–100) ≤4 months in the control groups was -13.3	The mean quality of life (SF-36 physical role limitation 0–100) ≤4 months in the intervention groups was 14.9 higher (1.58 to 28.22 higher)
Quality of life (SF-36 bodily pain 0–100) ≤4 months	357 (2 studies)	VERY LOW[a,b] due to risk of bias,		The mean quality of life (SF-36 bodily pain 0–100) ≤4 months in the control groups was	The mean quality of life (SF-36 bodily pain 0–100) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
		imprecision		29.5	5.12 higher (0.22 to 10.03 higher)
Quality of life (SF-36 Physical function 0–100) ≤4 months	143 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 physical function 0–100) ≤4 months in the control groups was -11.8	The mean quality of life (SF-36 physical function 0–100) ≤4 months in the intervention groups was 8.2 higher (1.54 to 14.86 higher)
Quality of life (SF-36 Vitality 0–100) ≤4 months	143 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 vitality 0–100) ≤4 months in the control groups was -7.3	The mean quality of life (SF-36 vitality 0–100) ≤4 months in the intervention groups was 10.1 higher (3.19 to 17.01 higher)
Quality of life (SF-36 Social functioning 0–100) ≤4 months	143 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 social functioning 0–100) ≤4 months in the control groups was -8	The mean quality of life (SF-36 social functioning 0–100) ≤4 months in the intervention groups was 7.2 higher (0.77 lower to 15.17 higher)
Quality of life (SF-36 Mental health 0–100) ≤4 months	143 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 mental health 0–100) ≤4 months in the control groups was -6.1	The mean quality of life (SF-36 mental health 0–100) ≤4 months in the intervention groups was 4.6 higher (2.39 lower to 11.59 higher)
Quality of life (SF-36 Emotional role limitation 0–100) ≤4 months	143 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 emotional role limitation 0–100) ≤4 months in the control groups was -24.1	The mean quality of life (SF-36 emotional role limitation 0–100) ≤4 months in the intervention groups was 13.4 higher (0.11 lower to 26.91 higher)
Quality of life (SF-36 Bodily pain 0–100) > 4 months	212 (1 study)	VERY LOW[a,b] due to risk of		The mean quality of life (SF-36 bodily pain 0–100) > 4 months in the control	The mean quality of life (SF-36 bodily pain 0–100) > 4 months in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Acupuncture (95% CI)
		bias, imprecision		groups was 57.8	groups was 6.1 higher (0.6 lower to 12.8 higher)
Pain severity (VAS 0–10) ≤4 months	45 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0–10) ≤4 months in the control groups was 3.02	The mean pain severity (VAS 0–10) ≤4 months in the intervention groups was 1.28 lower (2.09 to 0.47 lower)
Pain severity (VAS 0–10) > 4 months	192 (1 study)	LOW[a] due to risk of bias		The mean pain severity (VAS 0–10) > 4 months in the control groups was 1.53	The mean pain severity (VAS 0–10) > 4 months in the intervention groups was 0.1 lower (0.4 lower to 0.2 higher)
Function (RMDQ 0–24) ≤4 months	100 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ 0–24) ≤4 months in the control groups was 2.8	The mean function (RMDQ 0–24) ≤4 months in the intervention groups was 2.24 lower (3.43 to 1.06 lower)
Function (ODI) >4 months	191 (1 study)	MODERATE[a] due to risk of bias		The mean function (ODI) >4 months in the control groups was 19.6	The mean function (ODI) >4 months in the intervention groups was 1.0 higher (4.16 lower to 6.16 higher)
Overall - Responder criteria (improvement in function >35%) <4 months	138 (1 study)	MODERATE[b] due to imprecision	OR 3.49 (1.71 to 7.15)	443 per 1000	292 more per 1000 (from 133 more to 408 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 245: Clinical evidence summary: acupuncture versus waiting list control in low back pain with/without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Waiting list	Risk difference with Acupuncture (95% CI)
Overall SF36 (change scores, <4 months) - Physical Scale from: 0 to 100.	2594 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean overall sf36 (change scores, <4 months) - physical in the control groups was 2.3	The mean overall sf36 (change scores, <4 months) - physical in the intervention groups was 4.7 higher (4 to 5.4 higher)
Overall SF36 (change scores, <4 months) - Mental Scale from: 0 to 100.	2594 (1 study)	MODERATE [a] due to risk of bias		The mean overall sf36 (change scores, <4 months) - mental in the control groups was 0.3	The mean overall sf36 (change scores, <4 months) - mental in the intervention groups was 2.1 higher (1.4 to 2.8 higher)
Overall SF36 (change scores, >4 months) - Physical Scale from: 0 to 100.	2492 (1 study)	MODERATE [a] due to risk of bias		The mean overall sf36 (change scores, >4 months) - physical in the control groups was 6.3	The mean overall sf36 (change scores, >4 months) - physical in the intervention groups was 0.6 higher (0.2 lower to 1.4 higher)
Overall SF36 (change scores, >4 months) - Mental Scale from: 0 to 100.	2492 (1 study)	MODERATE [a] due to risk of bias		The mean overall sf36 (change scores, >4 months) - mental in the control groups was 1.3	The mean overall sf36 (change scores, >4 months) - mental in the intervention groups was 0.2 higher (0.6 lower to 1 higher)
Prescription of analgesics	2594 (1 study)	MODERATE [a] due to risk of bias	RR 0.93 (0.81 to 1.08)	Moderate	
				227 per 1000	16 fewer per 1000 (from 43 fewer to 18 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 246: Clinical evidence summary: acupuncture versus TENS in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with TENS	Risk difference with Acupuncture (95% CI)
Pain (VAS 0–10) ≤4 months	32 (2 studies)	LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0–10) ≤4 months in the control groups was 6.5	The mean pain (VAS 0–10) ≤4 months in the intervention groups was 1.54 lower (3.43 lower to 0.36 higher)
Function (RMDQ 0–24) ≤4 months	13 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ 0–24) ≤4 months in the control groups was 7.5	The mean function (RMDQ 0–24) ≤4 months in the intervention groups was 0.8 lower (5.38 lower to 3.78 higher)
Functional ability; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 20.	20 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean functional ability; stratum = without sciatica; outcome ≤4 months in the control groups was 2.222	The mean functional ability; stratum = without sciatica; outcome ≤4 months in the intervention groups was 1.42 lower (3.09 lower to 0.25 higher)
Adverse events ≤4 months	20 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1 (0.26 to 3.81)	Moderate	
				300 per 1000	0 fewer per 1000 (from 222 fewer to 843 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 247: Clinical evidence summary: acupuncture versus NSAIDs in low back pain with or without sciatica (overall population)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with NSAIDs	Risk difference with Acupuncture (95% CI)
Pain (VAS 0–10) intramuscular diclofenac ≤4 months	58 (1 study)	LOW[a,b] due to risk of		The mean pain (VAS 0–10) intramuscular diclofenac ≤4 months	The mean pain (VAS 0–10) intramuscular diclofenac ≤4 months in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with NSAIDs	Risk difference with Acupuncture (95% CI)
		bias, imprecision		in the control groups was 4.91	groups was 1.5 higher (0.11 to 2.89 higher)
Pain (VAS 0–10) oral diclofenac ≤4 months	44 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0–10) oral diclofenac ≤4 months in the control groups was 3.02	The mean pain (VAS 0–10) oral diclofenac ≤4 months in the intervention groups was 0.37 lower (0 to 0.47 higher)
Pain (VAS 0–10) > 4 months	58 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0–10) > 4 months in the control groups was 6.84	The mean pain (VAS 0–10) > 4 months in the intervention groups was 0.2 lower (1.33 lower to 0.93 higher)
Function (ODI/RMDQ) ≤4 months	102 (2 studies)	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI/RMDQ) ≤4 months in the control groups was 26.05	The mean function (ODI/RMDQ) ≤4 months in the intervention groups was 0.39 higher (0.01 lower to 0.78 higher)
Function (ODI 0–100) > 4 months	58 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI 0–100) > 4 months in the control groups was 80.83	The mean function (ODI 0–100) > 4 months in the intervention groups was 7.6 lower (16.47 lower to 1.27 higher)
Healthcare utilisation (Inpatient care) > 4 months	58 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.7 (0.53 to 0.93)	Moderate	
				931 per 1000	279 fewer per 1000 (from 65 fewer to 438 fewer)
Healthcare utilisation (duration of hospital stay) > 4 months	58 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (duration of hospital stay) > 4 months in the control groups was 17.96	The mean healthcare utilisation (duration of hospital stay) > 4 months in the intervention groups was 5.38 lower (10.73 to 0.03 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

13.3.6.1 Combined interventions – acupuncture adjunct

Table 248: Acupuncture + electrotherapy (TENS) compared with usual care for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with usual care	Risk difference with Acupuncture + TENS (95% CI)
Pain (VAS, 0–10 0–10) ≤ 4 months	13 (1 study) 10 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (0–100 VAS converted to 0–10) - ≤4 months in the control groups was 5.81	The mean pain (0–100 VAS converted to 0–10) - ≤4 months in the intervention groups was 0.89 lower (3.18 lower to 1.4 higher)
Function (RMDQ, 0–24) ≤ 4 months.	13 (1 study) 10 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (roland morris 0–24) - ≤4 months in the control groups was 7.7	The mean function (roland morris 0–24) - ≤4 months in the intervention groups was 1.2 lower (4.84 lower to 2.44 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 249: Acupuncture + Electrotherapy (TENS) compared with electrotherapy (TENS) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with TENS	Risk difference with Acupuncture + TENS (95% CI)

Pain severity (VAS, 0–10) ≤ 4 months	12 (1 study) 10 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (0–100 VAS converted to 0–10) - ≤4 months in the control groups was 5.8	The mean pain (0–100 VAS converted to 0–10) - ≤4 months in the intervention groups was 0.88 lower (2.95 lower to 1.19 higher)
Function (RMDQ, 0–24) ≤ 4 months	12 (1 study) 10 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (roland morris 0–24) - ≤4 months in the control groups was 7.5	The mean function (roland morris 0–24) - ≤4 months in the intervention groups was 1 lower (4.15 lower to 2.15 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 250: Acupuncture + manual therapy (massage) compared with usual care for low back pain without sciatica

				Anticipated absolute effects	
Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Relative effect (95% CI)**	**Risk with usual care**	**Risk difference with Acupuncture + massage (95% CI)**
Pain (VAS, 0–10, proportion of baseline value) ≤ 4 months	51 (1 study) 4 weeks	LOW[a] due to risk of bias		The mean pain (proportion of baseline value) - ≤4 months in the control groups was 0.99	The mean pain (proportion of baseline value) - ≤4 months in the intervention groups was 0.38 lower (0.55 to 0.21 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 251: Acupuncture + exercise (biomechanical + aerobic) + self-management compared with exercise (biomechanical + aerobic) + self-management for low back pain without sciatica

				Anticipated absolute effects	
Outcomes	**No of Participants (studies) Follow up**	**Quality of the evidence (GRADE)**	**Relative effect (95% CI)**	**Risk with exercise (biomechanical + aerobic)**	**Risk difference with Acupuncture + exercise (biomechanical + aerobic) (95% CI)**

Quality of life (EQ-5D, 0–1) ≤ 4 months.	51 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (eq-5d) - ≤4 months in the control groups was 0.11	The mean quality of life (eq-5d) - ≤4 months in the intervention groups was 0.06 lower (0.23 lower to 0.11 higher)
Quality of life (EQ-5D, 0–1)>4 months	51 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (eq-5d) - >4 months in the control groups was 0.26	The mean quality of life (eq-5d) - >4 months in the intervention groups was 0.11 higher (0 to 0.22 higher)
Pain severity (VAS, 0–10) ≤ 4 months	51 (1 study) 3 months	LOW[a] due to risk of bias, imprecision		The mean pain (VAS 0–10) - ≤4 months in the control groups was -2.12	The mean pain (VAS 0–10) - ≤4 months in the intervention groups was 1.19 higher (0.34 lower to 2.72 higher)
Pain severity (VAS, 0–10) > 4 months	51 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0–10) - > 4 months in the control groups was -1.79	The mean pain (VAS 0–10) - > 4 months in the intervention groups was 0.29 lower (1.87 lower to 1.29 higher)
Function (ODI, 0–100) ≤4 months	51 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) - ≤4 months in the control groups was -7.46	The mean function (ODI) - ≤4 months in the intervention groups was 1.36 higher (4.45 lower to 7.17 higher)
Function (ODI, 0–100) > 4 months	51 (1 study) 6 months	LOW1,2[a,b] due to risk of bias, imprecision		The mean function (ODI) - > 4 months in the control groups was -6.67	The mean function (ODI) - > 4 months in the intervention groups was 4 lower (12.41 lower to 4.41 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

13.4 Economic evidence

One economic evaluation (with two related publications) was identified that included acupuncture as a comparator and has been included in this review.[415,484] This is summarised in the economic evidence profile below (Table 252) and the economic evidence table in Appendix I.

Four economic evaluations relating to acupuncture were identified but were excluded due to limited applicability.[74,276,480,551] These are listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 252: Economic evidence profile: Acupuncture versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Ratcliffe 2006[415]/Thomas 2005[484] (UK)	Partially applicable[(a)]	Potentially serious[(b)]	• Within-RCT analysis (Thomas 2006[485]/Thomas 2005[484]) • Population: mixed (with and without sciatica) (4–52 weeks) • Two comparators: 1. Usual care (UC) 2. UC + acupuncture • Follow-up: 2 years	2-1: £255[(c)]	2-1: 0.071 QALYs[(d)]	2 versus 1: £3,598 per QALY gained	• ICER 95% CI: £188 to £22,149 • ICER using SF-6D utility data £4241 per QALY gained; probability cost-effective ~97% • ICER reduced to £2,104 per QALY when those permanently unable to work were excluded

(a) Study does not include all non-invasive treatment options. Resource use data (1999–2002) and units costs (2002/3) may not reflect the current NHS context.

(b) A longer time horizon may be preferable given that benefits continued to accrue over time (0.012 QALYs at 1 year; 0.027 QALYs at 2 years).Within-trial analysis and so does not reflect full body of available evidence for this comparison; Thomas 2005/Thomas2006 RCT is 1 of several included studies comparing acupuncture to usual care. The probability of intervention being cost effective is not reported for the EQ-5D-based analysis.

(c) 2002/3 costs; cost components incorporated: intervention, primary care contacts (GP, practice nurse, non-study intervention NHS acupuncture, chiropractic, osteopathy) and secondary care contacts (emergency service, inpatient hospital stays, outpatient appointments [generic, pain clinic, physiotherapy], physiotherapy at GP surgery).

(d) Estimated using EQ-5D, UK tariff

Unit costs

Acupuncture could be provided by a physiotherapist, private acupuncture practitioner or in some pain clinics by any trained member of staff from nurse to consultant. The unit cost of a physiotherapist is provided below to aid consideration of cost effectiveness. A GDG member noted that acupuncture is a post-graduate course for physiotherapist and so provision is likely to be at band 6, possibly band 7.

Table 253: Unit costs of healthcare professionals

Healthcare professional	Costs per hour
Hospital physiotherapist (band 5/6/7)	£37/£46/£56
Community physiotherapist (band 5/6/7)	£36/£45/£55

Source: PSSRU 2014[100]; including qualifications.

The unit costs of community physiotherapists do not account for travel costs, such as mileage and travel time. As a result, these estimates are probably an underestimate.

There will also be some costs associated with acupuncture equipment.

13.5 Evidence statements

13.5.1 Clinical

No data were available for any of the comparisons regarding the population of low back pain with sciatica.

13.5.1.1 Acupuncture versus sham/placebo

13.5.1.1.1 Low back pain population (without sciatica)

Evidence from 1 study demonstrated a clinically important benefit of acupuncture in all but one (mental health) of the individual domain scores of SF-36 for short-term follow-up (moderate and high quality; n=80). Data from 2 large trials also demonstrated a clinically important benefit for the composite physical score for short- and long-term follow-up in favour of acupuncture, but not for the composite mental health score (Moderate and high quality; n = 952).

There was evidence from 1 study for a clinically important benefit of acupuncture for depression as measured by HADS in the short term, but not in the long term (high quality; n = 95), and further evidence did not demonstrate a clinical benefit for depression at either time point using the CES-D and BDI measures (high to moderate quality; 2 studies; n = 210 and 116). Similarly, high quality evidence showed no clinically significant difference for pain severity in both the short and long term (8 studies, n = 1670; and 5 studies, n = 1458 respectively). A sensitivity analysis for pain severity was carried out using IPD which also showed no clinically significant difference between acupuncture and sham in both the short and long term (8 studies, n = 1670; and 5 studies, n = 1450 respectively).

Benefit of acupuncture was also seen in the short term for healthcare utilisation (days with analgesics) in 1 study (moderate quality; n=210) and in responder criteria in another study (moderate quality, n=88). Evidence from 6 studies showed acupuncture to have no benefit over sham for function, using a range of measures (very low to high quality). No difference in terms of treatment related and not treatment related adverse events was observed (low quality; 2 studies; n = 530 and low quality; 2 studies; n = 984, respectively).

13.5.1.1.2 Mixed population (with or without sciatica)

Evidence was available from 3 studies in this population and no clinical difference was found across any of the reported outcomes: pain severity and function (moderate quality; n = 90), and treatment-related adverse events (low quality; n = 256). A sensitivity analysis was carried out using IPD for pain severity at less than or equal to 4 months which also showed no clinical difference between acupuncture and sham treatments (moderate quality; n = 90).

13.5.1.2 Acupuncture versus usual care

13.5.1.2.1 Low back pain population (without sciatica)

A clinically important benefit in favour of acupuncture compared with usual care was demonstrated for quality of life in terms of SF-36 physical composite score (high quality; 2 studies; n = 945) and by 1 study in terms of the 'bodily pain' domain (moderate quality; n = 214) up to 4 months follow-up. A benefit of acupuncture over usual care was shown for pain intensity (very low quality; 8 studies; n = 1334) at less or equal to 4 months, but not a later follow-up by 3 studies (low quality; n = 950). A sensitivity analysis was carried out for the pain severity outcomes using IPD, similar results were observed with clinical benefit of acupuncture seen in short term (very low quality; 8 studies; n = 1334) but not long term time points (low quality; n = 959).

Benefit of acupuncture was also seen in the short term for healthcare utilisation (days with analgesics) in 1 study (moderate quality; n=210) and short-term responder criteria in another study (moderate quality, n=83).

Results for function varied depending on the measure used, with a suggestion of a benefit from acupuncture in the short term based on very low to moderate quality evidence when assessed using the RMDQ (5 studies; n = 633), PDI (2 studies; n = 300) or HFAQ (1 studies; n = 734). Of all of these measures, a benefit from acupuncture in the longer term was only seen for FFbH-R in evidence from a single study (moderate quality; n = 701). There was no clinically significant benefit of acupuncture compared with usual care for psychological distress based on individual studies for either the CES-D (moderate quality; n = 214) or HADS (low quality; n = 86). No clinical difference was observed in adverse events (1 study; low quality; n=988).

13.5.1.2.2 Mixed population (with or without sciatica)

A clinically important improvement in quality of life with acupuncture compared with usual care was demonstrated in the short term, mostly by single studies, across all domains and measures (low to very low quality; total n = 495). In the longer term, 1 study demonstrated no clinical difference on EQ-5D (moderate quality; n = 213), while another study demonstrated a clinical benefit of acupuncture for the bodily pain domain of SF-36 (very low quality; n = 212).

Similarly, very low quality evidence suggested a short-term improvement in pain intensity (1 study; n = 45) and function (2 studies; n = 100), but this was not sustained in the longer term. A sensitivity analysis was carried out using IPD for pain severity at greater than 4 months which also showed no clinical difference between acupuncture and usual care (very low quality quality; n = 40). Short term benefit was also seen in responder criteria (improvement in function of greater than 35%) in a single study (moderate quality, n=138).

One study comparing acupuncture to waiting list control found short term benefit for acupuncture on quality of life in terms of SF-36 physical composite score, however this was not maintained at longer term. There was also no difference in clinical benefit for quality of life in terms of SF-36 mental composite score at either time point, or for healthcare utilisation at ≤4 months (moderate to low quality; n=3093).

13.5.1.3 Acupuncture versus active comparisons

There were no data on quality of life or psychological distress for this comparison. Low to very low quality evidence, mainly from single studies, demonstrated no clinically important difference between acupuncture and the active comparison for nearly all pain and function outcomes assessed by the studies, regardless of the active comparison that was used (TENS, NSAIDs). The exception was 2 studies demonstrating a clinically important reduction in pain severity for acupuncture when compared with the use of TENS at less than 4 months in the low back pain (without sciatica) population (low quality, n= 32), and 1 study demonstrating an improvement in pain severity favouring NSAIDs compared to acupuncture in people with low back pain with or without sciatica (low quality; n=58). No clinically important difference between acupuncture and the active comparison was observed for adverse events or healthcare utilisation.

13.5.1.4 Combination of interventions - acupuncture adjunct

13.5.1.4.1 Low back pain population (without sciatica)

Very low quality evidence from a very small study showed no clinical benefit of acupuncture plus TENS versus usual care or TENS alone for both pain and function (n=12 and n=13). When acupuncture was combined with manual therapy (massage) however, there was clinical benefit over usual care in terms of pain (low quality, n=51). When acupuncture was combined with exercise versus exercise alone, low quality evidence from a single trial (n=51) suggested benefit for exercise alone for short-term quality of life (EQ-5D), but in favour of acupuncture plus exercise in the long term. Short term pain benefits also favoured exercise alone, but in the longer term follow up there was no clinical difference between either intervention. In terms of function there was also no difference from the addition of acupuncture at either time-point.

13.5.2 Economic

- One cost–utility analysis found that acupuncture plus usual care was cost effective compared with usual care alone for treating low back pain (with or without sciatica) (ICER: £3,958 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.

13.6 Recommendations and link to evidence

Recommendations	14. Do not offer acupuncture for managing low back pain with or without sciatica.
Relative values of different outcomes	The GDG agreed that the most critical outcome for decision making was health-related quality of life; with pain severity, function and psychological distress being individually critical outcomes as well as components of quality of life measures. Adverse events were considered important for decision making because experience of adverse events may outweigh the possible benefits gained from acupuncture. Similarly, any differences in healthcare utilisation were considered an important outcome likely to reflect any benefits in the quality of life experienced. The GDG discussed the importance of responder criteria as an outcome and agreed that although important in decision making, due to the inherent difficulties in dichotomising continuous outcomes, this was not a critical outcome. Although many studies quoted responder criteria as an outcome, only one study used a definition of response matched that as agreed by the GDG ≥30% improvement in pain or function).
Trade-off between clinical benefits and harms	The GDG first discussed the necessity of a body of evidence to show specific intervention effects, that is, over and above any contextual or placebo effects. It was therefore agreed that if placebo-controlled evidence (or sham acupuncture) is available, this should inform decision making in preference to contextual effects, but

	that the effect sizes compared with usual care would be important to consider if effectiveness relative to placebo, or sham, has been demonstrated. This approach is consistent with that taken in the recent osteoarthritis NICE guideline. **Acupuncture versus placebo/sham in low back pain without sciatica** For the placebo/sham controlled evidence in the low back pain population, the GDG agreed that no clinical benefit was seen for pain or function. Heterogeneity was observed in the meta-analysis that was unexplained by pre-specified subgroup analysis of type of acupuncture or duration of pain. A clinically important benefit was demonstrated in all but one (mental health) of the individual domain scores of SF-36 quality of life for short-term follow-up (below 4 months) in the group who received 5 sessions of acupuncture. It was however highlighted that this was from one study of 80 participants who had acute low back pain of less than 1 month's duration and were recruited from an emergency department and therefore may not be generalisable. Data from 2 large trials (total n 952) in people with chronic low back pain (over 6 months of duration) also demonstrated a clinically important benefit for the composite physical score but not for the composite mental health score. There was evidence of a clinically important benefit for depression as measured by HADS in the short term, but not in the long term and not on CES-D or BDI measures. It was also noted that there was no difference between groups in terms of adverse events. **Acupuncture versus placebo/sham in low back pain with or without sciatica (mixed population)** In the mixed population of low back pain with or without sciatica, the GDG agreed that no clinically significant improvements were demonstrated for any of the outcomes reported (pain, function, adverse events, and responder criteria). **Acupuncture versus usual care (or waiting list) in low back pain without sciatica and in low back pain with or without sciatica (mixed population)** For the comparison with usual care in people with low back pain without sciatica, the GDG agreed that clinically important benefits in terms of improvements in quality of life were observed in evidence from a number of studies. However, it was highlighted that one of these only reported the bodily pain domain and was not specific enough regarding the effects on low back pain. Benefit was also observed in pain and function at ≤4 months, identified from a large body of evidence. The benefits for pain were not sustained beyond 4 months, neither were they for function with the exception of that assessed by the Hannover functional ability questionnaire (FFbH-R), but it was noted this was from one study only. The results were similar for the mixed population of low back pain with or without sciatica, with clinically important benefits were demonstrated for quality of life (EQ-5D and most of the SF-36 domains) as well as for pain and function (RMDQ) in the short term, but not for EQ-5D and pain in the longer-term. The evidence demonstrating benefit was from studies with varying populations and treatment regimens and usual care descriptions. All of the data for SF-36, with the exception of bodily pain at greater than 4 months, was from a single study performed in an inpatient rehabilitation programme and are therefore not necessarily generalizable to the general population. One of the larger studies did demonstrate benefits in quality of life for SF36 bodily pain at > 4 months from a study of 3 months in duration consisting of up to 10 sessions of acupuncture, but the EQ5D benefits were only observed in the short term follow-up. Furthermore, the GDG noted caution with interpreting the SF36 results as only one domain had been reported by the study. The quality of life benefits from this study were also not supported by their outcomes for pain or function. Benefits in pain at short term follow-up (with uncertainty about the clinical importance) were seen from one study of people with acute low back pain of less than two weeks duration and who received acupuncture sessions every day for 5 days. Improvements in function in the short term (with uncertainty about the clinical importance) were observed both in outcomes from this study and another study of five weeks duration in people who had had low back pain for at least 6 weeks.

Evidence from one large study in patients with low back pain for greater than 6 months who were given 15 sessions of acupuncture demonstrated short term benefit in SF-36 for the physical composite score when compared to waiting list control. However this was not maintained in the long-term follow-up and there was no clinical benefit observed for SF-36 mental composite score.

Many of the observed benefits were not sustained beyond 4 months, however the study treatment durations were a maximum of 15 weeks and the GDG debated whether a long term follow up would be expected from a shorter course of treatment.

It was noted that 4 of the included studies had a 'waiting list' group as their usual care comparison. It was considered that this may over-estimate the effects of treatment as people may become disheartened in the comparison group whilst waiting to start active treatment. This may be a cause for the observed heterogeneity in the meta-analysis. It was also noted that people within the control group of many of the usual care studies received management that was not representative of UK primary care practice. It's possible that in some cases this group represents people for whom standard care has been insufficient to manage their pain and are therefore receiving more than usual care. It is noted this applies to all reviews with usual care comparators and has been taken into account equally across interventions reviewed in this guideline.

Sensitivity analysis for acupuncture versus sham and usual care

A sensitivity analysis was carried out using individual patient data (IPD) reported in Vickers 2012 for the pain severity outcomes in acupuncture versus sham and acupuncture versus usual care comparisons where this data were available. The GDG noted that incorporating IPD did not change the clinical importance of the outcomes for any of the meta-analyses carried out using data from the original studies. The GDG noted that where IPD were available, the mean differences in the sensitivity analyses were less favourable towards acupuncture. It is likely that this difference is due to the fact that the IPD was analysed using ANCOVA adjusting for baseline values. It is possible that had IPD been available for all studies, the overall effect size would have been even smaller, however given the lack of data (IPD only available for 1 study per meta-analysis in this review) the GDG were unable to speculate further. The GDG agreed that the sensitivity analysis did not change their conclusion to recommend against the use of acupuncture in a NHS setting but did add strength to this recommendation.

Acupuncture versus active comparisons

The GDG also considered the evidence for acupuncture compared with active interventions (TENS and NSAIDs). The evidence was of low quality from studies of small sample size, with conflicting results and uncertainty regarding the clinical importance for the outcomes assessed by the studies, regardless of the active comparison that was used.

No evidence was identified for people who had low back pain with sciatica, although some of the included studies did not state that people with sciatica were explicitly excluded.

Acupuncture in combination with other treatments

The GDG discussed that the majority of evidence of acupuncture combined with other treatments (exercise, massage, self-management or TENS) didn't show any additional benefit of the addition of acupuncture, with the exception quality of life (EQ-5D) at long term follow up when acupuncture was combined with exercise and self-management. This benefit was not observed at the short term follow up and it was also noted that the acupuncture was applied to the ear. The GDG expressed doubts about the validity of this evidence, and considered that as the EQ5D result was in conflict with the other outcomes, no firm conclusions could be drawn from this evidence. Short term benefit was also seen for acupuncture combined with massage over usual care for pain, however this was a single outcome of low quality

	from a small study. **Summary** The GDG discussed that despite a large number of trials reporting pain as an outcome and the inclusion of trials with large numbers of patients for these and other outcomes, there was still not compelling and consistent evidence of a treatment-specific effect for acupuncture. Where clinically important effects were demonstrated, these were usually short-term. The GDG noted that although comparison of acupuncture with usual care demonstrated improvements in pain, function and quality of life in the short term, comparison with sham acupuncture showed no consistent clinically important effect, leading to the conclusion that the effects of acupuncture were probably the result of contextual effects. As stated above, the GDG agreed that across all reviews if placebo-controlled evidence (or sham acupuncture) is available, this should inform decision making in preference to contextual effects. They agreed in this case the lack of evidence of effect for improving pain or function compared to sham acupuncture was therefore more informative for recommendation making than any evidence compared to usual care, and on this basis acupuncture should not be recommended. Although acupuncture was considered a relatively safe intervention, it was acknowledged that lack of detail on the nature of the adverse events as reported by the trials is a concern with regard to interpreting results appropriately.
Trade-off between net clinical effects and costs	One relevant economic evaluation was included that considered acupuncture as an adjunct to usual care in a mixed population of low back pain with or without sciatica. This was based on the RCT reported by Thomas and colleagues included in the clinical review.[484,485] This within-trial analysis found that the addition of acupuncture to usual care increased costs and improved health (increased QALYs) with an incremental cost-effectiveness ratio of £3,598 per QALY gained. Uncertainty was not reported in the analysis using EQ-5D but in the analysis using SF-6D (which had a similar ICER) the probability of acupuncture being cost effective was around 97%. The analysis only reflects the effectiveness evidence from one RCT of acupuncture whereas many were identified. In this study people received up to 10 sessions of acupuncture and benefits to patients in terms of QALYs were evaluated over two years. Across the studies included in the clinical review the total number of sessions ranged from 1 to 24 and the treatment duration from a one off treatment to treatment over a period of 15 weeks. It is widely accepted that large pragmatic randomised trials (such as the study carried out by Thomas and colleagues) are the best study design on which to base an economic evaluation, as this will capture the cost-effectiveness of an intervention as it would be used in practice (that is, the real world impact on the patient and the NHS). However, before this is considered the GDG decided to ascertain if the intervention has treatment-specific effects over and above the contextual or placebo effects, and the best comparator to prove this would be a placebo or sham. The GDG concluded that there was insufficient evidence of an overall treatment-specific effect to support a recommendation for acupuncture and so consideration of cost-effectiveness was not considered relevant. In addition, the GDG noted that while the study provided evidence of a clinically important difference in EQ-5D quality of life, the trial did not show a benefit for pain, function or distress, and this therefore led them to question the mechanism by which quality of life would be improved.
Quality of evidence	The quality of evidence informing the usual care and other active comparisons ranged from high to very low. The high rating was only observed in outcomes with a sham comparator. In the outcomes with a usual care comparison, lack of patient blinding was the primary reason for a significant risk of bias for subjective outcomes and the quality rating was downgraded accordingly. In addition blinding of the treating therapist was not achieved in many trials due to the nature of the sham technique employed. Pre-specified subgroup analysis was carried out where heterogeneity was present, and if the data allowed for separating as determined a priori in the protocol,

	however this information was frequently unavailable from the included studies. The evidence for pain and function was informed by several studies with a number of meta-analyses showing substantial heterogeneity. Subgroup analyses according to type of acupuncture and chronicity of pain did not explain this heterogeneity. It was considered in the usual care comparison, this may in part be due to variations in the usual care comparator. The GDG discussed the variability in the different sham comparators that were used in the studies. It was considered that if there is inadequate patient, therapist or outcome assessor blinding, there is a risk of studies demonstrating inflated effect sizes, particularly on subjective outcomes when the patient is not blinded to the treatment group. The GDG considered that blinding within the studies reviewed was not equally effective, and therefore this was taken into account when the quality of evidence was reviewed. It was further considered that this may contribute to the inconsistency in the evidence and effects observed, however this cannot be tested by this review. The economic evaluation was judged to be partially applicable with potentially serious limitations. The latter was largely due to the fact that this analysis is based on only one of a number of RCTs that contribute to the evidence base for the clinical effectiveness of acupuncture. In addition uncertainty was not reported for the analysis using EQ-5D, but given that the analysis using SF-6D had a similar ICER and very low uncertainty this was not considered a significant concern.
Other considerations	The GDG considered whether it was acceptable to recommend an intervention that was thought unlikely (on the basis of reported results) to have a specific treatment effect but was thought to be acting through contextual mechanisms. The GDG acknowledged that this was a controversial issue. The GDG considered that other treatments reviewed in the guideline had specific and clinically important treatment effects, beyond contextual effects, although acknowledged that for treatments where no “sham” comparison was available it was not possible to distinguish specific and effects. The majority view of the group was to recommend “do not offer” acupuncture. The GDG noted the lack of effect of acupuncture on pain outcomes in the sham-controlled trials and the inconsistent effect on quality of life in these trials. The GDG discussed that if there was a specific treatment effect, this would be likely to be mediated through pain reduction. Therefore the GDG thought that it was more likely that contextual effects rather than pain reduction were driving the observed outcomes for acupuncture. The GDG discussed whether acupuncture could be considered for those not responding to other treatment options, rather than as a routine treatment. However, the GDG did not find any evidence to support treatment in such sub-groups and chose not to make a recommendation in this regard. The GDG noted that access and provision of acupuncture for low back pain and sciatica in the NHS is currently very variable, in spite of the recommendation in the previous guideline. The GDG considered the potentially considerable cost impact for the NHS if acupuncture was recommended and this would need to be underpinned by a strong evidence base of clinical and cost-effectiveness, which the GDG did not feel had been demonstrated. The GDG discussed whether acupuncture treatment might discourage self-management or participation in activity and exercise. The GDG agreed that this possibility would not be detected in the trials reviewed and that, within NHS settings, Western medical acupuncture provision is usually integrated into a care pathway which involves self-management and activity advice. The GDG considered that there was a substantial body of evidence relating to acupuncture in this review and that further research was unlikely to alter conclusions.

14 Electrotherapies

14.1 Introduction

Electrotherapy is an umbrella term that defines a variety of interventions with the common feature that they all involve the application of forms of energy to the body. These all aim to produce various physiological effects with the goal of improving symptoms or recovery.

Transcutaneous electrical nerve stimulation (TENS) involves the use of pads placed on the skin, and a battery operated device delivering a small current to them to produce a tingling sensation. Mechanisms for TENS-induced pain relief are thought to be multifactorial and due to the effect of controlling the activity of the peripheral, spinal and supra-spinal nervous systems.

Percutaneous electrical nerve stimulation (PENS) uses the same principle as TENS, but electrode needles are inserted through the skin into the subcutaneous tissue and current from a stimulator device is sent to produce a sensation in the tissue itself. One or several sets of treatment may be administered in an outpatient setting.

Interferential therapy involves application of medium frequency electrical currents to affected tissues. Treatment is usually achieved by placing several electrodes on the skin over the affected area, sometimes with the use of suction cups. It is used to stimulate local nerves with the aims of modulating pain, reducing swelling, stimulating local muscles or to promote healing.[531] It is usually administered by a physiotherapist during several treatment sessions, but portable devices are now available for home use.

Low level laser therapy (LLLT) involves the non-invasive application of a single wavelength of light to the skin over the injured area using a probe. One or a series of treatments may be administered in an outpatient setting. There are various laser devices and probe configurations in clinical use. The light is absorbed in the tissues and it is hypothesised that this results in local heating and effects on local chemical activity and cellular behaviour. It is through those effects that laser therapy is purported to have an anti-inflammatory effect and promote tissue repair.[556]

Therapeutic ultrasound involves the delivery of mechanical energy in the form of high frequency sound waves to the site of injury, usually through a probe applied to the skin. This penetrates the tissues at varying depths, depending on the frequency used. Delivered continuously it has a heating effect on the tissues. It is proposed that this thermal or mechanical stimulation may generate improved blood flow and may also facilitate the inflammatory process and tissue healing.[531]

14.2 Review question: What is the clinical and cost effectiveness of electrotherapy (non-invasive interventions) in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 254: PICO characteristics of review question

Population	People aged 16 or above with non-specific low back pain People aged 16 or above with sciatica
Intervention(s)	Electrotherapy • TENS (Transcutaneous Electrical Nerve Stimulation) • PENS (Percutaneous Electric Nerve Stimulation) • interferential therapy

	• laser therapy • therapeutic ultrasound
Comparison(s)	• Placebo/Sham/Attention control • Usual care/waiting list • To each other: other interventions within the same class but not the same type (for example, TENS versus PENS, but not TENS versus another type of TENS) • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D) • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]) • Function (for example, the Roland-Morris Disability Questionnaire or the Oswestry disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI). **Important** • Responder criteria (>30% improvement in pain or function) • Adverse events: 1. morbidity 2. mortality. • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit).
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

14.3 Clinical evidence

14.3.1 Summary of studies included

14.3.1.1 Single interventions

Forty studies were included in the review.
16,25,29,56,69,70,112,117,122,126,135,139,156,173,177,182,215,231,235,236,243,246,279,281,285,286,299,305,307,326,336,408,463,487,490,493,501,504,535,536,538

The populations included adults with acute, subacute or chronic low back pain, with or without sciatica. Interventions included TENS, PENS, interferential therapy, laser and ultrasound. These were compared with each other, with placebo/sham or usual care, or with other interventions including exercise, manual therapies such as massage, traction and manipulation, appliances such as corsets, and acupuncture. Outcomes are reported by strata (with sciatica, without sciatica or mixed populations with or without sciatica) and separated by time-point the outcome is reported, either less than or equal to, or more than 4 months.

Evidence from these studies is summarised in **Table 255** below and in the GRADE clinical evidence profile below (Section 14.3.5). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Due to the limited number of high quality randomised trials included in this review the search was extended to non-randomised studies. No non-randomised controlled trials relevant to the protocol were identified.

Evidence for electrotherapy versus acupuncture can also be found in the acupuncture chapter (See Chapter 13).

14.3.1.2 Combined interventions

Thirteen studies looking at combinations of non-invasive interventions (with electrotherapy as the adjunct) were also included in this review. [7,117,123,126,173,182,183,236,243,281,504,535,554] These are summarised in **Table 256** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (Section 14.3.6). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Two Cochrane reviews [127,556] were identified but they were not included for the following reasons:

- It was unclear whether sciatica was included in the population and studies in people with acute low back pain were excluded;[127]
- The population had thoracic as well as low back pain;[556]

The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol.

For evidence on orthotics and appliances, please see section 11.

14.3.2 Heterogeneity

For the comparison of electrotherapy (TENS) plus exercise (biomechanical) versus exercise (biomechanical) and for electrotherapy (laser) plus self-management (home exercise) versus self-management (home exercise), there was substantial heterogeneity between the studies when they were meta-analysed for the outcomes of pain and function at greater than 4 months. Pre-specified subgroup analyses (different within-class modalities, and chronicity of pain) were unable to be performed on this outcome because the studies were not different in terms of these factors. A random effects meta-analysis was therefore applied to these 2 outcomes, and the evidence was downgraded for inconsistency in GRADE.

Table 255: Summary of included studies – single interventions

Study	Intervention and comparison	Population	Outcomes	Comments
TENS versus Sham				
Buchmuller 2012[26]	TENS Placebo/sham	Low back pain with or without sciatica N=236 Intervention 3 months France	Quality of life (SF-36) Function(RMDQ)	Concomitant treatment = not stated Pain centres
Cheing 1999[8]	TENS Placebo/sham	Low back pain without sciatica N=30 1 intervention session only China	Pain (VAS)	Concomitant treatment = no physiotherapy or medication allowed for previous 2 weeks Secondary care
Deyo 1990[9]	TENS TENS + exercise Placebo/sham tens Placebo/sham tens + exercise	Overall N=145 4 weeks and 3 months follow-up USA	Pain (VAS and mean sickness impact profile : results reported for tens and tens + exercise groups combined versus sham tens and sham tens + exercise groups combined; adjusted for baseline values and for effect of exercise) Healthcare utilisation (prescribing medication : results reported for tens and tens + exercise groups combined versus sham tens and sham tens + exercise groups combined; adjusted for baseline values and for effect of exercise)	Concomitant treatment = twice-weekly visits. At these visits, all the subjects received moist-heat treatment (hot packs), adjustments in the placement of the tens electrodes, and written and oral advice concerning lifting, standing, and resting positions. The authors also loaned the subjects electric heating pads for home use and advised them to apply the pads to painful areas for 10 minutes twice a day
Herman 1994[17]	TENSPlacebo/sham	Low back pain with or without sciatica N=58 Intervention 4 weeks Canada	Pain(VAS) Function (RMDQ)	Concomitant treatment = back rehabilitation programme Workers' compensation board back program
Jarzem	TENS	Low back pain	Function (RMDQ)	Concomitant

Study	Intervention and comparison	Population	Outcomes	Comments
2005[20]	Acu-TENS Biphasic TENSSham	without sciatica N=349 Intervention 3 months Canada		treatment = not stated Secondary care
Kofotolis 2008[281]	4 arm trial Electrotherapy (TENS) Sham electrotherapy (sham TENS) electrotherapy (TENS) + exercise (also included in the comparison TENSversus usual care in this review)	Low back pain without sciatica N=92 4 weeks intervention + 8 weeks follow-up Greece	Pain severity (borg verbal pain rating scale) Function (ODI)	Concomitant treatment: not stated
Krammer 2015[286]	TENS Sham	Low back pain with or without sciatica N=40 4 week follow-up New zealand	Pain (patient specific functional scale(psfs), NRS)-data reported graphically which rendered it un-usable Function (ODI)-data reported graphically which rendered it un-usable	Concomitant treatment = content of each session was determined by physician: typically manipulation, mobilisation, advice and exercise; singularly or in combination. Patients also received physiotherapy treatment twice per week for up to 4 weeks.
Lehmann 1986[24]	TENS Electroacupuncture Placebo/sham TENS	Low back pain with or without sciatica N=53 3 week intervention and 6 months follow-up USA	Pain VAS, results shown graphically which made the data un-usable)	Concomitant treatment = comprehensive multidisciplinary educational programme and twice daily exercise training sessions Inpatients at rehabilitation programme
Marchand 1993[27]	TENS Placebo/sham Waiting list	Low back pain with or without sciatica N=42 Intervention 10 weeks and follow-up at 6 months Canada	Pain (VAS, results reported as means and post hoc dunnet tests values which made data un-usable)	Concomitant treatment =not stated Community setting
Thompson 2008[33]	TENS Placebo/sham	Low back pain without sciatica N=58	Pain (VAS)	Concomitant treatment = usual dose regimen of opioid

Study	Intervention and comparison	Population	Outcomes	Comments
		Intervention of single treatment and follow-up 1 week United kingdom		analgesic and/or non-opioid analgesic (usually NSAID) provided dosage kept constant and within bnf guidelines Secondary care
Topuz 2004[34]	TENS Low frequency TENS Placebo/sham TENS 4 arm trial (also included in PENS versus sham in this review)	Low back pain without sciatica N=60 Intervention 2 weeks Turkey	Quality of life (SF-36) Pain (VAS) Function (ODI)	Concomitant treatment = not stated Secondary care
TENS versus usual care				
Hsieh 2002[232]	TENS Usual care: medication including NSAID (diclofenac potassium) and muscle relaxant (mephenoxalone) and antacid (Wellpine) + educational material 3 arm trial (also included in PENS versus other treatment and PENS versus usual care comparisons in this review)	Low back pain with or without sciatica N=133 1 week follow-up China	Pain (VAS) Function (Quebec back pain disability scale)	Concomitant treatment =Medication including NSAID (diclofenac potassium) and muscle relaxant (mephenoxalone) and antacid (Wellpine) + educational material
Itoh 2009[243]	Electrotherapy (TENS) Usual care: No specific treatment except allowed to use topical poultice containing methylsalicylic acid. 4 arm trial (also included in TENS versus other treatment comparison in this review)	Low back pain without sciatica N=32 5 weeks intervention + 10 weeks follow-up Japan	Pain severity (VAS) Function (RMDQ)	Concomitant treatment: allowed to continue medication if no change in dose for 1 month or longer
Kofotolis 2008[281]	Electrotherapy (TENS) Usual care: individual exercise (biomechanical	Low back pain without sciatica N=92 4 weeks intervention + 8	Pain severity (Borg verbal pain rating scale) Function (ODI)	Concomitant treatment: not stated

Study	Intervention and comparison	Population	Outcomes	Comments
	exercise - Core stability) 4 arm trial (also included in TENS versus sham comparison in this review as well as combination adjunct)	weeks follow-up Greece		
TENS versus Other treatment				
Melzack 1983[28]	TENS (+ exercise concomitant) Massage	Low back pain with or without sciatica N=41 Canada Intervention up to 5 weeks (mean 3 weeks) Secondary care	Pain(McGill) Responder criteria (Pain)	Concomitant treatment = not stated for massage group
Pope 1994[31]	TENS Manipulation Massage	Overall (acute, chronic) without sciatica N=150 USA Intervention 3 weeks Spine research centre	Pain (VAS)	Concomitant treatment = not stated
Facci 2011[29]	TENS Inferential Waiting list	Overall N=150 Intervention 2 weeks Brazil	Pain (VAS, McGill Pain Questionnaire: results given as means only with no corresponding statistics, therefore data is un-usable) Function (RMDQ, results given as means only with no corresponding statistics, therefore data is un-usable)	Concomitant treatment = guidance about vertebral column care Secondary care
PENS versus Placebo/Sham				
Weiner 2003[37]	PENS Placebo/sham	Low back without sciatica N=34 Intervention 6 weeks and follow-up 3 months USA	Pain(VAS)	• Concomitant treatment = Physical therapy: physical reconditioning, management of pain flares, stretching, education • Community
Weiner 2008[38]	PENS Sham PENS	Low back pain without sciatica	Quality of life (SF-36)	• Concomitant treatment = not

Study	Intervention and comparison	Population	Outcomes	Comments
	4 arm trial (also included in PENS versus other treatment comparison in this review as well as combination adjunct)	N=200 Intervention 6 weeks and follow-up 6 months USA	Function (RMDQ)	stated • Secondary care
Topuz 2004[34]	PENS Placebo/sham PENS 4 arm trial (also included in PENS versus other treatment comparison in this review as well as combination adjunct)	Low back pain without sciatica N=60 Intervention 2 weeks Turkey	Quality of life (SF-36) Pain (VAS) Function (ODI)	• Concomitant treatment = not stated • Secondary care
PENS versus usual care				
Hsieh 2002[232]	PENS Usual care: medication including NSAID (diclofenac potassium) and muscle relaxant (mephenoxalone) and antacid (Wellpine) + educational material 3 arm trial (also included in TENS versus usual care and PENS versus other treatment comparisons in this review)	Low back pain with or without sciatica N=133 1 week follow-up China	Pain (VAS) Function (Quebec back pain disability scale)	Concomitant treatment =Medication including NSAID (diclofenac potassium) and muscle relaxant (mephenoxalone) and antacid (Wellpine) + educational material
PENS versus other treatment				
Hsieh 2002[232]	PENS TENS 3 arm trial (also included in PENS versus usual care and TENS versus usual care comparisons in this review)	Low back pain with or without sciatica N=133 1 week follow-up China	Pain (VAS) Function (Quebec back pain disability scale)	Concomitant treatment =Medication including NSAID (diclofenac potassium) and muscle relaxant (mephenoxalone) and antacid (Wellpine) + educational material
Topuz 2004[34]	PENS TENS 4 arm trial (also included in PENS versus sham in this review)	Low back pain without sciatica N=60 Intervention 2 weeks Turkey	Quality of life(SF-36) Pain (VAS) Function (ODI)	Concomitant treatment = not stated Secondary care

Study	Intervention and comparison	Population	Outcomes	Comments
Inferential therapy versus sham				
Fuentes 2014[13]	Inferential therapy Sham	Low back pain without sciatica N=117 Intervention single treatment only Canada	Pain (NRS)	Concomitant treatment = Limited (5 minute) interaction with therapist (brief introduction to purpose of treatment); therapist left the room, returned at 15 and 30 minutes Community
Inferential therapy versus usual care				
Hurley 2001[235]	Inferential therapy Usual care (as for concomitant treatment)	Low back pain with or without Sciatica N=60 Intervention 1 week and follow-up 3 months United Kingdom	Quality of life(EQ-5D; results reported as medians which denied meta-analysis) Pain(McGill Pain Questionnaire, results reported as medians which denied meta-analysis) Function (RMDQ; results reported as medians which denied meta-analysis)	Concomitant treatment = The Back Book patient education encouraging early return to normal activities and participation in low impact activities such as walking, swimming and cycling Secondary care
Inferential therapy versus other treatment				
Werners 1999[39]	Inferential therapy Traction (manual therapy)	Overall N=147 Germany Intervention 3 weeks and follow-up to 3 months Primary care	Function (ODI)	Concomitant treatment = not stated
Hurley 2004[236]	Inferential therapy Maitland technique (manual therapy) Inferential + Maitland	Overall N=240 Intervention 8 weeks and follow-up 12 months UK	Quality of life (EQ-5D, SF-36; results reported as mean scores only with no corresponding statistics which denied meta-analysis) Pain(VAS, results reported as mean scores only with no corresponding statistics which denied meta-	Concomitant treatment = none reported Secondary care

Study	Intervention and comparison	Population	Outcomes	Comments
			analysis) Function (RMDQ; results reported as mean scores only with no corresponding statistics which denied meta-analysis)	
Laser versus sham				
Ay 2010[4]	Laser therapy Sham	Low back pain with sciatica N=80 3 weeks follow-up Turkey	Pain (VAS) Function (RMDQ)	Concomitant treatment = All groups received hot-pack therapy for 20 minutes
Basford 1999[5]	Laser therapy Sham	Low back pain without sciatica N=61 1 month follow-up USA	Pain (VAS) Function (ODI)	Concomitant treatment = not stated
Djavid 2007[10]	Laser therapy Sham	Low back pain without sciatica N=41 Intervention 6 weeks and follow-up at week 12 Iran	Pain (VAS) Function (ODI)	Concomitant treatment = Exercise: first session with physiotherapist then exercises at home Secondary care
Klein 1990[21]	Laser Placebo/sham	Low back pain without sciatica N=20 Intervention 4 weeks USA	Pain (VAS) Function (RMDQ)	Concomitant treatment = standardised home exercise programme of 50 full-forward flexion exercises (standing) and 25 extension exercises twice daily; walk briskly 20 minutes each day; 2 sets of knee flexion coupled with hip abduction exercises each day Secondary care
Konstantinovic 2010[23]	Laser Placebo/sham Nimesulide	Low back pain with sciatica N=546 Intervention 3 weeks Serbia and Montenegro	Pain (VAS) Responder criteria (function)	Concomitant treatment = Nimesulide Secondary care (inpatient or outpatient)
Soriano	Laser	Low back pain	Responder criteria	Concomitant

Study	Intervention and comparison	Population	Outcomes	Comments
1998[32]	Placebo/sham	without sciatica N=85 Intervention 2 weeks Argentina	(pain)	treatment = No analgesic drugs or physical therapy allowed Secondary care
Laser versus usual care				
Gur 2003[16]	Laser (+ exercise concomitant treatment) Usual care 3 arm trial (also included in laser versus other treatment comparison in this review)	Low back pain with or without sciatica N=75 4 weeks intervention and 1 month follow-up Turkey	Pain (VAS) Function (RMDQ)	Usual care consisted of: exercise only (exercise as for laser + exercise group) Secondary care
Konstantinovic 2010[23]	Laser Nimesulide 3 arm trial (also included in laser versus sham comparison in this review)	Low back pain with sciatica N=546 Serbia and Montenegro Intervention 3 weeks	Pain (VAS) Responder criteria (function)	Concomitant treatment = Nimesulide Secondary care (inpatient or outpatient)
Vallone 2014[504]	Diode laser therapy Usual care: Sham - applications of the laser therapy were delivered by the same hand piece, the therapist moved the hand piece at the same rate and pressure as for the intervention group + exercise	Low back pain with or without sciatica N=100 3 week follow-up Italy	Pain (VAS)	Concomitant treatment for both groups = Exercise program including posterior pelvic tilts, sit-ups, bridging, quadruped exercises, hip and knee muscle stretching. Instructed to perform the exercises daily, the stretching before the strengthening. After completion of all treatment sessions patients were asked to continue exercising daily at home for a further 3 weeks
Laser therapy versus other treatment				
Gur 2003[16]	Laser (+ exercise concomitant treatment) Biomechanical exercise 3 arm trial (also	Low back pain with or without sciatica N=75 4 weeks intervention and 1 month follow-up	Pain (VAS) Function (RMDQ)	Usual care consisted of: exercise only (exercise as for laser + exercise group) Secondary care

Study	Intervention and comparison	Population	Outcomes	Comments
	included in laser versus usual care in this review)	Turkey		
Bertocco 2002[6]	Laser therapy Individual Biomechanical exercise - Core stability	Overall (acute, chronic) without sciatica N=21 3 weeks intervention Italy	Pain (VAS, result reported as mean only with no corresponding statistics; therefore could not be meta-analysed)	Concomitant treatment = All walked 1 hour per day, 5 days a week for 3 weeks Secondary care
Unlu 2008[36]	Laser Ultrasound Traction (manual therapy)	Low back pain with sciatica N=60 Intervention 3 weeks, follow-up 3 months Turkey	Pain (VAS) Function (RMDQ)	Concomitant treatment = Co-interventions not allowed Secondary care
Fiore 2011[12]	Laser Ultrasound	Overall (acute, chronic) without sciatica N=30 Intervention 3 weeks Italy	Pain (VAS; result reported as median therefore could not be meta-analysed) Function (ODI; result reported as median therefore could not be meta-analysed)	Concomitant treatment = No other physical therapy; instructed to avoid analgesic/anti-inflammatory drugs and abstain from painful activities involving the lumbar spine Secondary care
Ultrasound versus sham				
Ansari 2006[3]	Ultrasound: Sham	Low back pain without sciatica N=15 3-4 weeks follow-up Iran	Function (ODI)	Concomitant treatment = Continue existing treatment but not start any new analgesic or treatment, no exercise programme
Ebadi 2012[30]	Ultrasound Placebo/sham	Low back pain without sciatica N=50 4 weeks treatment and 1 month follow-up Iran	Pain (VAS) Function (ODI)	Concomitant treatment = Semi-supervised exercise programme: pamphlet describing exercise programme (stretching and strengthening) with figures, checked by therapist at each treatment session; patients asked to perform exercises daily during 4 weeks ultrasound treatment plus 1 month after.

Study	Intervention and comparison	Population	Outcomes	Comments
				Requested not to take pain medication or participate in other exercise or treatment programme
Goren 2010[14]	Ultrasound Placebo/sham	Low back pain with sciatica N=34 Intervention 3 weeks Turkey	Pain (VAS) Function (ODI) Healthcare utilisation (paracetamol use)	Concomitant treatment = Exercise in Rehabilitation Department: stretching and strengthening plus low-intensity cycling Secondary care
Licciardone 2013[25]	Ultrasound Placebo/sham	Low back pain without sciatica N=455 Intervention 8 weeks and follow-up to 12 weeks USA	Responder criteria (pain)	Concomitant treatment = could self-initiate low back pain co-treatments, such as non-prescription drugs and complementary and alternative medicine therapies. Patients could also independently receive low back pain usual care (any co-treatments except OMT, other manual therapies, or UST) at any time from physicians not associated with the study. 2 x 2 factorial design, so half the patients in each group also received orthopaedic manual treatment (OMT) and the other half sham treatment. Community
Ultrasound versus usual care				
Durmus 2013[11]	Ultrasound + usual care Usual care	Low back pain without sciatica N=60 Intervention at 6 weeks Turkey	Quality of life (SF-36) Pain (VAS) Function (ODI) Psychological distress (BDI)	Usual care consisted of: Exercise: 60 minute back and abdominal exercises (motion, flexibility, strengthening, posture, dynamic body balance, coordination, relaxation) with warm-up and cool-down period 10 minutes stretching exercises 3 days a week

Study	Intervention and comparison	Population	Outcomes	Comments
				Secondary care
Ultrasound versus other treatment				
Charlusz 2010[7]	Laser therapy Ultrasound	Low back pain with or without sciatica N=94 Poland	Pain (VAS)	Concomitant treatment = not stated Day rehabilitation centre
Unlu 2008[36]	Ultrasound Laser Traction (manual therapy)	low back pain with sciatica n=60 intervention 3 weeks, follow-up 3 months Turkey	Pain (VAS) Function (RMDQ)	Concomitant treatment = Co-interventions not allowed Secondary care

Table 256: Summary of included studies – combination of interventions (electrotherapy adjunct)

Study	Intervention and comparison	Population	Outcomes	Comments
Alayat 2014[7]	Electrotherapy (High Intensity Laser Therapy) + self-management (unsupervised exercise) Self-management (unsupervised exercise) + placebo laser therapy Electrotherapy (HILT Laser therapy)	Low back pain with or without sciatica N=72 4 weeks intervention + 12 weeks follow-up Saudi Arabia	Pain severity (VAS) Function (RMDQ, MODQ)	Concomitant treatment: not stated
Djavid 2007[117]	Combined non-invasive interventions: electrotherapy (laser) + exercise Exercise (biomechanical - Core stability) Electrotherapy (Laser)	Low back pain with or without sciatica N=61 6 weeks intervention + 12 weeks follow-up Iran	Pain severity (VAS) Function (ODI)	Concomitant treatment: not stated
Durmus 2010[123]	Electrotherapy (TENS) + exercise Electrotherapy (ultrasound) + exercise Exercise (biomechanical - Core stabilisation)	Low back pain without sciatica N=68 6 weeks intervention and follow-up Turkey	Quality of life (SF-36) Pain severity (Pain disability index) Function (ODI) Psychological distress (BDI/)	Concomitant treatment: not stated Some SF-36 scores presented as median (range) not mean (SD)
Ebadi 2012[126]	Electrotherapy (ultrasound) +	Low back pain without sciatica	Pain severity (VAS)	Concomitant treatment: no pain

Study	Intervention and comparison	Population	Outcomes	Comments
	exercise + self-management exercise + self-management	N=50 4 weeks intervention + 1 month follow-up Iran		medication, no participation in other exercise or treatment programme.
Goren 2010[173]	Electrotherapy (ultrasound) + exercise Exercise (biomechanical + aerobics) Waiting list control: Instructed not to take NSAIDs or muscle relaxants but allowed maximum of 500mg paracetamol 3 times a day in case of intense pain	Low back pain with sciatica N=34 3 weeks intervention + follow-up Turkey	Pain severity (Back pain VAS, Leg pain VAS) Function (ODI) Healthcare utilisation (Analgesic use - paracetamol)	Concomitant treatment: instruction not to take NSAIDs or muscle relaxants, but max 500mg paracetamol 3 times/day in case of intense pain
Gur 2003[182]	Electrotherapy (Laser) + exercise Electrotherapy (Laser) Exercise (biomechanical - core stability)	Low back pain with or without sciatica N=75 4 weeks intervention Turkey	Pain severity (VAS) Function (RMDQ; MODQ)	Concomitant treatment: not stated
Gyulai 2015[183]	Electrotherapy (BEMER (Bio-Electro-Magnetic-Energy-Regulation) + TENS) + exercise + manual therapy (massage) Electrotherapy (placebo BEMER + TENS) + exercise + manual therapy (massage)	Low back pain with or without sciatica N=25 15 weeks follow-up Hungary	Quality of life (SF-36) Pain severity (exercise VAS, resting VAS) Function (OD)	Concomitant treatment: not stated
Hurley 2004[236]	Manual therapy (manipulation) + electrotherapy (interferential therapy) Manual therapy (Manipulation) Electrotherapy (Interferential)	Low back pain with or without sciatica N=240 5 weeks intervention + 1 year follow-up UK	Quality of life (EQ-5D; SF-36) Pain severity (VAS; McGill) Function (RMDQ)	Concomitant treatment: participants requested to continue normal activities and avoid other forms of treatment for the duration of the study, apart from routine physician management and analgesics. All subjects received the Back Book from the physiotherapists, who reinforced its message

Study	Intervention and comparison	Population	Outcomes	Comments
				of early return to normal activities and participation in low impact activities such as walking, swimming and cycling.
Itoh 2009[243]	Acupuncture + electrotherapy (TENS) Acupuncture Electrotherapy (TENS) Usual care: No specific treatment except allowed to use topical poultice containing methylsalicylic acid.	Low back pain without sciatica N=32 5 weeks intervention + 10 weeks follow-up Japan	Pain severity (VAS) Function (RMDQ)	Concomitant treatment: allowed to continue medication if no change in dose for 1 month or longer
Kofotolis 2008[281]	Electrotherapy (TENS) + exercise Electrotherapy (TENS) Sham electrotherapy (sham TENS) Individual exercise (biomechanical exercise - Core stability)	Low back pain without sciatica N=92 4 weeks intervention + 8 weeks follow-up Greece	Pain severity (Borg verbal pain rating scale) Function (ODI)	Concomitant treatment: not stated
Vallone 2014[504]	Electrotherapy (Laser) + exercise + self-management (education) Exercise + self-management (education)	Low back pain without sciatica N=100 3 weeks intervention Italy Non-specific low back pain >6 months; age >18 years	Pain severity (VAS)	Concomitant treatment: patients were requested not to take any pain medication during study period and not to engage in any other exercise or treatment programme.
Weiner 2008[535]	Electrotherapy (PENS) + exercise Exercise (biomechanical + aerobics) + sham electrotherapy (PENS) Electrotherapy (PENS) Sham electrotherapy (PENS)	Low back pain without sciatica N=200 6 weeks intervention + 6 months follow-up USA	Quality of life (SF-36) Pain severity (VAS; McGill pain) Function (RMDQ) Psychological distress (Geriatric Depression Scale)	Concomitant treatment: not stated Depression score not eligible (not a protocol defined outcome)
Yeung 2003[554]	Electroacupuncture + exercise + self-	low back pain with or without sciatica	pain severity (NRS) function (Aberdeen	Concomitant treatment: patients

Study	Intervention and comparison	Population	Outcomes	Comments
	management (education + home exercise) Exercise + self-management (education + home exercise)	N=52 4 weeks intervention + 3 months follow-up Hong Kong	Low Back Pain scale) healthcare utilisation (analgesic consumption)	were asked not to undergo any other types of therapy for low back pain during the study

14.3.3 Data unsuitable for meta-analysis

14.3.3.1 Combinations of interventions (electrotherapy adjunct)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Durmus 2010[123]	TENS + exercise versus exercise: Quality of life (SF-36 Physical function, 0-100) ≤ 4 months	Median (range): 97.5 (80-100)	24	Median (range): 90 (70-100)	23	Very high
	TENS + exercise versus exercise: Quality of life (SF-36 Pain, 0-100) ≤ 4 months	Median (range): 88.0 (55-100)	24	Median (range): 77.0 (65-100)	23	Very high
	TENS + exercise versus exercise: Quality of life (SF-36 Social function, 0-100) ≤ 4 months	Median (range): 88.0 (70-100)	24	Median (range): 77.0 (44-88)	23	Very high
	TENS + exercise versus exercise: Quality of life (SF-36 Physical role, 0-100) ≤ 4 months	Median (range): 100.0 (50-100)	24	Median (range): 100.0 (50-100)	23	Very high
	TENS + exercise versus exercise: Quality of life (SF-36 Emotional role, 0-100) ≤ 4 months	Median (range): 100.0 (66-100)	24	Median (range): 100.0 (33-100)	23	Very high
	Ultrasound + exercise: Quality of life (SF-36 Physical function, 0-100) ≤ 4 months	Median (range) 90.0 (65-100)	21	Median (range): 90.0 (70-100)	23	Very high
	Ultrasound + exercise: Quality of life (SF-36 Pain, 0-100) ≤ 4 months	Median (range) 88.0 (66-99)	21	Median (range) 77.0 (65-100)	23	Very high
	Ultrasound + exercise: Quality of life (SF-36 Social function, 0-100) ≤ 4 months	Median (range) 77.0 (55-88)	21	Median (range) 77.0 (44-88)	23	Very high
	Ultrasound + exercise: Quality of life (SF-36 Physical role, 0-100) ≤ 4 months	Median (range) 100.0 (75-100)	21	Median (range) 100.0 (50-100)	23	Very high

	Ultrasound + exercise: Quality of life (SF-36 Emotional role, 0-100) ≤ 4 months	Median (range) 100.0 (66-100)	21	Median (range) 100.0 (33-100)	23	Very high

14.3.4 Clinical evidence summary tables

Table 257: TENS versus sham in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus sham (95% CI)
SF-36; stratum = without sciatica - Physical function; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - physical function; outcome ≤4 months in the control groups was -3.75	The mean SF-36; stratum = without sciatica - physical function; outcome ≤4 months in the intervention groups was 19.41 higher (5.79 to 33.03 higher)
SF-36; stratum = without sciatica - Social function; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - social function; outcome ≤4 months in the control groups was -6.87	The mean SF-36; stratum = without sciatica - social function; outcome ≤4 months in the intervention groups was 17.70 higher (5.97 to 29.43 higher)
SF-36; stratum = without sciatica - Physical role limitation; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - physical role limitation; outcome ≤4 months in the control groups was -16.66	The mean SF-36; stratum = without sciatica - physical role limitation; outcome ≤4 months in the intervention groups was 52.76 higher (23.03 to 9 higher)
SF-36; stratum = without sciatica - Emotional role limitation; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - emotional role limitation; outcome ≤4 months in	The mean SF-36; stratum = without sciatica - emotional role limitation; outcome ≤4 months in the

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus sham (95% CI)
				the control groups was -22.26	intervention groups was 33.36 higher (11.14 to 55.58 higher)
SF-36; stratum = without sciatica - Mental health; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - mental health; outcome ≤4 months in the control groups was -2.33	The mean SF-36; stratum = without sciatica - mental health; outcome ≤4 months in the intervention groups was 7.39 higher (0.32 to 14.46 higher)
SF-36; stratum = without sciatica - Vitality; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - vitality; outcome ≤4 months in the control groups was 0.41	The mean SF-36; stratum = without sciatica - vitality; outcome ≤4 months in the intervention groups was 4.25 higher (2.61 lower to 11.11 higher)
SF-36; stratum = without sciatica - Bodily pain; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - bodily pain; outcome ≤4 months in the control groups was -2.25	The mean SF-36; stratum = without sciatica - bodily pain; outcome ≤4 months in the intervention groups was 14.98 higher (7.56 to 22.4 higher)
SF-36; stratum = without sciatica - General health perception; outcome ≤4 months Scale from: 0 to 100.	27 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - general health perception; outcome ≤4 months in the control groups was -2.91	The mean SF-36; stratum = without sciatica - general health perception; outcome ≤4 months in the intervention groups was 10.51 higher (3.51 to 17.51 higher)
Back pain % of baseline; stratum = without sciatica; outcome ≤4 months.	30 (1 study)	MODERATE[a] due to risk of		The mean back pain % of baseline; stratum = without	The mean back pain % of baseline; stratum = without sciatica;

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus sham (95% CI)
		bias		sciatica; outcome ≤4 months in the control groups was 96.73	outcome ≤4 months in the intervention groups was 33.62 lower (53.27 to 13.97 lower)
Back pain; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	102 (2 studies)	MODERATE[a] due to risk of bias		The mean back pain; stratum = without sciatica; outcome ≤4 months in the control groups was 0.105	The mean back pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.5 lower (0.53 to 0.47 lower)
Function, RMDQ; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 24.	490 (3 studies)	MODERATE[a] due to risk of bias		The mean function, RMDQ; stratum = without sciatica; outcome ≤4 months in the control groups was 9.7	The mean function, RMDQ; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.36 lower (1.4 lower to 0.68 higher)
Function, ODI 0-100; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 100.	44 (1 study)	MODERATE[a] due to risk of bias		The mean function, ODI 0-100; stratum = without sciatica; outcome ≤4 months in the control groups was 0.2	The mean function, ODI 0-100; stratum = without sciatica; outcome ≤4 months in the intervention groups was 4.40 lower (5.07 to 3.73 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 258: TENS versus sham in low back pain with or without sciatica

Outcomes	No of	Quality of	Relati	Anticipated absolute effects

	Participants (studies)	the evidence (GRADE)	ve effect (95% CI)	Risk with Control	Risk difference with TENS versus sham (95% CI)
SF-36 Composite scores; stratum +/- sciatica - Physical composite; outcome ≤4 months Scale from: 0 to 100.	174 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 composite scores; stratum +/- sciatica - physical composite; outcome ≤4 months in the control groups was 34.2	The mean SF-36 composite scores; stratum +/- sciatica - physical composite; outcome ≤4 months in the intervention groups was 1 higher (1.25 lower to 3.25 higher)
SF-36 Composite scores; stratum +/- sciatica - Mental composite; outcome ≤4 months Scale from: 0 to 100.	174 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 composite scores; stratum +/- sciatica - mental composite; outcome ≤4 months in the control groups was 39.1	The mean SF-36 composite scores; stratum +/- sciatica - mental composite; outcome ≤4 months in the intervention groups was 0.2 higher (3.29 lower to 3.69 higher)
Back pain (VAS cm); stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 10.	41 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean back pain (VAS cm); stratum +/- sciatica; outcome ≤4 months in the control groups was 3.59	The mean back pain (VAS cm); stratum +/- sciatica; outcome ≤4 months in the intervention groups was 0.01 lower (1.75 lower to 1.73 higher)
Back pain VAS: improvement of ≥50% from baseline; stratum = +/- sciatica; outcome ≤4 months.	208 (1 study)	MODERATE[a] due to risk of bias	RR 3.71 (1.69 to 8.18)	67 per 1000	182 more per 1000 (from 46 more to 483 more)
Function; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 24.	41 (1 study)	LOW[a] due to risk of bias		The mean function; stratum +/- sciatica; outcome ≤4 months in the control groups was 9.9	The mean function; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 1 lower (4.53 lower to 2.53 higher)
Function, RMDQ: improvement of 4 points (median 15 at baseline); stratum = +/- sciatica; outcome ≤4 months.	222 (1 study)	VERY LOW[a,b] due to risk of bias,	RR 1.05 (0.67	250 per 1000	12 more per 1000 (from 82 fewer to 162 more)

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus sham (95% CI)
		imprecision	to 1.65)		

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 259: TENS versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus usual care (95% CI)
Pain VAS; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	70 (2 studies)	LOW[a] due to risk of bias		The mean pain VAS; stratum = without sciatica; outcome ≤4 months in the control groups was 3.69	The mean pain VAS; stratum = without sciatica; outcome ≤4 months in the intervention groups was0.45 higher (0.37 to 0.53 higher)
Function RMDQ final values; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 24.	26 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function RMDQ final values; stratum = without sciatica;, outcome ≤4 months in the control groups was 7.2	The mean function RMDQ final values; stratum = without sciatica;, outcome ≤4 months in the intervention groups was 0.20 lower (3.08 lower to 2.68 higher)
Function ODI 0-100 change scores; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 100.	44 (1 study)	MODERATE[a] due to risk of bias		The mean function ODI 0-100 change scores,; stratum = without sciatica; outcome ≤4 months in the control groups was -14.2	The mean function ODI 0-100 change scores,; stratum = without sciatica; outcome ≤4 months in the intervention groups was 6.80 higher (5.17 to 8.43 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 260: TENS versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus usual care (95% CI)
Pain VAS; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 10.	102 (1 study)	LOW[a] due to risk of bias		The mean pain VAS; stratum +/- sciatica; outcome ≤4 months in the control groups was -1.75	The mean pain VAS; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 0.25 lower (1.06 lower to 0.56 higher)
Quebec Back Pain Disability Scale; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 100.	102 (1 study)	LOW[a] due to risk of bias		The mean Quebec back pain disability scale; stratum +/- sciatica; outcome ≤4 months in the control groups was -14.45	The mean Quebec back pain disability scale; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 0.85 higher (5.21 lower to 6.91 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 261: TENS versus corset in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus corset (95% CI)
Pain; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	44 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain; stratum = without sciatica; outcome ≤4 months in the control groups was -1.59	The mean pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.63 higher (1.07 lower to 2.33 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 262: TENS versus spinal manipulation in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus manipulation (95% CI)
Pain; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain; stratum = without sciatica; outcome ≤4 months in the control groups was -2.41	The mean pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 1.45 higher (0.09 lower to 2.99 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 263: TENS versus massage in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus massage (95% CI)
Pain; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain; stratum = without sciatica; outcome ≤4 months in the control groups was -1.72	The mean pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.76 higher (0.95 lower to 2.47 higher)
Pain rating index change (%); stratum +/- sciatica; outcome ≤4 months	41 (1 study)	LOW[a] due to risk of bias		The mean pain rating index change (%); stratum +/- sciatica; outcome ≤4 months in the control groups was -37.2	The mean pain rating index change (%); stratum +/- sciatica; outcome ≤4 months in the intervention groups was 32.3 lower (36.58 to 28.02 lower)
Responder: >50% decrease in pain; outcome ≤4 months	41 (1 study)	LOW[a] due to risk of bias	RR 2.23 (1.25 to 3.97)	381 per 1000	469 more per 1000 (from 95 more to 1000 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 264: TENS versus massage in low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with TENS versus massage (95% CI)
Pain rating index change (%); stratum +/- sciatica; outcome ≤4 months	41 (1 study)	LOW[a] due to risk of bias		The mean pain rating index change (%); stratum +/- sciatica; outcome ≤4 months in the control groups was -37.2	The mean pain rating index change (%); stratum +/- sciatica; outcome ≤4 months in the intervention groups was 32.3 lower (36.58 to 28.02 lower)
Responder: >50% decrease in pain; outcome ≤4 months	41 (1 study)	LOW[a] due to risk of bias	RR 2.23 (1.25 to 3.97)	381 per 1000	469 more per 1000 (from 95 more to 1000 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 265: PENS versus sham in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with PENS versus sham (95% CI)
SF-36 Composite scores; stratum = without sciatica - Mental composite; chronic low back pain; outcome >4 months.	184 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 composite scores; stratum = without sciatica - mental composite; chronic low back pain; outcome >4 months in the control groups was 1.35	The mean SF-36 composite scores; stratum = without sciatica - mental composite; chronic low back pain; outcome >4 months in the intervention groups was 2.38 lower (6.34 lower to 1.57 higher)
SF-36 Composite scores; stratum = without sciatica - Physical composite; chronic low back pain; outcome >4 months.	184 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 composite scores; stratum = without sciatica - physical composite; chronic low	The mean SF-36 composite scores; stratum = without sciatica - physical composite; chronic low

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with PENS versus sham (95% CI)
				back pain; outcome >4 months in the control groups was 6.8	back pain; outcome >4 months in the intervention groups was 1.23 lower (8.28 lower to 5.82 higher)
SF-36 Domain scores; stratum = without sciatica - Physical function; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - physical function; chronic low back pain; outcome ≤4 months in the control groups was -3.75	The mean SF-36 domain scores; stratum = without sciatica - physical function; chronic low back pain; outcome ≤4 months in the intervention groups was 27.98 higher (15.18 to 40.78 higher)
SF-36 Domain scores; stratum = without sciatica - Social function; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - social function; chronic low back pain; outcome ≤4 months in the control groups was -6.87	The mean SF-36 domain scores; stratum = without sciatica - social function; chronic low back pain; outcome ≤4 months in the intervention groups was 26.87 higher (15.32 to 38.42 higher)
SF-36 Domain scores; stratum = without sciatica - Physical role limitation; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - physical role limitation; chronic low back pain; outcome ≤4 months in the control groups was -16.66	The mean SF-36 domain scores; stratum = without sciatica - physical role limitation; chronic low back pain; outcome ≤4 months in the intervention groups was 55.76 higher (28.34 to 83.18 higher)
SF-36 Domain scores; stratum = without sciatica - Emotional role limitation; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - emotional role limitation; chronic low back pain; outcome ≤4 months	The mean SF-36 domain scores; stratum = without sciatica - emotional role limitation; chronic low back pain; outcome ≤4

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with PENS versus sham (95% CI)
				in the control groups was -22.26	months in the intervention groups was 68.42 higher (44.07 to 92.77 higher)
SF-36 Domain scores; stratum = without sciatica - Mental health; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - mental health; chronic low back pain; outcome ≤4 months in the control groups was -2.33	The mean SF-36 domain scores; stratum = without sciatica - mental health; chronic low back pain; outcome ≤4 months in the intervention groups was 8.48 higher (1.69 to 15.27 higher)
SF-36 Domain scores; stratum = without sciatica - Vitality; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - vitality; chronic low back pain; outcome ≤4 months in the control groups was 0.41	The mean SF-36 domain scores; stratum = without sciatica - vitality; chronic low back pain; outcome ≤4 months in the intervention groups was 11.89 higher (3.82 to 19.96 higher)
SF-36 Domain scores; stratum = without sciatica - Bodily pain; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - bodily pain; chronic low back pain; outcome ≤4 months in the control groups was -2.25	The mean SF-36 domain scores; stratum = without sciatica - bodily pain; chronic low back pain; outcome ≤4 months in the intervention groups was 21.05 higher (14.04 to 28.06 higher)
SF-36 Domain scores; stratum = without sciatica - General health perception; chronic low back pain; outcome ≤4 months Scale from: 0 to 100.	25 (1 study)	LOW[a] due to risk of bias		The mean SF-36 domain scores; stratum = without sciatica - general health perception; chronic low back pain; outcome ≤4 months in the control groups was	The mean SF-36 domain scores; stratum = without sciatica - general health perception; chronic low back pain; outcome ≤4 months in the intervention groups

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with PENS versus sham (95% CI)
				-2.91	was 24.23 higher (15.63 to 32.83 higher)
Pain; stratum = without sciatica; outcome ≤4 months.	59 (2 studies)	LOW[a] due to risk of bias		The mean pain; stratum = without sciatica; outcome ≤4 months in the control groups was 5.99	The mean pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 1.33 standard deviations lower (1.92 to 0.75 lower)
Pain; stratum = without sciatica; outcome >4 months.	184 (2 studies)	MODERATE[a] due to risk of bias		The mean pain; stratum = without sciatica; outcome >4 months in the control groups was -3.2	The mean pain; stratum = without sciatica; outcome >4 months in the intervention groups was 0.05 standard deviations lower (0.34 lower to 0.24 higher)
Function (ODI, change score); stratum = without sciatica; outcome ≤4 months Scale from: 0 to 24 or 0-50.	25 (1 study)	VERY LOW[a,b,c] due to risk of bias, inconsistency		The mean function (ODI, change score); stratum = without sciatica; outcome ≤4 months in the control groups was 2.16	The mean function (ODI, change score); stratum = without sciatica; outcome ≤4 months in the intervention groups was 11.69 lower (14.92 to 8.46 lower)
Function (RMDQ, final value); stratum = without sciatica; outcome ≤4 months.	34 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, final value); stratum = without sciatica; outcome ≤4 months in the control groups was 12.18	The mean function (RMDQ, final value); stratum = without sciatica; outcome ≤4 months in the intervention groups was 2.93 lower (6.11 lower to 0.25 higher)
Function (RMDQ, final value); stratum = without sciatica; outcome >4 months Scale from: 0 to 24 or 0-50.	184 (2 studies)	VERY LOW[a,c] due to risk of bias, inconsistency		The mean function (RMDQ, final value); stratum = without sciatica; outcome >4 months in the control groups was -2.9	The mean function (RMDQ, final value); stratum = without sciatica; outcome >4 months in the intervention groups was 0.81 higher

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with PENS versus sham (95% CI)
					(0.53 lower to 2.15 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Downgraded by 1 or 2 increments because heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

Table 266: PENS versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with PENS versus usual care (95% CI)
Pain VAS; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 10.	102 (1 study)	LOW[a] due to risk of bias		The mean pain VAS; stratum +/- sciatica; outcome ≤4 months in the control groups was -1.75	The mean pain VAS; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 0.05 lower (0.95 lower to 0.85 higher)
Function, Quebec Back Pain Disability Scale; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 100.	102 (1 study)	LOW[a] due to risk of bias		The mean Quebec back pain disability scale; stratum +/- sciatica; outcome ≤4 months in the control groups was -14.45	The mean Quebec back pain disability scale; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 1.62 lower (7.75 lower to 4.51 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 267: PENS versus TENS in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with PENS versus TENS (95% CI)

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with PENS versus TENS (95% CI)
SF-36; stratum = without sciatica - Physical function; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - physical function; outcome ≤4 months in the control groups was 15.66	The mean SF-36; stratum = without sciatica - physical function; outcome ≤4 months in the intervention groups was 8.57 higher (6.78 lower to 23.92 higher)
SF-36; stratum = without sciatica - Social function; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - social function; outcome ≤4 months in the control groups was 10.83	The mean SF-36; stratum = without sciatica - social function; outcome ≤4 months in the intervention groups was 9.17 higher (0.08 lower to 18.42 higher)
SF-36; stratum = without sciatica - Physical role limitation; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - physical role limitation; outcome ≤4 months in the control groups was 36.1	The mean SF-36; stratum = without sciatica - physical role limitation; outcome ≤4 months in the intervention groups was 3.00 higher (25.48 lower to 31.48 higher)
SF-36; stratum = without sciatica - Emotional role limitation; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - emotional role limitation; outcome ≤4 months in the control groups was 11.1	The mean SF-36; stratum = without sciatica - emotional role limitation; outcome ≤4 months in the intervention groups was 35.06 higher (15.13 to 54.99 higher)
SF-36; stratum = without sciatica - Mental health; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - mental health; outcome ≤4 months in the control groups was 5.06	The mean SF-36; stratum = without sciatica - mental health; outcome ≤4 months in the intervention groups was 1.09 higher (3.26 lower to 5.44 higher)

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with PENS versus TENS (95% CI)
SF-36; stratum = without sciatica - Vitality; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - vitality; outcome ≤4 months in the control groups was 4.66	The mean SF-36; stratum = without sciatica - vitality; outcome ≤4 months in the intervention groups was 7.64 higher (0.58 to 14.7 higher)
SF-36; stratum = without sciatica - Bodily pain; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - bodily pain; outcome ≤4 months in the control groups was 12.73	The mean SF-36; stratum = without sciatica - bodily pain; outcome ≤4 months in the intervention groups was 6.07 higher (2.76 lower to 14.9 higher)
SF-36; stratum = without sciatica - General health perception; outcome ≤4 months Scale from: 0 to 100.	28 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - general health perception; outcome ≤4 months in the control groups was 7.6	The mean SF-36; stratum = without sciatica - general health perception; outcome ≤4 months in the intervention groups was 13.72 higher (3.74 to 23.7 higher)
Pain VAS; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain VAS; stratum = without sciatica; outcome ≤4 months in the control groups was -2.8	The mean pain VAS; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.81 lower (2.29 lower to 0.67 higher)
Function; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 50.	28 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function; stratum = without sciatica; outcome ≤4 months in the control groups was -6.6	The mean function; stratum = without sciatica; outcome ≤4 months in the intervention groups was 2.93 lower (6.84 lower to 0.98 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 268: PENS versus TENS in low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with PENS versus TENS (95% CI)
Pain VAS; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 10.	102 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain VAS; stratum +/- sciatica; outcome ≤4 months in the control groups was -2	The mean pain VAS; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 0.2 higher (0.65 lower to 1.05 higher)
Function; stratum +/- sciatica; outcome ≤4 months Scale from: 0 to 100.	102 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function; stratum +/- sciatica; outcome ≤4 months in the control groups was -13.6	The mean function; stratum +/- sciatica; outcome ≤4 months in the intervention groups was 2.47 lower (8.36 lower to 3.42 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 269: Inferential therapy versus sham in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Interferential therapy versus placebo/sham (95% CI)
Back pain NRS cm; stratum = without sciatica	117 (2 studies)	HIGH		The mean back pain NRS cm; stratum = without sciatica in the control groups was -1.63	The mean back pain NRS cm; stratum = without sciatica in the intervention groups was 0.85 lower (1.14 to 0.56 lower)

Table 270: Inferential therapy versus traction in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Interferential versus traction (95% CI)
Function; outcome ≤4 months	128 (1 study)	LOW[a] due to risk of bias		The mean function; outcome ≤4 months in the control groups was 21.7	The mean function; outcome ≤4 months in the intervention groups was 0.6 lower (5.68 lower to 4.48 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 271: Laser versus sham in low back pain with sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Laser versus sham (95% CI)
Back pain; stratum = with sciatica - final score; outcome at ≤4 months Scale from: 0 to 10.	80 (2 studies)	LOW[a,c] due to risk of bias, inconsistency		The mean back pain; stratum = with sciatica - final score; outcome at ≤4 months in the control groups was 2.33	The mean back pain; stratum = with sciatica - final score; outcome at ≤4 months in the intervention groups was 0.35 higher (0.28 lower to 0.98 higher)
Back pain; stratum = with sciatica - change score; outcome at ≤4 months Scale from: 0 to 10.	364 (1 study)	MODERATE[a] due to risk of bias		The mean back pain; stratum = with sciatica - change score; outcome at ≤4 months in the control groups was -1.57	The mean back pain; stratum = with sciatica - change score; outcome at ≤4 months in the intervention groups was 1.43 lower (1.56 to 1.3 lower)
Function; stratum = with sciatica; outcome at ≤4 months Scale from: 0 to 24.	80 (2 studies)	LOW[a,b] due to risk of bias,		The mean function; stratum = with sciatica; outcome at ≤4 months in the control groups was	The mean function; stratum = with sciatica; outcome at ≤4 months in the intervention

		imprecision		8.95	groups was 1.14 lower (3.31 lower to 1.04 higher)
Responder (function improvement); stratum = with sciatica; outcome at ≤4 months.	364 (1 study)	HIGH	RR 1.54 (1.33 to 1.79)	538 per 1000	291 more per 1000 (from 178 more to 425 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Downgraded by 1 or 2 increments because heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

Table 272: Laser versus sham in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Laser versus sham (95% CI)
Back pain; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	57 (2 studies)	LOW[a,c] due to risk of bias, inconsistency		The mean back pain; stratum = without sciatica; outcome ≤4 months in the control groups was 3.55	The mean back pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.80 standard deviations lower (1.73 lower to 0.12 higher)
Back pain (max pain in last 24hrs); stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	61 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean back pain (max pain in last 24hrs); stratum = without sciatica; outcome ≤4 months in the intervention groups was 1.6 lower (2.8 to 0.37 lower)
Responder (pain improvement >60%): stratum = without sciatica - Chronic low back pain; outcome ≤4 months.	71 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.95 (1.19 to 3.21)	364 per 1000	345 more per 1000 (from 69 more to 804 more)
Function (RMDQ/ODI); stratum = without sciatica; outcome ≤4 months	57 (2 studies)	VERY LOW[a,b] due to risk		The mean function (RMDQ/ODI); stratum = without sciatica; outcome	The mean function (RMDQ/ODI); stratum = without sciatica;

Scale from: 0 to 0-100.		of bias, imprecision		≤4 months in the control groups was 13.5	outcome ≤4 months in the intervention groups was 0.62 standard deviations lower (2.55 lower to 1.32 higher)
Function (ODI) = without sciatica < 4 months.	61 (1 study)	LOW[a, b] due to risk of bias, imprecision		*	The mean function (ODI)= without sciatica < 4 months in the intervention groups was 8.2 lower (13.6 to 2.8 lower)

* No control group risk reported, study only reports mean difference

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Downgraded by 1 or 2 increments because heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

Table 273: Laser versus usual care in low back pain with sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Laser versus usual care (95% CI)
Back pain; stratum = with sciatica; outcome at ≤4 months Scale from: 0 to 10.	364 (1 study)	HIGH		The mean back pain; stratum = with sciatica; outcome at ≤4 months in the control groups was -2.081	The mean back pain; stratum = with sciatica; outcome at ≤4 months in the intervention groups was 0.92 lower (1.05 to 0.78 lower)
Function improvement; stratum = with sciatica; outcome at ≤4 months.	364 (1 study)	HIGH	RR 4.58 (3.34 to 6.27)	181 per 1000	649 more per 1000 (from 424 more to 956 more)

Table 274: Laser versus usual care in low back pain with or without sciatica

Outcomes	No of	Quality of	Relative	Anticipated absolute effects

	Participants (studies)	the evidence (GRADE)	effect (95% CI)	Risk with Control	Risk difference with Laser versus usual care (95% CI)
Pain VAS; stratum: +/- sciatica; outcome ≤4 months Scale from: 0 to 10.	150 (2 studies)	LOW[a,b] due to risk of bias		The mean pain VAS; stratum: +/- sciatica; outcome ≤4 months in the control groups was 3.49	The mean pain VAS; stratum: +/- sciatica; outcome ≤4 months in the intervention groups was 1.26 lower (1.74 to 0.78 lower)
Function; Roland Disability Questionnaire; stratum: +/- sciatica; outcome ≤4 months Scale from: 0 to 24.	50 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean Roland Disability Questionnaire; stratum: +/- sciatica; outcome ≤4 months in the control groups was 5.5	The mean Roland Disability Questionnaire; stratum: +/- sciatica; outcome ≤4 months in the intervention groups was 0.8 higher (1.06 lower to 2.66 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 275: Laser versus exercise in low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Laser versus exercise (95% CI)
Pain VAS; stratum: +/- sciatica; outcome ≤4 months Scale from: 0 to 10.	50 (1 study)	LOW[a] due to risk of bias		The mean pain VAS; stratum: +/- sciatica; outcome ≤4 months in the control groups was 2.9	The mean pain VAS; stratum: +/- sciatica; outcome ≤4 months in the intervention groups was 1 lower (1.75 to 0.25 lower)
Function; Roland Disability Questionnaire; stratum: +/- sciatica; outcome ≤4 months Scale from: 0 to 24.	50 (1 study)	LOW[a] due to risk of bias		The mean Roland Disability Questionnaire; stratum: +/- sciatica; outcome ≤4 months in the control groups was 5.5	The mean Roland Disability Questionnaire; stratum: +/- sciatica; outcome ≤4 months in the intervention groups was 1.1 higher (0.59 lower to 2.79 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 276: Laser versus traction in low back pain with sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Laser versus traction (95% CI)
Back pain; stratum = with sciatica; outcome ≤4 months Scale from: 0 to 10.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean back pain; stratum = with sciatica; outcome ≤4 months in the control groups was 3.13	The mean back pain; stratum = with sciatica; outcome ≤4 months in the intervention groups was 0.13 lower (1.16 lower to 0.9 higher)
Radicular pain; stratum = with sciatica; outcome ≤4 months Scale from: 0 to 10.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean radicular pain; stratum = with sciatica; outcome ≤4 months in the control groups was 2.95	The mean radicular pain; stratum = with sciatica; outcome ≤4 months in the intervention groups was 0.59 lower (1.66 lower to 0.48 higher)
Function; stratum = with sciatica; outcome ≤4 months Scale from: 0 to 24.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function; stratum = with sciatica; outcome ≤4 months in the control groups was 8.9	The mean function; stratum = with sciatica; outcome ≤4 months in the intervention groups was 2.2 lower (4.84 lower to 0.44 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 277: Ultrasound versus placebo/sham in low back pain with sciatica

Outcomes	No of	Quality of	Relative	Anticipated absolute effects

	Participants (studies)	the evidence (GRADE)	effect (95% CI)	Risk with Control	Risk difference with Ultrasound versus placebo/sham (95% CI)
Back pain (VAS cm); stratum = with sciatica; outcome at ≤4 months Scale from: 0 to 10.	30 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean back pain (VAS cm); stratum = with sciatica; outcome at ≤4 months in the control groups was -1.94	The mean back pain (VAS cm); stratum = with sciatica; outcome at ≤4 months in the intervention groups was 0.06 lower (2.1 lower to 1.98 higher)
Function; stratum = with sciatica; outcome at ≤4 months Scale from: 0 to 100.	30 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function; stratum = with sciatica; outcome at ≤4 months in the control groups was -7.8	The mean function; stratum = with sciatica; outcome at ≤4 months in the intervention groups was 3.86 higher (2.48 lower to 10.2 higher)
Paracetamol use; stratum = with sciatica; outcome at ≤4 months.	30 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean paracetamol use; stratum = with sciatica; outcome at ≤4 months in the control groups was 16	The mean paracetamol use; stratum = with sciatica; outcome at ≤4 months in the intervention groups was 7.67 lower (21.37 lower to 6.03 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 278: Ultrasound versus placebo/sham in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Ultrasound versus placebo/sham (95% CI)
Back pain (VAS cm); stratum = without sciatica; outcome at ≤4 months Scale from: 0 to 10.	39 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean back pain (VAS cm); stratum = without sciatica; outcome at ≤4 months in the control groups was	The mean back pain (VAS cm); stratum = without sciatica; outcome at ≤4 months in the intervention groups was

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Ultrasound versus placebo/sham (95% CI)
				2.55	0.22 higher (0.55 lower to 0.99 higher)
Moderate (>30%) pain reduction; stratum = without sciatica; outcome ≤4 months.	455 (1 study)	MODERATE[b] due to imprecision	RR 1.02 (0.86 to 1.2)	541 per 1000	11 more per 1000 (from 76 fewer to 108 more)
Function; stratum = without sciatica; outcome at ≤4 months Scale from: 0 to 100.	49 (2 studies)	LOW[a] due to risk of bias		The mean function; stratum = without sciatica; outcome at ≤4 months in the control groups was 35.2	The mean function; stratum = without sciatica; outcome at ≤4 months in the intervention groups was 7.46 lower (13.54 to 1.38 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 279: Ultrasound versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Ultrasound versus usual care (both groups had exercise) (95% CI)
SF-36; stratum = without sciatica - Physical function domain; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - physical function domain; outcome ≤4 months in the control groups was 89.75	The mean SF-36; stratum = without sciatica - physical function domain; outcome ≤4 months in the intervention groups was 2.75 lower (9.72 lower to 4.22 higher)
SF-36; stratum = without sciatica - Mental health domain; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean SF-36; stratum = without sciatica - mental health domain; outcome ≤4 months in the control	The mean SF-36; stratum = without sciatica - mental health domain; outcome ≤4 months in

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Ultrasound versus usual care (both groups had exercise) (95% CI)
		imprecision		groups was 74.1	the intervention groups was 0.7 lower (7.64 lower to 6.24 higher)
SF-36; stratum = without sciatica - Pain domain; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - pain domain; outcome ≤4 months in the control groups was 77.45	The mean SF-36; stratum = without sciatica - pain domain; outcome ≤4 months in the intervention groups was 0.25 lower (7.67 lower to 7.17 higher)
SF-36; stratum = without sciatica - General health domain; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - general health domain; outcome ≤4 months in the control groups was 66.75	The mean SF-36; stratum = without sciatica - general health domain; outcome ≤4 months in the intervention groups was 5.75 lower (15.34 lower to 3.84 higher)
SF-36; stratum = without sciatica - Social function domain; outcome ≤4 months Scale from: 0 to 10.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - social function domain; outcome ≤4 months in the control groups was 86.1	The mean SF-36; stratum = without sciatica - social function domain; outcome ≤4 months in the intervention groups was 1.75 lower (9.54 lower to 6.04 higher)
SF-36; stratum = without sciatica - Physical role limitation domain; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	LOW[a] due to risk of bias		The mean SF-36; stratum = without sciatica - physical role limitation domain; outcome ≤4 months in the control groups was 90.75	The mean SF-36; stratum = without sciatica - physical role limitation domain; outcome ≤4 months in the intervention groups was 6 higher (1.55 lower to 13.55 higher)
SF-36; stratum = without sciatica - Emotional role limitation domain; outcome ≤4 months	40 (1 study)	VERY LOW[a,b] due to risk of		The mean SF-36; stratum = without sciatica - emotional role limitation	The mean SF-36; stratum = without sciatica - emotional role

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Ultrasound versus usual care (both groups had exercise) (95% CI)
Scale from: 0 to 100.		bias, imprecision		domain; outcome ≤4 months in the control groups was 89.05	limitation domain; outcome ≤4 months in the intervention groups was 7 higher (2.2 lower to 16.2 higher)
SF-36; stratum = without sciatica - Energy domain; outcome ≤4 months Scale from: 0 to 100.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36; stratum = without sciatica - energy domain; outcome ≤4 months in the control groups was 72.5	The mean SF-36; stratum = without sciatica - energy domain; outcome ≤4 months in the intervention groups was 3.5 lower (11.53 lower to 4.53 higher)
Pain; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 10.	40 (1 study)	LOW[a] due to risk of bias		The mean pain; stratum = without sciatica; outcome ≤4 months in the control groups was 3.05	The mean pain; stratum = without sciatica; outcome ≤4 months in the intervention groups was 1.7 lower (2.57 to 0.83 lower)
Function; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 50.	40 (1 study)	LOW[a] due to risk of bias		The mean function; stratum = without sciatica; outcome ≤4 months in the control groups was 5.55	The mean function; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.6 lower (2.8 lower to 1.6 higher)
Depression; stratum = without sciatica; outcome ≤4 months Scale from: 0 to 63.	40 (1 study)	LOW[a] due to risk of bias		The mean depression; stratum = without sciatica; outcome ≤4 months in the control groups was 4.65	The mean depression; stratum = without sciatica; outcome ≤4 months in the intervention groups was 0.75 lower (3.01 lower to 1.51 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 280: Ultrasound versus laser in low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Laser	Risk difference with Ultrasound (95% CI)
Back pain; stratum +/- sciatica Scale from: 0 to 10.	62 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean back pain; stratum +/- sciatica in the control groups was 4.37	The mean back pain; stratum +/- sciatica in the intervention groups was 0.37 lower (1.53 lower to 0.79 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 281: Ultrasound versus traction in low back pain with sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Ultrasound versus traction (95% CI)
Back pain; stratum = with sciatica; outcome ≤4 months Scale from: 0 to 10.	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean back pain; stratum = with sciatica; outcome ≤4 months in the control groups was 3.13	The mean back pain; stratum = with sciatica; outcome ≤4 months in the intervention groups was 0.44 lower (1.42 lower to 0.54 higher)
Function RMDQ SMD; stratum = with sciatica; outcome ≤4 months Scale from: 0 to 24.	40 (1 study)	LOW[a] due to risk of bias		The mean function RMDQ smd; stratum = with sciatica; outcome ≤4 months in the control groups was 8.9	The mean function RMDQ smd; stratum = with sciatica; outcome ≤4 months in the intervention groups was 0.3 lower (3.46 lower to 2.86 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

14.3.5 Combination of interventions – electrotherapy adjunct

14.3.5.1 Low back pain with sciatica

Table 282: Electrotherapy (Ultrasound) + exercise (biomechanical + aerobics) compared to waiting list control for low back pain with sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with waiting list control	Risk difference with Exercise (biomechanical + aerobics) + ultrasound (95% CI)
Pain (Back pain VAS 0-10) ≤4 months.	30 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0-10) - ≤4 months in the control groups was 0.4	The mean pain (VAS 0-10) - ≤4 months in the intervention groups was 2.6 lower (4.27 to 0.93 lower)
Pain (Leg pain VAS 0-10) ≤4 months	30 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0-10) - ≤4 months in the control groups was 0.53	The mean pain (VAS 0-10) - ≤4 months in the intervention groups was 2 lower (3.73 to 0.27 lower)
Function (ODI, 0-100) ≤4 months	30 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI 0-100) - ≤4 months in the control groups was -3.6	The mean function (ODI 0-100) - ≤4 months in the intervention groups was 0.34 lower (7.27 lower to 6.59 higher)
Healthcare utilisation (medication use - Paracetamol intake) ≤4 months	30 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean medication use - ≤4 months in the control groups was 30.6	The mean medication use - ≤4 months in the intervention groups was 22.27 lower (38.26 to 6.28 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 283: Electrotherapy (Ultrasound) + exercise (biomechanical + aerobics) compared to exercise (biomechanical + aerobics) for low back pain with sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (biomechanical + aerobics)	Risk difference with Ultrasound + exercise (biomechanical + aerobics) (95% CI)
Pain (Back pain VAS 0-10) ≤4 months	30 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0-10) - ≤4 months in the control groups was -1.94	The mean pain (VAS 0-10) - ≤4 months in the intervention groups was 0.26 lower (2.3 lower to 1.78 higher)
Pain (Leg pain VAS 0-10) ≤4 months	30 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0-10) - ≤4 months in the control groups was -2.47	The mean pain (VAS 0-10) - ≤4 months in the intervention groups was 1.00 higher (1.44 lower to 3.44 higher)
Function (ODI, 0-100) ≤4 months.	30 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean function (ODI 0-100) - ≤4 months in the control groups was -7.8	The mean function (ODI 0-100) - ≤4 months in the intervention groups was 3.86 higher (2.48 lower to 10.2 higher)
Healthcare utilisation (Medication use - Use of paracetamol) ≤4 months	30 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean medication use - ≤4 months in the control groups was 16	The mean medication use - ≤4 months in the intervention groups was 7.67 lower (21.37 lower to 6.03 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

14.3.5.2 Low back pain without sciatica

Table 284: Electrotherapy (Laser) + self-management (education) + exercise (biomechanical) compared to self-management (education) + exercise (biomechanical) for low back pain with and without sciatica

Outcomes	No of Participants	Quality of the evidence (GRADE)	Relative effect (95%	Anticipated absolute effects	
				Risk with education + exercise	Risk difference with Laser + education + exercise

	(studies)		CI)	(biomechanical)	(biomechanical) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	100 (1 study) 3 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain (0-10 VAS) - ≤4 months in the control groups was -2.32	The mean pain (0-10 VAS) - ≤4 months in the intervention groups was 1.64 lower (2.42 to 0.86 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 285: Electrotherapy (TENS) + acupuncture compared to acupuncture for low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with acupuncture	Risk difference with TENS + acupuncture (95% CI)
Pain severity (VAS, 0-10) ≤4 months	13 (1 study) 10 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (0-100 VAS converted to 0-10) - ≤4 months in the control groups was 4.33	The mean pain (0-100 VAS converted to 0-10) - ≤4 months in the intervention groups was 0.59 higher (1.48 lower to 2.66 higher)
Function (RMDQ, 0-24) ≤4 months	13 (1 study) 10 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (roland-morris 0-24) - ≤4 months in the control groups was 6.7	The mean function (roland-morris 0-24) - ≤4 months in the intervention groups was 0.2 lower (3.98 lower to 3.58 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 286: Electrotherapy (TENS) + exercise (biomechanical) compared to sham TENS for low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with sham TENS	Risk difference with TENS + exercise (biomechanical) (95% CI)

Pain severity (Borg verbal pain rating scale, 0-10) ≤4 months	42 (1 study) 8 weeks	LOW[a] due to risk of bias		The mean pain (borg verbal pain rating scale 0-10) - ≤4 months in the control groups was 0.19	The mean pain (borg verbal pain rating scale 0-10) - ≤4 months in the intervention groups was 0.66 lower (0.7 to 0.62 lower)
Function (ODI, 0-100) ≤4 months	42 (1 study) 8 weeks	LOW[a] due to risk of bias		The mean function (ODI 0-100) - ≤4 months in the control groups was 0.2	The mean function (ODI 0-100) - ≤4 months in the intervention groups was MD 7.60 lower (8.77 to 6.43 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 287: Electrotherapy (TENS) + exercise (biomechanical) compared to exercise (biomechanical) for low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (biomechanical)	Risk difference with TENS + exercise (biomechanical) (95% CI)
SF-36 (0-100) - ≤4 months: Mental health SF-36. Scale from: 0 to 100.	40 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: mental health in the control groups was 71.75	The mean SF-36 (0-100) - ≤4 months: mental health in the intervention groups was 6.95 higher (0.44 lower to 14.34 higher)
SF-36 (0-100) - ≤4 months: General health SF-36. Scale from: 0 to 100.	40 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: general health in the control groups was 64.25	The mean SF-36 (0-100) - ≤4 months: general health in the intervention groups was 6.15 higher (5.3 lower to 17.6 higher)
SF-36 (0-100) - ≤4 months: Energy SF-36. Scale from: 0 to 100.	40 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: energy in the control groups was 67.75	The mean SF-36 (0-100) - ≤4 months: energy in the intervention groups was 16.05 higher

					(7.72 to 24.38 higher)
Pain (Borg and PDI -converted to 0-10) - ≤4 months Scale from: 0 to 10.	84 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean pain (borg and PDI - converted to 0-10) - ≤4 months in the control groups was 0	The mean pain (borg and PDI - converted to 0-10) - ≤4 months in the intervention groups was 0.15 higher (0.54 lower to 0.85 higher)
Function (ODI 0-100) - ≤4 months ODI. Scale from: 0 to 100.	84 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean function (ODI 0-100) - ≤4 months in the control groups was 0	The mean function (ODI 0-100) - ≤4 months in the intervention groups was 2.63 higher (5.61 lower to 4.86 higher)
Psychological distress: Beck Depression Inventory (0-63) - ≤4 months BDI. Scale from: 0 to 63.	40 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress: beck Depression Inventory (0-63) - ≤4 months in the control groups was 4.85	The mean psychological distress: beck Depression Inventory (0-63) - ≤4 months in the intervention groups was 1.5 lower (3.68 lower to 0.68 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Downgraded by 1 increment for I^2 >50% - 74% and 2 increments for I^2 >75%.

Table 288: Electrotherapy (PENS) + exercise (biomechanical + aerobics) compared to sham electrotherapy (PENS) + exercise (biomechanical + aerobics) for low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with sham PENS + exercise (biomechanical + aerobics)	Risk difference with PENS + exercise (biomechanical + aerobics) (95% CI)
Quality of life (SF-36 Mental component summary score, 0-100) ≤ 4 months	89 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: mental component summary score in the control groups was 2.8	The mean SF-36 (0-100) - ≤4 months: mental component summary score in the intervention groups was 3.1 lower (8.34 lower to 2.14 higher)

Quality of life (SF-36 Mental component summary score, 0-100) > 4 months :	89 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - > 4 months : mental component summary score in the control groups was 1.5	The mean SF-36 (0-100) - > 4 months : mental component summary score in the intervention groups was 1.7 lower (7.44 lower to 4.04 higher)
Quality of life (SF-36 Physical component summary score, 0-100) ≤4 months:	89 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: physical component summary score in the control groups was 6.9	The mean SF-36 (0-100) - ≤4 months: physical component summary score in the intervention groups was 3 lower (13.09 lower to 7.09 higher)
Quality of life (SF-36 Physical component summary score,0-100) - > 4 months :	89 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - > 4 months : physical component summary score in the control groups was 8.5	The mean SF-36 (0-100) - > 4 months : physical component summary score in the intervention groups was 4.1 lower (15.06 lower to 6.86 higher)
Pain severity (McGill, 0-78) ≤4 months	89 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill) - ≤4 months in the control groups was -3.1	The mean pain (McGill) - ≤4 months in the intervention groups was 1 lower (4.34 lower to 2.34 higher)
Pain severity (McGill, 0-78) - > 4 months	89 (1 study) 6 months	MODERATE[a] due to risk of bias		The mean pain (McGill) - > 4 months in the control groups was -3.1	The mean pain (McGill) - > 4 months in the intervention groups was 0.7 lower (4.04 lower to 2.64 higher)
Function (RMDQ, 0-24) ≤4 months	89 (1 study) 6 weeks	MODERATE[a] due to risk of bias		The mean function (roland-morris) - ≤4 months in the control groups was -3	The mean function (roland-morris) - ≤4 months in the intervention groups was 0.4 higher (1.53 lower to 2.33 higher)
Function (RMDQ, 0-24) > 4 months	89	LOW[a]		The mean function (roland-morris)	The mean function (roland-

	(1 study) 6 months	due to risk of bias, imprecision		- > 4 months in the control groups was -2.8	morris) - > 4 months in the intervention groups was 0.7 higher (1.31 lower to 2.71 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 289: Electrotherapy (Ultrasound) + exercise compared to exercise (biomechanical) for low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (biomechanical)	Risk difference with Ultrasound + exercise (95% CI)
Quality of life (SF-36 Mental health, 0-100) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: mental health in the control groups was 71.75	The mean SF-36 (0-100) - ≤4 months: mental health in the intervention groups was 1.3 higher (6.09 lower to 8.69 higher)
Quality of life (SF-36 General health, 0-100) ≤4 months:	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: general health in the control groups was 64.25	The mean SF-36 (0-100) - ≤4 months: general health in the intervention groups was 1.27 higher (9.07 lower to 11.61 higher)
Quality of life (SF-36 Energy, 0-100) ≤ 4 months:	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: energy in the control groups was 67.75	The mean SF-36 (0-100) - ≤4 months: energy in the intervention groups was 0.93 higher (8.36 lower to 10.22 higher)
Pain severity (pain disability index 0-50) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (pain disability index 0-50) - ≤4 months in the control groups was 6.5	The mean pain (pain disability index 0-50) - ≤4 months in the intervention groups was 0.29 lower (3.07 lower to 2.49 higher)
Function (ODI, 0-100) ≤4 months	39	VERY LOW[a,b]		The mean function (ODI 0-100) - ≤4	The mean function (ODI 0-100) -

	(1 study) 6 weeks	due to risk of bias, imprecision		months in the control groups was 8.4	≤4 months in the intervention groups was 0.28 higher (2.03 lower to 2.59 higher)
Psychological distress (Beck Depression Inventory,0-63)) ≤4 months	39 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean depression (beck Depression Inventory (0-63)) - ≤4 months in the control groups was 4.85	The mean depression (beck Depression Inventory (0-63)) - ≤4 months in the intervention groups was 0.91 lower (3.05 lower to 1.23 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 290: Electrotherapy (Ultrasound) + exercise + self-management compared to exercise + self-management for low back pain without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise + self-management	Risk difference with Ultrasound + exercise + self-management (95% CI)
Pain (0-100 VAS converted to 0-10) - ≤4 months VAS. Scale from: 0 to 10.	39 (1 study) 2 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (0-100 VAS converted to 0-10) - ≤4 months in the control groups was 2.55	The mean pain (0-100 VAS converted to 0-10) - ≤4 months in the intervention groups was 0.22 higher (0.55 lower to 0.99 higher)
Function (Functional Rating Index) - ≤4 months Scale from: 0 to 40.	39 (1 study) 2 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (functional rating index) - ≤4 months in the control groups was 30.5	The mean function (functional rating index) - ≤4 months in the intervention groups was 7.7 lower (14.13 to 1.27 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

14.3.5.3 Low back pain with or without sciatica

Table 291: Electroacupuncture + self-management (mixed modality – education + home exercise) + exercise compared to self-management (mixed modality - education + home exercise) + exercise for low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with education + exercise + home exercise	Risk difference with Electroacupuncture + education + exercise + home exercise (95% CI)
Pain (NRS 0-10) - ≤4 months	49 (1 study)	LOW[a] due to risk of bias		The mean pain (NRS 0-10) - ≤4 months in the control groups was 5.27	The mean pain (NRS 0-10) - ≤4 months in the intervention groups was 1.81 lower (3.07 to 0.55 lower)
Function (Aberdeen low back pain scale 0-100 converted to 0-10 scale) - ≤ 4 months	49 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Aberdeen low back pain scale 0-100 converted to 0-10 scale) - ≤4 months in the control groups was 2.582	The mean function (Aberdeen low back pain scale 0-100 converted to 0-10 scale) - ≤4 months in the intervention groups was 0.6 lower (1.25 lower to 0.06 higher)
Analgesic consumption - ≤4 months	52 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.5 (0.1 to 2.5)	Moderate	
				154 per 1000	77 fewer per 1000 (from 138 fewer to 231 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 292: Electrotherapy (interferential) + manual therapy (manipulation) compared to manual therapy (manipulation) for low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with manipulation	Risk difference with Interferential + manipulation (95% CI)

Quality of life (EQ-5D) - ≤4 months	129 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (eq-5d) - ≤4 months in the control groups was 0.16	The mean quality of life (eq-5d) - ≤4 months in the intervention groups was 0.01 lower (0.15 lower to 0.13 higher)
Quality of life (EQ-5D) - > 4 months	103 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (eq-5d) - >4 months in the control groups was 0.15	The mean quality of life (eq-5d) - > 4 months in the intervention groups was 0.1 higher (0.01 lower to 0.21 higher)
SF-36 (0-100) - ≤4 months: Physical functioning	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: physical functioning in the control groups was 15.26	The mean SF-36 (0-100) - ≤4 months: physical functioning in the intervention groups was 0.95 lower (8.27 lower to 6.37 higher)
SF-36 (0-100) - > 4 months : Physical functioning	103 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 (0-100) - >4 months: physical functioning in the control groups was 9.36	The mean SF-36 (0-100) - > 4 months : physical functioning in the intervention groups was 12.04 higher (2.6 to 21.48 higher)
SF-36 (0-100) - ≤4 months: Role physical	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: role physical in the control groups was 28.58	The mean SF-36 (0-100) - ≤4 months: role physical in the intervention groups was 1.43 higher (12.96 lower to 15.82 higher)
SF-36 (0-100) - > 4 months : Role physical	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: role physical in the control groups was 36.9	The mean SF-36 (0-100) - > 4 months : role physical in the intervention groups was 12.2 higher (5.48 lower to 29.88 higher)
SF-36 (0-100) - ≤4 months: Bodily pain	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: bodily pain in the control groups was 22.89	The mean SF-36 (0-100) - ≤4 months: bodily pain in the intervention groups was 0.69 lower

					(8.86 lower to 7.48 higher)
SF-36 (0-100) - > 4 months : Bodily pain	103 (1 study)	MODERATE[a] due to risk of bias		The mean SF-36 (0-100) - >4 months: bodily pain in the control groups was 23.81	The mean SF-36 (0-100) - > 4 months : bodily pain in the intervention groups was 12.59 higher (2.65 to 22.53 higher)
SF-36 (0-100) - ≤4 months: General health	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: general health in the control groups was -1.25	The mean SF-36 (0-100) - ≤4 months: general health in the intervention groups was 2.27 higher (3.56 lower to 8.1 higher)
SF-36 (0-100) - > 4 months : General health	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: general health in the control groups was -2.53	The mean SF-36 (0-100) - > 4 months : general health in the intervention groups was 3.27 higher (4.58 lower to 11.12 higher)
SF-36 (0-100) - ≤4 months: Vitality	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: vitality in the control groups was 8.17	The mean SF-36 (0-100) - ≤4 months: vitality in the intervention groups was 0.96 lower (7.64 lower to 5.72 higher)
SF-36 (0-100) - > 4 months : Vitality	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: vitality in the control groups was 11.23	The mean SF-36 (0-100) - > 4 months : vitality in the intervention groups was 5.17 higher (2.93 lower to 13.27 higher)
SF-36 (0-100) - ≤4 months: Social functioning	129 (1 study)	LOW[b] due to imprecision		The mean SF-36 (0-100) - ≤4 months: social functioning in the control groups was 15.56	The mean SF-36 (0-100) - ≤4 months: social functioning in the intervention groups was 0.17 lower (9.05 lower to 8.71 higher)
SF-36 (0-100) - > 4 months : Social functioning	103 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean SF-36 (0-100) - >4 months: social functioning in the control groups was	The mean SF-36 (0-100) - > 4 months : social functioning in the intervention groups was

		imprecision		24.4	0.2 lower (13.99 lower to 13.59 higher)
SF-36 (0-100) - ≤4 months: Role emotional	129 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: role emotional in the control groups was 10.2	The mean SF-36 (0-100) - ≤4 months: role emotional in the intervention groups was 11.85 higher (3.38 lower to 27.08 higher)
SF-36 (0-100) - > 4 months : Role emotional	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: role emotional in the control groups was 21.3	The mean SF-36 (0-100) - > 4 months : role emotional in the intervention groups was 8.2 higher (7.21 lower to 23.61 higher)
SF-36 (0-100) - ≤4 months: Mental health domain	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - ≤4 months: mental health domain in the control groups was 3.89	The mean SF-36 (0-100) - ≤4 months: mental health domain in the intervention groups was 2.46 higher (3.06 lower to 7.98 higher)
SF-36 (0-100) - > 4 months : Mental health domain	103 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 (0-100) - >4 months: mental health domain in the control groups was 4.72	The mean SF-36 (0-100) - > 4 months : mental health domain in the intervention groups was 5.58 higher (1.53 lower to 12.69 higher)
Pain (0-100 VAS converted to 0-10) - ≤ 4 months	129 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (0-100 VAS converted to 0-10) - ≤4 months in the control groups was -1.988	The mean pain (0-100 VAS converted to 0-10) - ≤4 months in the intervention groups was 0.48 lower (1.35 lower to 0.39 higher)
Pain (0-100 VAS converted to 0-10) - > 4 months	103 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (0-100 VAS converted to 0-10) - >4 months in the control groups was -1.82	The mean pain (0-100 VAS converted to 0-10) - > 4 months in the intervention groups was 0.75 lower (1.81 lower to 0.31 higher)
Function (Roland-Morris Disability Questionnaire) - ≤4 months	129 (1 study)	MODERATE[a] due to risk of		The mean function (Roland-Morris Disability Questionnaire) -	The mean function (Roland-Morris Disability Questionnaire) -

		bias		≤4 months in the control groups was -4.53	≤4 months in the intervention groups was 0.12 lower (1.78 lower to 1.54 higher)
Function (Roland-Morris Disability Questionnaire) - > 4 months	103 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (Roland-Morris Disability Questionnaire) - >4 months in the control groups was -4.71	The mean function (Roland-Morris Disability Questionnaire) - > 4 months in the intervention groups was 1.79 lower (3.77 lower to 0.19 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 293: Electrotherapy (laser) + self-management (home exercise) compared to self-management (home exercise) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with home exercise	Risk difference with Laser + home exercise (95% CI)
Pain (VAS 0-10) - ≤4 months	87 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean pain (VAS 0-10) - ≤4 months in the control groups was 3.6	The mean pain (VAS 0-10) - ≤4 months in the intervention groups was 0.99 lower (2.85 lower to 0.87 higher)
Function (Oswestry disability index 0-100) - ≤4 months	87 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean function (ODI 0-100) - ≤4 months in the control groups was 29.6	The mean function (ODI 0-100) - ≤4 months in the intervention groups was 4.00 lower (11.23 lower to 3.23 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

(c) Downgraded by 1 increment for I^2 >50% - 74% and 2 increments for I^2 >75%.

Table 294: Electrotherapy (HILT laser) + self-management (unsupervised exercise) compared to placebo HILT laser + self-management (unsupervised exercise) for low back pain with or without sciatica

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with HILT laser + self-management (unsupervised exercise) compared to placebo HILT laser + self-management (unsupervised exercise) for low back pain (95% CI)
Pain severity (VAS, 0-10) ≤ 4 months	52 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS, 0-10) ≤ 4 months in the control groups was 3.71	The mean pain severity (VAS, 0-10) ≤ 4 months in the intervention groups was 1.07 lower (1.77 to 0.37 lower)
Function (RMDQ, 0-24) ≤4 months	52 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was 6.92	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 1.42 lower (1.95 to 0.89 lower)
Function (MODQ, 0-100) ≤ 4 months	52 (1 study) 12 weeks	LOW[a] due to risk of bias		The mean function (modq, 0-100) ≤ 4 months in the control groups was 18.75	The mean function (modq, 0-100) ≤ 4 months in the intervention groups was 3.61 lower (5.62 to 1.6 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 295: Electrotherapy (BEMER + TENS) + exercise + manual therapy (massage) compared to placebo BEMER + TENS + exercise + manual therapy (massage) for low back pain with or without sciatica

Outcomes	No of	Quality of the	Relative	Anticipated absolute effects

	Participants (studies) Follow-up	evidence (GRADE)	effect (95% CI)	Risk with Control	Risk difference with BEMER + TENS+ exercise + manual therapy (massage) versus placebo BEMER + TENS + manual therapy (massage) (95% CI)
Quality of life (SF-36 Physical functioning, 0-100) ≤ 4 months	26 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the control groups was -1.03	The mean quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the intervention groups was 0.15 lower (3.95 lower to 3.65 higher)
Quality of life (SF-36 Role physical, 0-100) ≤ 4 months	28 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 role physical, 0-100) ≤ 4 months in the control groups was 0.64	The mean quality of life (SF-36 role physical, 0-100) ≤ 4 months in the intervention groups was 5.63 lower (13.72 lower to 2.46 higher)
Quality of life (SF-36 Bodily pain, 0-100) ≤ 4 months	33 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the control groups was -2.44	The mean quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the intervention groups was 4.01 lower (8.86 lower to 0.84 higher)
Quality of life (SF-36 General health, 0-100) ≤ 4 months	26 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 general health, 0-100) ≤ 4 months in the control groups was -2.17	The mean quality of life (SF-36 general health, 0-100) ≤ 4 months in the intervention groups was 1.40 lower (5.18 lower to 2.38 higher)
Quality of life (SF-36 Vitality, 0-100) ≤ 4 months	22 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 vitality, 0-100) ≤ 4 months in the control groups was 0.25	The mean quality of life (SF-36 vitality, 0-100) ≤ 4 months in the intervention groups was 5.6 lower (11.13 to 0.07 lower)
Quality of life (SF-36 Social functioning, 0-100) ≤ 4 months	31 (1 study)	VERY LOW[a,b] due to risk of		The mean quality of life (SF-36 social functioning, 0-100) ≤ 4	The mean quality of life (SF-36 social functioning, 0-100) ≤ 4

	15 weeks	bias, imprecision		months in the control groups was -0.56	months in the intervention groups was 0.98 lower (8.25 lower to 6.29 higher)
Quality of life (SF-36 Role emotional, 0-100) ≤ 4 months	28 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 role emotional, 0-100) ≤ 4 months in the control groups was -1.86	The mean quality of life (SF-36 role emotional, 0-100) ≤ 4 months in the intervention groups was 3.5 lower (16.38 lower to 9.38 higher)
Quality of life (SF-36 Mental health, 0-100) ≤ 4 months	24 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 mental health, 0-100) ≤ 4 months in the control groups was -3.84	The mean quality of life (SF-36 mental health, 0-100) ≤ 4 months in the intervention groups was 0.52 lower (6.71 lower to 5.67 higher)
Quality of life (SF-36 Physical component summary score, 0-100) ≤ 4 months	16 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 physical component summary score, 0-100) ≤ 4 months in the control groups was -2.06	The mean quality of life (SF-36 physical component summary score, 0-100) ≤ 4 months in the intervention groups was 0.93 lower (6.38 lower to 4.52 higher)
Quality of life (SF-36 Mental component summary score, 0-100) ≤ 4 months	16 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 mental component summary score, 0-100) ≤ 4 months in the control groups was -1.31	The mean quality of life (SF-36 mental component summary score, 0-100) ≤ 4 months in the intervention groups was 8.66 lower (15.29 to 2.03 lower)
Pain severity (exercise VAS, 0-10) ≤ 4 months	37 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (exercise VAS, 0-10) ≤ 4 months in the control groups was 1.126	The mean pain severity (exercise VAS, 0-10) ≤ 4 months in the intervention groups was 0.42 higher (0.99 lower to 1.83 higher)
Pain severity (resting VAS, 0-10) ≤ 4 months	37 (1 study)	VERY LOW[a,b] due to risk of		The mean pain severity (resting VAS, 0-10) ≤ 4 months in the	The mean pain severity (resting VAS, 0-10) ≤ 4 months in the

	15 weeks	bias, imprecision		control groups was 0.874	intervention groups was 0.72 higher (0.6 lower to 2.04 higher)
Function (ODI, 0-100) ≤ 4 months	37 (1 study) 15 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI, 0-100) ≤ 4 months in the control groups was 4.68	The mean function (ODI, 0-100) ≤ 4 months in the intervention groups was 1.19 higher (7.02 lower to 9.40 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

14.4 Economic evidence

Published literature

No relevant economic evaluations were identified. One economic evaluation relating to TENS was identified but excluded due to limited applicability.[407] This is listed in Appendix M, with the reason for exclusion given.

See also the economic article selection flow chart in Appendix F.

Unit costs

Relevant unit costs are provided below to aid consideration of cost effectiveness.

TENS devices may either be provided on loan to people with low back pain and sciatica or purchased by the individuals themselves. The unit cost of a TENS device varies depending on the model and is between £34 and £191.[1]

Unit costs relating to PENS devices have not been identified.

Interferential therapy, laser therapy and ultrasound therapy units are a shared resource which would already be available in most physiotherapy departments and therefore would not be a new investment for the NHS. Of note, based on the NHS supply chain catalogue April 2014, an interferential therapy unit costs £1128, a laser therapy unit costs between £955 and £1609 depending on the model, and an ultrasound therapy unit costs between £853 and £2159 depending on the model.[1] For these interventions, an appointment with a physiotherapist would be required. The cost of a non-admitted face to face first attendance in physiotherapy is £51, and a follow-up attendance costs £39 based on the NHS reference costs 2012-2013.[109]

14.5 Evidence statements

14.5.1 Clinical

14.5.1.1 TENS versus usual care or sham

Low back pain population (without sciatica)

Evidence demonstrated a clinical benefit of TENS compared with sham for all SF-36 quality of life domains at ≤4 months (1 study; low quality; n = 27) and for pain reduction at ≤4 months (2 studies; moderate quality; n = 102). However, there was conflicting evidence for short term function, with 3 studies showing no clinical benefit in terms of RMDQ score (moderate quality; n = 490), while another study showed a clinical benefit of TENS on the ODI score (moderate quality; n = 44). Additionally, when compared with usual care no benefit of TENS was seen for pain (2 studies; low quality; n = 70) or function as measured by RMDQ (2 studies; very low quality; n = 26) and harm was observed in one study assessing function with the ODI score (moderate quality; n = 44). No evidence was available to assess the clinical benefit of TENS in terms of psychological distress.

Mixed population (with or without sciatica)

Evidence from single studies demonstrated no clinical benefit of TENS compared to sham or usual care for any of the outcomes reported (quality of life, pain, and function) in this population (very low

to moderate quality; n = 41–222). No evidence was available to assess the clinical benefit of TENS in terms of psychological distress.

Sciatica population

No evidence was available.

14.5.1.2 TENS versus active comparators

Low back pain population (without sciatica)

No clinical benefit of TENS was seen when compared with corset, spinal manipulation or massage, and in some cases harm was seen (benefit for the comparator intervention).

Specifically, no clinical benefit was found in single studies in terms of reducing pain when TENS was compared with corset (very low quality; n = 44) or with massage (very low quality; n = 40), and in fact a benefit for spinal manipulation over TENS was reported for this outcome (very low quality; n =63). No evidence was available to assess the clinical benefit of TENS in terms of quality of life or psychological distress.

Mixed population (with or without sciatica)

In contrast to findings in the low back pain population, a clinical benefit was seen in 1 study for TENS compared with massage pain and for pain reduction (low quality; n = 41). No evidence was available to assess the clinical benefit of TENS in terms of function, quality of life or psychological distress.

Sciatica population

No evidence was available.

14.5.1.3 PENS versus usual care or sham

Low back pain population (without sciatica)

When compared with sham, 1 study demonstrated a clinically important benefit for the quality of life domain scores at ≤4 months (low quality; n = 25), but another study did not show a clinical benefit for the quality of life composite scores at the longer term follow-up (moderate to low quality; n = 184). Similarly, 2 studies suggested a clinical benefit for the pain and function outcomes at less than 4 months (very low and low quality; n = 59), but not after 4 months (very low and moderate quality; n = 184). No evidence was available to assess the clinical benefit of PENS in terms of psychological distress.

Mixed population (with or without sciatica)

Evidence from 1 study that compared PENS with usual care found no clinical benefit for improving pain and function (low quality; n = 102). No evidence was available to assess the clinical benefit of PENS in terms of function, quality of life or psychological distress.

Sciatica population

No evidence was available.

14.5.1.4 PENS versus conventional TENS

Low back pain population (without sciatica)

Evidence from 1 study suggested a clinical benefit for PENS for most of the quality of life domains, as well as for function, but not for pain intensity (very low and low quality; n = 28). No evidence was available to assess the clinical benefit in terms of psychological distress.

Mixed population (with or without sciatica)

The evidence demonstrated no clinical difference between TENS and PENS for pain or function (very low quality; n = 102). No evidence was available to assess the clinical benefit in terms of quality of life or psychological distress.

Sciatica population

No evidence was available.

14.5.1.5 Interferential therapy

Low back pain population (without sciatica)

When compared with sham, high quality evidence did not demonstrate a clinically important benefit of inferential therapy for pain (2 studies; n = 117). A further study reported no clinical benefit for function when interferential therapy was compared with traction (low quality; n = 128). No evidence was available to assess the clinical benefit in terms of quality of life or psychological distress, nor for the comparison with usual care.

Sciatica population

No evidence was available.

14.5.1.6 Laser therapy versus usual care or sham

Low back pain population (without sciatica)

There was conflicting evidence for the benefit of laser therapy compared with sham. Two studies suggested no clinical benefit of laser therapy for pain on VAS (low quality; n = 57), while further individual studies suggested a benefit of laser therapy for reduced pain intensity in the last 24 hours (low quality; n =61) or for pain improvement greater than 60% (very low quality; n = 70). No evidence was available to assess the clinical benefit in terms of function, quality of life or psychological distress.

Sciatica population

As with the population without sciatica there was inconsistency between the findings. Two studies reported no clinical benefit of laser therapy compared with sham for pain intensity or function on the RMDQ score (low quality; n = 80), while a further large study reported a benefit of laser therapy over sham for pain intensity and improvement in function (moderate and high quality; n = 364). This same large study also showed a benefit of laser therapy compared with usual care for function improvement but not for pain intensity (high quality; n = 364). No evidence was available to assess the clinical benefit terms of quality of life or psychological distress.

Mixed population (with or without sciatica)

Two studies (overall low quality; n=150) showed a benefit of laser therapy for pain intensity but no benefit for function assessed by RMDQ was seen in one study(very low quality; n=50) No evidence was available to assess the clinical benefit in terms of quality of life or psychological distress.

14.5.1.7 Laser therapy versus exercise

Mixed population (with or without sciatica)

One study showed a benefit of laser therapy compared with exercise for pain intensity but not for function assessed by RMDQ (very low and low quality; n = 50).

No evidence was available for other critical outcomes or populations.

14.5.1.8 Laser therapy versus traction

Sciatica population

One study showed no clinical benefit of laser therapy compared with traction for pain intensity, whereas a clinical benefit was suggested for function assessed by RMDQ (very low quality; n = 40).

No evidence was available for other critical outcomes or populations.

Therapeutic ultrasound (all comparisons)

Evidence mostly from small, individual studies of low or very low quality demonstrated no clinical benefit on any outcome for ultrasound compared with sham (in both the with sciatica and the without sciatica populations), usual care (without sciatica population), traction (with sciatica population), or laser (a mixed population of people with or without sciatica). The sole exception was evidence from 1 study demonstrating a clinical benefit in reducing pain compared with usual care in the low back pain population without sciatica (low quality; n = 40).

14.5.1.9 Combinations of non-invasive interventions – electrotherapy adjunct

Low back pain with sciatica

Low and very low quality evidence from a single small study (n=30) showed clinical benefit for pain in the short and long term when ultrasound was combined with exercise (biomechanical and aerobics) compared to waiting list control. There was no benefit on pain (and clinical harm in the long term) when the same combination was compared to exercise alone. There was no benefit for either comparison on function and healthcare utilisation (medication use). No other outcomes were reported.

Low back pain without sciatica population

Low quality evidence from a single study (n=100) showed clinical benefit for pain in the short and long term when laser therapy was given as an adjunct to self-management and exercise (biomechanical) compared to self-management and exercise (biomechanical) alone. No other outcomes were reported.

When electrotherapy (TENS) was given as an adjunct to acupuncture versus acupuncture or to exercise versus sham TENS, there was no clinical benefit seen for short-term pain or function in single studies (low and very low quality, range n=13 to n=84). No other outcomes were reported. There was however, clinical benefit for SF-36 domains when compared to exercise.

Low and moderate quality evidence from a single study (n=89) for PENS as an adjunct to exercise (biomechanical + aerobics) showed clinical harm (ie. favoured sham + exercise) for SF-36 physical and mental composites in the short term. However there was no difference in the longer term or for any of the other outcomes (pain and function).

Very low quality evidence from a single small study (n=39) for ultrasound as an adjunct to exercise showed no clinical benefit for pain, function or quality of life. However, when given as an adjunct to exercise + self-management, there was clinical benefit for function in the short-term, but not for pain.

Mixed population (low back pain with or without sciatica)

Low and very low quality evidence from a single small study (n=49) showed a clinical benefit of electroacupuncture as an adjunct to self-management (mixed modality – education and home exercise) with exercise in terms of pain and analgesic consumption, however there was no benefit for function.

When inferential therapy was combined with manual therapy (manipulation), there was clinical benefit in the longer term for quality of life (EQ-5D and several SF-36 domains) but not in the short term. There was no clinical benefit at other time-point for pain or function (low quality, single studies, n=103 or n=129).

Evidence for laser therapy as an adjunct to self-management (home exercise) showed no benefit compared to self-management alone for pain and function (very low quality, 2 studies, n=87). When HLIT laser was used as the adjunct to exercise, there was clinical benefit to short-term pain but not in function (very low quality, 1 study, n=52). No other outcomes were reported.

There was evidence for mixed modality electrotherapy (BEMER + TENS) as part of a triple combination of non-invasive interventions (exercise + manual therapy) compared to these interventions alone with a sham electrotherapy. There was either clinical harm (benefit to the non-adjunct arm) or no benefit for quality of life (SF-36 domains), and no benefit for pain and function (very low quality, 1 study, range of n = 16 to n=37).

14.5.2 Economic

- No relevant economic evaluations were identified.

14.6 Recommendations and link to evidence

Recommendations	**15. Do not offer ultrasound for managing low back pain with or without sciatica.** **16. Do not offer percutaneous electrical nerve simulation (PENS) for managing low back pain with or without sciatica.** **17. Do not offer transcutaneous electrical nerve simulation (TENS) for managing low back pain with or without sciatica.** **18. Do not offer interferential therapy for managing low back pain with or without sciatica.**
Research recommendations	**1. What is the clinical and cost-effectiveness of laser therapy in the management of low back pain and sciatica?**

Relative values of different outcomes	The GDG agreed that the most critical outcomes for decision-making were health-related quality of life, pain severity, function and psychological distress. Adverse events were considered important for decision-making because experience of adverse events may outweigh any possible benefits gained. Similarly, any difference in healthcare utilisation was considered an important outcome likely to reflect any benefits in quality of life experienced. The GDG discussed the importance of responder criteria as an outcome and agreed that although important in decision-making, due to the inherent difficulties in dichotomising continuous outcomes this was not a critical outcome. No data were identified for the outcome of responder criteria that were relevant to the review protocol.
Trade-off between clinical benefits and harms	**TENS** **Sham or usual care** When TENS was compared to sham TENS or usual care in a mixed population of people with or without sciatica, no clinical benefit was observed for any of the outcomes reported (quality of life, pain or function). However, for those without sciatica clinically important benefit in favour of TENS compared to sham was demonstrated for all of the quality of life domain scores however there was conflicting evidence for pain and function for sham and usual care comparisons. **Active interventions** . When compared to the use of a corset or massage, no difference was observed between interventions in those without sciatica in terms of reducing pain and when compared to manipulation, pain was reduced by a greater amount in the manual therapy group. Conversely in people with or without sciatica a benefit was seen favouring TENS compared to massage in terms of pain. However it was noted this was from a single small study. There was some evidence of improvement in the short-term for quality of life when TENS was given in addition to exercise, however there was no benefit when in combined with some other interventions and this was from a single small study. The GDG concluded that the evidence was conflicting and overall there was insufficient evidence of clinical benefit to support a recommendation for the use of TENS for low back pain or sciatica. **PENS** **Sham or usual care** When compared with sham, a clinically important benefit for the individual quality of life domains was demonstrated for people without sciatica, but no clinical benefit was demonstrated for the quality of life composite scores. It was noted that the individual domain scores are more informative in terms of what aspect of quality of life has improved and benefits may have been seen in separate domains even when the overall composite score does not demonstrate benefit. Clinical benefit for pain and function was observed at less than 4 months, but no clinical benefit after 4 months. When compared to usual care in a mixed population of people with or without sciatica, no clinical benefit was found for PENS in improving pain and function. **Active interventions** When compared to TENS in people with sciatica, benefits favouring PENS were observed for function and quality of life, but not for pain. No difference was observed in a mixed population of those with or without sciatica. In terms of quality of life (mental and physical components), there was some evidence that PENS in addition to exercise was less beneficial than exercise with sham PENS. The GDG discussed whether there should be concern regarding possible adverse events given that PENS involved penetrating the skin. However, it was felt that the

	risks would be similar to acupuncture which has an acceptable safety profile. Overall, the GDG noted that, while the evidence was in places positive for people with low back pain it was of low quality with low patient numbers. It was highlighted that PENS is currently not widely used and so a recommendation for its use would be a significant change in practice. It was thus concluded that there was insufficient evidence of clinical benefit to support a recommendation for the use of PENS for low back pain or sciatica. **Interferential therapy** No difference between interventions was observed when comparing interferential therapy with sham or traction in people with low back pain without sciatica. The same was true when combined with education, exercise and self-management. No evidence was identified for people without sciatica. Overall, the GDG concluded that there was a lack of evidence of clinical benefit to support a recommendation for the use of Interferential therapy as a treatment for low back pain or sciatica. **Laser therapy** Conflicting evidence was found comparing laser with sham and usual care for pain and function outcomes. The same was true when comparisons were made with active interventions of exercise and traction. Evidence from combined treatments did demonstrate some benefits when provided in combination with self-management in terms of pain, but not function. No difference was observed in combination with acupuncture or exercise however. The GDG noted the key evidence of benefit was from the sham comparison in a group of people with acute low back pain with sciatica. They highlighted that overall while the sham evidence was conflicting; this evidence of clinical benefit was of moderate quality in a reasonably large patient group whereas the evidence of no benefit was of lower quality and in smaller patient groups. However, this was conducted in an inpatient setting in Serbia; there were concerns of the applicability of this evidence to a UK healthcare context. The GDG felt that currently the body of evidence was conflicting and the evidence of clinical benefit from this study was insufficient to base a recommendation on. However, it was considered an area where future research may be of benefit, addressing the methodological concerns in the existing studies to help inform future guidance. **Therapeutic ultrasound** **Sham** No difference between groups was observed when ultrasound was compared to sham, usual care, traction or laser, with the one exception of an improvement in terms of pain when compared to usual care. In combination with other treatments some benefit in terms of pain for people with low back pain and sciatica) was observed when ultrasound was combined with exercise, however this was from a small study compared to a waiting list control and no difference was observed in other reported outcomes. There was also no clinical benefit observed from the addition of ultrasound to exercise when compared to exercise alone in pain, function or healthcare utilisation. When combined with both exercise and self-management, there was some evidence of clinical benefit for function, however, no benefit was observed for other outcomes, this was also from a single small trial. Overall, the GDG concluded that there was a lack of sufficient evidence of clinical benefit to support a recommendation for the use of ultrasound as a treatment for low back pain or sciatica. The only evidence of benefit was of low quality and based on low patient numbers; for the majority outcomes no benefit was seen.
Trade-off between net clinical effects	**TENS** No economic evaluations were identified from the published literature. The GDG

and costs	noted that TENS machines are currently often purchased by the patient; however, they may also be provided on loan to the patient at a cost to the NHS in terms of the machine itself and also related personnel time explain how to use it. If effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. However, given the conflicting evidence on its clinical benefit, the cost of providing this intervention were not considered justified. **PENS** No economic evaluations were identified from the published literature. Use of PENS will be associated with costs relating to the equipment and personnel time required to deliver the therapy. If effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. Although some indications of possible benefit were seen for PENS, overall the GDG concluded that it was insufficient to support a conclusion of clinical benefit and thus also insufficient to justify intervention costs. In addition, PENS is not widely used and might require higher implementation costs. **Interferential therapy** No economic evaluations were identified from the published literature. Use of interferential therapy will be associated with costs relating to the equipment and personnel time required to deliver the therapy, although the GDG noted that interferential therapy units are a shared resource which would already be available in most physiotherapy departments. If effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. However, given the lack of evidence of clinical benefit for interferential therapy, intervention costs were not considered justified. **Laser therapy** No economic evaluations were identified from the published literature. Use of laser therapy will be associated with costs relating to the equipment and personnel time required to deliver the therapy, although the GDG noted that laser therapy units are a shared resource which would already be available in most physiotherapy departments. If effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. Although some indications of possible benefit were seen for laser therapy, overall the GDG concluded that it was insufficient to support a conclusion of clinical benefit and thus also insufficient to justify intervention costs. In addition they highlighted that even if laser therapy was clinically effective, the regimen in the key trial was very intensive (5 daily sessions for 3 weeks) and cost effectiveness may depend on whether or not clinical benefit is maintained when treatment stops which was unclear from the current evidence. **Therapeutic ultrasound** No economic evaluations were identified from the published literature. Use of ultrasound therapy will be associated with costs relating to the equipment and personnel time required to deliver the therapy, although the GDG noted that ultrasound therapy units are a shared resource which would already be available in most physiotherapy departments. If effective, upfront costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. However, given the lack of evidence of clinical benefit for ultrasound therapy, intervention costs were not considered justified.
Quality of evidence	The majority of the evidence for TENS versus massage, TENS versus manipulation, TENS versus corset and TENS versus usual care was of low or very low quality, mainly due to risk of bias. For these comparisons, common contributing factors to the risk of bias rating included the difficulty of adequate blinding with such interventions, high drop out and switching rates, difficulties with selection bias, such as inadequate sequence generation and allocation concealment, and issues with comparability of care. However there were some moderate quality evidence for several of the outcomes within the sham comparisons. The majority of the evidence for the comparison PENS versus sham was of moderate

	to very low quality, mainly due to risk of bias. The GDG also highlighted problems with the sham for PENS and TENS. An issue regarding the credibility of sham conditions specifically for TENS studies was whether the sham condition that is employed controls adequately for all aspects of the treatment experience. Various types of sham TENS have been proposed including deactivated units that are identical in appearance but deliver no actual stimulation to devices where an initial brief period of stimulation at the start of use is delivered and then faded out. To enhance blinding in these paradigms the information given to participants is often limited regarding what they should feel when the device is switched on. However it is clear that there are substantial threats to the credibility of these shams when compared to active stimulation that elicits strong sensations. Given that the effectiveness of TENS and PENS is widely thought to be related to the intensity of the stimulus a true sham that establishes robust blinding of participants is not achievable. Nonetheless this represents a risk of bias to sham controlled trials of TENS and PENS. For PENS versus conventional TENS the evidence was of low to very low quality, due to risk of bias and imprecision of the effect estimate. The evidence for the comparison PENS versus usual care was of low quality due to risk of bias. The evidence for the comparisons laser versus sham and versus usual care came from mainly single, large trials that ranged from high to very low quality overall; the evidence for the comparison laser versus exercise was of low quality due to risk of bias; and for the comparison laser versus traction was of very low quality due to risk of bias and imprecision of the effect estimate. The GDG noted that the positive evidence for laser versus sham was of moderate quality and based on a reasonably large patient group, although from a single study. They noted that this study was very intensive with 5 sessions daily for 3 weeks and 80% of people were hospitalised and this raised concerns regarding the applicability of the study and its relevance to decision-making. The majority of the evidence for therapeutic ultrasound was of low or very low quality, due to risk of bias and imprecision of the effect estimate. The evidence informing the comparison of interferential versus sham was of high quality, and was low quality for the comparison with traction
Other considerations	**TENS** The GDG highlighted that in trials of TENS, a problem affecting all studies is that the intervention only works while in progress providing temporary relief rather than intending to have long term benefits, however the trials are not designed to look at this when they record outcomes at later follow-up times. **Laser therapy** The positive results for laser interventions are largely driven by one study that the GDG has concerns regarding the applicability of, and there is conflicting evidence from other sources (albeit of lower quality). The GDG therefore concluded that while they did not want to dismiss the evidence of clinical benefit entirely, it should be treated with caution and hence a research recommendation was produced. The GDG were aware of existing NICE interventional procedure guidance for Peripheral nerve-field stimulation for chronic low back pain which recommends special arrangement for clinical governance, consent, audit and research.[378] This specific therapy has therefore been excluded from this review. If its use is being considered for people with low back pain and/or sciatica, the existing guidance should be followed. Interventional procedures guidance for Percutaneous intradiscal electrothermal therapy for low back pain (IPG319) was being updated during development of this guideline, details of the updated is available at the following link: https://www.nice.org.uk/guidance/indevelopment/gid-ip2803. No evidence on this procedure was identified within this review and therefore the updated guidance for this procedure should be followed for people with low back pain.

	Research recommendation Laser therapy involves the non-invasive application of a single wavelength of light to the skin over the painful area using a probe. There are various laser devices and probe configurations in clinical use. The light is absorbed in the tissues and it is hypothesised that this results in local heating and effects on local chemical activity and cellular behaviour. It is through those effects that laser therapy is purported to have an anti-inflammatory effect and promote tissue repair.[556] Conflicting evidence was found comparing laser with sham and usual care for pain and function outcomes. While evidence of clinical benefit was observed in some comparisons for pain and function there were concerns with the quality and applicability of the evidence (see the LETR for electrotherapies in section 14.6). There remains uncertainty regarding the efficacy and effectiveness of laser therapy, though there is some promising evidence. There is therefore a need for high quality trials into the effectiveness and cost effectiveness of laser therapy for low back pain with and without sciatica.

15 Psychological interventions

15.1 Introduction

The initial work of psychologists studying pain in the 1960s was rooted in operant behavioural psychology. There was concern about the validity and reliability of self-reported pain symptoms, so the proposal to focus on the presentation of pain as a behaviour provided an opportunity for empirical assessment. This not only introduced the possibility of objective measurement of observable specific 'pain-related behaviour', but also suggested that such behaviours were open to change or modification. It was proposed that use of behavioural methods could reduce disability related pain or 'illness behaviour' and encourage 'well behaviour' and a return to normal function.[142,143]

Cognitive behavioural approaches emerged in the late 1970s and 1980s. This was particularly evident in the work of Sternbach, Gottlieb et al. and Turk, Meichenbaum and Genest who demonstrated the key role of cognitive processes such as beliefs in the experience of pain and their effects on associated disabilities or pain-related behaviours.[174,472,494] Cognitive behavioural approaches have played an increasingly central role in the management of chronic pain. Cognitive approaches are aimed at altering unhelpful or inappropriate beliefs as a basis for changing behaviour, such as pain-associated disability. Specific psychological constructs such as 'Catastrophising' in relation to pain have also been identified as key cognitive variables to be targeted for intervention.[477]

Mindfulness, Acceptance and Commitment Therapy (ACT) and Compassion Focused Therapy (CFT) emerged in the 1990s, as a co-called 'third wave' of psychological approaches, building on the cognitive behavioural approach. The approaches emphasise the importance of experiencing undesirable thoughts and feelings, in the absence of influence of 'judgemental, evaluative and analytic thought content'.[482] The approaches aim to enhance what has been termed 'psychological flexibility'.[205] Group-based programmes and individual approaches aimed at people with chronic low back pain have subsequently been developed.

15.2 Review question: What is the clinical and cost effectiveness of psychological therapies in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 296: PICO characteristics of review question

Population	People aged 16 years or above with non-specific low back pain People aged 16 years or above with sciatica
Interventions	Psychological interventions: • Behavioural therapies • Cognitive therapies • Cognitive behavioural approaches • Mindfulness • Acceptance and commitment therapy (ACT)
Comparisons	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline

	• Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

15.3 Clinical evidence

15.3.1 Summary of studies included – single interventions

Twenty-one RCTs (reported in twenty-five papers) were included in the review, these are summarised in **Table 297** below.[28,64,141,147,169,248,283,288-290,298,308,338,355,356,381,391,433,452,457-461,474,476,495,496,496,497,500] Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (section 15.3.4). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Due to there being limited RCT evidence, the search was also extended to cohort studies for mindfulness and acceptance and commitment therapy, but no relevant cohort studies were identified.

The Smeets 2006 trial[460] (Smeets 2008[459], Smeets 2009[457], Smeets 2006[461], Smeets 2008[458]) reported data from 4 arms (exercise, cognitive behavioural approaches, exercise plus cognitive behavioural approaches/MBR, and waiting list control). The data extracted in this review was for the cognitive behavioural approaches versus waiting list control. The data for cognitive behavioural approaches versus exercise is in the exercise review, and the data for the combination arm (exercise plus cognitive behavioural approaches) is in the MBR review (See Chapter 17).

One Cochrane review[214,214] on psychological interventions was identified but it was not included as the stratification of people with low back pain, low back pain with or without sciatica and sciatica was unclear and did not match our guideline stratification. The studies included in this Cochrane review were individually assessed and included if they matched the review protocol.

15.3.2 Summary of studies included – combined interventions (psychological therapy adjunct)

Three studies (reported in six papers) looking at combinations of non-invasive interventions (with psychological therapy as the adjunct) were also included in this review. [147,288,496] These are summarised in **Table 298** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (Section (a)). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

15.3.3 Heterogeneity

For the comparison of mindfulness versus usual care/waiting list, there was substantial heterogeneity between the studies when they were meta-analysed for the outcome of pain (McGill) at under or equal to 4 months. Pre-specified subgroup analyses (different within-class modalities, and chronicity of pain) were unable to be performed on this outcome because the studies were not different in terms of these factors. A random effects meta-analysis was therefore applied to this outcome, and the evidence was downgraded for inconsistency in GRADE.

Table 297: Summary of studies included in the review – single interventions

Study	Intervention and comparison	Population	Outcomes	Comments
Cognitive behavioural approaches				
Carpenter 2012[64]	Cognitive behavioural approaches Waiting list	Low back pain with or without sciatica N=164 Study length 3 weeks USA	Pain (VAS) Function (RMDQ)	Cognitive behavioural approaches: the wellness workbook - an on-line self-help intervention consisting of a mind/body treatment rationale, pain education and cognitive behavioural approach techniques including cognitive restructuring, stress management, relaxation training, mindfulness and vales-based behavioural activation. Wait list control group: were informed they would receive access to the wellness workbook in 3 weeks
Gohner 2006[169]	Cognitive behavioural approaches Usual care	Low back pain with or without sciatica N=47 Study length 6 months Germany	Pain (10 point scale)	3 x cognitive behavioural approach sessions lasting 50 minutes Usual care: not reported
Jellema 2005 [248]	Cognitive behavioural approaches Usual care	Low back pain with or without sciatica N=314 Study length 1 year Netherlands	Quality of life (SF-36) Quality of life (eq-5d)[a] Function[b] (RMDQ) Pain[b] (0-10)	Cognitive behavioural approaches: exploration phase: the GP explored the presence of psychological prognostic factors by asking standardised questions. Information phase: the GP provided general information on the cause, course, and possibilities of treatments of low back pain and included the patient's cognitions, emotions and behaviour. Self-care phase: the GP

Study	Intervention and comparison	Population	Outcomes	Comments
				and patient set specific goals on resuming activities or work and discussed time contingent use of analgesic drugs, and the doctor gave the patient a booklet based on the back book. Usual care: following a wait and see policy for acute low back pain, with analgesics and gradual uptake of activities, and advice on reactivation and home exercises. For subacute low back pain (> 6 weeks), referral for exercise therapy, physiotherapy, or manual therapy in the case of persistent functional disability.
Kole-snijders 1999[283]	Cognitive behavioural approaches Behavioural therapy Waiting list	Low back pain with or without sciatica N=148 6 weeks intervention time, 1 year study length Netherlands	Outcomes not adequately reported	Cognitive therapy: operant behavioural treatment and cognitive coping skills training. Placebo/sham: operant behavioural therapy and group discussions. Waiting list: no treatment.
Leeuw 2008[298]	Cognitive behavioural approaches Behavioural therapy	Low back pain with or without sciatica N=85 Study length 1 year Netherlands	Pain (VAS) Function (quebec back pain disability; RMDQ)	Cognitive behavioural approaches: exposure in vivo (cognitive therapy, education, engaging in fear-provoking activities) for approximately 16 sessions Behavioural therapy: operant graded activity (positive reinforcement of healthy behaviours, education, activity quotas)
Linden 2014[308]	Cognitive behavioural approaches Usual care	Low back pain with or without sciatica N=107 Study length 21 days Germany	Pain (VAS) Function(pain disability index, PDI)	Cognitive behavioural approaches: designed in reference to the grip and the pain and illness management programme with additional cognitive behavioural approaches interventions which aim at stress reduction and problem solving, self-monitoring, pain management, change in

Study	Intervention and comparison	Population	Outcomes	Comments
				dysfunctional cognitions, reduction of avoidance behaviour, and wellbeing therapy. Cognitive behavioural approach group also given usual care. Usual care: general orthopaedic inpatient treatment (regularly seen by physicians, got medication as needed and participated on a daily basis in sport therapy and physiotherapy, balneotherapy, massages, or electrotherapy. They also got occupational therapy to support their reintegration in work. There were also general patient education sessions with information on how to understand and cope with the illness.
Menzel 2006[338]	Cognitive behavioural approaches Waiting list	Low back pain with or without sciatica N=32 Study length 12 weeks USA	Pain (VAS)	Cognitive behavioural approach: 6 x 1 hour sessions Control group: waiting list.
Newcomer 2008[381]	Cognitive behavioural approaches Placebo/sham	Low back pain with or without sciatica N=220 Study length 1 year USA	Pain (pain and impairment relationship scale) Function (ODI)	Cognitive behavioural approaches: videotape given with education component and elements targeting beliefs and self-management skills. Lasting 20 minutes to be watched at home at least once every 3 months. Placebo: 20 minute video using traditional education approach emphasizing information and technical skills. To be watched at home at least once every three months.
Sanderson 2012[433]	Cognitive behavioural approaches Usual care	Low back pain with or without sciatica N=47 Study length 3 months USA	Pain (patient centred outcomes questionnaire 0-100)	Brief individualised cognitive behavioural approaches and opioid medication. Length of therapy varied across patients, each session was 1 hour in length

Study	Intervention and comparison	Population	Outcomes	Comments
				performed by therapists trained in cognitive behavioural approaches for chronic pain. Each session consisted of a combination of skill and homework review, as well as new skill acquisitions. Patients were also taught adaptive coping skills, such as activity pacing, and a variety or relaxation techniques. Usual care: opioid medication varied according to individual prescription (in both arms).
Smeets 2006/2006A Smeets 2006[460] (Smeets 2008[459], Smeets 2009[457], Smeets 2006[461], Smeets 2008[458])	Cognitive behavioural approaches Exercise (biomechanical +aerobic) Combination MBR (cognitive behavioural approaches + exercise) Waiting list *Note: only data for the cognitive behavioural approaches versus waiting list comparison has been reported in this review. The study only reports ≤4 month data for waiting list comparison and not for >4 months (which is reported for all active treatment comparisons). The cognitive behavioural approaches versus exercise data has been reported in the*	Low back pain with or without sciatica* N=211 Study length 10 weeks Netherlands **note: the population in this study has been classified as low back pain 'with or without sciatica' because they have included leg pain, with no way of knowing whether or not the patients have nerve root entrapment (the study says it has excluded people with nerve root involvement but does not specify if this was determined on the basis of MRI).*	Pain (VAS) Function (RMDQ) Psychological distress (BDI) Healthcare utilisation (number visits to: GP, medical specialist care, radiology, occupational physician, psychologist and number of therapist sessions (physiotherapist, manual therapy, cesar or mensendieck). *Outcomes reported as mean difference between treatment and waiting list*	Cognitive behavioural approaches consisting of operant behavioural graded activity training and problem solving training. Graded activity training was 3 group sessions followed by a max of 17 individual sessions of 30 minutes. Problem solving started with 3 explanatory sessions, the next 6 were teaching sessions and a course book was provided. Groups were a max of 4 people. Homework assignments were given. Mixed exercise: biomechanical + aerobic. Group of a max of 4 people, 3 minutes of training on a bike and 75 minutes of strength and endurance training of lower back and upper leg muscles, 3 times a week during 10 weeks. Supervised by 2 physiotherapists. Usual care - waiting-list. Instructed to wait 10 weeks, after which they were offered a regular individual rehabilitation treatment.

Study	Intervention and comparison	Population	Outcomes	Comments
	exercise review, and the combination arm data has been reported in the MBR review.			
Behavioural therapy				
Fordyce 1986[141]	Behavioural therapy Usual care	Low back pain with or without sciatica N=107 Study length 1 year Usa	Function (modified activity form score) Healthcare utilisation (medication, hospitalisation, and treatment visits)	Behavioural therapy: interventions on a time contingent basis- analgesia prescribed at fixed times and prescription not renewable, activity prescribed of specified intervals, with determined and fixed exercise content. Return visit set at 2 weeks. Usual care: intervention on a pain contingent basis. Analgesia prescribed as required and repeat prescriptions allowed; activities limits decided by patient on when pain subsided sufficiently, and the exercises prescribed wither to be undertaken according to how much pain was being experienced. Repeat visits to clinician allowed as required, but always at start and 2 weeks.
Nouwen 1983[391]	Behavioural therapy Waiting list	Low back pain with or without sciatica N=20 Study length 3 weeks Netherlands	Pain (back pain log, a modification of budzinsky 1973, to rate the intensity of the pain on a 5-point scale each waking hour of the day)	Behavioural therapy: emg biofeedback (15 sessions over 3 weeks) Usual care: waiting-list. Patients were told that 9 weeks of measurement were required before treatment could be given.
Stuckey 1986 [476]	Behavioural therapy Placebo	Low back pain with or without sciatica N=24 Study length unclear, 8 sessions of intervention Usa	Pain (pain rating during the function test 0-100)	Emg biofeedback (n=8); relaxation (n=8); placebo (n=8, same physical set up but no feedback from the emg electrodes and no instructions in specific relaxation techniques) Placebo/sham: subjects in this condition were placed in the same physical set-up as those in intervention group. These subjects received no feedback from

Study	Intervention and comparison	Population	Outcomes	Comments
				the emg electrodes and no instructions in specific relaxation techniques for the first 8 sessions. They received a detailed description of the value of relaxation for pain relief and how the egg-crate mattress and the bed position would facilitate relaxation. They were encouraged to relax more deeply at home in their daily relaxation-practice sessions, but they were not given instructions on how to relax.
Turner 1988[495]	Behavioural therapy Waiting list	Low back pain with or without sciatica N=55 Study length 8 weeks Usa	Pain (mcgill pain questionnaire)	Behavioural therapy: Operant behavioural therapy- patients and spouses educated, and advised to set goals for physical exercise and monitor results and obstacles. Spouses asked to reinforce good behavioural patterns. 8 x 2 hour weekly sessions Usual care: waiting list
Turner 1990[496]	Behavioural therapy Waiting list	Low back pain without sciatica N=96 Study length 1 year Usa	Pain (mcgill pain questionnaire)	Behavioural therapy: operant conditioning (fordyce), participation of spouses, group discussion, role playing, feedback; 2 hour/week. Usual care: waiting list
Mindfulness				
Banth 2015[28]	Mindfulness Usual care	Low back pain with or without sciatica N=88 Study length 8 weeks Iran	Pain (mcgill pain questionnaire) Quality of life (SF-36)	Mindfulness: conducted in a private physiatrist clinic near to physiotherapy centres. A mbsr program administered 1 session per week for explaining techniques, practice, and feedback and share their experience for 8 weeks beside 30–45 minutes' daily home practice. Meditation transformed the patients' awareness through the techniques of breathing and mindfulness. Usual care: normal

Study	Intervention and comparison	Population	Outcomes	Comments
				routines in healthcare including physiotherapy and medicine
Morone 2008[355]	Mindfulness Waiting list	Low back pain with or without sciatica N=37 Intervention time 8 weeks, follow-up 3 months Usa	Quality of life (SF-36) Pain (mcgill pain questionnaire) Function (RMDQ)	Mindfulness: MBSR programme. 8 weekly 90 minute mindfulness meditation sessions and meditation homework assignments. Usual care: waiting list
Morone 2009[356]	Mindfulness Placebo/sham	Low back pain with or without sciatica N=35 Intervention time 8 weeks, follow-up 4 months Usa	Quality of life (SF-36)* Pain (mcgill pain questionnaire)* Function (RMDQ)* * *only reported in graphical form - no data available.*	Mindfulness: MBSR programme. Meditation delivered weekly for 90 minutes (1 hour meditation and 30 minutes discussion) including three methods of mindfulness meditation: 1) the body scan, where in a lying position, the participant is guided to place their attention non-judgementally on each area of the body from the toes to the top of the head; 2) sitting practice, where the participant is guided to focus their attention on breathing while sitting on a chair; and 3) walking meditation, where the participant is guided in mindful slow walking with focused attention on body sensation and/or breathing. Placebo/sham: active control: controlled for time, group size and facilitator time. Included lectures, group discussion, and homework assignments based on the health topics discussed. Subjects were given materials to promote participation and retention in the program including the use of a nintendo ds 'brain age' game and encouraged to do this as daily homework

Study	Intervention and comparison	Population	Outcomes	Comments
				as well as homework assignments from the book 'keep your brain alive'. Each class had 45-60 minutes lecture by a health professional and 30-45 minutes class of brain exercise and discussion.
Cognitive therapy				
Siemonsma 2013[452]	Cognitive therapy Waiting list	Low back pain with or without sciatica N=156 Study length 18 weeks Netherlands	Function (quebec back pain disability scale)	Cognitive treatment of illness perception (ctip) 10-14 one-hour individual treatment sessions provided weekly by a single physical therapist or occupational therapist. Usual care: waiting list
Storheim 2003[474]	Cognitive therapy Usual care Exercise	Low back pain without sciatica N=93 Intervention 15 weeks, total study length 18 weeks. Norway	Quality of life (SF-36) Pain (VAS) Function (RMDQ)	Cognitive therapy: explanation of pain mechanisms. The questionnaire completed at inclusion was discussed once more in-depth. Functional examination with individual feedback and advice. Instruction in activation of deep stabilizing muscles (i.e. The transverse abdominal muscle) and advice on how to use it actively in functional and demanding tasks of daily life. Instruction in the squat technique when lifting is required. How to cope with new attacks. Reassure and emphasize that it is safe to move and to use the back without restriction. Usual care: patient treated by their GP with no restrictions of treatments or referral.
Turner 1993[497]	Cognitive therapy Waiting list	Low back pain with or without sciatica N=102 Study length 13 months Usa	Pain (VAS) Psychological distress (BDI)	Cognitive therapy: patients first learned to identify negative emotions related to pain and stressful events and to identify associated maladaptive thoughts. Next, they were taught

Study	Intervention and comparison	Population	Outcomes	Comments
				how to generate more adaptive thoughts to 'counter' automatic negative cognitions. Usual care: waiting list

(a) EQ-5D was collected but not reported by study apart from as QALYs in economic analysis (see Section 15.5 Economic evidence)

(b) Data for these outcomes only reported as median and IQR, therefore could not be meta-analysed.

Table 298: Summary of studies included in the review – combination of interventions (psychological adjunct)

Study	Intervention and comparison	Population	Outcomes	Comments
Friedrich 1998[147]	Psychological (cognitive behavioural approach) + exercise Exercise (mixed: biomechanical + aerobic)	Low back pain with or without sciatica N=93 12 months intervention + follow up Austria	Pain severity (NRS) Function (low back outcome scale questionnaire)	concomitant treatment: not stated
Lamb 2012, 2010a, 2010b, Underwood 2011[288-290,500]	Psychological (cognitive behavioural approach) + self-management Self-management	Low back pain with or without sciatica N=701 3 months intervention + 1 year follow up Uk	Quality of life (eq-5d, sf-12) Pain severity (modified von Korff pain) Function (RMDQ, modified von Korff disability)	
Turner 1990[496]	Exercise (aerobic) + psychological intervention (behavioural therapy) Exercise (group aerobic) Psychological intervention (behavioural therapy) Waiting list control (usual care not specified)	Low back pain without sciatica N=96 1 year intervention + follow up Usa	Pain severity (mcgill pain questionnaire)	Concomitant treatment: not stated

15.3.4 Clinical evidence summary tables

Table 299: Cognitive behavioural approach versus placebo/sham in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with cognitive behavioural approach versus placebo/sham (95% CI)
Pain severity (pain and impairment relationship scale) >4 months	118 (1 study)	LOW[a] due to risk of bias		The mean pain severity (pain and impairment relationship scale) >4 months in the control groups was 7.5	The mean pain severity (pain and impairment relationship scale) >4 months in the intervention groups was 0.90 higher (3.6 lower to 5.41 higher)
Function (ODI, 0-100) >4 months	118 (1 study)	LOW[a] due to risk of bias		The mean function (ODI, 0-100) >4 months in the control groups was 14.3	The mean function (ODI, 0-100) >4 months in the intervention groups was 0.7 higher (4.81 lower to 6.21 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 300: Cognitive behavioural approach versus usual care/ waiting list in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with cognitive behavioural approach versus usual care/waiting list (95% CI)
Pain severity (VAS, 0-10) ≤4 months	458 (6 studies)	VERY LOW[a,b] due to risk of bias, inconsistency		*	The mean pain severity (VAS, 0-10) ≤4 months in the intervention groups was 0.66 lower (1.01 to 0.31 lower)
Pain severity (VAS, 0-10) >4 months	47 (1 study)	VERY LOW[a,c] due to risk of bias,		*	The mean pain severity (VAS, 0-10) >4 months in the intervention groups was 0.02 lower

		imprecision			(0.99 lower to 0.95 higher)
Function (RMDQ 0-24) ≤4 months	240 (2 studies)	LOW[a] due to risk of bias		*	The mean function (RMDQ, 0-24) -with or without sciatica ≤4 months in the intervention groups was 2.95 lower (4.26 to 1.65 lower)
Function (pain disability index, PDI, 0-70) ≤4 months	103 (1 study)	VERY LOW[a,c] due to risk of bias, imprecision		The mean function (pain disability index, PDI, 0-70 final value) ≤4 months in the control groups was 21.14	The mean function (pain disability index, PDI, 0-70 final value ≤4 months in the intervention groups was 1.20 lower (6.44 lower to 4.04 higher)
Psychological distress (BDI 0-63) ≤4 months	109 (1 study)	LOW[a,c] due to risk of bias, imprecision		*	The mean psychological distress (BDI, final value) ≤4 months in the intervention groups was 1.65 lower (3.42 lower to 0.12 higher)
Quality of life (SF-36 perceived general health, 0-5) ≤4 months	314 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life - SF-36 perceived general health ≤4 months in the control groups was 2.6	The mean quality of life - SF-36 perceived general health ≤4 months in the intervention groups was 0 higher (0.18 lower to 0.18 higher)
Quality of life (SF-36 perceived general health, 0-5) >4 months	314 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life - SF-36 perceived general health >4 months in the control groups was 2.7	The mean quality of life - SF-36 perceived general health >4 months in the intervention groups was 0 higher (0.19 lower to 0.19 higher)
*No control rate reported in study, only mean difference given					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment because of heterogeneity, I^2 >50%

(c) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 301: Cognitive behavioural approach versus behavioural therapy in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with cognitive behavioural approach versus behavioural therapy (95% CI)
Pain severity (VAS, 0-10) ≤4 months	77 (1 study)	LOW[a] due to risk of bias		The mean pain severity (VAS, 0-10) ≤4 months in the control groups was 4.407	The mean pain severity (VAS, 0-10) ≤4 months in the intervention groups was 0.4 lower (1.03 lower to 0.96 higher)
Pain severity (VAS, 0-10) >4 months	73 (1 study)	LOW[a] due to risk of bias		The mean pain severity (VAS, 0-10) >4 months in the control groups was 4.045	The mean pain severity (VAS, 0-10) >4 months in the intervention groups was 0.07 higher (0.95 lower to 1.09 higher)
Function (Quebec pain disability scale, 0-100) >4 months	73 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Quebec pain disability scale, 0-100) >4 months in the control groups was 41.94	The mean function (Quebec pain disability scale, 0-100) >4 months in the intervention groups was 2.94 lower (12.17 lower to 6.29 higher)
Function (RMDQ, 0-24) >4 months	73 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) >4 months in the control groups was -4.23	The mean function (RMDQ, 0-24) >4 months in the intervention groups was 2.11 lower (4.71 lower to 0.49 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by one increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 302: behavioural therapy versus placebo/sham in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Behavioural therapy versus placebo (95% CI)
Pain severity (VAS, 0-10) ≤4 months	24 (2 studies)	LOW[a,b] due to risk of bias,		The mean pain severity (VAS, 0-10) ≤4 months in the control groups was	The mean pain severity (VAS, 0-10) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Behavioural therapy versus placebo (95% CI)
		imprecision		4.44	1.44 lower (2.88 lower to 0 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 303: behavioural therapy versus usual care/waiting list in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Behavioural therapy versus usual care/waiting list (95% CI)
Pain intensity (Back pain log) ≤4 months	20 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain intensity (Back pain log) ≤4 months in the control groups was 19.14	The mean pain intensity (Back pain log) ≤4 months in the intervention groups was 4.80 lower (15.84 lower to 6.24 higher)
Pain intensity (McGill questionnaire, 0-78) ≤4 months	122 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain intensity - ≤4 months (McGill questionnaire) in the control groups was 21.55	The mean pain intensity - ≤4 months (McGill questionnaire) in the intervention groups was 3.42 lower (8.08 lower to 1.24 higher)
Function (Modified activity form score)- >4 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Modified activity form score) >4 months in the control groups was 6.25	The mean function (Modified activity form score) >4 months in the intervention groups was 1.41 lower (2.66 to 0.16 lower)
Healthcare utilisation - Estimated medication costs in last month, at 9-12 months	103 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean healthcare utilisation - estimated medication costs in last month, at 9-12 months in the control	The mean healthcare utilisation - estimated medication costs in last month, at 9-12 months in the

		imprecision		groups was 0.94	intervention groups was 0.42 lower (0.92 lower to 0.08 higher)
Healthcare utilisation - Number of hospitalisations at 9-12 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation - number of hospitalisations at 9-12 months in the control groups was 0.88	The mean healthcare utilisation - number of hospitalisations at 9-12 months in the intervention groups was 0.32 lower (0.82 lower to 0.18 higher)
Healthcare utilisation - Number of medications now taken at 9-12 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation - number of medications now taken at 9-12 months in the control groups was 0.56	The mean healthcare utilisation - number of medications now taken at 9-12 months in the intervention groups was 0.27 lower (0.49 to 0.05 lower)
Healthcare utilisation - Number of treatment visits at 9-12 months	103 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation - number of treatment visits at 9-12 months in the control groups was 0.52	The mean healthcare utilisation - number of treatment visits at 9-12 months in the intervention groups was 0.14 lower (0.51 lower to 0.23 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 304: mindfulness versus usual care/waiting list in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Mindfulness versus UC/waiting list (95% CI)
Pain severity (McGill 0-78) ≤4 months	124 (2 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean pain severity (McGill 0-78) ≤4 months in the control groups was 20.0	The mean pain severity (McGill 0-78)≤4 months in the intervention groups was 5.55 lower (11.7 lower to 0.08 higher)
Function (RMDQ, 0-24) ≤4 months	37	LOW[a,c]		The mean function (RMDQ, 0-24)	The mean function (RMDQ, 0-24) ≤4

	(1 study)	due to risk of bias, imprecision		≤4 months in the control groups was 10.6	months in the intervention groups was 1.20 lower (4.55 lower to 2.15 higher)
Quality of life (SF-36 global health composite, 0-100) ≤4 months	37 (1 study)	LOW[a,c] due to risk of bias, imprecision		The mean quality of life - SF-36 global health composite in the control groups was 42.9	The mean quality of life - SF-36 global health composite in the intervention groups was 1.8 higher (4.56 lower to 8.16 higher)
Quality of life (SF-36 mental health composite, 0-100) ≤4 months	124 (2 studies)	VERY LOW[a,c] due to risk of bias, imprecision		The mean quality of life - SF-36 mental health composite in the control groups was 33.3	The mean quality of life - SF-36 mental health composite in the intervention groups was 4.74 higher (2.87 to 6.62 higher)
Quality of life (SF-36 pain scale, 0-100) ≤4 months	37 (1 study)	VERY LOW[a,c] due to risk of bias, imprecision		The mean quality of life - SF-36 pain scale in the control groups was 38.8	The mean quality of life - SF-36 pain scale in the intervention groups was 1.1 higher (4.07 lower to 6.27 higher)
Quality of life (SF-36 physical function scale, 0-100)- ≤4 months	37 (1 study)	VERY LOW[a,c] due to risk of bias, imprecision		The mean quality of life - SF-36 physical function scale in the control groups was 44.5	The mean quality of life - SF-36 physical function scale in the intervention groups was 1.2 higher (5.04 lower to 7.44 higher)
Quality of life (SF-36 physical health composite, 0-100) ≤4 months	124 (2 studies)	VERY LOW[a,c] due to risk of bias, imprecision		The mean quality of life - SF-36 physical health composite in the control groups was 32.1	The mean quality of life - SF-36 physical health composite in the intervention groups was 3.69 higher (2.59 to 4.80 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 2 increments because of heterogeneity, I^2=75%, p=0.05, unexplained by subgroup analysis

(c) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 305: Cognitive therapy versus usual care/ waiting list in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/ waiting list	Risk difference with Cognitive versus (95% CI)
Quality of life (SF-36 Physical function, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - physical function in the control groups was 6	The mean quality of life >4 months - physical function in the intervention groups was 6.7 higher (2.01 lower to 15.41 higher)
Quality of life (SF-36 Role function, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - role function in the control groups was 18.1	The mean quality of life >4 months - role function in the intervention groups was 9.1 higher (57.12 lower to 75.32 higher)
Quality of life (SF-36 Bodily pain, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - bodily pain in the control groups was 12.6	The mean quality of life >4 months - bodily pain in the intervention groups was 8.9 higher (2.63 lower to 20.43 higher)
Quality of life (SF-36 General health, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - general health in the control groups was -2.9	The mean quality of life >4 months - general health in the intervention groups was 5 higher (1.12 lower to 11.12 higher)
Quality of life (SF-36 Vitality, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - vitality in the control groups was 3.9	The mean quality of life >4 months - vitality in the intervention groups was 12.6 higher (2.44 to 22.76 higher)
Quality of life (SF-36 Social function, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - social function in the control groups was 9.5	The mean quality of life >4 months - social function in the intervention groups was 1.9 higher (9.43 lower to 13.23 higher)
Quality of life (SF-36 Role emotional, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - role emotional in the control groups was 11.5	The mean quality of life >4 months - role emotional in the intervention groups was 14 higher (7.44 lower to 35.44 higher)

Quality of life (SF-36 Mental health, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 Mental health, 0-100) >4 months in the control groups was 5.6	The mean quality of life (SF-36 Mental health, 0-100) >4 months in the intervention groups was 6.8 higher (0.7 lower to 14.3 higher)
Quality of life (SF-36 Health transition, 0-100) >4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (SF-36 Health transition, 0-100) >4 months in the control groups was 23.6	The mean quality of life (SF-36 Health transition, 0-100) >4 months in the intervention groups was 5.6 higher (13.43 lower to 24.63 higher)
Pain (VAS, 0-10) ≤4 months	63 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS, 0-10) ≤4 months (no sciatica) in the control groups was -1	The mean pain (VAS, 0-10) ≤4 months (no sciatica) in the intervention groups was 1.09 lower (2.202 lower to 0.22 higher)
Function (RMDQ, 0-24) >4 months	63 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) >4 months in the control groups was -1.6	The mean function (RMDQ, 0-24) >4 months in the intervention groups was 1.9 lower (3.84 lower to 0.04 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 306: Cognitive therapy versus usual care/waiting list in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/ waiting list	Risk difference with Cognitive versus (95% CI)
Pain (VAS, 0-10) ≤4 months	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS, 0-10) ≤4 months in the control groups was 4.806	The mean pain (VAS, 0-10) ≤4 months in the intervention groups was 1.12 lower (2.51 lower to 0.28 higher)
Psychological distress (BDI, 0-63) ≤4 months	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress(BDI, 0-63) ≤4 months in the control groups was 7.22	The mean psychological distress (BDI, 0-63) ≤4 months in the intervention groups was 1.53 higher (2.63 lower to 5.69 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/ waiting list	Risk difference with Cognitive versus (95% CI)
Function (Sickness impact profile, 0-68) ≤ 4 months	34 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (sickness impact profile, 0-68) ≤ 4 months in the control group was 9.64	The mean function (sickness impact profile, 0-68) ≤ 4 months in the intervention group was 1.69 lower (7.34 lower to 3.96 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 307: Cognitive therapy versus exercise (biomechanical + aerobics) in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Exercise	Risk difference with Cognitive therapy (95% CI)
Quality of life (SF-36 Physical function, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - physical function in the control groups was 6.5	The mean quality of life >4 months - physical function in the intervention groups was 6.2 higher (2.51 lower to 14.91 higher)
Quality of life (SF-36 Role function, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - role function in the control groups was 30.8	The mean quality of life >4 months - role function in the intervention groups was 3.6 lower (26.21 lower to 19.01 higher)
Quality of life (SF-36 Bodily pain, 0-100) >4 months -	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - bodily pain in the control groups was 14.7	The mean quality of life >4 months - bodily pain in the intervention groups was 6.8 higher (4.4 lower to 18 higher)
Quality of life (SF-36 General	64	VERY LOW[a,b]		The mean quality of life >4 months -	The mean quality of life >4 months -

health, 0-100) >4 months	(1 study)	due to risk of bias, imprecision		general health in the control groups was 0.9	general health in the intervention groups was 1.2 higher (5.45 lower to 7.85 higher)
Quality of life (SF-36 Vitality, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - vitality in the control groups was 4	The mean quality of life >4 months - vitality in the intervention groups was 12.5 higher (4.02 to 20.98 higher)
Quality of life (SF-36 Social function, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - social function in the control groups was 8.3	The mean quality of life >4 months - social function in the intervention groups was 3.1 higher (8.47 lower to 14.67 higher)
Quality of life (SF-36 Role emotional, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - role emotional in the control groups was 18.9	The mean quality of life >4 months - role emotional in the intervention groups was 6.6 higher (16.58 lower to 29.78 higher)
Quality of life (SF-36 Mental health, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - mental health in the control groups was 4.7	The mean quality of life >4 months - mental health in the intervention groups was 7.7 higher (1.01 to 14.39 higher)
Quality of life (SF-36 Health transition, 0-100) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life >4 months - health transition in the control groups was 26.6	The mean quality of life >4 months - health transition in the intervention groups was 2.6 higher (17.36 lower to 22.56 higher)
Pain (VAS 0-100 converted to 0-10, change score) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (change score) - >4 months in the control groups was -1.49	The mean pain (change score) - >4 months in the intervention groups was 0.6 lower (1.76 lower to 0.56 higher)
Function (RMDQ, 0-24) >4 months	64 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ) >4 months in the control groups was -2.1	The mean function (RMDQ) >4 months in the intervention groups was 1.4 lower (3.34 lower to 0.54 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

15.4 Combinations of interventions – psychological therapy adjunct

15.4.1 Low back pain without sciatica

Table 308: Psychological intervention (Behavioural therapy) + exercise (aerobic) compared to waiting list for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with waiting list	Risk difference with Behavioural therapy + exercise (aerobic) (95% CI)
Pain severity (McGill, 0-78) ≤4 months	37 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (McGill) ≤4 months in the control groups was 20.95	The mean pain severity (McGill) ≤4 months in the intervention groups was 6.17 lower (13.29 lower to 0.95 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 309: Psychological intervention (Behavioural therapy) + exercise (aerobic) compared to exercise (aerobic) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise (aerobic)	Risk difference with Behavioural therapy + exercise (aerobic) (95% CI)
Pain severity (McGill, 0-78) ≤4 months	39 (1 study) 8 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (McGill) ≤4 months in the control groups was 17.52	The mean pain severity (McGill) ≤4 months in the intervention groups was 2.74 lower (9.59 lower to 4.11 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

15.4.2 Low back pain with or without sciatica

Table 310: Psychological intervention (cognitive behavioural approaches) + exercise compared to exercise for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with exercise	Risk difference with cognitive behavioural approaches + exercise (95% CI)
Pain severity (0-100 NRS converted to 0-10 scale) - ≤4 months	84 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (0-100 NRS converted to 0-10 scale) - ≤4 months in the control groups was 3.98	The mean pain severity (0-100 NRS converted to 0-10 scale) - ≤4 months in the intervention groups was 0.71 lower (1.8 lower to 0.38 higher)
Pain severity (0-100 NRS converted to 0-10 scale) - >4 months	69 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (0-100 NRS converted to 0-10 scale) - >4 months in the control groups was 4.19	The mean pain severity (0-100 NRS converted to 0-10 scale) - >4 months in the intervention groups was 1.55 lower (2.78 to 0.32 lower)
Function (Low back outcome scale questionnaire 0-75 converted to 0-10) ≤4 months	84 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (low back outcome scale questionnaire 0-75 converted to 0-10) ≤4 months in the control groups was 6.8	The mean function (low back outcome scale questionnaire 0-75 converted to 0-10) ≤4 months in the intervention groups was 0.83 higher (0.06 lower to 1.72 higher)
Function (Low back outcome scale questionnaire 0-75 converted to 0-10) >4 months	69 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (low back outcome scale questionnaire 0-75 converted to 0-10) >4 months in the control groups was 6.79	The mean function (low back outcome scale questionnaire 0-75 converted to 0-10) >4 months in the intervention groups was 1.06 higher (0.06 to 2.06 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 311: Psychological intervention (cognitive behavioural approaches) + self-management compared to self-management for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with self-management	Risk difference with cognitive behavioural approaches + self-management (95% CI)
Pain severity (0-100 von Korff converted to 0-10 scale) ≤4 months	545 (1 study)	LOW[a] due to risk of bias		The mean pain severity (0-100 von Korff converted to 0-10 scale) ≤4 months in the control groups was -0.54	The mean pain severity (0-100 von Korff converted to 0-10 scale) ≤4 months in the intervention groups was 0.68 lower (1.06 to 0.3 lower)
Pain (0-100 von Korff converted to 0-10 scale) >4 months	598 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (0-100 von Korff converted to 0-10 scale) >4 months in the control groups was -0.64	The mean pain severity (0-100 von Korff converted to 0-10 scale) >4 months in the intervention groups was 0.7 lower (1.12 to 0.28 lower)
Function (RMDQ, 0-24) ≤4 months	545 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) ≤4 months in the control groups was -1.1	The mean function (RMDQ, 0-24) ≤4 months in the intervention groups was 0.9 lower (1.63 to 0.17 lower)
Function (RMDQ 0-24) >4 months	598 (1 study)	MODERATE[a] due to risk of bias		The mean function (RMDQ 0-24) >4 months in the control groups was -1.1	The mean function (RMDQ 0-24) >4 months in the intervention groups was 1.3 lower (2.12 to 0.48 lower)
Function (0-100 von Korff scale converted to 0-10) ≤4 months	545 (1 study)	LOW[a] due to risk of bias		The mean function (0-100 von Korff scale converted to 0-10) ≤4 months in the control groups was -0.	The mean function (0-100 von Korff scale converted to 0-10) ≤4 months in the intervention groups was 0.43 lower (0.85 to 0.01 lower)
Function (0-100 von Korff scale converted to 0-10) >4 months	598 (1 study)	MODERATE[a] due to risk of bias		The mean function (0-100 von Korff scale converted to 0-10) >4 months in the control groups was -0.54	The mean function (0-100 von Korff scale converted to 0-10) >4 months in the intervention groups was 0.84 lower

					(1.26 to 0.42 lower)
Quality of life (EQ-5D, 0-1) ≤4 months	528 (1 study)	LOW[a] due to risk of bias		The mean quality of life (eq-5d, 0-1) ≤4 months in the control groups was 0.567	The mean quality of life (eq-5d, 0-1) ≤4 months in the intervention groups was 0.06 higher (0.01 to 0.11 higher)
Quality of life (EQ-5D, 0-1) >4 months.	490 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (eq-5d, 0-1) >4 months in the control groups was 0.592	The mean quality of life (eq-5d, 0-1) >4 months in the intervention groups was 0.05 higher (0.02 to 0.09 higher)
Quality of life (SF-12 physical component, 0-100) ≤4 months	545 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-12 physical component, 0-100) ≤4 months in the control groups was 46.4	The mean quality of life (sf-12 physical component, 0-100) ≤4 months in the intervention groups was 0.60 higher (-1.47 to 2.67 higher)
Quality of life (SF-12 physical component, 0-100) >4 months	598 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-12 physical component, 0-100) >4 months in the control groups was47	The mean quality of life (sf-12 physical component, 0-100) >4 months in the intervention groups was 0.6 lower (2.60 lower to 1.40 higher)
Quality of life (SF-12 mental component, 0-100) ≤4 months	545 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-12 mental component, 0-100) ≤4 months in the control groups was 39.1	The mean quality of life (sf-12 mental component, 0-100) ≤4 months in the intervention groups was 1.6 higher (0.34 lower to 3.54 higher)
Quality of life (SF-12 mental component, 0-100) >4 months	598 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (SF-12 mental component, 0-100) >4 months in the control groups was	The mean quality of life (sf-12 mental component, 0-100) >4 months in the intervention groups was 3.3 higher (1.29 to 5.31 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

15.5 Economic evidence

Published literature

Three economic evaluations were identified that included cognitive behavioural approach as a comparator and have been included in this review.[247,288,289,457] These are summarised in the economic evidence profile below (Table 312) and the economic evidence table in Appendix I.

No studies were identified relating to behavioural therapies, cognitive therapies, mindfulness or acceptance and commitment therapy.

Two studies relating to cognitive behavioural approach were identified but were selectively excluded.[381,390] These are reported in Appendix M, with reasons for exclusion given.

Finally, one additional economic evaluation (Critchley et al 2007)[94] of a MBR programme which included a psychological component was identified. This is presented in the MBR review (See Chapter 17).

See also the economic article selection flow chart in Appendix F.

Table 312: Economic evidence profile: psychological interventions – cognitive behavioural approach

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Jellema2007[247] (Netherlands)	Partially applicable [a]	Potentially serious limitations [b]	• With-RCT analysis (Jellema 2005[248]) • Cost-utility analysis (QALYs) • Population: Low back pain mixed population (with or without sciatica) (> 12 weeks or exacerbation of mild symptoms) • Two comparators: 1. Usual care 2. Cognitive behavioural approach (minimal intervention strategy) • Follow-up: 1 year	2-1: £4 [c]	2-1: 0.004 QALYs lost	Usual care dominant (lower costs and more QALYs)	• Uncertainty not reported for cost effectiveness • Cost 95% CI: -£45 to £51 • QALY CI not reported
Smeets 2009[457] (Netherlands)	Partially applicable [d]	Potentially serious limitations [e]	• With-RCT analysis (Smeets 2006a[461]) • Cost-utility analysis (QALYs) • Population: mixed (with or without sciatica) (> 3 months resulting in disability (RDQ >3) and ability to walk at least 100m) • Three comparators: 1. Mixed modality exercise 2. Cognitive behavioural approach 3. MBR (2 core elements: physical, psychological).	2-1: saves £908 [f]	2-1: 0.03 QALYs gained	Cognitive behavioural approach is dominant (lower costs and higher QALYs)	• Uncertainty not reported for cost effectiveness • Cost and QALY CIs not reported

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
			Combination of interventions 1 and 2. • Follow-up: 62 weeks				
Lamb 2010[288,289] (UK)	Partially applicable [(g)]	Potentially serious limitations [(h)]	• Within-RCT analysis (Lamb 2012[290]) • Cost-utility analysis (QALYs) • Population: Low back pain mixed population (with and without sciatica) (> 6 weeks) • Two comparators: 1. Self-management (active management) 2. Self-management (active management) + cognitive behavioural approach • Follow-up: 1 year	2-1:£178 [(i)]	2-1: 0.099 QALYs gained	2 versus 1: £1786 per QALY gained	Probability intervention 2 cost-effective (£20K/30K threshold): ~99%/99% Subgroup analysis by RMQ: ≥4: £1524 ≤4: Intervention 2 dominated by intervention 1 (higher costs and lower QALYs) Subgroup analysis by gender, age or duration of low back pain did not greatly impact results.

ICER = incremental cost effectiveness ratio; n/a = not available; RCT = randomised clinical trial; QALY = quality-adjusted life year

(a) Dutch resource use data (2001-2003) and unit costs (2002) may not reflect current NHS context. Study does not include all non-invasive treatment options.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Jellema 2005 is 1 of 9 studies included in the clinical review for cognitive behavioural approach. No exploration of uncertainty available relevant to guideline.

(c) 2002 Netherlands euros converted to UK pounds.[394] Cost components incorporated: Primary care (GP, intervention costs, physical therapist, manual therapist, exercise therapist, back school, chiropractor, physiofitness program, professional home carer, psychologist), secondary care (outpatient appointments, hospitalization, surgery, radiograph, MRI scan), medication.

(d) Dutch resource use data (2002-2004) and unit costs (2003) may not reflect current NHS context. Study does not include all non-invasive treatment options.

(e) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Smeets 2006a is 1 of 9 studies included in the clinical review for cognitive behavioural approach.

(f) 2003 Netherlands euros converted to UK pounds.[394] Cost components incorporated: Interventions, GP, medical specialist including radiology, occupational physician, physiotherapist, manual therapist, Cesar or Mensensieck therapist, psychologist, medication, hospitalisation, medical procedures.

(g) Study does not include all non-invasive treatment options.

(h) A longer time horizon may be preferable if differences seen at 1 year persist beyond this time. Within-trial analysis and so does not reflect full body of available evidence for this intervention; Lamb 2010 is 1 of 13 studies included in the clinical review for cognitive behavioural approach - although 1 of 7 compared to usual care / waiting list and the only one with EQ5D data.

(i) *Cost components incorporated: Intervention costs (contact time, non-contact time [e.g. writing notes, admin, travel], supervisory support time, consumables, equipment, training); other NHS resource use (contacts with GPs, nurses, physiotherapists, psychologists, other health-care consultations, diagnostic tests (x-rays, MRI scans, CT scans, blood tests), A&E attendances, hospital admissions; pharmacological treatments.*

Unit costs

The main cost of delivering psychological interventions will be the personnel costs. Psychological interventions may be delivered by a psychologist or another health care professional trained to give the therapy such as a nurse or physiotherapist.

Table 313: UK costs of a selection of healthcare professionals that might deliver psychological interventions

Drug	Cost per hour client contact [(a)]
Clinical psychologist, Band 8a	£138 [(b)]
Practice nurse, Band 7	£58
Physiotherapist (community), Band 7	£123[(c)]
Physiotherapist (hospital), Band 7	£125[(c)]

(a) Unit costs based on Unit Costs of Health and Social Care 2014, PSSRU,[99] Some costs have been adapted to reflected salary bands other than those used in publication. All unit costs include qualifications unless otherwise stated.
(b) Unit cost excludes qualification (not available)
(c) The ratio of face to face client contact to total working hours was not reported for physiotherapists and so was assumed to be the same as for psychologists 1:2.25.

In addition, the PSSRU reports a cost per individual cognitive behavioural approaches session of £91. This is based on a session lasting 55 minutes and conducted by a clinical psychologist, mental health nurse or specialist doctor. Note this is based on costs estimated for a RCT of interventions for adolescents with depression. [99]

15.6 Evidence statements

15.6.1 Clinical

15.6.1.1 Cognitive behavioural approaches

15.6.1.1.1 Mixed population (with or without sciatica)

No clinical benefit was observed for people with low back pain with / without sciatica when cognitive behavioural approaches was compared to sham or usual care or waiting list controls for the majority of reported outcomes, with measures of pain and function being the most commonly reported (moderate to very low quality; total of 7 studies; range of n = 47–458). The one exception was function as measured by RMDQ at less or equal to 4 months in 2 studies, which showed a clinical benefit of cognitive behavioural approaches compared with waiting list control (low quality; n = 240).

When cognitive behavioural approaches was compared to behavioural therapy, clinical benefit in favour of cognitive behavioural approaches was seen at greater than 4 months when measured by RMDQ, but not the Quebec back pain disability scale. No difference was seen between the treatments in terms of pain at either time point (1 study, cognitive behavioural approaches (n=73; low quality).

No data were available for the individual sciatica or low back pain populations.

15.6.1.2 Behavioural therapy

Evidence from one small study suggested a clinical benefit at short term of behavioural therapy (EMG biofeedback) compared with sham biofeedback for improving pain in people with low back pain with

or without sciatica (low quality; n = 24). No evidence was available to assess the clinical benefit of behavioural therapy in terms of quality of life, function or psychological distress in this population.

Two studies suggested no clinical benefit of behavioural therapy approach compared with waiting list controls for pain intensity measured on the McGill scale (very low quality; n = 122). Evidence from 1 study showed clinical benefit of behavioural therapy in improving pain when compared to usual care (very low quality; n = 20). One study also demonstrated no clinically important difference for function or healthcare utilisation (very low quality; n = 103). No evidence was available to assess the clinical benefit of behavioural therapy in terms of quality of life, or psychological distress in this population.

No data were available for the individual sciatica or low back pain populations.

15.6.1.3 Mindfulness

The evidence suggested that for people with low back pain with or without sciatica, there was no clinically important benefit of a mindfulness intervention compared to waiting list control on pain (2 studies, very low quality, n=124), function (1 study, low quality, n=37) or the majority of quality of life outcomes reported (very low to low quality, n=37) except for the quality of life composite measures of mental health and physical health, which showed a clinical benefit of mindfulness (2 studies, very low quality, n=124) at less or equal to 4 months. No evidence was available to assess the clinical benefit of mindfulness in terms of psychological distress in this population.

No data were available for the individual sciatica or low back pain populations, nor for the comparison of mindfulness with placebo or sham.

15.6.1.4 Cognitive therapies

15.6.1.4.1 Low back pain population (without sciatica)

There was evidence from 1 study suggesting a clinical benefit of cognitive therapy when compared to usual care in terms of quality of life and pain at greater than 4 months but no difference for function (very low quality; n = 63).

When compared with biomechanical plus aerobic exercise there was conflicting evidence on the clinical benefit of cognitive therapy for the quality of life components. Clinical benefit favouring cognitive therapy was observed on physical function, bodily pain, vitality, social function, role emotional and mental health. However, clinical benefit in favour of exercise was observed on role function, and no clinically important difference was seen for general health or health transition. There was also no clinical benefit observed for function or pain (very low quality; n = 64). No evidence was available to assess the clinical benefit of cognitive therapy in terms of psychological distress in this population.

15.6.1.4.2 Mixed population (with or without sciatica)

One small study suggested clinical benefit of cognitive therapy compared with waiting list control in terms of pain intensity, but no clinical difference on psychological distress or function assessed with the sickness impact profile (very low quality; n = 34). No evidence was available to assess the clinical benefit of behavioural therapy in terms of quality of life or pain in this population.

No data were available for the sciatica population, nor for the comparison of cognitive therapies with placebo or sham.

15.6.1.5 Acceptance and commitment therapy

No RCT or cohort evidence were found for acceptance and commitment therapy.

15.6.1.6 Combinations of non-invasive interventions with psychological therapy

15.6.1.6.1 Low back pain population (without sciatica)

One small study suggested no clinical benefit of psychological therapy (behavioural therapy) in combination with aerobic exercise in terms of pain when compared to waiting list controls or aerobic exercise alone (very low quality, n=37).

15.6.1.6.2 Mixed population (with or without sciatica)

Low quality evidence from a single study (n=84) comparing psychological therapy plus exercise showed no clinical benefit in the short-term but benefit in the longer term for both pain and function, compared to exercise alone. When combined with self-management, a benefit of cognitive behavioural approaches was seen in terms of quality of life when assessed by EQ-5D and SF-12 mental component in the longer term, but not for the physical component of the SF12. No difference between treatments in terms of pain and function were observed.

15.6.2 Economic

- One cost-utility analysis found that usual care was dominant (less costly and more effective) compared to cognitive behavioural approach for the management of low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost utility analysis found that cognitive behavioural approach was dominant (less costly and more effective) compared to mixed modality exercise for the management of low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost–utility analysis found that cognitive behavioural approach was dominant (less costly and more effective) when compared to a 2-element MBR (physical, psychological) programme and mixed manual therapy plus self-management for treating low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.
- No relevant economic evaluations were identified relating to behavioural therapy in people with low back pain or sciatica.
- No relevant economic evaluations were identified relating to cognitive therapy in people with low back pain or sciatica.
- No relevant economic evaluations were identified relating to mindfulness in people with low back pain or sciatica.
- No relevant economic evaluations were identified relating to acceptance and commitment therapy in people with low back pain or sciatica.

15.7 Recommendations and link to evidence

Recommendations	**19. Consider psychological therapies using a cognitive behavioural approach for managing low back pain with or without sciatica but only as part of a treatment package including exercise, with or without manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage).**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria for pain and function, healthcare utilisation and adverse events were considered important to decision making, however mortality was not considered to be a treatment related adverse event for this review and was not

	included as an outcome. No evidence was identified for responder criteria or adverse events from the included studies.
Trade-off between clinical benefits and harms	The GDG discussed the necessity of a body of evidence to show specific intervention effects, that is, over and above any contextual or placebo effects. It was therefore agreed that if placebo or sham-controlled evidence is available, this should inform decision making in preference to contextual effects. However, if there was a lack of placebo or sham-controlled evidence, evidence against usual care will be given priority when decision making. It was noted that the majority of evidence for this review was from mixed populations with low back pain with or without sciatica. Some data were available for people without sciatica for cognitive therapies and combinations of interventions, noted below. A wide variation in length of interventions in the studies included (from 3 weeks to 1 year) was noted. **Cognitive behavioural approaches** There was no clinical benefit for cognitive behavioural approaches compared to sham cognitive behavioural approaches, usual care or waiting list controls observed for any reported outcome with the exception of function at the longer term follow-up when compared to waiting list control. Six studies were meta-analysed for short term pain outcome in people receiving cognitive behavioural approaches compared to usual care or waiting list which, demonstrated no difference in outcomes, with little uncertainty, albeit of very low quality overall. One study was included which compared cognitive behavioural approaches to sham cognitive behavioural approaches, but this did not demonstrate a meaningful difference between treatments for pain or function. The GDG were aware that in some of the included studies, the interventions were not provided by a qualified clinical psychologist. For example, one study assessed cognitive behavioural approaches delivered by video which the patient followed themselves. This was considered by the GDG to be a valid method of delivering a cognitive behavioural approach. It was also considered that cognitive behavioural approaches are rarely provided in isolation to other treatments and is intended to be part of a package of care (see MBR, chapter 17). The primary aim of a cognitive behavioural approach is not to directly improve pain and function, but reduce the fear of pain, thus increasing people's confidence in undertaking physical rehabilitation and therefore the GDG considered it unsurprising that meaningful effects were not seen in these outcomes. **Behavioural therapies** Although there was some evidence of benefit for behavioural therapy (EMG biofeedback) versus sham biofeedback in improving pain, it was noted that this was only from one small study of 24 participants. The evidence comparing behavioural therapies to usual care or waiting list controls was conflicting when looking at the benefit of behavioural therapy on improving pain at ≤4 months, with no clinically important difference observed for function or healthcare utilisation when compared to usual care. Three of the included studies compared the intervention to a group acting as waiting list controls. As discussed elsewhere in this guideline, waiting list controls may inflate intervention effect sizes due to a negative effect on people randomised to wait, but knowing that they will receive treatment later. Additionally, the lack of difference seen in these outcomes when compared to waiting list control groups does not provide evidence that this intervention is effective for improving function or reducing healthcare utilisation. A further study was included in this review comparing cognitive behavioural approaches and behavioural therapy which demonstrated no difference between treatments in terms of pain and mixed evidence in terms of function (clinical benefit for cognitive behavioural approaches when measured with RMDQ, no difference between treatments when measured with Quebec pain disability scale) at longer term follow-up. **Mindfulness** Two small studies comparing mindfulness with waiting list control were included,

	however there was no clinically important benefit observed on pain, function or quality of life, except for the two SF-36 composite measures of physical and mental health, which showed clinical benefit of mindfulness at ≤ 4 months. The GDG considered that there was insufficient evidence for this therapy from this evidence review. **Cognitive therapies** There was some evidence from two small studies (one in people with low back pain without sciatica, and one in people with or without sciatica) to suggest a clinical benefit of cognitive therapy when compared to usual care or waiting list controls on pain outcomes at ≤4 months and in one study for quality of life outcomes at ≤4 months, but not difference on psychological distress or function in either study. The GDG considered that this evidence was too limited to inform a recommendation. The GDG noted that only one of the included studies reported evidence on psychological distress relevant to this review protocol, and therefore were unable to determine whether this aspect may have improved. However, the lack of consistent observed benefit in quality of life was suggestive that other aspects of wellbeing may not have improved significantly. The GDG therefore agreed that there is no consistent good quality evidence from this review to recommend that any of the psychological therapies reviewed were effective for people with low back pain or sciatica when delivered in isolation. **Combinations of non-invasive interventions** Evidence came mainly from a single large study, which looked at group cognitive behavioural approaches in combination with self-management and did not show clinical benefit to a change in pain and function. There was however, improvement in terms of quality of life (SF-12 mental in the long term and EQ-5D in the short and longer term). It was also noted that no difference was observed when cognitive behavioural approaches was provided in combination with aerobic exercise, compared to exercise alone, in people without sciatica but this evidence was from a small study (n-34) which was at high risk of bias. The GDG noted that although it was disappointing that there was not a bigger change in function, the positive evidence in favour of cognitive behavioural approaches in combination with self-management was from a large trial, and indicated there was some benefit of cognitive behavioural approaches when provided alongside other interventions such as self-management. **Summary** The GDG highlighted that much of the evidence in this review is based on individual studies for each comparison. It was consequently agreed that there was not enough evidence to make any recommendations for the use of psychological therapies in isolation. The GDG discussed that the evidence suggests psychological therapies are of limited effectiveness in isolation for low back pain or sciatica; however, there is an indication from this review that in combination with other therapies such as self-management, they may be of benefit. This is also reviewed in Chapter 17 where there was evidence suggesting benefits from a package of treatment including a psychological element. The evidence from Chapter 17, together with the evidence from this review, supported the recommendation of a cognitive behavioural approach as psychological element in the treatment package. The GDG did not feel that psychological therapy should be a mandatory component of a treatment package, but that it is one optional modality that might be considered alongside exercise.
Trade-off between net clinical effects and costs	Two economic evaluations of cognitive behavioural approach for low back pain were included, whereas no studies were identified relating to behavioural therapies, cognitive therapies, mindfulness or acceptance and commitment therapy. The first cost-utility analysis found that usual care was dominant (less costly and more effective) compared to cognitive behavioural approach for the management of low back pain with or without sciatica (>12 weeks or exacerbation of mild

	symptoms).[247] This analysis was assessed as partially applicable with potentially serious limitations. The second cost utility analysis found that cognitive behavioural approach was dominant (less costly and more effective) compared to mixed modality exercise for the management of low back pain with or without sciatica (> 3 months resulting in disability (RMDQ >3) and ability to walk at least 100m).[457] This analysis was assessed as partially applicable with potentially serious limitations. Both studies are within-trial analyses, each based on one of nine clinical studies included for this comparator and so do not reflect full body of available evidence for this comparison. A third study which included a psychological intervention[288,289] was a cost-utility analysis which found that cognitive behavioural approach in combination with self-management (active management) was cost-effective compared to self-management alone (ICER £1,786 per QALY gained). This analysis was assessed as partially applicable with potential serious limitations. In addition, the NHS cost per session of individual cognitive behavioural approach was also presented to the GDG. The GDG considered this conflicting economic evidence and felt that there was too much uncertainty regarding the clinical and cost-effectiveness of cognitive behavioural approach as a standalone intervention to make a strong recommendation. They acknowledged that the economic evidence showing cognitive behavioural approach being more cost effective than mixed modality exercise was based only on one RCT which showed cognitive behavioural approach to be more effective than usual care in terms of pain severity, however this was in conflict with the remaining body of evidence showing no difference between cognitive behavioural approach and usual care. In addition, the comparison between cognitive behavioural approach and mixed modality exercise in Smeets 2009 was based on clinically insignificant effectiveness data, therefore the GDG did not believe cognitive behavioural approach to be more clinically and cost effective than mixed modality exercise. However cognitive behavioural approach was considered cost effective if provided as part of a MBR programme or as part of a package of combined physical and psychological treatments, based on the evidence in the MBR review. No economic evidence was identified relating to behavioural therapies, cognitive therapies, mindfulness or acceptance and commitment therapy. The main cost of delivering these psychological interventions would be the personnel costs. The unit costs for a clinical psychologist or another health care professional trained to give psychological therapy such as a nurse or physiotherapist was presented to the GDG for consideration. In the absence of evidence on these specific interventions, the GDG decided to only make a recommendation on interventions which have a cognitive behavioural approach.
Quality of evidence	The quality of evidence in this review ranged from moderate to very low. Most of the studies included were assessed as having serious or very serious risk of bias. A contributing factor to the risk of bias rating is the difficulty of adequate blinding with such interventions. Waiting list controls were used as comparator groups in a number of the included studies which are not reflective of usual practice and often lead to inflated estimates of effect sizes in the intervention groups due to the negative effect on people randomised to delayed treatment. There was also a lack of detail provided about the background care that the participants received apart from the intervention, and therefore it was impossible to assess in some cases whether the care in the two groups was comparable. This therefore renders the risk of overestimating effects in subjective outcomes such as pain and function. It was noted that for behavioural therapies, the included studies were all published prior to 1990. The GDG agreed this was not unexpected as this treatment is now less commonly used to treat people with low back pain. The evidence for mindfulness was very limited (1 small study compared to waiting list control, and 1 compared to sham which only reported data in graphical format and therefore could not be analysed within this review). However, a search for

	observational studies in this area did not identify any additional studies.
Other considerations	For recommendations on Exercise therapies, Manual therapies and MBR, please see chapters 9, 12, and 17, respectively. The GDG noted that this evidence relates to psychological therapies for low back pain and sciatica and not for co-morbid conditions such as anxiety or depression that may be present in people with low back pain or sciatica. In these individuals other relevant NICE guidance should apply (See Section 3.4.3).

16 Pharmacological interventions

16.1 Introduction

A review of pharmacological interventions for back pain is important because of the ubiquitous nature and tendency for back pain to persist or recur[89,95], coupled with the high frequency and cost of prescribing analgesics, and the potential harm associated with standard analgesic dosing.

Sciatica was included in the definition of radicular pain in the NICE clinical guideline for pharmacological management of neuropathic pain (CG173) which covered oral and topical pharmacological management of sciatica. [373] Therefore this review focused on pharmacological management of back pain with or without sciatica. The management of sciatica with injections and surgery are covered by other reviews in this guideline.

The main drug treatments used for low back pain are:

NSAIDs inhibit the activity of both cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2). It is thought that inhibiting COX-2 leads to the anti-inflammatory and analgesic effects. NSAIDs and selective COX-2 inhibitors may be regarded as a single drug class of 'NSAIDs' as they have been within this review, although it is noted there are different side effect profiles.

Paracetamol has a spectrum of action similar to a weak NSAID. It inhibits COX-1 and COX-2 through metabolism by the peroxidase function of these isoenzymes. The mode of action of paracetamol is unclear. Its main effects appear to be exerted by interaction with neurotransmitters in the central nervous system, although it may act in part by inhibiting prostaglandin synthesis in peripheral tissues. [176]

Opioids include natural and synthetic alkaloid derivatives of poppy plant resin. The principle mode of action on pain relief is by binding to opioid receptors in the central and peripheral nervous system. Opioids vary in potency and side-effects, based on the relative activation of different receptors and pathways. The effect of opioids on non-cancer pain is limited by tolerance (decreasing effectiveness of a given dose with repeated use), side-effects (typically constipation, nausea), dependence and addiction.

Antidepressants are used for treating chronic and neuropathic pain; separate from their antidepressant actions. The precise mechanism of analgesic action of antidepressants is unknown. Antidepressants, such as amitriptyline, elevate synaptic concentrations of neurotransmitters such as serotonin and noradrenaline, and indirectly affect opioid pathways. They also bind to other receptors that may be important for therapeutic effects and side effects. Antidepressants are not currently licenced for chronic low back pain or sciatica, but are prescribed off-ilcense for these conditions. This review will look at selective serotonin reuptake inhibitors (SSRIs), selective noradrenaline reuptake inhibitors (SNRIs) and tricyclic antidepressants (TCAs).

Anticonvulsants are used for treating chronic and neuropathic pain; separate from their anticonvulsant actions. The precise mechanism of analgesic action of anticonvulsants is unknown. Anticonvulsants have diverse pharmacological properties including binding to sodium and calcium ion channels and decreasing the release of neurotransmitters in the brain and spinal cord. The principle drugs in this class are gabapentin and pregabalin, which are anticonvulsants that are licenced for the treatment of neuropathic pain. Other anticonvulsants are not currently licenced for chronic low back pain or sciatica, but are presecribed off-licence.

Skeletal muscle relaxants are used for treating chronic muscle spasm, which may also be painful. These drugs bind to different receptors and exert their effect on muscles by central nervous system mechanisms, and are distinct from the peripherally acting muscle relaxants used during general

anaesthesia. Centrally acting muscle relaxants include diazepam, tizanidine and methocarbamol. Orphenadrine is an anticholinergic with central and peripheral actions on skeletal muscles. Diazepam, tizanidine and orphenadrine are not currently licensed for chronic low back pain or sciatica, but are presecribed off-licence.

Vitamin D is term that covers a range of steroid-like compounds. Studies have linked low vitamin D levels to back pain,[475]but the evidence of causation not clear.

Antibiotics have been used to treat chronic low back pain. However, it is not known whether it is the antimicrobial or anti-inflammatory properties of antibiotics that are important clinically for this purpose.

16.2 Review question: What is the clinical and cost effectiveness of pharmacological treatment in the management of non-specific low back pain?

For full details see review protocol in Appendix C.

Table 314: PICO characteristics of review question

Population	• People aged 16 years or above with non-specific low back pain. • People aged 16 or above with sciatica *Note: Pharmacological therapies for management of sciatica will not be covered by this guideline*
Interventions	Pharmacological treatment (oral/sublingual, rectal, intra-muscular and transdermal but not intravenous): • Non-opioid analgesics (including paracetamol) • Non-steroidal anti-inflammatories • Opioid analgesics (including codeine, tramadol, tapentadol, fentanyl) • Muscle relaxants • Anti-depressants 1. SSRIs 2. SNRIs 3. Tricyclic antidepressants • Anticonvulsants 1. Gabapentinoids 2. Others • Antibiotics • Vitamin D
Comparisons	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI)

	Important • Responder criteria (>30% improvement in pain or function) • Adverse events: 1. morbidity 2. mortality • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

16.3 Clinical evidence

16.3.1 Summary of included studies

16.3.1.1 Single interventions

A search was conducted for randomised trials comparing the effectiveness of pharmacological treatment (antidepressants, anticonvulsants, opioids, paracetamol, non-steroidal anti-inflammatories, muscle relaxants, antibiotics and vitamin D) versus placebo, usual care treatment and other non-invasive interventions for people with low back pain. Where there was very limited or no RCT evidence, the search was widened to include cohort studies.

Fifty five studies were included in the review.[9,10,13,21-23,30,38,39,44,58,86,103,114,120,171,172,191-193,239,240,251,259,263,264,293,322,333,339,353,362,366,369,398,399,401,403,428,432,441,443,446,453-455,470,471,478,481,525,526,533,548,553]

Evidence from these studies is summarised in the clinical evidence summary tables below (Section 16.3.1.2). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

No relevant clinical studies comparing vitamin D with placebo were identified.

Outcomes could not be extracted for Alcoff 1982[10] and Nadler 2002[366] in this review.

Studies included populations with low back pain only, mixed populations of people with low back pain with and without sciatica and populations with low back pain and sciatica. Although pharmacological treatment of sciatica is excluded from this review, this population has been included where data on low back pain only was limited to inform on low back pain treatment. Where back pain and leg pain was reported by the study, only back pain outcomes have been reported in this review.

Randomised controlled trial evidence for pharmacological treatments compared to other non-invasive interventions was found and has been reported in other chapters, comparing NSAIDS to acupuncture (chapter 13) and NSAIDs to manipulation/mobilisation (chapter 16).

A further search for cohort studies on antidepressants, anticonvulsants, muscle relaxants, paracetamol antibiotics and vitamin D was carried out due to insufficient randomised trial evidence. One cohort study was identified for anticonvulsants compared to usual care,[353] however no relevant studies comparing the other pharmacological interventions against placebo or usual care were found.

16.3.1.2 Combinations of interventions – pharmacological adjunct

Two studies looking at combinations of non-invasive interventions (with pharmacological therapy as the adjunct) were also included in this review. [322,446] These are summarised in **Table 315** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence

summary below (section 16.3.4). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Ten Cochrane reviews were identified but could not be included for the following reasons:

- The stratification of the population, i.e. low back pain only, low back pain with or without sciatica and low back pain with sciatica, did not match that of the review protocol.[68,512-514]
- The population did not meet the requirement of the review protocol; included people with sciatica,[422,423,502] osteoarthiritis[435], included people with non-cancer and breakthrough pain but not limited to the low back.[368]
- The review focussed on vitamin E as the intervention.[475]

However the studies included in the Cochrane reviews were individually assessed and included if they matched the review protocol criteria.

16.3.2 Summary of included studies

Table 315: Antidepressants versus placebo

Study	Intervention and comparison	Population	Outcomes	Comments
Alcoff 1982[10]	Tricyclic antidepressants versus placebo	Low back pain with/without n=50 USA	No outcomes to report	Concomitant treatment not specified Study length 8 weeks
Atkinson 1998[22]	Tricyclic antidepressants versus placebo	Low back pain with/without n=78 USA Radicular pain: 19%	Pain severity [Descriptor Differential Scale (DDS)] Psychological distress (BDI, STAI) Adverse events	Ongoing use of non-opioids (e.g. aspirin, NSAIDs) was permitted. Study length 8 weeks
Atkinson 1999[21]	SSRIs versus placebo (diphenhydramine hydrochloride up to 37.5 mg daily)	Low back pain with/without n=103 USA Radicular pain: 14%	Pain severity (DDS)	Ongoing use of non-opioids (e.g. aspirin, NSAIDs) was permitted. Study length 8 weeks
Atkinson 2007[23]	SSRIs versus placebo (Benztropine mesylate 0.5 mg daily)	Low back pain without sciatica n=121 USA Radicular pain: 49%	Pain severity (DDS) Adverse events	Concurrent use of non-opioids (e.g. NSAIDs) was permitted. Study length 12 weeks
Dickens 2000[114]	SSRIs versus placebo	Low back pain with/without n=98 UK	Pain severity (DDS) Function (ODI) Psychological distress (MADRS)	Combined analgesics (i.e. codeine-related drugs with acetaminophen like drugs), simple analgesics and NSAIDs were allowed. Study length 56 days

Study	Intervention and comparison	Population	Outcomes	Comments
Goodkin 1990[172]	Tricyclic antidepressants versus placebo	Low back pain with/without n=42 USA	Pain severity (VAS) Psychological distress (BDI)	Subjects taking a narcotic or NSAID either discontinued or agreed a fixed daily dose. Other medications, physical treatments and therapies were maintained at baseline level, but new forms of treatment were proscribed. Study length 6 weeks.
Jenkins 1976[251]	Tricyclic antidepressants versus placebo	Low back pain with or without sciatica n=59 UK	Pain severity (VAS)[a] Psychological distress (BDI)[a]	Analgesics only prescribed when essential; only psychotropic drugs used were hypnotics. All patient had a therapeutic program of exercise (groups and individual), together with physio-, occupational and hydrotherapy. Study length 4 weeks
Skljarevski 2009[454] (NB 3 linked studies)	SNRIs versus placebo	Low back pain with or without sciatica n=404 USA Radicular pain: 26%	Quality of life (EQ-5D, SF-36) Pain severity (BPI-severity) Function (BPI) Adverse events	Patients who entered the trial taking stable doses of NSAIDs/receiving physical therapy were allowed to continue. Rescue therapy/'Episodic use' (≤3 consecutive days, ≤20 total days) of short-acting analgesics was allowed. Study length 13 weeks
Skljarevski 2010[455]	SNRIs versus placebo	Low back pain with or without sciatica n=401 Multiple countries Radicular pain: 13%	Quality of life (EQ-5D, SF-36) Pain severity (BPI-severity) Function (RMDQ) Responder criteria (pain reduction of at	Rescue therapy of short acting analgesics allowed including ibuprofen, acetaminophen and naproxen (≤3 consecutive days, ≤20 total days).

Study	Intervention and comparison	Population	Outcomes	Comments
			least 30%) Adverse events	Study length 13 weeks
Skljarevski 2010[453]	SNRIs versus placebo	Low back pain with or without sciatica n=236 Multiple countries Radicular pain: 34%	Quality of life (EQ-5D, SF-36) (a) Pain severity (BPI-severity) Function (BPI) Healthcare utilisation (at least 1 treatment emergent adverse event) Responder criteria (pain reduction of at least 30%)	Patients regularly using (for ≥14 days per month for 3 months) therapeutic doses of NSAID or acetaminophen at the time of study entry were allowed to continue with fixed dosage. Continuation of long term, regular, non-pharmacological treatments such as physical/ relaxation therapy was allowed. Rescue therapy of short-acting analgesics (≤3 consecutive days, ≤20 total days) was allowed. Study length 13 weeks

(a) Outcomes reported inadequately for meta-analysis

Table 316: Anticonvulsants versus placebo/usual care

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
McCleane 2001[333]	Gabapentinoids. Dosage increasing from 300 mg to 1200 mg per day over a period of 6 weeks versus placebo	Low back pain with sciatica n=65 Patients were eligible for inclusion if they had lumbar and associated leg pain. Those with features of neuropathic pain (shooting pain, paraesthesia, numbness, allodynia) in either back or leg were excluded.	Pain severity (VAS pain at rest and on movement) Adverse events	Patients were allowed to continue their normal analgesics providing they did not change the preparation over the study period. Study length 10 weeks
Morera-dominguez 2010[353] (cohort study)	Anticonvulsants (mean (SD) dose 189.9 (141.7) mg/day) versus usual care (participants added	Low back pain with sciatica n=683	Quality of life (SF-12) Pain severity (BPI) Psychological distress (HADS) Responder criteria	Drugs such as anti-epileptics other than pregabalin, anxiolytic and antidepressant drugs were permitted.

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
	an analgesic other than pregabalin to their previous treatment)		(pain reduction of at least 50%)	Study length 12 weeks
Muehlbacher 2006[362]	Topiramate versus placebo	Low back pain with or without sciatica n=96 Germany Radicular pain: 10%	Quality of life (SF-36) Pain severity (McGill) Function (ODI) Adverse events	Current antidepressant medication was allowed. Study length 6 weeks.

Table 317: Muscle relaxants versus placebo/ usual care

Study	Intervention and comparison	Population	Outcomes	Comments
Basmajian 1978[30]	Muscle relaxants versus placebo (Diazepam 5mg up to 6 times a day)	Low back pain with or without sciatica n=76 Canada	Muscle spasms	Patients were put through a time-motion-study program: they were seated at a table and performed a series of 12 simple standardised manual tasks which require twisting of the torso. The tasks were carried out first with the right hand and then the left hand, each time with 2.5 kg weight attached to the wrist of the hand being used. Study length: 2 weeks
Berry 1988[39]	Tizanidine 4 mg three times a day versus placebo Control arm: placebo plus ibuprofen 400mg three times daily	Low back pain with sciatica n=51 100% have some form of sciatica: (none/mild: 70%, moderate/severe: 30%)	Pain severity (VAS) Adverse events	Concomitant treatment not reported Study length 7 days
Berry 1988[38]	Tizanidine 4 mg three times a day versus placebo	Low back pain with sciatica n=59 Sciatica: 53%	Pain severity (VAS) Adverse events	Consumption of aspirin tablets, taken as 'rescue' medication, was recorded. Study length 7 days
Dapas 1985[103]	Baclofen 80 mg per day versus placebo	Low back pain without sciatica n=100	Pain severity (VAS) Adverse events	Patients wearing a back brace or support or receiving physical therapy at the time the study began maintained the same

Study	Intervention and comparison	Population	Outcomes	Comments
				regimen throughout the study period. Study length 14 days
Pareek 2009[399]	Tizanidine 2 mg versus usual care (paracetamol 100 mg)	Low back pain without sciatica n=197	Pain severity (VAS pain on movement, at rest, at night) Adverse events	Patients in the intervention group receiving Tizanidine also received 100 mg paracetamol. Study length 7 days
Tervo 1976[481]	Muscle relaxant (Initial intramuscular injection of 60 mg orphenadrine citrate followed by combined tablet of 35 mg orphenadrine citrate and 450 mg paracetamol to take two 3 times a day) versus placebo (Initially given a saline injection, followed by two 450 mg paracetamol tablets 3 times a day).	Low back pain with or without sciatica n=50 Finland	Function (disability scores) (a)	Concomitant treatment not reported Study length 21 days

(a) Outcomes reported inadequately for meta-analysis

Table 318: Opioids versus placebo

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
Buynak 2010[58,58,264]	Oxycodone dose per day ranging from 20 to 50mg versus placebo	Low back pain without sciatica n=334	Pain (VAS)	During the titration period, acetaminophen was permitted (≤1000mg/day as needed) as rescue medication except for the last 3 days. During the study, analgesic medication only allowed for non-low back pain (acetaminophen ≤1000mg/day), for 3 consecutive days. TENS, acupuncture, physical therapy, packs, massages and other interventional adjunctive therapy was permitted during the

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
				study if patients started the treatment ≥14 days prior to enrolment and continued on the same regimen. Patients with diagnosed psychiatric or neurological conditions were allowed medications, such as SSRIs, at a controlled, stable dose for ≥3 months prior to randomisation. Study length 12 weeks
Buynak 2010[58,264]	Tapentadol 100-250 mg (determined versus placebo	Low back pain without sciatica n=321	Pain (BPI)	As for above.
Chu 2012[86]	Sustained acting morphine 15 mg versus placebo	Low back pain without sciatica n=69 Eligible patients: chronic non-malignant, non-radicular low-back pain. Exclusion criteria: pain outside the lower back	Function (RMDQ), Pain (VAS)	Patients currently on low-dose opioid therapy(≤30mg) were allowed to continue; however they were instructed to refrain from taking their daily medication at least 10 hours before any pain testing sessions. Study length 1 month
Hale 2005[193]	Oxycodone versus placebo Active control: placebo and oxycodone controlled release.	Low back pain without sciatica n=80 Exclusion: acute nerve root compression, severe lower extremity weakness or numbness.	Pain (VAS), adverse events	Rescue medication with oral morphine sulphate (15mg q4-6hr) was permitted unlimited for first 4 days of the double-blind phase. Rescue medication of 30mg/d thereafter. Adjunctive therapies for back pain, such as physical therapy, and doses of benzodiazepines, antidepressants, anticonvulsants, sedatives, or tranquilizers were required to remain unchanged during the study, Over-the-counter NSAIDs, aspirin or

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
				acetaminophen were permitted as needed for relief of symptoms other than pain. Study length 18 days
Hale 2010[191,192,369]	Hydromorphone extended release versus placebo	Low back pain without sciatica n=134 Exclusion criteria: severe or progressive lower extremity weakness or numbness Non-neuropathic low back pain: 64.5%, neuropathic low back pain 35.5%.	Function (RMDQ), adverse events (just for the subgroup of non-neuropathic pain only patients and so this data was not extracted) (pain reported as graphically therefore could not be analysed)	Hydromorphone immediate release (IR) (2, 4 and 8 mg) was allowed as rescue medication. Rescue medication was unrestricted for the first 3 days and then restricted to two tablets per day after day 3 of the conversion/titration phase. All patients were required to be on daily opioid with >60 mg oral morphine equivalent (>12 mg hydromorphone) per day within 2 months prior to the screening visits, and on stable doses of all prior analgesics for at least 2 weeks prior to the screening visit but these were discontinued at screening with the exception of aspirin ≤325mg/d for cardiovascular prophylaxis. Study length 12 weeks
Katz 2015A[263]	Oxycodone (Xtampza ER ≥40 to ≤160 mg) versus placebo	Low back pain without sciatica n=389 Exclusion criteria: Patients known to be refractory or intolerant to the analgesic effects of opioids or who had failed previous opioid therapy or had a known contraindication to any opioid or paracetamol,	Quality of life (SF-12) Pain (NRS) Function (RMDQ) Responder criteria (pain reduction of at least 30%) Adverse events)	Any adjunct therapy for back pain such as physical therapy, biofeedback therapy, transcutaneous electrical nerve stimulation, acupuncture, nutraceuticals, herbal remedies, and water aerobics remained unchanged through the end-of-study or early discontinuation visit per protocol. Use

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
		including allergy or hypersensitivity. Patients with any chronic pain condition other than CLBP who, in the investigator's opinion, would have interfered with the assessment of CLBP		of paracetamol up to 2000 mg/day was also permissible.
Ruoff 2003[428]	Combination of Tramadol 37.5mg/APAP 325mg, versus placebo	Low back pain without sciatica n=162 Patients not enrolled if they had severe pain in a location other than the lower back or had neurological deficits in the lower extremities.	Function (RMDQ) Pain (VAS, McGill) Quality of life (SF-36)	Rescue medication was allowed on days 1 to 6 of the double blind phase and consisted of up to 2000mg APAP (provided the patient was not taking >6 tablets of the study medication per day). Study length 3 months
Schnitzer 2000[443]	Tramadol 200-400 mg/day versus placebo	Low back pain without sciatica n=127 Exclusion: neurological deficits in the lower extremities, severe pain in a location other than the lower back.	Function (RMDQ) Pain (VAS) Adverse events	Rescue medication (any short acting analgesic) was permitted during dose titration. No rescue medication was permitted during the double blind phase. Physiotherapy started before entry into the open label phase was continued throughout both the open label and double blind phases of the study. Study length 4 weeks
Steiner 2011[339,471,553]	Buprenorphine (BTDS) 10 or 20 mcg/hour versus placebo	Low back pain without sciatica n=539 Exclusion: radicular symptoms, surgery to treat their back pain within 6 months of screening or had planned to have surgery during the study period.	Pain (BPI) Adverse events	Rescue medication for all patients was provided. Immediate-release oxycodone for supplementary analgesia during the first six days following randomisation. Weeks 2-12 use of paracetamol was permitted (500 mg every six hours up to a maximum of 2g/day) or ibuprofen 200 mg every six hours up to a

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
				maximum of 800 mg/day. Downgrade of dosage was permitted once if analgesia was deemed inadequate. Study length 4 weeks
Vondrackova 2008[525]	Oxycodone 10 or 20 mg PR every 12 hours versus placebo	Low back pain without sciatica n=151	Adverse events (no data for pain outcome reported in the study)	During the screening period, patients could receive OxyNorm q4-6hr when necessary as rescue medication at a quarter of the dose of their previous total daily opioid medication, and again during the trial at a quarter of their total daily opioid medication. Study length 12 weeks
Vorsanger 2008[526]	Tramadol 300 mg/day versus placebo	Low back pain without sciatica n=128	Function (RMDQ) Pain (VAS)	Patients were permitted to use low dose aspirin (≤325 mg/day) for cardiovascular prophylaxis or acetaminophen 2,000mg/day for reasons other than chronic pain for no more than three consecutive days. Study length 3 months
Vorsanger 2008[526]	Tramadol 200 mg/day versus placebo	Low back pain without sciatica n=129	Function (RMDQ) Pain (VAS)	Patients were permitted to use low dose aspirin (≤325 mg/day) for cardiovascular prophylaxis or acetaminophen 2000 mg/day for reasons other than chronic pain for no more than three consecutive days. Study length 3 months
Webster 2006[533]	Oxycodone (titrated to a dose between 10-80 mg/day) versus	Low back pain without sciatica n=206	Pain severity (11-point numeric diary pain intensity scale)	Tricyclic antidepressants, SSRIs, glucosamine/chondroit

Study	Intervention and comparison	Population	Outcomes	Concomitant treatment
	placebo		Adverse events (discontinuation due to adverse events)	in or St John's worth were allowed if doses were stable for 4 weeks before study entry. Study length 12 weeks

(a) Outcomes reported inadequately for meta-analysis

Table 319: Paracetamol versus placebo

Study	Intervention and comparison	Population	Outcomes	Comments
Nadler 2002[366]	Paracetamol 2 tablets 4 times a day, total dose of 4000 mg/day versus placebo	Low back pain without sciatica n=113	Pain outcomes only presented graphically therefore data could not be analysed	Concomitant treatment not reported Study length 4 days
Williams 2014[548]	Paracetamol 2 times 665 mg tablets 3 times a day versus placebo	Low back pain with or without sciatica n=1097 Radicular pain: 20%	Function (RMDQ) Pain (VAS) Quality of life (SF-12) Adverse events	Rescue medication was 2 day supply of naproxen 250 mg (two tablets initially, then one tablet every 6-8 hours as needed). Concomitant medicine and treatment use was allowed and included a wide range of treatments. Study length 4 weeks

(a) Outcomes reported inadequately for meta-analysis

Table 320: NSAIDS versus placebo

Study	Intervention and comparison	Population	Outcomes	Comments
Amlie 1987[13]	Pirioxicam 40 mg of for the first 2 days, followed by 20 mg for the remaining 5 days versus placebo	Low back pain without sciatica n=140 Exclusion criteria included radicular symptoms.	Pain (results represented in graphical format, therefore not extracted) Adverse events	Paracetamol 500 mg tablets were provided as rescue medication up to 1000 mg (two tablets) three or four times daily. In very few cases, a combination of paracetamol and codeine was permitted for more severe pain. Study length 7 days
Birbara 2003[44]	Etoricoxib 60 mg once a day versus placebo	Low back pain with or without sciatica n=103	Function (RMDQ) Pain (VAS) Quality of life (SF-12)	Paracetamol (up to 1950 mg daily) was provided as rescue medication.
	Etoricoxib 90 mg	Low back pain with		

Study	Intervention and comparison	Population	Outcomes	Comments
	once daily versus placebo	or without sciatica n=107	Adverse events	Muscle relaxants, physical therapy and chiropractic or alternative therapy (such as acupuncture) were permitted, if their use was stable for the month preceding the screening visit and was expected to remain stable for the duration of the study. Study length 12 weeks
Dreiser 2003[120]	Diclofenac maximum of 6 tablets of 12.5 mg per day (1/2 tablets every 4-6 hours) versus placebo	Low back pain without sciatica n=124 Inclusion criteria: pain not due to an associated radiculalgia i.e. Lasègue sign absent or superior to 90o; not radiating below the gluteal fold.	Pain (VAS) Adverse events	Rescue medication consisted of 1 or 2 tablets of paracetamol (500 mg per tablet) taken only in case of moderate-to-severe pain, not earlier than 2 hours after the initial dose of study medication. The use of rescue medication terminated the participation of the patient in the trial. Study length 7 days
	Ibuprofen maximum of 6 tablets of 200 mg per day (1/2 tablets every 4-6 hours) versus placebo	Low back pain without sciatica n=122		
Goldie 1968[171]	Indomethacin 3x 25 mg a day, total of 75 mg/day versus placebo	Low back pain with sciatica n=25 Sciatica: 100%	Adverse events	Concomitant treatment not reported Study length 14 days
Nadler 2002[366]	Ibuprofen 2 tablets 4 times a day, total dose of 1200 mg/day versus placebo	Low back pain without sciatica n=106 Exclusion: any evidence or history of radiculopathy.	Outcomes only presented as graphs therefore data could not be analysed.	Concomitant treatment not reported Study length 4 days
Pallay 2004[398]	Etoricoxib 60 mg daily versus placebo	Low back pain without sciatica n=109	Function (RMDQ) Pain (VAS) Quality of life (SF-12) Adverse events	Muscle relaxants, physical therapy, chiropractic or alternative therapy (such as acupuncture) were permitted if their use was stable for the month preceding the screening visit and was expected to remain stable for the duration
	Etoricoxib 90 mg per day versus placebo	Low back pain without sciatica n=106		

Study	Intervention and comparison	Population	Outcomes	Comments
				of the study. Paracetamol (up to 1,950mg daily) was provided as rescue medication, as needed, and was discontinued at least 12h prior to an efficacy visit. Study length 12 weeks
Szpalski 1994[478]	Non-steroidal anti-inflammatory drugs versus placebo (20 mg tenoxicam/saline intramuscular injection on day 1, followed by 20 mg oral tenoxicam/placebo for the next 13 days)	Low back pain with or without sciatica n=73	Pain severity (VAS)	7 days of bed rest followed by 7 days of light activity prescribed to all. Other medications such as analgesics were not allowed. Study length 2 weeks

Table 321: Antibiotics versus placebo

Study	Intervention and comparison	Population	Outcomes	Comments
Albert 2013[9]	Amoxicillin-clavulanate (500mg/125 mg) (Bioclavid) tablets three times a day. n=45 patients took one tablet. n=45 took two tablets. Versus placebo	Low back pain n=90	Pain[a] (0-10 cale), function[a] (RMDQ), EQ-5D[a], healthcare utilisation, adverse events	All patients were allowed to take their usual anti-inflammatory and pain relieving medication (treatment as usual). Study length 100 days

(a) Data for these outcomes only reported as median and IQR, therefore could not be meta-analysed.

Table 322: Head to head comparisons

Study	Intervention and comparison	Population	Outcomes	Comments
Innes 1998[240]	Paracetamol/codeine (600 mg/60 mg) 60 mg versus Ketorolac tromethamine10mg	Acute low back pain with or without sciatica n=123	Pain (VAS) Adverse events	Ketorolac tromethamine group: patients requiring a 5th or 6th dose of analgesic in any 24-hour period were given paracetamol 650 mg per dose in 2 optional doses. Otherwise, all patients in this study were instructed to avoid all contraindicated

Study	Intervention and comparison	Population	Outcomes	Comments
				medications. Study length7-9 days follow-up. Results recorded at 6 hours and 1 week, but only pain reported at 6 hours and adverse events at 1 week.
Kalita 2014[259]	Pregabalin 75 mg twice a day for 2 weeks, 150 mg for 4 weeks then 300 mg twice daily versus amitriptyline 12.5 mg for 2 weeks, 25 mg for 4 weeks then 50 mg.	Low back pain with or without sciatica n=200 Radiculopathy: 47.5%	Pain (VAS) Adverse events	All the patients advised to do back extension exercise for 10-15 minutes daily. 14 week follow-up
Nadler 2002[366]	Paracetamol 2 tablets 4 times a day, total dose of 4000 mg/day versus Ibuprofen 2 tablets 4 times a day, total dose of 1200 mg/day	Low back pain without sciatica n=229	Outcomes only presented in graphs therefore could not be analysed.	Concomitant treatment not reported. Study length 4 days
Perrot 2006[403]	Paracetamol/ tramadol (325 mg/37.5 mg) versus tramadol 50mg	Low back pain without sciatica	Pain (VAS) (a) Adverse events	Any physical and adjunctive therapies as well as any analgesic concomitant medications were prohibited. 10 days follow-up.
Stein 1996[470]	Amitriptyline 150mg versus paracetamol 2000mg	Acute low back pain with or without sciatica	Pain (VAS) Psychological distress (STAI, BDI)	No other medications were allowed during the study period. 5 weeks follow-up.

(a) Data could not be meta-analysed as standard deviations were not reported.

Table 323: Combined pharmacological treatments versus placebo

Study	Intervention and comparison	Population	Outcomes	Comments
Hyup lee 2013[239]	Opioid plus paracetamol versus placebo (Extended release tramadol hydrochloride 75 mg /paracetamol 650 mg)	Low back pain with or without sciatica n=245 South Korea	Quality of life (Korean SF-36) Function (Korean ODI) Adverse events Responder criteria (at least 30% reduction in pain)	All patients were receiving a stable dose of NSAID or COX-2-selective inhibitor that they had been using for pain relief throughout the trial.

				Study length 4 weeks
Lasko 2012[293]	Opioid plus paracetamol versus placebo (tramadol (2x75 mg)/Paracetamol (650 mg) controlled release)	Low back pain without sciatica n=277	Pain severity (time to onset: perceptible pain relief, meaningful pain relief; time to remedication) Adverse events	No rescue medication allowed. Study length 2.5 days (double blind phase)
Peloso 2004[401]	Opioid plus paracetamol versus placebo (tramadol/paracetamol (37.5 mg/325 mg) Max of 2 tablets QID and minimum of 3 tablets/day)	Low back pain without sciatica n=336	Quality of life (SF-36) Pain severity (VAS) Function (RMDQ) Adverse events	Rescue medication (paracetamol 500mg up to 4 tablets daily) during the first 6 days of the double blind phase, provided the patient was taking no more than 6 tablets of study medication daily. After the first 6 days, paracetamol at a max of 100 mg/day for 2 consecutive days was allowed for non-low back related pain. Patients were allowed to continue taking prophylactic doses of aspirin for cardiovascular protection. Study length 91 days
Schiphorst preuper 2014[441]	Opioid plus paracetamol versus placebo (tramadol/paracetamol (37.5 mg/325 mg) per capsule (titrated from 1 capsule 2 times per day to max of 2 capsules 3 times per day).	Low back pain with or without sciatica n=50	Pain severity (VAS) Function (RMDQ) Adverse events	Concomitant treatment not reported. Study length 2 weeks

Table 324: Combined pharmacological treatments versus monotherapy

Study	Intervention and comparison	Population	Outcomes	Comments
Sakai 2015[432]	Opioid plus paracetamol (2 tablets per day; tramadol 75 mg and acetaminophen 650 mg per day) versus anticonvulsant (pregabalin, 75 mg before bedtime)	Low back pain n=65 Inclusion criteria: Neuropathic or nociceptive low back pain	Number of people discontinued due to adverse events (Data were reported for other outcomes but only as graphs so was unable to be included in this review.)	Run-in of NSAIDs for 1 month and 7-14 day washout of prior analgesics. Study length 4 weeks

Table 325: Combinations of interventions – pharmacological adjunct

Study	Intervention and comparison	Population	Outcomes	Comments
Majchrzycki 2014[322]	• Pharmacological treatment (NSAID) + Manual therapy (massage) • Manual therapy (massage)	Low back pain without sciatica N=59 2 weeks intervention Poland	Pain severity (VAS) Function (RMDQ, ODI)	Concomitant treatment: not stated.
Shankar 2011[446]	• Pharmacological (NSAID) + exercise • Acupuncture	Low back pain without sciatica N=60 3 weeks intervention India Chronic low back pain (>6 months); 30-50 years; moderate-severe intensity non-radiating low back pain; without apparent neurological deficit or prior history of acupuncture therapy	Pain severity (VAS)	Concomitant treatment: not stated.

16.3.3 Data that could not be meta-analysed

Table 326: Summary of results for Tervo 1976: Muscle relaxants versus placebo/sham at ≤4 months – low back pain with or without sciatica

Outcome	Intervention		Comparator		Risk of bias
	Mean (SD) days	No. analysed	Mean (SD) days	No. analysed	
Duration of disability,	8.6 (0.6)	25	12.9 (1.2)	25	Very high

Table 327: Summary of results for Jenkin 1976: tricyclic antidepressants versus placebo/sham at ≤4 months – low back pain with or without sciatica

Outcome	Intervention		Comparator		Risk of bias
	Result reported	No. analysed	Result reported	No. analysed	
Pain (VAS)	Mean (SD): 3.42 (10)	11	Mean: 4.18 (no SD reported)	9	Very high
Psychological distress (BDI)	Median: 5	-	Median: 10	-	Very high

Table 328: Summary of results for Skljarevski 2010: SNRI versus placebo at ≤4 months – low back pain with or without sciatica

Outcome	Result	Risk of bias
Reduction in pain intensity	EQ-5D did not change significantly in patient treated with duloxetine as compared with placebo, but numerical improvement was observed. Amongst the 8 subscales of SF-36, only bodily pain (duloxetine vs placebo: least-squares mean change of 1.58 vs 1.04, P=0.038), general health (duloxetine vs placebo: least-squares mean change of 1.90 vs 0.87, P=0.041), and vitality (duloxetine vs placebo: least-squares mean change of 1.46 vs 0.43, P=0.040) were significantly improved in the duloxetine group compared with placebo. However, all other subscales of SF-36 were numerically improved with duloxetine compared with placebo.	Very high

Table 329: Summary of results for Alberts 2013: Antibiotics versus placebo at ≤4 months and >4 to 12 months- low back pain with or without sciatica

Outcome	Antibiotic group	Placebo group	Risk of bias

	Median (lower, upper quartile)	No. analysed	Median (lower, upper quartile)	No. analysed	
≤4 months					
Function (RMDQ 0-24)	11.5 (7, 14)	76	14 (11, 18)	67	High
Back pain (0-10)	5 (2.7, 6.7)	76	6.3 (3.7, 7.7)	67	High
EQ-5D (0-100)	65 (40, 79)	76	60 (40, 75)	67	High
>4 months – 1 year					
Function (RMDQ 0-24)	7 (4, 11)	77	14 (8, 18)	67	High
Back pain (0-10)	3.7 (1.3, 5.8)	77	6.3 (4, 7.7)	67	High
EQ-5D (0-100)	75 (54, 90)	77	60 (39, 74)	67	High

Table 330: Summary of results for Hale 2010: Opioids versus placebo-low back pain≤4 months

Outcome	Result	Risk of bias
Reduction in pain intensity	Hydromorphone ER significantly reduced pain intensity compared to placebo (p≤0.001). A significantly higher proportion of hydromorphone ER (60.6%) versus placebo (42.9%) patients had at least a 30% reduction in diary NRS pain score from screening to endpoint (p≤0.001).	Very high

Table 331: Summary of results for Perrot 2006:Opioid plus non-opioid versus opioid at ≤4 months – low back pain without sciatica

Outcome	Opioid+non-opioid		Opioid		Risk of bias
	Mean	No. analysed	Mean	No. analysed	
VAS (0-10)	2.79	51	2.48	48	High

16.3.4 Clinical evidence summary tables

16.3.4.1 Antidepressants

Table 332: SSRIs versus placebo –low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SSRIs versus placebo (95% CI)
Pain severity (low back pain population) DSS. Scale from: 0 to 20.	53 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (low back pain population) in the control groups was 6.2	The mean pain severity (low back pain population) in the intervention groups was 0.90 higher (0.63 lower to 2.43 higher)
Pain severity (low back pain with or without sciatica population) - SMD	162 (2 studies) ≤4 months	MODERATE[c] due to risk of bias		*	The mean pain severity (low back pain with or without sciatica population) in the intervention groups was 0.05 standard deviations higher (0.26 lower to 0.36 higher)
Function (ODI) (low back pain with or without sciatica population) Scale from: 0 to 100.	92 (1 study) ≤4 months	LOW[b,c] due to risk of bias, imprecision		The mean function (ODI) in the control groups was 52.4	The mean function (ODI) in the intervention groups was 2.2 lower (8.11 lower to 3.71 higher)
Psychological distress, MADRS Scale from: 0 to 60. (low back pain with or without sciatica population)	92 (1 study) ≤4 months	MODERATE[c] due to risk of bias		The mean psychological distress, MADRS in the control groups was 23.3	The mean psychological distress, MADRS in the intervention groups was 0.1 lower (3.64 lower to 3.44 higher)
Adverse events (low back pain population)	69 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 3.22 (1.04 to 10.01)	115 per 1000	256 more per 1000 (from 5 more to 1000 more)
Adverse events (low back pain with or without sciatica population)	54 (1 study) ≤4 months	MODERATE[c] due to risk of bias	RR 0.94 (0.81 to 1.09)	969 per 1000	58 fewer per 1000 (from 184 fewer to 87 more)

** Control rate not given, only mean difference reported*

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 1 increment if the majority of the evidence was at high risk of bias

Table 333: Tricyclic antidepressants versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Tricyclic antidepressants versus placebo (95% CI)
Pain severity (DSS 0-20 and VAS 0-10)	116 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean pain severity in the control groups was 5.88	The mean pain severity in the intervention groups was 0.24 standard deviations higher (0.13 lower to 0.6 higher)
Psychological distress BDI. Scale from: 0 to 63.5	118 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean psychological distress in the control groups was 11.84	The mean psychological distress in the intervention groups was 1.75 higher (0.05 lower to 3.56 higher)
Psychological distress STAI. Scale from: 20 to 80.	78 (1 study) ≤4 months	VERY LOW[b,c] due to risk of bias, imprecision		The mean psychological distress in the control groups was -0.62	The mean psychological distress in the intervention groups was 2.59 higher (1.28 lower to 6.46 higher)
Adverse events	81 (1 study) ≤4 months	LOW[a,e] due to risk of bias, imprecision	RR 1.02 (0.78 to 1.33)	725 per 1000	14 more per 1000 (from 160 fewer to 239 more)

(a) Downgraded by one increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(c) Downgraded by 1increment if the confidence interval crossed 1 MID

Table 334: SNRIs versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRIs versus placebo (95% CI)
Pain severity (BPI 0-10)_	1004 (3 studies)	MODERATE[a] due to risk of bias		The mean pain severity in the control groups was	The mean pain severity in the intervention groups was

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRIs versus placebo (95% CI)
	≤4 months			-1.603	0.7 lower (0.99 to 0.4 lower)
Function (mean change)	1004 (3 studies) ≤4 weeks	MODERATE[a] due to risk of bias		The mean function (mean change) in the control groups was -1.4067	The mean function (mean change) in the intervention groups was 0.66 lower (0.91 to 0.41 lower)
Responder criteria (pain reduction >30%)	630 (2 studies) ≤4 months	LOW[a,b] due to risk of bias, imprecision	RR 1.22 (1.05 to 1.43)	Moderate	
				442 per 1000	97 more per 1000 (from 22 more to 190 more)
EQ-5D Scale from: 0 to 1.	742 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean eq-5d in the control groups was 0.075	The mean eq-5d in the intervention groups was 0.05 higher (0.01 to 0.09 higher)
Healthcare utilisation	357 (1 study) ≤4 months	MODERATE[a] due to risk of bias	RR 0.57 (0.44 to 0.76)	Moderate	
				479 per 1000	206 fewer per 1000 (from 115 fewer to 268 fewer)
Adverse events	1041 (3 studies) ≤4 months	LOW[a,b] due to risk of bias, imprecision	RR 1.39 (1.17 to 1.65)	197 per 1000	77 more per 1000 (from 34 more to 128 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 335: SNRIs (Duloxetine 60mg) versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRI (60 mg) versus placebo (low back pain ± sciatica) (95% CI)
SF-36 (Duloxetine 60 mg) - Mental component	300 (1 study)	LOW[a,b] due to risk of		The mean SF-36 (duloxetine 60 mg) - mental component in the control groups	The mean SF-36 (duloxetine 60 mg) - mental component in the intervention

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRI (60 mg) versus placebo (low back pain ± sciatica) (95% CI)
Scale from: 0 to 100.	≤4 months	bias and imprecision		was 0.64	groups was 2.25 higher (0.17 to 4.33 higher)
SF-36 (Duloxetine 60 mg) - Physical component Scale from: 0 to 100.	300 (1 study) ≤4 months	LOW[a,b] due to risk of bias and imprecision		The mean SF-36 (duloxetine 60 mg) - physical component in the control groups was 4.1	The mean SF-36 (duloxetine 60 mg) - physical component in the intervention groups was 1.24 higher (0.89 lower to 3.37 higher)
SF-36 (Duloxetine 60 mg) - Bodily pain Scale from: 0 to 100.	588 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - bodily pain in the control groups was 10.912	The mean SF-36 (duloxetine 60 mg) - bodily pain in the intervention groups was 0.66 higher (0.13 to 1.2 higher)
SF-36 (Duloxetine 60 mg) - Mental health Scale from: 0 to 100.	541 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - mental health in the control groups was 0.3325	The mean SF-36 (duloxetine 60 mg) - mental health in the intervention groups was 1.02 higher (0.09 to 1.96 higher)
SF-36 (Duloxetine 60 mg) - General health Scale from: 0 to 100.	588 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - general health in the control groups was 2.52	The mean SF-36 (duloxetine 60 mg) - general health in the intervention groups was 0.69 higher (0.1 lower to 1.49 higher)
SF-36 (Duloxetine 60 mg) - Physical functioning Scale from: 0 to 100.	585 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - physical functioning in the control groups was 5.205	The mean SF-36 (duloxetine 60 mg) - physical functioning in the intervention groups was 0.53 higher (0.47 lower to 1.54 higher)
SF-36 (Duloxetine 60 mg) - Role-emotional Scale from: 0 to 100.	561 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - role-emotional in the control groups was 2.235	The mean SF-36 (duloxetine 60 mg) - role-emotional in the intervention groups was 0.12 higher (0.13 lower to 0.37 higher)
SF-36 (Duloxetine 60 mg) - Role-physical Scale from: 0 to 100.	561 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - role-physical in the control groups was 4.46	The mean SF-36 (duloxetine 60 mg) - role-physical in the intervention groups was 0.01 higher (0.4 lower to 0.43 higher)
SF-36 (Duloxetine 60 mg) - Social functioning	588 (2 studies)	MODERATE[a] due to risk of		The mean SF-36 (duloxetine 60 mg) - social functioning in the control groups	The mean SF-36 (duloxetine 60 mg) - social functioning in the intervention groups was

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRI (60 mg) versus placebo (low back pain ± sciatica) (95% CI)
Scale from: 0 to 100.	≤4 months	bias		was 4.005	0.01 higher (0.42 lower to 0.44 higher
SF-36 (Duloxetine 60 mg) - Vitality Scale from: 0 to 100.	538 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 60 mg) - vitality in the control groups was 2.77	The mean SF-36 (duloxetine 60 mg) - vitality in the intervention groups was 0.75 higher (0.2 lower to 1.7 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 336: SNRIs (Duloxetine 20) versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRIs versus placebo (low back pain ± sciatica) (95% CI)
SF-36 (Duloxetine 20mg) - Bodily pain Scale from: 0 to 100.	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - bodily pain in the control groups was 1.36	The mean SF-36 (duloxetine 20mg) - bodily pain in the intervention groups was 0.15 higher (0.5 lower to 0.8 higher)
SF-36 (Duloxetine 20mg) - General health Scale from: 0 to 100.	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - general health in the control groups was 0.66	The mean SF-36 (duloxetine 20mg) - general health in the intervention groups was 0.04 higher (0.94 lower to 1.02 higher)
SF-36 (Duloxetine 20mg) - Mental health Scale from: 0 to 100.	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - mental health in the control groups was 0.38	The mean SF-36 (duloxetine 20mg) - mental health in the intervention groups was 0.17 lower (1.35 lower to 1.01 higher)
SF-36 (Duloxetine 20mg) - Physical functioning Scale from: 0 to 100.	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - physical functioning in the control groups was 2.23	The mean SF-36 (duloxetine 20mg) - physical functioning in the intervention groups was 0.43 lower (1.68 lower to 0.82 higher)
SF-36 (Duloxetine 20mg) - Role-emotional	162 (1 study)	MODERATE[a] due to risk of		The mean SF-36 (duloxetine 20mg) - role-emotional in the control groups was	The mean SF-36 (duloxetine 20mg) - role-emotional in the intervention groups was

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRIs versus placebo (low back pain ± sciatica) (95% CI)
Scale from: 0 to 100.	≤4 months	bias		0.08	0.02 higher (0.27 lower to 0.31 higher)
SF-36 (Duloxetine 20mg) - Role physical Scale from: 0 to 100.	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - role physical in the control groups was 0.8	The mean SF-36 (duloxetine 20mg) - role physical in the intervention groups was 0.01 higher (0.5 lower to 0.52 higher)
SF-36 (Duloxetine 20mg) - Social functioning Scale from: 0 to 100.	162 (1 study) ≤4 days	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - social functioning in the control groups was 0.5	The mean SF-36 (duloxetine 20mg) - social functioning in the intervention groups was 0.25 higher (0.26 lower to 0.76 higher)
SF-36 (Duloxetine 20mg) - Vitality Scale from: 0 to 100.	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 20mg) - vitality in the control groups was 0.91	The mean SF-36 (duloxetine 20mg) - vitality in the intervention groups was 0.22 lower (1.42 lower to 0.98 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias

Table 337: SNRIs (Duloxetine 120mg) versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRIs versus placebo (low back pain ± sciatica) (95% CI)
SF-36 (Duloxetine 120 mg) - Bodily pain Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - bodily pain in the control groups was 1.36	The mean SF-36 (duloxetine 120 mg) - bodily pain in the intervention groups was 0.75 higher (0.21 to 1.29 higher)
SF-36 (Duloxetine 120 mg) - General health Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - general health in the control groups was 0.66	The mean SF-36 (duloxetine 120 mg) - general health in the intervention groups was 0.15 higher (0.67 lower to 0.97 higher)
SF-36 (Duloxetine 120 mg) - Mental health Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - mental health in the control groups was 0.38	The mean SF-36 (duloxetine 120 mg) - mental health in the intervention groups was

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with SNRIs versus placebo (low back pain ± sciatica) (95% CI)
					0.08 higher (0.9 lower to 1.06 higher)
SF-36 (Duloxetine 120 mg) - Physical functioning Scale from: 0 to 100.	210 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - physical functioning in the control groups was 2.23	The mean SF-36 (duloxetine 120 mg) - physical functioning in the intervention groups was 0.32 higher (0.72 lower to 1.36 higher)
SF-36 (Duloxetine 120 mg) - Role-emotional Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - role-emotional in the control groups was 0.08	The mean SF-36 (duloxetine 120 mg) - role-emotional in the intervention groups was 0.06 higher (0.19 lower to 0.31 higher)
SF-36 (Duloxetine 120 mg) - Role physical Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - role physical in the control groups was 0.08	The mean SF-36 (duloxetine 120 mg) - role physical in the intervention groups was 0.05 higher (0.37 lower to 0.47 higher)
SF-36 (Duloxetine 120 mg) - Social functioning Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - social functioning in the control groups was 0.5	The mean SF-36 (duloxetine 120 mg) - social functioning in the intervention groups was 0.12 lower (0.55 lower to 0.31 higher)
SF-36 (Duloxetine 120 mg) - Vitality Scale from: 0 to 100.	209 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 (duloxetine 120 mg) - vitality in the control groups was 0.91	The mean SF-36 (duloxetine 120 mg) - vitality in the intervention groups was 0.47 lower (1.47 lower to 0.53 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias

16.3.4.2 Anticonvulsants

Table 338: Clinical evidence summary: gabapentinoids versus placebo – low back pain with sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Gabapentinoids versus placebo (low back pain with sciatica) (95% CI)

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Gabapentinoids versus placebo (low back pain with sciatica) (95% CI)
Back pain at rest VAS. Scale from: 0 to 10.	65 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean back pain at rest in the control groups was 6.52	The mean back pain at rest in the intervention groups was 0.21 lower (1.22 lower to 0.8 higher)
Back pain on movement VAS. Scale from: 0 to 10.	65 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean back pain on movement in the control groups was 7.34	The mean back pain on movement in the intervention groups was 0.33 lower (1.15 lower to 0.49 higher)
Adverse events	65 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision	RR 1.60 (0.96 to 2.67)	382 per 1000	229 more per 1000 (from 15 fewer to 639 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 339: Clinical evidence summary: gabapentinoid versus usual care – low back pain with sciatica (cohort study)

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anticonvulsants versus usual care (95% CI)
Pain intensity Scale from: 0 to 10. ≤4 months	683 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain intensity in the control groups was -2	The mean pain intensity in the intervention groups was 1.4 lower (1.81 to 0.99 lower)
HADS- anxiety Scale from: 0 to 21. ≤4 months	683 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean HADS- anxiety in the control groups was -1.9	The mean HADS- anxiety in the intervention groups was 1.8 lower (2.42 to 1.18 lower)
HADS- depression Scale from: 0 to 21.	683 (1 study)	VERY LOW[a,b] due to risk of bias,		The mean HADS- depression in the control groups was	The mean HADS- depression in the intervention groups was

≤4 months	12 weeks	imprecision		-2.1	1.9 lower (2.58 to 1.22 lower)
SF-12 physical Scale from: 0 to 100. ≤4 months	683 (1 study) 12 weeks	VERY LOW[a] due to risk of bias, imprecision		The mean SF-12 physical in the control groups was 5.8	The mean SF-12 physical in the intervention groups was 3.9 higher (2.21 to 5.59 higher)
SF-12 mental Scale from: 0 to 100. ≤4 months	683 (1 study) 12 weeks	VERY LOW[a] due to risk of bias, imprecision		The mean SF-12 mental in the control groups was 2	The mean SF-12 mental in the intervention groups was 5.3 higher (3.71 to 6.89 higher)
Responder (pain reduction >50%) ≤4 months	683 (1 study) 12 weeks	VERY LOW[a] due to risk of bias	RR 1.66 (1.3 to 2.12)	370 per 1000	244 more per 1000 (from 111 more to 414 more)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1MID

Table 340: Clinical evidence summary: other anticonvulsants versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Other anticonvulsants versus placebo (low back pain ± sciatica) (95% CI)
Function ODI. Scale from: 0 to 100.	96 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean function in the control groups was 38.9	The mean function in the intervention groups was 4.9 lower (7 to 2.8 lower)
Pain severity McGill pain questionnaire. Scale from: 0 to 78.	96 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean pain severity in the control groups was 34.3	The mean pain severity in the intervention groups was 11.4 lower (12.16 to 10.64 lower)
SF-36 - Physical function Scale from: 0 to 100.	96 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 - physical function in the control groups was 57.1	The mean SF-36 - physical function in the intervention groups was 8 higher (5.07 to 10.93 higher)

SF-36 - Role-physical Scale from: 0 to 100.	96 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 - role-physical in the control groups was 55	The mean SF-36 - role-physical in the intervention groups was 7.5 higher (4.42 to 10.58 higher)
SF-36 - Bodily pain Scale from: 0 to 100.	96 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 - bodily pain in the control groups was 55.5	The mean SF-36 - bodily pain in the intervention groups was 2.1 higher (0.49 lower to 4.69 higher)
SF-36 - General health perceptions Scale from: 0 to 100.	96 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 - general health perceptions in the control groups was 54.2	The mean SF-36 - general health perceptions in the intervention groups was 3.5 higher (0.88 to 6.12 higher)
SF-36 - Vitality Scale from: 0 to 100.	96 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 - vitality in the control groups was 53.6	The mean SF-36 - vitality in the intervention groups was 6.2 higher (2.88 to 9.52 higher)
SF-36 - Social functioning Scale from: 0 to 100.	96 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 - social functioning in the control groups was 69.4	The mean SF-36 - social functioning in the intervention groups was 3.2 higher (0.66 to 5.74 higher)
SF-36 - Role-emotional Scale from: 0 to 100.	96 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 - role-emotional in the control groups was 77.1	The mean SF-36 - role-emotional in the intervention groups was 2.6 higher (0.53 to 4.67 higher)
SF-36 - Mental health Scale from: 0 to 100.	96 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean SF-36 - mental health in the control groups was 67.5	The mean SF-36 - mental health in the intervention groups was 5.4 higher (3.14 to 7.66 higher)
Adverse events	96 (1 study) ≤4 months	LOW[a] due to risk of bias, imprecision	RR 1.80 (0.93 to 3.49)	208 per 1000	167 more per 1000 (from 15 fewer to 519 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.3 Muscle relaxants versus placebo

Table 341: Muscle relaxants versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Muscle relaxants versus placebo (low back pain with sciatica) (95% CI)
Pain at night VAS. Scale from: 0 to 10.	193 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean pain at night in the control groups was 18	The mean pain at night in the intervention groups was 0.26 lower (0.99 lower to 0.48 higher)
Pain at rest VAS. Scale from: 0 to 10.	193 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean pain at rest in the control groups was 19	The mean pain at rest in the intervention groups was 0.11 lower (0.90 lower to 0.69 higher)
Pain walking VAS. Scale from: 0 to 10.	193 (2 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean pain walking in the control groups was 18	The mean pain walking in the intervention groups was 0.19 higher (0.56 lower to 0.95 higher)
Muscle spasms Scale from: 1 to 5.	35 (1 study) 13 - 18 days ≤4 months	VERY LOW[b,c] due to risk of bias, imprecision		The mean muscle spasms in the control groups was -1.1	The mean muscle spasms in the intervention groups was 0.10 higher (0.03 to 0.17 higher)
Adverse events	412 (3 studies) ≤4 months	MODERATE[a] due to risk of bias	RR 1.97 (1.53 to 2.54)	279 per 1000	271 more per 1000 (from 148 more to 430 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(c) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.4 Muscle relaxants versus usual care

Table 342: Muscle relaxants versus usual care – low back pain

Outcomes	No. of	Quality of the	Relative	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	effect (95% CI)	Risk with Control	Risk difference with Muscle relaxants versus usual care (95% CI)
Pain - Pain on movement Scale from: 0 to 10.	185 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean pain - pain on movement in the control groups was -3.98	The mean pain - pain on movement in the intervention groups was 2.11 lower (2.72 to 1.5 lower)
Pain - Pain at rest Scale from: 0 to 10.	185 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain - pain at rest in the control groups was -4.35	The mean pain - pain at rest in the intervention groups was 1.53 lower (2.16 to 0.9 lower)
Pain - Pain at night Scale from: 0 to 10.	185 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain - pain at night in the control groups was -4.4	The mean pain - pain at night in the intervention groups was 1.36 lower (1.98 to 0.74 lower)
Adverse effects	197 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision	OR 0.94 (0.4 to 2.22)	125 per 1000	7 fewer per 1000 (from 71 fewer to 116 more)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 2 increment if the confidence interval crossed 2 MIDs

16.3.4.5 Opiods

Table 343: Opioids versus placebo-low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Opioid analgesics versus placebo (LBP population) (95% CI)
Quality of life (Physical component Score, PCS,0-100)< 4 months	389 (1 study) <4 months	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (physical component score, pcs,0-100)< 4 months in the control groups was 3.62	The mean quality of life (physical component score, pcs,0-100)< 4 months in the intervention groups was 3.9 higher (1.95 to 5.85 higher)
Quality of life (Mental component Score, MCS,0-100)< 4	389 (1 study)	MODERATE[a] due to risk of		The mean quality of life (mental component score, mcs,0-100)< 4 months in the control groups was	The mean quality of life (mental component score, mcs,0-100)< 4 months in the intervention groups was

months	<4 months	bias		0.67	3.22 lower (5.37 to 1.07 lower)
Function(RMDQ, 0-24)<4 months	1510 (7 studies) <4 months	MODERATE[a] due to risk of bias		The mean function(rmdq, 0-24)<4 months in the control groups was 10.2	The mean function(rmdq, 0-24)<4 months in the intervention groups was 1.32 lower (1.88 to 0.75 lower)
Pain intensity (<4 months) (VAS 0-10)	3268 (12 studies) <4 months	MODERATE[a] due to risk of bias		The mean pain intensity (<4 months) (vas 0-10) in the control groups was 4.93	The mean pain intensity (<4 months) (vas 0-10) in the intervention groups was 0.59 lower (0.61 to 0.56 lower)
Responder ≥30%in pain intensity on NRS scale	389 (1 study) <4 months	LOW[a,b] due to risk of bias, imprecision	RR 1.48 (1.16 to 1.9)	332 per 1000	159 more per 1000 (from 53 more to 298 more)
Responder ≥50%in pain intensity on NRS scale	389 (1 study) <4 months	LOW[a,b] due to risk of bias, imprecision	RR 1.57 (1.16 to 2.12)	245 per 1000	140 more per 1000 (from 39 more to 274 more)
Adverse events	1804 (7 studies)	VERY LOW[a,b] due to risk of bias, inconsistency	RR 2.39 (1.46 to 3.92)	151 per 1000	210 more per 1000 (from 70 more to 442 more)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - Physical functioning	296 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - physical functioning in the control groups was 0	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - physical functioning in the intervention groups was 0.7 lower (6.92 lower to 5.52 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - Role - physical	295 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - physical functioning in the control groups was **53.3**	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - role - physical in the intervention groups was 10.1 higher (0.6 to 19.6 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months -	297	LOW[a,b] due to risk of		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months -	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months -

Bodily pain	(1 study)	bias, imprecision		role - physical in the control groups was **39.7**	bodily pain in the intervention groups was 4.4 higher (0.49 lower to 9.29 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - Vitality	296 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - bodily pain in the control groups was **43.4**	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - vitality in the intervention groups was 0.3 higher (4.65 lower to 5.25 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - Social functioning	297 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - vitality in the control groups was **46.9**	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - social functioning in the intervention groups was 2 higher (4.13 lower to 8.13 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - Role - emotional	297 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - social functioning in the control groups was **70.3**	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - role - emotional in the intervention groups was 13.1 higher (3.89 to 22.31 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - Mental health	296 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - role - emotional in the control groups was **58.9**	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - mental health in the intervention groups was 0 higher (0.74 lower to 7.34 higher)
Quality of life (Individual domain scores, SF36, 0-100) < 4 months - General health	290 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - mental health in the control groups was **71.9**	The mean quality of life (individual domain scores, sf36, 0-100) < 4 months - general health in the intervention groups was 0.4 lower (5.28 lower to 4.48 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 344: Opioids versus placebo-low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Placebo (LBP with sciatica population)	Risk difference with Opiod analgesics (95% CI)
Adverse events	309 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	OR 1.02 (0.65 to 1.59)	525 per 1000	5 more per 1000 (from 107 fewer to 112 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

16.3.4.6 Paracetamol

Table 345: Paracetamol versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Paracetamol versus placebo (low back pain ± sciatica) (95% CI)
Pain intensity VAS. Scale from: 0 to 10.	1011 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean pain intensity in the control groups was 1.3	The mean pain intensity in the intervention groups was 0.1 lower (0.38 lower to 0.18 higher)
Function RMDQ. Scale from: 0 to 24.	1007 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean function in the control groups was 2.4	The mean function in the intervention groups was 0 higher (0.57 lower to 0.57 higher)
SF-12 Physical score Scale from: 0 to 100.	495 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean SF-12 physical score in the control groups was 54.7	The mean SF-12 physical score in the intervention groups was 0.2 higher (1.33 lower to 1.73 higher)
SF-12 Mental score Scale from: 0 to 100.	495 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean SF-12 mental score in the control groups was 44.7	The mean SF-12 mental score in the intervention groups was 0.9 higher

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Paracetamol versus placebo (low back pain ± sciatica) (95% CI)
					(0.05 lower to 1.85 higher)
Adverse events	1065 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.00 (0.78 to 1.29)	185 per 1000	0 fewer per 1000 (from 41 fewer to 54 more)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.7 NSAIDs versus placebo

Table 346: NSAIDs versus placebo – low back pain without sciatica and low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with NSAID versus placebo (low back pain ± sciatica) (95% CI)
Ibuprofen - Pain (change from baseline) ≤ 4 months low back pain without sciatica VAS. Scale from: 0 to 10.	195 (1 study) 7 days	LOW[a, c] due to risk of bias and imprecision		The mean pain (change from baseline) ≤ 4 months low back pain without sciatica in the control groups was -3.75	The mean pain (change from baseline) ≤ 4 months low back pain without sciatica in the intervention groups was 1.13 lower (1.85 to 0.41 lower)
Diclofenac - Pain (change from baseline) ≤ 4 months low back pain without sciatica VAS. Scale from: 0 to 10.	199 (1 study) 7 days	LOW[a, c] due to risk of bias and imprecision		The mean pain (change from baseline) ≤ 4 months low back pain without sciatica in the control groups was -3.75	The mean pain (change from baseline) ≤ 4 months low back pain without sciatica in the intervention groups was 1.09 lower (1.83 to 0.35 lower)
Pain intensity ≤4 months NSAID 20 mg with or without sciatica Scale from: 0 to 10.	68 (1 study) 14 days	LOW[b,c] due to risk of bias, imprecision		The mean pain intensity ≤4 months NSAID 20 mg with or without sciatica in the control groups was 0.79	The mean pain intensity ≤4 months NSAID 20 mg with or without sciatica in the intervention groups was 0.23 lower (0.76 lower to 0.3 higher)
Pain (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID	427 (2 studies) 12 weeks	MODERATE[b] due to risk of bias		The mean pain (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the	The mean pain (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the

60mg) VAS. Scale from: 0 to 10.				control groups was 0 Not reported	intervention groups was 1.03 lower (1.57 to 0.70 lower)
Pain (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) VAS. Scale from: 0 to 10.	422 (2 studies) 12 weeks	LOW[b,c] due to risk of bias		The mean pain (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the control groups was 0 Not reported	The mean pain (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the intervention groups was 1.02 lower (1.45 to 0.59 lower)
Function (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) RMDQ. Scale from: 0 to 24.	427 (2 studies) 12 weeks	LOW[b,c] due to risk of bias, imprecision		The mean function (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the control groups was 0 Not reported	The mean function (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the intervention groups was 2.64 lower (3.61 to 1.67 lower)
Function (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) RMDQ. Scale from: 0 to 24.	422 (2 studies) 12 weeks	LOW[b,c] due to risk of bias, imprecision		The mean function (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the control groups was 0 Not reported	The mean function (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the intervention groups was 2.23 lower (3.19 to 1.26 lower)
HRQoL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) SF-12 Physical component. Scale from: 0 to 100.	427 (2 studies) 12 weeks	MODERATE[b] due to risk of bias		The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the control groups was 0 Not reported	The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the intervention groups was 2.31 higher (0.61 to 4.02 higher)
HRQoL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) SF12 - Physical component. Scale from: 0 to 100.	422 (2 studies) 12 weeks	MODERATE[b] due to risk of bias		The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the control groups was 0 Not reported	The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the intervention groups was 2.80 higher (1.10 to 4.49 higher)
HRQoL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) SF-12 Mental component. Scale	427 (2 studies) 12 weeks	MODERATE[b] due to risk of bias		The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the control groups was 0 Not reported	The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 60mg) in the intervention groups was 0.49 higher (1.06 lower to 2.05 higher)

from: 0 to 100.					
HRQoL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) SF12 - Mental component. Scale from: 0 to 100.	422 (2 studies) 12 weeks	MODERATE[b] due to risk of bias		The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg)) in the control groups was 0 Not reported	The mean HRQOL (mean difference) ≤ 4 months low back pain without with or without sciatica (NSAID 90mg) in the intervention groups was 0.07 lower (1.62 lower to 1.47 higher) (MID 5.475)
Adverse events ≤4 months low back pain without sciatica	1025 (4 studies) 1-12 weeks	LOW[c,d] due to risk of bias, imprecision	RR 1.07 (0.87 to 1.31)	239 per 1000	17 more per 1000 (from 31 fewer to 74 more)
Adverse events ≤4 months low back pain with or without sciatica	319 (1 study) 12 weeks	LOW[c,d] due to risk of bias, imprecision	RR 1.18 (0.93 to 1.49)	468 per 1000	84 more per 1000 (from 33 fewer to 299 more)

(a) Unclear randomisation and allocation concealment.
(b) Differential rates of missing data between groups in 1 study, 1 study reported differences between groups in rescue medication taken (paracetamol).
(c) Downgraded by 1 increment if the confidence interval crossed 1 MID
(d) Downgraded by 1increment if the majority of the evidence was at high risk of bias

16.3.4.8 Antibiotics versus placebo

Table 347: Antibiotics versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Antibiotics versus placebo (95% CI)
Healthcare utilisation (Dr consultation for back pain)	144 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision	RR 0.56 (0.34 to 0.92)	418 per 1000	184 fewer per 1000 (from 33 fewer to 276 fewer)
Adverse events (GI complaints)	162 (1 study) ≤4 months	MODERATE[a] due to risk of bias	RR 2.78 (1.79 to 4.32)	236 per 1000	420 more per 1000 (from 187 more to 784 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.9 Head to head comparisons

16.3.4.9.1 Anti-epileptic versus antidepressant (TCA)

Table 348: Anti-epileptic versus antidepressants – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Antidepressant	Risk difference with Anti-epileptic versus antidepressant (TCA) (95% CI)
Adverse events ≤4 months	200 (1 study) 6 weeks	LOW[a,b] due to risk of bias, imprecision	RR 1.71 (1.02 to 2.87)	Moderate	
				175 per 1000	124 more per 1000 (from 3 more to 327 more)

(a) *Downgraded by 1 increment if the majority of the evidence was at high risk of bias*
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.9.2 Antidepressant (TCA) versus paracetamol

Table 349: Antidepressants versus paracetamol- low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Paracetamol	Risk difference with TCSA versus paracetamol (95% CI)
Pain (VAS 0-15) VAS. Scale from: 0 to 15. ≤4 months	39 (1 study) 5 weeks	MODERATE[a] due to imprecision		The mean pain (VAS 0-15) in the control groups was 4.48	The mean pain (VAS 0-15) in the intervention groups was 1.83 lower (3.66 lower to 0 higher)
Psychological distress Beck depression inventory. Scale from: 0 to 63. ≤4 months	39 (1 study) 5 weeks	MODERATE[a] due to imprecision		The mean psychological distress in the control groups was 9.42	The mean psychological distress in the intervention groups was 2.17 lower (7.35 lower to 3.01 higher)
Psychological distress STAI-state. Scale from: 20 to 80.	39 (1 study)	MODERATE[a] due to		The mean psychological distress in the control groups was	The mean psychological distress in the intervention groups was

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Paracetamol	Risk difference with TCSA versus paracetamol (95% CI)
≤4 months	5 weeks	imprecision		35.26	2.31 lower (8.16 lower to 3.54 higher)
Psychological distress STAI-trait. Scale from: 20 to 80. ≤4 months	39 (1 study) 5 weeks	LOW[a] due to imprecision		The mean psychological distress in the control groups was 37.80	The mean psychological distress in the intervention groups was 1.3 lower (10.91 lower to 8.31 higher)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

16.3.4.9.3 Opioid + paracetamol versus opioid

Table 350: Opioid + paracetamol versus opioid- low back pain without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Opioid	Risk difference with Opioid + paracetamol versus opioid (95% CI)
Adverse events ≤4 months	119 (1 study) 10 days	MODERATE[a] due to imprecision	RR 0.69 (0.52 to 0.93)	Moderate	
				384 per 1000	119 fewer per 1000 (from 27 fewer to 184 fewer)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.9.4 Opioid + paracetamol versus NSAIDs

Table 351: Opioid plus paracetamol versus NSAIDs- without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with NSAIDs	Risk difference with Opioids + paracetamol versus NSAIDs (95% CI)
Pain intensity (VAS) Scale from: 0 to 10.	113 (1 study) 1 weeks	HIGH		The mean pain intensity (VAS) in the control groups was 6.16	The mean pain intensity (VAS) in the intervention groups was 0.05 higher (0.81 lower to 0.91 higher)

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with NSAIDs	Risk difference with Opioids + paracetamol versus NSAIDs (95% CI)
Adverse events	121 (1 study) 1 weeks	HIGH	RR 1.9 (1.28 to 2.83)	339 per 1000	305 more per 1000 (from 95 more to 620 more)

16.3.4.9.5 Combined pharmacological treatments

Table 352: Clinical evidence summary: opioid plus paracetamol versus placebo – low back pain without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Combination (opioid and paracetamol) ≤4 months, low back pain only (95% CI)
Time to onset: perceptible pain relief ≤4 months	277 (1 study) 3 days	LOW[a,b] due to risk of bias, imprecision	HR 1.22 (0.92 to 1.62)	Study population	
				699 per 1000	70 more per 1000 (from 30 fewer to 158 more)
				Moderate	
				0 per 1000	-
Time to onset: meaningful pain relief ≤4 months	277 (1 study) 3 days	LOW[a,b] due to risk of bias, imprecision	HR 1.57 (1.05 to 2.35)	Study population	
				331 per 1000	137 more per 1000 (from 13 more to 280 more)
				Moderate	
				0 per 1000	-
Time to remedication ≤4 months	280 (1 study) 3 days	VERY LOW[a,c] due to risk of bias, imprecision	HR 0.93 (0.47 to 1.84)	Study population	
				125 per 1000	8 fewer per 1000 (from 64 fewer to 93 more)
				Moderate	
				0 per 1000	-
Adverse events ≤4 months	613 (2 studies)	MODERATE[a] due to risk of bias	RR 3.48 (2.06 to	Study population	
				98 per 1000	244 more per 1000 (from 104 more to 437

	2.5 days		5.44)		more)
SF McGill Pain questionnaire Scale from: 0 to 78. ≤4 months	325 (1 study) 91 days	MODERATE[a] due to risk of bias		The mean SF McGill pain questionnaire in the control groups was 17.7	The mean SF McGill pain questionnaire in the intervention groups was 2.2 lower (4.64 lower to 0.24 higher)
Pain VAS (0-10) Scale from: 0 to 10. ≤4 months	336 (1 study) 91 days	LOW[a,b] due to risk of bias, imprecision		The mean pain VAS (0-100) in the control groups was 62.9	The mean pain VAS (0-100) in the intervention groups was 1.55 lower (2.47 lower to 0.63 lower)
SF-36 bodily pain Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 bodily pain in the control groups was 34.1	The mean SF-36 bodily pain in the intervention groups was 6.4 higher (2.09 to 10.71 higher)
SF-36 general health Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 general health in the control groups was 57.9	The mean SF-36 general health in the intervention groups was 3.5 higher (0.94 lower to 7.94 higher)
SF-36 mental health Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 mental health in the control groups was 65.2	The mean SF-36 mental health in the intervention groups was 2.6 higher (1.8 lower to 7 higher)
SF-36 physical functioning Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	LOW[a,b] due to risk of bias, imprecision		The mean SF-36 physical functioning in the control groups was 41	The mean SF-36 physical functioning in the intervention groups was 3.8 higher (1.83 lower to 9.43 higher)
SF-36 reported health transition Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	MODERATE[a] due to risk of bias		The mean SF-36 reported health transition in the control groups was 54	The mean SF-36 reported health transition in the intervention groups was 2.2 lower (7.42 lower to 3.02 higher)
SF-36 role-emotional Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	VERY LOW[a,c] due to risk of bias, imprecision		The mean SF-36 role-emotional in the control groups was 55.2	The mean SF-36 role-emotional in the intervention groups was 1.3 higher (8.02 lower to 10.62 higher)
SF-36 role-physical Scale from: 0 to 100.	327 (1 study)	VERY LOW[a,c] due to risk of		The mean SF-36 role-physical in the control groups was	The mean SF-36 role-physical in the intervention groups was

≤4 months	91 days	bias, imprecision		23.5	3.8 higher (4.03 lower to 11.63 higher)
SF-36 social functioning Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	VERY LOW[a,c] due to risk of bias, imprecision		The mean SF-36 social functioning in the control groups was 61.1	The mean SF-36 social functioning in the intervention groups was 0.7 lower (6.2 lower to 4.8 higher)
SF36 health survey - SF-36 vitality Scale from: 0 to 100. ≤4 months	327 (1 study) 91 days	VERY LOW[a,c] due to risk of bias, imprecision		The mean sf36 health survey - SF-36 vitality in the control groups was 42.2	The mean sf36 health survey - SF-36 vitality in the intervention groups was 1.3 higher (3.16 lower to 5.76 higher)
Function (RMDQ 0-24) Scale from: 0 to 24. ≤4 months	327 (1 study) 91 days	MODERATE[a] due to risk of bias		The mean function (RMDQ 0-24) in the control groups was 13.7	The mean function (RMDQ 0-24) in the intervention groups was 0.9 lower (2.16 lower to 0.36 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 2 increments if the confidence interval crossed both MIDs

Table 353: Clinical evidence summary: opioid plus paracetamol versus placebo – low back pain with or without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Combination (opioid and paracetamol) ≤4 months, low back pain with or without sciatica (95% CI)
Adverse events ≤4 months	295 (2 studies) ≤4 months	HIGH	RR 1.57 (1.31 to 1.89)	Study population	
				490 per 1000	279 more per 1000 (from 152 more to 436 more)
Responder criteria (pain reduction >30%) ≤4 months	175 (1 study) 2 weeks	MODERATE[a] due to imprecision	RR 1.4 (1.03 to 1.91)	Study population	
				411 per 1000	164 more per 1000 (from 12 more to 374 more)
Function (Korean ODI 0-100) Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	MODERATE[a] due to imprecision		The mean function (Korean ODI 0-100) in the control groups was 7.178	The mean function (Korean ODI 0-100) in the intervention groups was 4.04 higher (0.16 to 7.91 higher)
Korean Short Form-36 Bodily pain	170	LOW[a]		The mean Korean short form-36	The mean Korean short form-36 bodily

Scale from: 0 to 100. ≤4 months	(1 study) 2 weeks	due to risk of bias, imprecision		bodily pain in the control groups was 17.69	pain in the intervention groups was 1.6 higher (3.54 lower to 6.74 higher)
Korean Short Form-36 General health Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	LOW[a] due to risk of bias, imprecision		The mean Korean short form-36 general health in the control groups was 2.77	The mean Korean short form-36 general health in the intervention groups was 4.59 higher (0.52 to 8.66 higher)
Korean Short Form-36 health survey (change scores) - Mental health Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	LOW[a] due to risk of bias, imprecision		The mean Korean short form-36 health survey (change scores) - mental health in the control groups was 18.39	The mean Korean short form-36 health survey (change scores) - mental health in the intervention groups was 2.09 higher (5.1 lower to 9.28 higher)
Korean Short Form-36 Physical functioning Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	MODERATE[a] due to imprecision		The mean Korean short form-36 physical functioning in the control groups was 6.67	The mean Korean short form-36 physical functioning in the intervention groups was 3.15 higher (2.03 lower to 8.33 higher)
Korean Short Form-36 Reported health transition Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	MODERATE[a] due to imprecision		The mean Korean short form-36 reported health transition in the control groups was -6.9	The mean Korean short form-36 reported health transition in the intervention groups was 11.17 lower (19.63 to 2.71 lower)
Korean Short Form-36 Role emotional Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	LOW[a] due to risk of bias, imprecision		The mean Korean short form-36 role emotional in the control groups was 7.47	The mean Korean short form-36 role emotional in the intervention groups was 0.66 higher (7.94 lower to 9.26 higher)
Korean Short Form-36 Role physical Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	MODERATE[a] due to imprecision		The mean Korean short form-36 role physical in the control groups was 8.69	The mean Korean short form-36 role physical in the intervention groups was 7.35 higher (0.35 to 14.35 higher)
Korean Short Form-36 Social functioning Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	MODERATE[a] due to imprecision		The mean Korean short form-36 social functioning in the control groups was 6.61	The mean Korean short form-36 social functioning in the intervention groups was 5.14 higher (1.88 lower to 12.16 higher)

Korean Short Form-36 Vitality Scale from: 0 to 100. ≤4 months	170 (1 study) 2 weeks	MODERATE[a] due to imprecision		The mean Korean short form-36 vitality in the control groups was 5.82	The mean Korean short form-36 vitality in the intervention groups was 5.32 higher (0.63 lower to 11.27 higher)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID
(b) Downgraded by 2 increments if the confidence interval crossed 2 MIDs

Table 354: Clinical evidence summary: opioid plus paracetamol versus anticonvulsants – low back pain without sciatica

Outcomes	No. of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Combination (opioid and paracetamol) ≤4 months, low back pain only (95% CI)
Adverse events ≤4 months	60 (1 study) 4 weeks	MODERATE[a] due to imprecision	RR 1.50 (0.27 to 8.34)	Study population	
				67 per 1000	34 more per 1000 (from 49 fewer to 492 more)

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID

16.3.4.10 Combination of interventions – pharmacological adjunct

16.3.4.10.1 Low back pain without sciatica

Table 355: Pharmacological therapy (NSAID) + manual therapy (massage) compared to manual therapy (massage) for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with massage	Risk difference with Massage + NSAID (95% CI)
Pain severity (VAS , 0-10) ≤4 months	54 (1 study) 2 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0-100 converted to 0-10) - ≤4 months in the control groups was 4.22	The mean pain (VAS 0-100 converted to 0-10) - ≤4 months in the intervention groups was 1.16 lower (2.31 to 0.01 lower)
Function (RMDQ, 0-24) ≤4	54	VERY LOW[a,b]		The mean function (roland morris) - ≤4	The mean function (roland morris) - ≤4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with massage	Risk difference with Massage + NSAID (95% CI)
months	(1 study) 2 weeks	due to risk of bias, imprecision		months in the control groups was 6.4	months in the intervention groups was 0.3 lower (2.7 lower to 2.1 higher)
Function (ODI) ≤4 months	54 (1 study) 2 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (oswestry disability index) - ≤4 months in the control groups was 21	The mean function (oswestry disability index) - ≤4 months in the intervention groups was 4.4 lower (11.06 lower to 2.26 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed one MID or by 2 increments if the confidence interval crossed both MIDs

Table 356: Pharmacological therapy (NSAID) + exercise (biomechanical) compared to electroacupuncture for low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with electroacupuncture	Risk difference with NSAID + exercise (biomechanical) (95% CI)
Pain severity (VAS, 0-10) ≤4 months	60 (1 study) 3 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (VAS 0-10) - ≤4 months in the control groups was 3.3	The mean pain (VAS 0-10) - ≤4 months in the intervention groups was 0.9 higher (0.04 to 1.76 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

16.4 Economic evidence

16.4.1 Pharmacological treatment (usual care/placebo studies)

Published literature

One economic evaluation was identified that compared gabapentinoid anticonvulsants (pregabalin) to usual care and was included in this review.[353] This is summarised in the economic evidence profile below and the economic evidence table in Appendix I.

No relevant economic evaluations were identified comparing other pharmacological treatments with no treatment in people with low back pain.

See also the economic article selection flow chart in Appendix F.

Table 357: Economic evidence profile: pharmacological treatment (usual care/placebo studies)

Study	Applicability	Limitations	Other comments	Incremental costs	Incremental effects	Cost effectiveness	Uncertainty
Morera-Dominguez 2010[353] (Spain)	Partially applicable [(a)]	Potential serious limitations [(b)]	• Within-cohort study analysis (same paper) • Cost consequence analysis (various health outcomes) • Population: low back pain (with sciatica) (>6 months) • Two comparators: 1. Usual care 2. Care including pregabalin (mean dose 189.9 mg/day, SD 141.7) (gabapentinoid anticonvulsant) • Time horizon: 12 weeks	2 versus 1: saves £68 [(b)]	From clinical review (2 versus 1): • Pain (BPI): MD -1.40 • Quality of life (SF-12 physical summary score): MD 3.90 • Quality of life (SF-12 mental summary score): MD 5.30 • Psychological distress (HADS - anxiety): MD -1.80 • Psychological distress (HADS - depression): MD -1.90	n/a	95% CI cost 2 versus 1: saved £280 to £145 See clinical review for uncertainty on effectiveness

Abbreviations: BPI: brief pain index, 0-100; 95% CI: 95% confidence interval; HADS: hospital anxiety and depression scale, 0-21; ICER = incremental cost-effectiveness ratio; MD = mean difference; NR: not reported; QALYs: quality-adjusted life years; SF-12: short-form 12, 0-100.

(a) Spanish resource use data (2006-7) and unit costs (2007) may not reflect current NHS context. QALYs were not used as the health outcome measure. Study does not include all non-invasive treatment options.

(b) Analysis is based on a cohort study. Within-trial analysis and so does not reflect full body of available evidence for this comparison; Morera-Dominguez is 1 of 2 studies included in the clinical review for gabapentinoid anticonvulsants; 1 cohort and 1 RCT. No exploration of uncertainty. The analysis was funded by the manufacturer of pregabalin.

(c) 2007 Spanish Euros converted to UK pounds.[394] Cost components incorporated: pharmacological treatment, non-pharmacological treatment, medical visits and hospital admissions and complementary tests (for example, CT and MRI). Does not include any cost of adverse events of drugs.

16.4.2 Pharmacological treatment (head to head studies)

Published literature

One economic evaluation was identified that compared various pharmacological treatments and has been included in this review.[544] This was a cost-utility analysis model comparing duloxetine (SNRI), two NSAIDs, pregabalin (gabapentinoid anticonvulsant) and four opioid analgesics. In addition, one economic evaluation was identified that compared paracetamol to ibuprofen and has been included in this review.[314] This was a within-trial analysis based on the associated clinical paper Nadler 2002[366], with modelled post-trial extrapolation. These are summarised in the economic evidence profile below (**Table 358**) and the economic evidence table in Appendix I.

No relevant economic evaluations were identified that included muscle relaxants, SSRI antidepressants, tricyclic antidepressants, non-gabapentinoid anticonvulsants, antibiotics or vitamin D as a comparator.

One economic evaluation relating to NSAIDs, opioid analgesics and muscle relaxants was identified but was selectively excluded due to a combination of applicability and methodological limitations.[149] One economic evaluation relating to duloxetine (SNRI), two NSAIDs, two opioids, amitriptyline (tricyclic antidepressant) and pregabalin (gabapentinoid anticonvulsant) was excluded due to limited applicability.[543] These are listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 358: Economic evidence profile: pharmacological treatment (head to head studies)

Study	Applicability	Limitations	Other comments	Costs	Effects	Incremental costs	Incremental effects	Cost effectiveness	Uncertainty
Lloyd 2004[314] (UK)	Partially applicable[(a)]	Potential serious limitations [(b)]	• Within-RCT analysis (Nadler 2002[366]) with modelled post-trial extrapolation • Population: low back pain (without sciatica) (acute) • Three comparators (one excluded as non-protocol): 1. Paracetamol,1000mg 4x daily for 2 days 2. Ibuprofen (NSAID) 400mg 3x daily • Time horizon: ~4 days			2 versus 1: £1.84 [©]	2 versus 1: -0.08 proportion successfully treated	Paracetamol dominates ibuprofen	PSA was not conducted. Sensitivity analyses did not change conclusion although differences were small and no CIs were reported for this comparison.
Wielage 2013[544] (USA)	Partially applicable [(d)]	Potential serious limitations [(e)]	• Probabilistic decision analytic model, incorporating differences in QOL (mapping of pain scores), adverse events, discontinuation and mortality • Population: low back pain (with or without sciatica) (>3 months) post paracetamol • Eight comparators (max duration 1 year): 1. Duloxetine (SNRI), 60-120mg 2. Celecoxib (NSAID), 200mg once daily 3. Naproxen (NSAID), 500mg twice daily	Costs[(f)]	QALYs:	Incremental analysis:[(g)(h)]			PSA was not conducted for full incremental analysis. Probability cost-effective (£20K/30K threshold): Intervention 1 versus 3: 0%/10%[(i)] One way sensitivity analyses conducted for 1 (duloxetine) versus 3 (naproxen). When the probabilities of CV
				4. £35,842	4. 12.1884	Dominated (2 has lower costs and greater effects)			
				2. £35,213	2. 12.1887	Dominated (3 has lower costs and greater effects)			
				3. £34,989	3. 12.1899	Baseline			
				5. £36,188	5. 12.1973	Dominated (8 has lower costs and greater effects)			
				6. £36,876	6. 12.1974	Dominated (8 has lower costs and greater effects)			
				7. £38,090	7. 12.2029	Dominated (8 has lower costs and greater effects)			

Study	Applicability	Limitations	Other comments	Costs	Effects	Incremental costs	Incremental effects	Cost effectiveness	Uncertainty
			4. Pregabalin (gabapentinoid anticonvulsant), 300mg twice daily	8. £35,758	8. 12.2043	Extendedly dominated (the ICER for 8 versus 3 is higher (£53,402) than for 1 versus 3)			adverse events associated with NSAIDs were increased or when the start age in the model was increased to 65 years, duloxetine was cost effective compared to naproxen at £20,000 per QALY.
			5. Oxycodone/acetaminophen (opioid/ paracetamol), 7.5/325-15/650mg every 6 hours 6. Oxycodone ER (opioid), 10-30mg twice daily 7. Tapentadol ER (opioid), 300-600mg once daily 8. Tramadol immediate release (opioid), 200-300mg once daily • Time horizon: lifetime	1. £35,920	1. 12.2123	£931	0.0224 QALYs	£41,521 per QALY	

Abbreviations: AE = adverse event; EQ-5D = Euroqol 5 dimensions (scale: 0.0 [death] to 1.0 [full health], negative values mean worse than death); ICER = incremental cost-effectiveness ratio; pa = probabilistic analysis; NSAID = non-steroidal anti-inflammatory drug; OA = osteoarthritis; SNRI = serotonin–norepinephrine reuptake inhibitor; QALYs = quality-adjusted life years.

(a) Study does not include all non-invasive treatment options; resource use data (pre-1999) and unit costs (2001/2) may not reflect current NHS context. QALYs were not used as the health outcome measure.

(b) Modelled extrapolation of within-trial analysis and so does not reflect full body of available evidence: 1 of 1 study identified in clinical review directly comparing ibuprofen and paracetamol (although no protocol outcomes available); however, a number of placebo controlled studies are available for ibuprofen and paracetamol and so indirect evidence is available that is not incorporated. Downstream resource use rates based on estimates, although validated with UK data. PSA was not undertaken.

(c) Cost components incorporated: Initial prescription costs (NHS price of treatment, plus dispensing charge, corrected for patient contribution; assuming non-exempt patients (76%) buy OTC and so zero cost to NHS), GP reconsultation for AE or unsuccessful treatment, referral to physiotherapy for unsuccessful treatment, paracetamol prescription costs for those not referred to physiotherapy initial treatment was unsuccessful.

(d) Study does not include all non-invasive treatment options. USA unit costs from 2011 and resource use from various time points may not reflect current NHS context. Utilities obtained by converting pain scores to EQ-5D with a US preference weight, other utilities were included in the model and methods were unclear. Costs and health effects were discounted at a non-reference case rate (3%), although similar.

(e) Important outcomes may not be captured by model. Adverse events included were symptomatic ulcer, complicated GI bleed, myocardial infarction, stroke, heart failure, fracture, dyspepsia, nausea, diarrhoea, constipation, insomnia, pruritus, vomiting, dizziness, somnolence and opioid abuse adverse events omitted were renal failure, opioid misuse related mortality, bleeding, hepatotoxicity and suicidality. Full effect of treatment may not be captured as a result of mapping pain scores only (for example, impact of disability and mental distress). Relative treatment effects for QoL were based on a meta-analysis of low back pain RCTs: Skljarevski 2009, 2010A and 2010B are 3 of 10 studies comparing antidepressants to placebo; Pallay 2004 and Birbara 2003 are 2 of 6 studies comparing NSAIDs to placebo; Peloso 2004 is 1 of 4 studies comparing opioid combinations to placebo; Buynak 2009, Ruoff 2003 and Webster 2006 are 3 of 9 studies comparing opioids to placebo. Four studies were used in the model, which were excluded from the clinical review (Skljarevski 2010C, Binsfield 2010, Wild 2010, Hale 2009). AE rates for all comparators with the exception of duloxetine were from a different patient population; efficacy data for five of the comparators were based on

assumptions: celecoxib and naproxen assumed to have same efficacy as pooled efficacy of etoricoxib and naproxen, equivalent efficacies were assumed for tramadol and tramadol/acetaminophen, and for oxycodone/ acetaminophen and oxycodone, pregabalin was assumed to have same efficacy as placebo effect seen in placebo arms of the other RCTs. Discontinuation rates in subsequent 3 months based on expert opinion. PSA results were not reported for the full incremental analysis. Study funded by Eli Lilly (manufacturer of duloxetine).

(f) 2011 US dollars converted to UK pounds.[394] Cost components incorporated: drug costs and medical utilisation for management of adverse events, titration and discontinuation.

(g) Total cost/effect in order of least to most effective intervention.

(h) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

(i) Estimated from graph

Unit costs

Relevant unit costs for a selection of commonly prescribed pharmacological treatments are provided in **Table 359** to aid consideration of cost effectiveness.

Table 359: Unit costs for pharmacological treatments

Class	Drug	Preparation	mg/ units	Units/ pack	Cost/pack (£)	Cost/ unit (£)	Cost/ mg (£)	Units/ day	mg/day	Cost/ day (£)	Cost/ year (£)
Non-opioid analgesics	Paracetamol	Tablets	500	100	2.75 [a]	0.03	0.00	n/a	4000 [b]	0.22	80
Opioid analgesic/non-opioid analgesic combination	Co-codamol (8/500)	Tablets	8/500	30	1.11 [a]	0.04	n/a	8.00	n/a	0.30	108
	Co-codamol (30/500)	Capsules	30/500	100	3.95 [a]	0.04	n/a	8.00	n/a	0.32	115
Non-steroidal anti-inflammatories	Ibuprofen	Tablets	400	24	0.95 [a]	0.04	0.00	n/a	1600 [b]	0.16	58
	Diclofenac sodium	Gastro-resistant tablets	50	28	0.81 [a]	0.03	0.00	n/a	150 [b]	0.09	32
	Naproxen	Tablets	500	28	1.9 [a]	0.07	0.00	n/a	1000 [b]	0.14	50
Opioid analgesics	Codeine	Tablets	30	100	5.21 [a]	0.05	0.00	n/a	240 [b]	0.42	152
	Tramadol	Capsules	50	100	4.23 [a]	0.04	0.00	n/a	400 [b]	0.34	123
	Tapentadol	Modified-release tablets	100	56	49.82 [a]	0.89	0.01	n/a	200 [b]	1.78	650
	Morphine	Modified-release tablets	30	60	12.47 [a]	0.21	0.01	n/a	60 [b]	0.42	152
	Morphine	Tablets	30	60	8.30 [a]	0.14	0.00	n/a	60 [b]	0.28	101
	Oxycodone	Modified-release tablets	20	56	50.08 [a]	0.89	0.04	n/a	40 [b]	1.79	653
	Buprenorphine	20micrograms/hour transdermal patches	n/a	4	57.46 [a]	14.37	n/a	1 patch every 7 days [b]	n/a	2.05	749
	Fentanyl	25micrograms/hour transdermal patches	n/a	5	17.99 [a]	3.60	n/a	1 patch every 72 hours ([b]	n/a	1.54	563
Muscle relaxants	Diazepam	Tablets	2	28	0.86 [a]	0.03	0.02	n/a	6 [b]	0.09	34
Antidepressants	Amitriptyline	Tablets	25	28	0.86 [a]	0.03	0.00	n/a	75 [b]	0.09	34

Class	Drug	Preparation	mg/ units	Units/ pack	Cost/pack (£)	Cost/ unit (£)	Cost/ mg (£)	Units/ day	mg/day	Cost/ day (£)	Cost/ year (£)
(tricyclic)	Nortriptyline	Tablets	25	100	24.02 [b]	0.24	0.01	n/a	75 [b]	0.72	263
Anticonvulsants (gabapentinoids)	Pregabalin	Capsules	300	56	64.40 [a]	1.15	0.00	n/a	600 [b]	2.30	839
	Gabapentin	Tablets	600	100	9.81 [a]	0.10	0.00	n/a	3600 [b]	0.59	215
Antibiotics	Augmentin (co-amoxiclav 250/125)	Tablets	375	21	4.19[b]	0.20	0.00	3 [b]	n/a	0.60	218

(a) Source: NHS Drug Tariff August 2014[383]
(b) Maximum recommended dosage; Source: BNF 67[256]
(c) Maximum dose commonly prescribed for chronic low back pain.

16.5 Evidence statements

16.5.1 Clinical

All of the available data were reported at the short-term follow-up.

16.5.1.1 Antidepressants versus placebo

No clinically important difference was observed for any of the reported critical outcomes for SSRIs or TCAs compared with placebo (1 or 2 studies; very low to moderate quality; range of n = 53-162). Similar results were observed for SNRIs compared with placebo, where no difference was observed in terms of pain (3 studies; moderate quality; n = 1004), function (3 studies; moderate quality; n = 1004), or quality of life on SF-36 (1 or 2 studies; low and moderate quality; range of n = 162-588), but a benefit of SNRIs was seen for quality of life measured on EQ-5D in 2 studies (moderate quality; n = 742). In terms of adverse events, a clinically important harm of both SSRIs (1 study; very low quality; n = 69) and SNRIs (3 studies; n = 1041; low quality) was seen compared with placebo.

No data were available for the comparison with usual care.

16.5.1.2 Anticonvulsants versus placebo or usual care

There was inconsistent evidence for the impact of gabapentinoids on pain intensity. Evidence from 1 randomised, placebo-controlled RCT demonstrated no clinical benefit (low quality; n = 65), while 1 observational study demonstrated a clinically important improvement compared with usual care (very low quality; n = 683). RCT evidence also demonstrated a clinically significant harm in terms of increased risk of adverse events with gabapantinoids (low quality; n = 65), while evidence from the observational study showed no clinical benefit for depression or anxiety and a clinical harm for quality of life on SF-12 (very low quality; n = 683).

One further RCT compared topiramate with placebo, evidence showed a clinically important benefit of topiramate for pain severity and quality of life on SF-36, no clinically important difference for function but a harm in terms of increased rate of adverse events (low and moderate quality; n = 96).

16.5.1.3 Muscle relaxants versus placebo or usual care

The majority of the evidence was for tizanidine, with single studies for diazepam, baclofen and orphenadrine citrate, and no data were available for quality of life, function or psychological distress. There was conflicting evidence in relation to pain intensity on tizanidine, with evidence from 2 placebo controlled studies showing no clinical benefit (moderate quality; n = 193) and 1 study compared with usual care showing clinical benefit (low to very low quality; n = 185). Conversely, there was evidence of a clinically relevant increased incidence of adverse events in the groups treated with muscle relaxants compared with placebo (3 studies; moderate quality; n = 412), but not compared with usual care (1 study; very low quality; n = 197).

16.5.1.4 Opioids versus placebo

Evidence from 1 study (low quality, n = 389) demonstrated a clnical benefit favouring opiods in terms of both physical and mental quality of life, and responder criteria for improvement in pain severity. Consistent evidence across a large number of studies suggested that there was no clinically important benefit in terms of pain (12 studies; moderate quality; n = 3268) or function (7 studies; moderate quality; n = 1510) for opioids compared with placebo but a clinically important harm in terms of increased adverse events with opioids (8 studies; very low quality; n = 2113).

No data were available for psychological distress, nor for the comparison with usual care.

16.5.1.5 Paracetamol versus placebo

Evdence from 1 study showed no clinical benefit for any of the reported outcomes – pain (low quality; n = 1011), function (low quality; n = 1007), quality of life (low quality; n = 495) or adverse events (very low quality; n = 1065).

No data were available for psychological distress, nor for the comparison with usual care.

16.5.1.6 NSAIDs versus placebo

Evidence from 2 studies demonstrated a clinical benefit of etoricoxib in terms of pain severity at both analysed doses (60 and 90mg) and in terms of function at the lower dose (low to moderate quality; n = 427 and 422), while there was a clinical benefit for quality of life on the physical subscale of the SF-12 at both doses but this was not seen for the mental subscale (moderate quality; n = 427 and 422). Evidence from 5 studies showed no clinical difference of etoricoxib, pirioxicam, diclofena or indomethacin in the rate of adverse events (low quality; n = 1344). Further evidence from individual studies also found a benefit of ibuprofen or diclofenac compared with placebo for pain intensity (low quality; n = 195 and 200), but not for tenoxicam 20 mg (low quality; n = 68).

No data were available for psychological distress, nor for the comparison with usual care.

16.5.1.7 Antibiotics versus placebo

There was evidence from 1 RCT of the use of antibiotics in people with MRI confirmed disc prolapse. This evidence suggested an improvement in health care utilisation, but also an increase in adverse events (low and moderate quality; n = 162).

No data were available for quality of life, pain severity, function or psychological distress, nor for the comparison with usual care.

16.5.1.8 Head-to-head comparisons

Limited data were available. A clinical harm in terms of increased adverse events with anti-epileptics compared with anti-depressants was demonstrated in evidence from a single study (low quality; n = 200), while a further study suggested antidepressants to be clinically beneficial compared with paracetamol for improving pain intensity (moderate quality; n = 39), but no clinical difference for psychological distress was observed (low and moderate quality; n = 39).

No data were available for quality of life, pain severity or function.

16.5.1.9 Combinations of drugs versus placebo

The only available evidence for combinations of pharmacological therapies was for opioids combined with paracetamol. In people with low back pain (without sciatica) evidence from 1 study was inconsistent, with some measures suggesting there was clinically important benefit of placebo when compared with opioid plus paracetamol for the health related quality of life (SF-36 domains of bodily pain, general health, physical function, and physical role), while other measures showed no clinical difference for these outcomes (pain on the McGill score and SF-36 mental health, health transition, emotional role, social function and vitality domains) (low and moderate quality; n = 327). Clinical benefit in pain measured by VAS was reported for the combination treatment (low quality, n=327). No clinical benefit was seen for function (low quality; n = 327) but there was a clinical harm for increased adverse events (2 studies; moderate quality; n = 613). Similarly, in the mixed population no

benefit was seen for function and only some quality of life domains showed a clinical benefit (general health, physical function, physical role, social function and vitality, but not emotional role, health transition, mental health or bodily pain) (low and moderate quality; n = 170) and there was a clinical harm for increased adverse events (2 studies; high quality; n = 295).

16.5.1.10 Combinations of drugs versus other interventions

The only available evidence for combinations of pharmacological therapies was for opioids combined with paracetamol versus an anticonvulsant. In people with low back pain (without sciatica) evidence from 1 study only reported adverse events and showed no clinical difference between the groups (moderate quality; n = 60).

16.5.1.11 Combinations of non-invasive interventions – pharmacological adjunct

There was evidence from one RCT showing that when pharmacological therapy (NSAIDs) were combined with manual therapy (massage) there was a clinical benefit for pain and function in the short-term, compared to manual therapy (massage) alone (very low quality, n=54). When combined with exercise (biomechanical) the evidence from one RCT showed clinical benefit (very low quality, n=60). However, there was no evidence available for any of the other outcomes.

16.5.2 Economic

- One cost–consequence analysis found that care including pregabalin was less costly and more effective than care excluding pregabalin for low back pain with sciatica (£68 more per patient, pain (BPI): MD -1.40, quality of life (SF-12 physical summary score): MD 3.90, quality of life (SF-12 mental summary score): MD 5.30, psychological distress (HADS - anxiety): MD -1.80 and psychological distress (HADS - depression): MD -1.90 per patient). This analysis was assessed as partially applicable with potential serious limitations.
- One cost-effectiveness analysis found that paracetamol was dominant (less costly and more effective) compared to ibuprofen for acute low back pain (without sciatica). This analysis was assessed as partially applicable with potential serious limitations.
- One cost–utility analysis found that duloxetine was dominant (less costly and more effective) compared to pregabalin, celecoxib, oxycodone/acetaminophen, oxycodone, tapentadol and tramadol for treating low back pain (with or without sciatica) post paracetamol. It also found that duloxetine was not cost effective compared to naproxen treatment (ICER: £41,521 per QALY gained). This analysis was assessed as partially applicable with potential serious limitations.
- No relevant economic evaluations were identified that included muscle relaxants, SSRI antidepressants, tricyclic antidepressants, non-gabapentinoid anticonvulsants, antibiotics or vitamin D as a comparator for the management of low back pain.

16.6 Recommendations and link to evidence

Recommendations	**20. For recommendations on pharmacological management of sciatica, see NICE's guideline on neuropathic pain in adults.** **21. Consider oral non-steroidal anti-inflammatory drugs (NSAIDs) for managing low back pain, taking into account potential differences in gastrointestinal, liver and cardio-renal toxicity, and the person's risk factors, including age.** **22. When prescribing oral NSAIDs for low back pain, think about**

	appropriate clinical assessment, ongoing monitoring of risk factors, and the use of gastroprotective treatment. **23. Prescribe oral NSAIDs for low back pain at the lowest effective dose for the shortest possible period of time.** **24. Consider weak opioids (with or without paracetamol) for managing acute low back pain only if an NSAID is contraindicated, not tolerated or has been ineffective.** **25. Do not offer paracetamol alone for managing low back pain.** **26. Do not routinely offer opioids for managing acute low back pain (see recommendation 24).** **27. Do not offer opioids for managing chronic low back pain.** **28. Do not offer selective serotonin reuptake inhibitors, serotonin–norepinephrine reuptake inhibitors or tricyclic antidepressants for managing low back pain.** **29. Do not offer anticonvulsants for managing low back pain.**
Research recommendations	**2. What is the clinical and cost effectiveness of codeine with and without paracetamol for the acute management of low back pain?** **3. What is the clinical and cost effectiveness of benzodiazepines for the acute management of low back pain?**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (for pain and function) adverse events and healthcare utilisation were also considered as important. In this review, antidepressants were the only intervention studies that had evidence for all the critical and important outcomes, whereas there was no evidence for any of the critical outcomes for diazepam. The available evidence comparing combinations of pharmacological therapies to placebo reported time to pain relief as well as pain severity as a continuous variable. The GDG agreed that the time taken until pain relief was achieved was of less importance than whether or not any change in pain had occurred and therefore considered that this was of less value for decision making.
Trade-off between clinical benefits and harms	The evidence for pharmacological agents for low back pain is discussed below; note that pharmacological management for sciatica is covered by the NICE neuropathic pain guideline CG173.[373] **Antidepressants** No clinically important difference was observed for any of the reported outcomes for SSRIs versus placebo with the exception of adverse events which were seen to increase in the intervention group. Similar results were observed for TCAs where no difference was observed in terms of pain, psychological distress or adverse events, and SNRIs where there was no difference for any of the outcomes except for an increase in adverse events in the intervention group and a benefit of SNRIs on EQ-5D.

The GDG considered that consistent evidence from these RCTs for each of the antidepressant classes reviewed was sufficient to warrant a recommendation to advise against the use of SSRIs, SNRIs and TCAs in this population.

Anticonvulsants

The only available evidence for gabapentinoids versus placebo or usual care was from 1 small placebo controlled RCT (n=65) and 1 observational cohort study which compared gabapentinoids to usual care. Both studies included people with low back pain with sciatica. It was agreed that this should be included to inform treatment for low back pain, in the absence of evidence from a population without sciatica. It was noted that the population in the cohort study had a low mean baseline value on the HADs scale, indicative of a 'non-anxious' population. The GDG highlighted that changes in this scale were not of clinical relevance in this population as there was no scope for improvement. A clinically important improvement in pain was observed in the intervention group, however, this was not consistent with the RCT evidence which indicated no clinically important difference in any outcome apart from an increase incidence of adverse events in the intervention group. The GDG agreed this conflicting evidence in 2 studies was insufficient to base a recommendation on. The cohort study had a large sample size but was considered at high risk of bias in part due to being an un-blinded study.

The only available evidence for other anticonvulsants was 1 RCT comparing topiramate and placebo. The GDG considered that although there were differences that could be considered clinically important for both function and pain severity for topiramate, this is a drug that is not commonly used for low back pain and has a significant side effect profile, and therefore did not consider this sufficient evidence to recommend for people with low back pain.

Muscle relaxants

Evidence identified was for tizanidine, baclofen and orphenadrine citrate. The only outcome that could be assessed was pain severity and occurrence of adverse events. There was conflicting evidence in relation to pain with one study versus placebo showing no clinical benefit and one study versus usual care showing clinical benefit. There was evidence of an increased incidence of adverse events in the group treated with muscle relaxants compared to placebo. The GDG agreed that this was sufficient evidence to recommend that muscle relaxants should not be used for the management of low back pain.

The GDG highlighted that it was surprising the only available evidence for diazepam, which is widely prescribed for people with low back pain, was from 1 small RCT (n = 76), which only reported change in muscle spasms. The GDG were aware of an RCT published in German which was not included in this review due to being a non-English language study.[346,346] It was noted that even had this study been included, it would remain a very weak evidence base for a drug that is widely used. The GDG were also aware of the potential for dependence and the risk of toxicity such as drowsiness and impairment of driving ability. Therefore it was considered important to write a research recommendation for the use of diazepam in the management of low back pain.

Opioids

The review protocol defined that opioids would be pooled unless heterogeneity was observed. Therefore strong and weak opioids were combined within this review. It was noted that there was no heterogeneity in the pooled data. It was noted that all the evidence was drawn from people with chronic low back pain. The evidence therefore suggests that there was no reason to believe different strength opioids would have different clinical effectiveness in a population with chronic low back pain. There was some evidence of a small benefit in terms of pain and function versus placebo, but these effects were not judged to be clinically important. The GDG noted that the meta analysis included a large number of trials, and the effects

were very consistent across these trials. Evidence from 1 study reported clinical benefit for opioids in physical and mental component scores of the quality of life measure SF-12. There was no evidence found for the use of opioids in acute low back pain or for the management of acute episodes of low back pain and therefore the effectiveness of opioids alone for the management of acute low back pain could not be determined from this review.

There was an increase in adverse events observed in those receiving opioids as a single agent. The GDG concluded that the potential harms of opioid treatment for chronic low back pain when used as a single agent outweighed the benefits and agreed a recommendation that opioids should not be used in the management of chronic low back pain. The GDG considered making a research recommendation regarding the use of opioids without paracetamol in acute low back pain, however did not do so because they were aware of an ongoing placebo-controlled trial in this population.

Paracetamol

There was no clinical benefit observed in any of the reported outcomes, however the GDG noted that the treatment period in the RCT analysed was only of 4 weeks duration whereas the follow-up period analysed in this review was at 12 weeks. At the 12 week time point, the GDG felt it would be unlikely to expect benefits to remain after a short course of treatment. The GDG considered that although this was from a large RCT the point estimates for pain intensity could not reliably inform whether paracetamol may be of some benefit in the management to people with low back pain. The study did include outcomes for pain and function at 4 weeks, and Kaplan-Meier curves for sustained recovery by treatment group, adjusted for baseline pain score, which did not show any significant differences in recovery over time between the groups receiving paracetamol or placebo. This data was only reported graphically so could not be included in the review, but the GDG agreed it was important to note. Furthermore, despite having large numbers of participants at 12 weeks for the assessment of pain severity and function, the number of participants analysed for the health related quality of life outcomes had more than halved in number across both arms. The GDG acknowledged that the evidence only considered the short-term efficacy of paracetamol, however, the GDG felt that there was no evidence to support paracetamol for the management of acute low back pain. In addition, the GDG felt that a recommendation not to use paracetamol long-term was justified given the lack of evidence of clinical benefit.

NSAIDs

The included evidence was for piroxicam, etoricoxib, diclofenac, ibuprofen and indomethacin as oral preparations and tenoxicam by intramuscular injection. NSAIDs were pooled for analysis and no heterogeneity was observed. Short-term effectiveness in terms of pain severity and function was demonstrated. One study of etoricoxib analysed 2 doses (60 and 90mg). The GDG noted that although there was a clinical benefit at both doses for pain and quality of life, function was only improved at the 60mg dose. Further evidence demonstrating benefit of pain was seen when NSAIDs were combined with massage, however this was from a single small study.

The GDG agreed there was sufficient evidence of benefit of NSAIDS on which to base a recommendation. Although this evidence review did not demonstrate any increase in adverse events in those receiving NSAIDs, the GDG noted that the side-effect profile of NSAIDs varied between drugs, and therefore although the efficacy could be considered similar across the class, the side effect profile should be considered when determining which drug was most appropriate for the individual. The GDG were aware of the considerable toxicity of NSAIDs and that the randomised controlled trials reviewed were not likely to pick up long term complications, toxicity due to co-morbidities or drug interactions.

	Antibiotics There was evidence from 1 RCT of the use of antibiotics in people with MRI confirmed disc prolapse, subsequent vertebral end plate oedema and chronic low back pain of more than 6 months duration. Although evidence indicated an improvement in health care utilisation, there was also an increase in adverse events. Data were only reported as median and interquartile range for pain, function and quality of life and therefore conclusions on the efficacy based on these outcomes could not be made with any degree of certainty. The GDG considered the external validity of this trial, specifically due to the recruitment. The study reported very limited detail of how participants were recruited, and the GDG expressed concern that the population included within this trial was highly selected and very specific and consequently may not be a representative sample. It was agreed that no recommendation could be based on this single study. **Combinations of drugs** The only available evidence for combinations of pharmacological therapies was for opioids combined with paracetamol. There was some evidence suggesting a clinically important benefit of a strong opioid plus paracetamol for the critical outcome pain severity when compared to placebo. However, as this was based on a single study, the GDG agreed that this was not enough evidence to base a recommendation on. Evidence from the same study reported clinical benefit for placebo for some quality of life domains of the SF-36 and no difference between treatments in some domains as well as in function. Evidence from another study comparing co-codamol with ketorolac in acute low back pain showed no difference in pain outcomes at less than 4 months, but adverse events were more common in the co-codamol group. The GDG discussed that there was a need to provide an alternative treatment for people with acute back pain where an NSAID could not be used, or had been ineffective or poorly tolerated, and therefore agreed on this basis that this study provided sufficient evidence of equivalent effect of weak opioid with or without paracetamol to NSAID, despite the adverse event profile, to base a recommendation on for this specific group of people. There was also evidence available for opioid plus paracetamol compared to an anticonvulsant, however the only outcome data available was for adverse events (which showed no clinical difference between the groups). Due to the lack of effectiveness data the GDG were unable to weigh up the benefits and harms of this comparison, and therefore agreed that there was not enough evidence to make a recommendation.
Trade-off between net clinical effects and costs	Three economic evaluations of pharmacological interventions for low back pain were included and unit costs of a selection of commonly prescribed pharmacological treatments were presented to the GDG. One cost-utility analysis found that naproxen (NSAID) was cost effective compared to duloxetine (SNRI), celecoxib (NSAID), pregabalin (gabapentinoid anticonvulsant) and four opioid analgesics in the management of low back pain post first line treatment with paracetamol.[544] This analysis was partially applicable with potentially serious limitations. A cost-effectiveness analysis found that paracetamol was dominant (less costly and more effective) compared to ibuprofen (NSAID).[314] This analysis was assessed as partially applicable with potentially serious limitations. The GDG considered both studies and although they conflicted with regards to the cost-effectiveness of NSAIDs, the GDG agreed that, when considering the limitations of these analyses, the unit cost of NSAIDs and the clinical evidence for etoricoxib (NSAID), NSAIDs could be cost-effective for the treatment of low back pain and therefore they should be considered. Although the clinical evidence did not report an increase in adverse events, the GDG noted that the side-effect profile should be considered when determining which drug was most appropriate for the individual. The economic evidence for opioids (Wielage et al 2013) indicated that these were

	not cost-effective for the management of low back pain. As with the clinical evidence, this study was based on clinical evidence of people with chronic low back pain. The GDG agreed to not offer opioids for this particular population. No economic evidence for opioid use for the management of acute low back pain was identified and so the GDG decided not to recommend them as a first line option for this group. However, the GDG discussed the possible alternative for people with acute back pain that cannot use NSAIDs and agreed that weak opioids (with or without paracetamol) could be a cost effective option as they would provide pain relief at an acceptable cost. The GDG considered Wielage et al 2013 study alongside the clinical evidence for antidepressants, which demonstrated a lack of clinical benefit and increase in adverse events, and agreed to not offer SSRIs, SNRI or TCAs for the management of low back pain. One cost-consequence analysis demonstrated that there was uncertainty regarding the costs and effects of a gabapentinoid anticonvulsant (pregabalin) when compared to usual care. This analysis was partially applicable with potentially serious limitations.[353] The GDG considered that both the economic and clinical evidence was insufficient to make a recommendation for the use of anticonvulsants in the management of low back pain. No economic studies were found for muscle relaxants however there would of course be a cost associated with providing this drug and given the conclusion of lack of clinical benefit and increased incidence of adverse events observed in the clinical evidence the GDG agreed to not offer muscle relaxants for the management of low back pain.
Quality of evidence	For the majority of evidence in this review, the quality ranged from a GRADE rating of moderate to very low. This was due to the high number of drop outs in some of the included studies, resulting in a high risk of bias rating, as well as the imprecise nature of the results extracted and analysed in this review. Evidence for opioid plus paracetamol versus placebo in a low back pain with or without sciatica population had a high quality GRADE rating for the adverse events outcome and opioid plus paracetamol versus NSAIDs in a Low back pain only population had a high quality GRADE rating for the pain severity and adverse events outcome. The high quality GRADE rating for these outcomes was due to the low risk of bias in the study outcomes and the precision of the results.
Other considerations	The studies included in this review varied considerably in terms of allowed concomitant treatment and rescue medication, and the reporting of use of these treatments was poor. The GDG noted that this should be a consideration in interpreting the evidence, but is a confounding factor that applies to the majority of evidence in this condition. The GDG noted that the pharmacological interventions reported critical and important outcomes in the short term (less than or equal to four months) but no studies reported outcomes or adverse events beyond four months. The GDG also noted that the populations for pharmacological interventions were drawn from both those with acute and those with chronic low back pain, and that the data was not analysed separately on this basis. It was noted that although some of the included evidence has populations with low back pain and sciatica, these pharmacological recommendations apply to the management of low back pain only. For the pharmacological treatment of sciatica, NICE clinical guideline 173: Neuropathic pain – pharmacological management: The pharmacological management of neuropathic pain in adults in non-specialist settings should be followed. The GDG discussed at what point in the treatment pathway NSAIDs should be considered. Given the evidence from placebo controlled trials and the relatively low

cost of the intervention it was concluded that NSAIDs were an appropriate first line treatment option and suitable for use throughout the treatment pathway for patients with low back pain. The GDG considered they were appropriate for use as-needed for chronic low back pain, subject to considering toxicity and drug interactions.

The GDG were aware of the guidance in the British National Formulary (BNF) that cautioned that NSAIDs should be used at the lowest effective dose for the shortest possible period of time. The GDG agreed to reflect the BNF guidance by recommending that health professionals take into account the differing toxicity of different NSAIDs and the person's risk factors, including age, when choosing an agent. The GDG were aware of the recommendations to withdraw NSAIDs in patients presenting with upper gastrointestinal bleeding (NICE Guideline on acute upper gastrointestinal bleeding CG141) and the recommendation to regularly monitor renal function in people taking NSAIDs (NICE Guidelines on chronic kidney disease CG182). The GDG agreed to adapt the recommendations regarding the use of NSAIDs from the NICE Osteoarthritis Guideline (CG177) and incorporated the advice to consider the use of gastroprotective agents and to use the lowest dose of an NSAID for the shortest possible period of time to reduce the risk of toxicity. The GDG were also aware that there were a limited number of studies looking at the effect of opioids on acute low back pain. The GDG noted there was only one study including codeine with paracetamol, one of the most commonly prescribed analgesics in England. With the known side effects of NSAIDs, the GDG acknowledged the need for an alternative treatment option for people with contraindications to NSAIDS use. The GDG therefore decided, on consensus to consider offering codeine (with or without paracetamol) alongside a research recommendation.

The GDG agreed that BNF guidance should be followed for all pharmacological recommendations, including considerations for pregnant women, and therefore did not consider that separate recommendations were required for pregnant women.

Research recommendations

Codeine with and without paracetemol

Codeine, often in combination with paracetamol, is commonly prescribed in primary care to people presenting with acute low back. This is often the case for people who cannot tolerate NSAIDs or for whom there are contra-indications to these medications. Whilst there is evidence that opioids are not effective in chronic low back pain, there are relatively few studies that look at the acute low back pain scenario that is commonly experienced in primary care. In addition it is not known whether the addition of paracetamol to codeine has a synergistic effect in the treatment of back pain.

Benzodiazepenes

Guidelines from many countries have advocated that muscle relaxants be considered for short-term use in patients with low back pain when the paraspinal muscles are in spasm. The evidence for this mainly comes from studies on medications that are not licenced for this use in the United Kingdom. The 2009 NICE guideline makes the recommendation to consider prescribing diazepam as a muscle relaxant in this scenario, but the evidence base to support this particular drug is extremely small. Benzodiazepines are not without risk of harm even in the short-term. There is therefore a need to determine whether diazepam is cost-effective in the management of acute low back pain.

17 Multidisciplinary biopsychosocial rehabilitation (MBR) programmes

17.1 Introduction

Low back pain, with or without sciatica is a complex, poorly understood, multi-factorial phenomenon which impacts on people's ability to undertake normal activities of daily living, social function and affects their mood and confidence. People are often given broad descriptions for their symptoms, rather than a definitive diagnosis. This makes it difficult to define a clear treatment plan, causing further stress. Many people find the idea of intermittent or long term pain, that cannot be easily controlled by medication alone, difficult to accept and may continue seeking diagnoses and treatments, both within traditional health services and within alternative or complementary therapies. For people who develop chronic pain, there is often a difficult transition from curative medicine, into the unknown territory of 'living well' and 'managing' with a long term health condition.

The rehabilitation process requires professionals working in a specialist pain service to work together, to give a consistent message to people who have been thoroughly investigated and treated without resolution; that their pain is long term or chronic and therefore requires management, rather than further investigation or long-term 'passive' treatments. The quality of life for people with any long term or chronic health condition depends less on the average 3 hours per year they have interacting with health professionals and more on the ability of the person to undertake self-management.[108,477,523] People therefore require support, knowledge, skills and confidence to do this. A recent Cochrane review by Kamper *et al.* adopted the broad term 'multidisciplinary biopsychosocial rehabilitation' or MBR as a basis for reviewing the evidence.[261]

The MBR approach combines education and physiotherapy, with different forms of cognitive-behavioural psychology to address participants' unhelpful beliefs about their pain, reduce 'fear-avoidance' behaviours and catastrophic thinking and improve mood, thus decreasing disability and improving function.

The definition of MBR programmes that has been used for the purposes of this review has been adapted from the 2014 Cochrane review[261] which defines these as follows: MBR was defined as an intervention that involves a physical component (such as specific exercise modalities, mobilisation, massage) and at least one other element from a biopsychosocial approach, that is psychological or social and occupational or educational (defined educational intervention e.g. education on anatomy, psychology, imaging, coping, medication, family, work and social life). The intervention program had to have been delivered by clinicians from different disciplines, that is a minimum of two healthcare professionals from different professional backgrounds had to be involved in the intervention delivery. The different components of the intervention had to be offered as an integrated programme involving communication between the providers responsible for the different components.

As noted in this review, there is no consensus regarding the definition of multidisciplinary treatment. Further discussion with the GDG agreed that these programmes may in fact include various components delivered by one individual, and that the multi-disciplinary aspect can apply to the interventions included in the package (across disciplines), not to the number of people / disciplines delivering this. For this reason, the included interventions in this review were agreed as falling into 3 main categories, which would be analysed as separate strata, but may be delivered by one or a number of people:

- MBR with 3 main components: physical, psychological and educational
- MBR with 2 main components: physical and psychological
- MBR with 2 main components: physical and educational.

17.2 Review question: What is the clinical and cost effectiveness of MBR programmes in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 360: PICO characteristics of review question

Population	People aged 16 or above with non-specific low back pain. People aged 16 or above with sciatica.
Interventions	• Multidisciplinary biopsychosocial rehabilitation programmes 1. Uni-disciplinary programmes including combined concepts: where it is one profession (usually Physio) who may be using cognitive - behavioural principles or a cognitive - behavioural approach, alongside exercise / education. 2. Multidisciplinary biopsychosocial programmes. Multidisciplinary defined as: 'multidisciplinary biopsychosocial programmes that target factors from the different domains (physical, psychological and social). - Irrespective of the number of people who deliver the programme - Must have a physical component plus at least 1 other core elements (psychological/educational): 3 core elements: Physical + psychological + educational 2 core elements: Physical + psychological 2 core elements: Physical + educational - Tailored components are acceptable as long as these components are described, and must be given in addition to a defined component (eg. acupuncture + tailored vs. tailored = acceptable; tailored vs. tailored = exclude)
Comparisons	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. Morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit) • Return to work

Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

17.3 Clinical evidence

17.3.1 Summary of clinical evidence

Twenty-two studies (found in 27 papers) were included in the review; these are summarised in **Table 361** below. [32,33,40,94,105,121,162,255,257,266,273,294,343,349-351,384,385,402,409,413,420,421,456-461,518] Evidence from these studies is summarised in the GRADE clinical evidence profile / clinical evidence summary below. One Cochrane review[260,262] was identified but it was excluded as the definition of MBR programme was different, requiring a minimum of two healthcare professionals from different professional backgrounds, and the review included studies comparing MBR to surgery, however the studies included in this Cochrane review where individually assessed and included if they matched the review protocol.. Pengel 2007 [402] was included, however no outcome could be extracted as data was reported in a way that could not be analysed in this review. Smeets et al.[457-461] looked at 4 different intervention arms: MBR, exercise, cognitive behavioural approaches and waiting list. Only data for the MBR comparisons have been reported in this review (as the others were not relevant). However, the other comparisons can be found in the exercise and psychological chapters (See chapters 9 and 15). A comparison between a 3-element MBR program and disc replacement can be found in the disc replacement chapter (see chapter 26). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Table 361: Summary of studies included in the review

Study	Intervention	Comparison	Population	Outcomes	Comments
MBR with 3 CORE ELEMENTS: physical + psychological + educational					
Bendix 1995 and Bendix 1998[31,33]	MBR physical + psychological + educational delivered by a multidisciplinary team (occupational therapist; clinical psychologist; physicians, therapists, psychologists, a social worker, a nutritionist)	MBR 2 element physical + psychological	Low back pain with or without sciatica N=75 6 weeks Treatment + follow ≤4 months Denmark	Pain severity (VAS) Function (0-30 scale) Healthcare utilisation (contact with healthcare systems)	MBR 3 element: Physical = mixed modality exercise (aerobic + biomechanical) Psychological = behavioural + APT Educational = 1hr/week class MBR 2 element: Physical = mixed modality exercise (aerobic + biomechanical) Psychological = pain management
Critchley 2007[94]	MBR physical + psychological + educational delivered by a unidisciplinary team	Combination of interventions (manual + self-management exercises +	Low back pain with or without sciatica N=212 18 months follow-up UK	Pain severity (VAS) Function (RMDQ) Quality of life (EQ-5D)	MBR 3 element: Physical = mixed modality exercise (aerobic + biomechanical) Psychological = cognitive behavioural

Study	Intervention	Comparison	Population	Outcomes	Comments
	(physiotherapists)	education - advice) Single intervention : biomechanical exercise			approaches Educational = back pain education Combination interventions: Manual therapy (manipulation, mobilisation, soft tissue technique – massage) Self-management (home exercises) Education (back care advice) Single intervention group ineligible due to inadequate details of exercise programme
Johnstone 2002[255]	MBR physical + psychological + educational delivered by a unidisciplinary team (physiotherapists)	MBR 2 element: physical + education	Low back pain with or without sciatica N=12 4 weeks treatment (most participants completed in this time) UK	Pain (VAS) Function (RMDQ)	MBR 3 element: Physical = exercise (biomechanical) + manual (manipulation) Psychological = cognitive behavioural approaches Education = basic anatomy and biomechanics of the spine, postural advice and bending and lifting techniques MBR 2 element: Physical = exercise (biomechanical) + manual (manipulation) Education = basic anatomy and biomechanics of the spine, postural advice and bending and lifting techniques
Keller 1997[266]	MBR physical + psychological + educational delivered by a	Waiting list	Low back pain with or without sciatica N=65 5 weeks	Pain (NRS) Function (functional capacity questionnaire -	MBR 3 element: Physical = exercise (biomechanical) + postural Psychological =

Study	Intervention	Comparison	Population	Outcomes	Comments
	multidisciplinary team (physicians; physiotherapists)		Treatment + 6 months follow-up Germany	Kohlmann)	cognitive (pleasant activity scheduling and distraction) Education = information about pain, pain medication, avoidance, demoralisation and dysphoric mood, how the Treatment methods would help gain self-control over pain and pain-related behaviour Control Waiting list
Lau 2008[294]	MBR physical + psychological + educational delivered by a unidisciplinary team (physiotherapists)	Single intervention : exercise	Low back pain with or without sciatica N=110 4 weeks Treatment + up to 6 months follow-up Hong Kong	Pain severity (NRS) Function (RMDQ) Quality of life (SF-12)	Concurrent medication/care: On discharge from A&E, standard physiotherapy in outpatient department twice a week including education, reassurance, pain management and interferential therapy according to findings of examination. discharged when 70% reduction in pain. MBR 3 element: Physical = aerobic exercise (walking) Psychological = cognitive (coping with pain, skills in self-management) Education = session with Back Care booklet (information on conservative management of acute low back pain, correct spinal posture during ADL,

Study	Intervention	Comparison	Population	Outcomes	Comments
					harmful effect of prolonged bed rest, advice to stay active Also received electrotherapy (inferential) Single intervention: Aerobic exercise (walking).
Moffett 1999[343]	MBR physical + psychological + educational delivered by a unidisciplinary team (physiotherapist)	Usual care	Low back pain without sciatica n=187 4 week Treatment + 1 year follow-up UK	Pain severity (Aberdeen Pain scale) Function (RMDQ) Quality of life (EQ-5D)	MBR 3 element: Physical = mixed modality exercise (aerobic + biomechanical; stretching and strengthening) Psychological = cognitive behavioural approaches Education = educational message encouraging self-reliance was delivered at each class Usual care: May have been referred to physiotherapy, one consultant used manipulation as usual care.
Monticone 2015 [349]	MBR physical + psychological + educational delivered by a multidisciplinary team (physiatrists; psychologist; physiotherapists)	Combination of interventions: exercise + manual therapy + postural therapy + self-management	Low back pain with or without sciatica N=150 5 weeks treatment + 2 years follow up Italy	Pain severity (NRS) Function (ODI) Quality of life (SF-36)	MBR 3 element: Physical = mixed modality group exercise (biomechanical + aerobic) Psychological = cognitive behavioural approaches Education = education on nature of pain and physiology, ergonomic advice, education booklet Combination

Study	Intervention	Comparison	Population	Outcomes	Comments
					interventions: Exercise (biomechanical exercise) Manual therapy (passive mobilization) Postural therapy (postural control) Self-management (education booklet) Concomitant treatment: no other treatments nor major pharmacological agents (opioids, steroids, anticonvulsants and antidepressant analgesics) allowed other than mild analgesics and NSAIDs.
Nicholas 1991 [384]	MBR physical + psychological + educational delivered by a multidisciplinary team (physiotherapists; psychologist) Two different MBRs delivered: one with a cognitive psychological component, the other with a behavioural psychological element	MBR physical + education	Low back pain with or without sciatica 5 weeks treatment, 12 months follow-up N=62 Australia	Pain severity (pain rating chart, 0-5) Function (sickness impact profile) Psychological distress (STAI; BDI) Healthcare utilisation (medication intake)	MBR 3 element: Physical = biomechanical exercise Psychological = cognitive and behavioural Education = self-management and advice to stay active MBR 2 element: Physical = biomechanical exercise Education = self-management and advice to stay active Concomitant treatment: Subjects recorded medication intake at weekly assessments. Medication types recorded included: narcotic analgesics, non-narcotic analgesics, non-steroidal anti-

Study	Intervention	Comparison	Population	Outcomes	Comments
					inflammatory drugs, antidepressants and sedatives/hypnotics.
Nicholas 1992 [385]	MBR physical + psychological + educational delivered by a multidisciplinary team (physiotherapists; psychologist)	MBR physical + education	Low back pain with or without sciatica 5 weeks treatment, 6 months follow-up N=20 Australia	Pain severity (pain rating chart, 0-5) Function (sickness impact profile) Psychological distress (BDI) Healthcare utilisation (medication intake; additional treatments)	MBR 3 element: Physical = biomechanical exercise Psychological = cognitive behavioural approaches Education = self-management and advice to stay active MBR 2 element: Physical = biomechanical exercise Education = self-management and advice to stay active Concomitant treatment: Subjects recorded medication intake at weekly assessments. Medication types included narcotic analgesics, non-narcotic analgesics, non-steroidal anti-inflammatory drugs antidepressants and sedatives/hypnotics.
Pengel 2007[402]	MBR physical + psychological + education delivered by a unidisciplinary team (physiotherapists)	MBR physical + psychological+ sham educational	Low back pain with or without sciatica N=259 6 weeks treatment + up to 1 year follow-up Australia / NZ	Pain severity (NRS) Function (RMDQ)	MBR 3 element: Physical = mixed modality exercise (aerobic + biomechanical; stretching and strengthening) Psychological = cognitive behavioural approaches Education = advice on activity and low back pain MBR 2 element: Physical = mixed modality exercise

Study	Intervention	Comparison	Population	Outcomes	Comments
					(aerobic + biomechanical; stretching and strengthening) Psychological = cognitive behavioural approaches Sham education = Participants were given the opportunity to talk about their low back pain. The physiotherapist responded in a warm and empathetic manner, but did not give advice about the low back pain No outcome was extracted as data could not be analysed
Skouen 2002[456]	MBR physical + psychological + educational delivered by a multidisciplinary team (physiotherapist; nurse; psychologist)	Usual care	Low back pain with or without sciatica 4 weeks Treatment + up to 24 months N=195 Norway	No relevant outcomes	MBR 3 element: Physical = biomechanical exercise (strengthening) Psychological = cognitive behavioural approaches Education = anatomy, pain mechanism, exercise, and mental coping strategies applied at work and daily life Usual care: GP administered medication and referral to either physiotherapists or chiropractors
MBR with 2 CORE ELEMENTS: physical + psychological					
Gatchel 2003[162]	MBR physical + psychological delivered by a multidisciplinary team (nurse;	Usual care	Low back pain with or without sciatica N=70 3 weeks treatment + 12	Pain severity (characteristic pain inventory, 0-100) Return to work	MBR 2 element: Physical = mixed modality exercise (aerobic + biomechanical) Psychological =

Study	Intervention	Comparison	Population	Outcomes	Comments
	physician)		months follow up USA		psychosocial approaches Usual care: Aerobic exercise + biomechanical exercise
Jousset 2004[257] [420,421]	MBR physical + psychological delivered by a multidisciplinary team (physiotherapist; physiatrist; psychologist)	Single intervention: exercise (individual biomechanical)	Low back pain with or without sciatica N=86 5 weeks intervention + 6 months follow-up France	Pain severity (VAS) Psychological distress (HAD) Return to work	Concomitant treatment: not stated Pain severity ≤ 4 months was in a format that could not be analysed.
Khan 2014A[273]	MBR physical + psychological delivered by a unidisciplinary team (physical therapist)	Single intervention: exercise (mixed modality – aerobic + biomechanical)	Low back pain with or without sciatica N=54 12 weeks follow up Pakistan	Pain severity (VAS) Function (RMDQ)	MBR 2 element: Physical = exercise (mixed modality – aerobic + biomechanical) Psychological = cognitive behavioural approaches Single intervention: Exercise (mixed modality – aerobic + biomechanical) Concomitant treatment: self-management (education)
Monticone 2013[351]	MBR physical + psychological delivered by a multidisciplinary team (physiatrists; psychologist; physiotherapists)	Combination of interventions (biomechanical exercise + manual)	Low back pain with or without sciatica N=90 12 months treatment + 12 and 24 months follow-up Italy	Pain severity (NRS) Function (RMDQ) Quality of life (SF-36)	Concurrent medication: Patients not offered any other treatment once enrolled including analgesia other than NSAIDS and mild analgesia. MBR 2 element: Physical = exercise (biomechanical – stretching and strengthening) Psychological = cognitive behavioural

Study	Intervention	Comparison	Population	Outcomes	Comments
					approaches Combination class interventions: Exercise (biomechanical – stretching and strengthening) Manual therapy (passive mobilisation)
Monticone 2014 [350]	MBR physical + psychological delivered by a multidisciplinary team (physiatrists; psychologist; physiotherapists)	Combination of interventions (manual therapy + exercise + postural therapy)	Low back pain with or without sciatica N=20 6-8 weeks treatment + 3 months follow up Italy	Pain severity (NRS) Function (RMDQ) Quality of life (SF-36) Healthcare utilisation (medication use)	MBR 2 element: Physical = exercise (motor control) Psychological = cognitive behavioural approaches Combination class interventions: Manual therapy (passive mobilisation) Exercise (stretching, muscle strengthening) Postural therapy (postural control) Concurrent treatment: No other treatments offered once the patients had been accepted for the programme; no major pharmacological agents allowed (mild analgesics and NSAIDs permitted)
Rasmussen-Barr 2003[413]	MBR physical + psychological delivered by a unidisciplinary team (physiotherapist)	Combination of interventions (manual + self-management)	Low back pain with or without sciatica N=47 6 weeks treatment + 3 months and 12 months follow-up Sweden	Pain severity (VAS) Function (ODI)	MBR 2 element: Physical = exercise (biomechanical – stretching and strengthening) Psychological = cognitive behavioural approaches Combination interventions: Manual therapy (passive mobilisation)

Study	Intervention	Comparison	Population	Outcomes	Comments
					Self-management
Smeets 2008/2008A/2009[457-459] Original/main RCT is Smeets 2006/2006A[460,461]	MBR physical + psychological delivered by a multidisciplinary team (physiotherapists; clinical psychologist or social worker)	Single intervention: psychological. Mixed modality exercise. cognitive behavioural approaches. NOTE: data for the comparisons of exercise versus cognitive behavioural approaches or waiting list, and cognitive behavioural approaches versus waiting list have been reported in the exercise and psychological therapies reviews.	Low back pain with or without sciatica* (overall 35.6% with radiation above the knee, 50.6% with radiation below the knee) N = 223 10 weeks treatment + 1 year follow up Netherlands *NOTE: the population in this study has been classified as low back pain 'with or without sciatica' because they have included leg pain, with no way of knowing whether or not the patients have nerve root entrapment (the study says it has excluded people with nerve root involvement but does not specify if this was determined on the basis of MRI).	Pain severity (VAS) Psychological distress (BDI) Function (RMDQ) Healthcare utilisation (number visits to: GP, medical specialist care, radiology, occupational physician, psychologist and number of therapist sessions (physiotherapist, manual therapy, Cesar or Mensendieck) Quality of life (outcome reported as QALYs only)	MBR 2 element: Physical = exercise (biomechanical – stretching and strengthening) Psychological = cognitive behavioural approaches Single intervention: Psychological (cognitive behavioural approaches) Mixed modality exercise (aerobic and biomechanical) Concomitant treatment: patients were allowed to continue medication prescribed at baseline, but other co-interventions were discouraged.
Sousa 2009[105]	MBR physical + psychological. Delivery of the programme was unclear	Waiting list	Low back pain without sciatica N=60 8 weeks treatment Brazil	Pain severity (VAS) Function (RMDQ) Psychological distress (BDI; STAI)	Both groups: Paracetamol 500mg every 6 hours if necessary MBR 2 element: Physical = exercise (biomechanical – stretching and strengthening) Psychological = cognitive

Study	Intervention	Comparison	Population	Outcomes	Comments
					restructuring Waiting list = waiting list control
Vibe Fersum 2013[518]	MBR physical + psychological delivered by a unidisciplinary team (physiotherapists)	Combination of interventions (biomechanical exercise + manual therapy + self-management- unsupervised exercise)	Low back pain without sciatica N = 169 12 weeks treatment + 12 months follow-up Norway	Pain severity (NRS) Function (ODI) Healthcare utilisation (number of treatments since intervention)	MBR 2 element: Physical = postural therapy + aerobic exercise Psychological = cognitive therapy Combination interventions: Manual therapy Biomechanical exercise Self-management (unsupervised exercise) Concomitant treatment: not specified.
MBR with 2 CORE ELEMENTS: physical + educational					
Bertocco 2002[40]	MBR physical + education. Delivery of the programme was unclear	Single intervention: electrotherapy	Low back pain without sciatica n=21 3 weeks treatment Italy	Pain severity (VAS)	Concurrent medication/care: Specific hypocaloric diet; no drugs; walked every day for about 1 hour, 5 times a week for 3 weeks MBR 2 element: Physical = exercise (biomechanical) Educational = keeping patient informed about changes in spine physiology, pain and posture related to obesity and other risk factors Single intervention: electrotherapy (Laser +/- ultrasound)
Dufour 2010[121]	MBR physical + education delivered by a multidisciplina	Single intervention: biomechanic	Low back pain with or without sciatica N=286	Pain severity (VAS) Function (RMDQ) Quality of life (SF-	MBR 2 element: Physical = mixed modality exercise (aerobic +

Study	Intervention	Comparison	Population	Outcomes	Comments
	ry team (physiotherapist; educational therapist)	al exercise	12 weeks treatment + 2 years follow-up Denmark	36)	biomechanical) Educational= biweekly lessons on anatomy, postural techniques and pain management, on back care and lifting techniques Single intervention: biomechanical exercise (core stability)
Preyde 2000[409]	MBR physical (manipulation + exercise) + education MBR physical (exercise) + education delivered by a unidisciplinary team (physiotherapists)	Sham electrotherapy (low level laser) Manual therapy (manipulation)	Low back pain with or without sciatica N=104 1 month intervention + 1 month follow up Canada	Pain severity (McGill) Function (RMDQ) Psychological distress (STAI)	Concomitant treatment: patients asked not to seek additional therapy for low back pain for duration of study, those taking anti-inflammatory medications asked to refrain on test days Sham electrotherapy: this comparison was not eligible as not including sham treatment of an intervention not included in the other arms of the study and was therefore excluded

17.3.2 Data not suitable for meta-analysis

Table 362: MBR programme 3 elements: physical + psychological + education versus usual care for low back pain with or without sciatica (>4 months)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Skouen 2002[456]	Return to work (number of months at work after end of treatment at 12 months)	Mean (SD): Men 7.6 (4.3); and women 5.9 (4.8) n=40.	Men: 17 Women:40	Mean (SD): Men 5.1 (4.7) and women: 5.6 (4.6)	Men: 31 Women: 55	Very high

Table 363: MBR programme 3 elements: physical + psychological + education versus MBR programme 2 elements: Physical and Cognitive in low back pain without sciatica

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Bendix 1995[33]	Function (0-30) ≤4 months	Median (IQR): 8.5 (5-15)	41	Median (IQR): 16.1 (11-19)	36	Very high
Bendix 1995[33]	Healthcare utilisation (contact with healthcare systems) ≤4 months	Median (IQR): 0.5 (0-2.4)	41	Median (IQR): 2.8 (0.4-4.6)	36	Very high
Bendix 1995[33]	Back pain severity (visual box scale 0-10) ≤4 months	Median (IQR): 2.7 (1.4-4.3)	41	Median (IQR): 5.6 (3.8-7.6)	36	Very high
Bendix 1995[33]	Function (0-30) > 4 months	Median (IQR): 10 (6-14)	40	Median (IQR): 17 (9-21)	34	Very high
Bendix 1995[33]	Healthcare utilisation (contact with healthcare systems) > 4 months	Median (IQR): 5 (0-19)	40	Median (IQR): 21 (3-34)	34	Very high
Bendix 1995[33]	Back pain severity	Median (IQR): 3 (2-6)	40	Median (IQR): 6 (4-8)	34	Very high

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
	(visual box scale 0-10) > 4 months					

Table 364: MBR programme 3 elements versus MBR programme 2 elements: Physical and Education (time-point not specified) in low back pain without sciatica

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Johnstone 2002[255]	Function (RMDQ, 0-24)	Median (range): -5 (6)	6 (unclear)	Median (range): -3.5 (6)	6 (unclear)	Very high
Johnstone 2002[255]	Pain severity (VAS 0-10)	Median (range): 1.5 (2)	6 (unclear)	Median (range): -2.5 (5)	6 (unclear)	Very high

Table 365: MBR programme 2 elements: Physical + Cognitive versus usual care in low back pain with or without sciatica (≤4 months)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Gatchel 2003[162]	Average of self-rated most 'intense pain' at 3 month follow up (Characteristic Pain Inventory 0-100)	Mean: 26.8	22	Mean: 43.1	48	Very high
Gatchel 2003[162]	Average of self-rated most 'intense pain' at 12 month follow up (Characteristic Pain Inventory 0-100)	Mean: 46.4	22	Mean: 67.3	48	Very high

Table 366: MBR programme 2 elements: Physical + Cognitive versus single intervention (biomechanical exercise) in low back pain with or without sciatica (≤4 months)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Jousset 2004[257]	Pain severity (VAS 0-10)	Change score: -1.9	68	Change score: -1.5	64	Very high

Table 367: MBR programme 2 elements: Physical + Education versus single intervention (laser therapy) in low back pain without sciatica (≤4 months)

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Bertocco 2002[40]	Pain severity (VAS 0-10)	Mean: 2.35	11	Mean: 2.08	10	Very high

Table 368: MBR programme 2 elements: Physical + Cognitive versus combined intervention (mobilisation or traction with unsupervised exercise) in low back pain with or without sciatica

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Rasmussen-barr 2003[413]	Function (Disability rating index 0-10) ≤4 months	Median (25, 75 percentile): 1.2 (0.7, 2.3)	17	Median (25, 75 percentile): 2.8 (0.8, 3.9)	16	Very high
Rasmussen-barr 2003[413]	Function (ODI 0-100) ≤4 months	Median (25, 75 percentile): 6 (4, 10)	17	Median (25, 75 percentile): 13 (3, 20)	16	Very high
Rasmussen-barr 2003[413]	Pain severity (VAS 0-10) ≤4 months	Median (25, 75 percentile): 1.4 (0.3, 2.2)	17	Median (25, 75 percentile): 2.2(0.7, 4.5)	16	Very high
Rasmussen-barr 2003[413]	Function (ODI 0-100) > 4 months	Median (25, 75 percentile): 8 (2, 10)	17	Median (25, 75 percentile): 8 (6, 19)	14	Very high
Rasmussen-barr 2003[413]	Function (Disability rating index 0-10) > 4 months	Median (25, 75 percentile): 1.3 (0.6, 2.9)	17	Median (25, 75 percentile): 2.3 (1.1-3.3)	14	Very high
Rasmussen-barr 2003[413]	Pain severity (VAS 0-10) > 4 months	Median (25, 75 percentile): 1.3 (0.5, 2.3)	17	Median (25, 75 percentile): 1.8 (0.9, 3.8)	14	Very high

17.3.3 Clinical evidence summary tables

Table 369: MBR programme 3 elements: physical + psychological + education versus usual care/waiting list control for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/waiting list control	Risk difference with MBR programme 3 elements: physical + psychological + education (95% CI)
Pain severity (VAS, 0-10) >4 months	52 (1 study) >4 months	LOW[a] due to risk of bias		The mean pain severity (VAS, 0-10) >4 months in the control groups was 5.6	The mean pain severity (VAS, 0-10) >4 months in the intervention groups was 2.5 lower (3.65 to 1.35 lower)
Function (ODI, 0-100) >4 months	53 (1 study) >4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI, 0-100)>4 months in the control groups was 66.7	The mean function (ODI, 0-100) >4 months in the intervention groups was 16.4 higher (7.06 to 25.74 higher)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
NB. All comparators were waiting list control

Table 370: MBR programme 3 elements: physical + psychological + education versus single intervention (aerobic exercise) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 3 elements: physical + psychological + education (95% CI)
Quality of life (SF-12 physical, 0-100) ≤4 months Exercise (aerobic)	99 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-12 physical 0-100) ≤4 months - exercise (aerobic) in the control groups was 47	The mean quality of life (sf-12 physical 0-100) ≤4 months - exercise (aerobic) in the intervention groups was 1.0 lower (4.76 lower to 2.76 higher)
Quality of life (SF-12 physical, 0-100) >4 months	99 (1 study)	LOW[a,b] due to risk of		The mean quality of life (sf-12 physical 0-100) >4 months - exercise (aerobic) in	The mean quality of life (sf-12 physical 0-100) >4 months - exercise (aerobic) in the

Exercise (aerobic)	>4 months	bias, imprecision		the control groups was 46	intervention groups was 1 lower (4.81 lower to 2.81 higher)
Quality of life (SF-12 mental, 0-100) ≤4 months Exercise (aerobic)	99 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-12 mental 0-100) ≤4 months - exercise (aerobic) in the control groups was 50	The mean quality of life (sf-12 mental 0-100) ≤4 months - exercise (aerobic)in the intervention groups was 1 higher (2.55 lower to 4.55 higher)
Quality of life (SF-12 mental, 0-100) >4 months Exercise (aerobic)	99 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-12 mental 0-100) >4 months - exercise (aerobic) in the control groups was 53	The mean quality of life (sf-12 mental 0-100) >4 months - exercise (aerobic) in the intervention groups was 1 higher (1.97 lower to 3.97 higher)
Pain severity (NRS, 0-10) ≤4 months Exercise (aerobic)	99 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean pain severity (NRS 0-10) ≤4 months - exercise (aerobic) in the control groups was 2.3	The mean pain severity (NRS 0-10) ≤4 months - exercise (aerobic) in the intervention groups was 0 higher (0.87 lower to 0.87 higher)
Pain severity (NRS, 0-10) > 4 months Exercise (aerobic)	99 (1 study) >4 months	VERY LOW[a,d] due to risk of bias, imprecision		The mean pain severity (NRS 0-10) >4 months - exercise (aerobic) in the control groups was 1.6	The mean pain severity (NRS 0-10) >4 months - exercise (aerobic) in the intervention groups was 0 (0.72 lower to 0.72 higher)
Function (RMDQ, 0-24) ≤4 months Exercise (aerobic)	99 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤4 months - exercise (aerobic) in the control groups was 3.8	The mean function (RMDQ, 0-24) ≤4 months - exercise (aerobic) in the intervention groups was 0.5 lower (2.02 lower to 1.02 higher)
Function (RMDQ, 0-24) >4 months Exercise (aerobic)	99 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean function (RMDQ, 0-24) (>4 months)- exercise (aerobic) in the control groups was 2.8	The mean function (RMDQ, 0-24) (≤4 months) - exercise (aerobic) in the intervention groups was 0.10 lower (1.49 lower to 1.29 higher)

Function (Back performance scale, 0-15) ≤4 months Exercise (aerobic)	100 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean function (back performance scale 0-15) ≤4 months - exercise (aerobic) in the control groups was 5.1	The mean function (back performance scale 0-15) ≤4 months - exercise (aerobic) in the intervention groups was 0 higher (1.1 lower to 1.1 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(d) Downgraded by 2 increments if the confidence interval crossed both MIDs

Table 371: MBR programme 3 elements: physical + psychological + education versus combined intervention (manual therapy + exercise + postural therapy + self-management; manual therapy + exercise + self-management) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 3 elements: physical + psychological + education (95% CI)
Pain severity (NRS, 0-10) ≤4 months Manual + exercise +postural therapy + self-management	150 (1 study)	LOW[a] due to risk of bias		The mean pain severity (NRS 0-10) ≤ 4 months in the control groups was 4.5	The mean pain severity (NRS 0-10) ≤ 4 months in the intervention groups was 3.10 lower (3.59 to 2.61 lower)
Pain severity (VAS 0-10) >4 months Manual therapy + exercise + advice	101 (1 study) >4 months	LOW[b,c] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) >4 months - manual + exercise + advice in the control groups was 4.2	The mean pain severity (VAS 0-10) >4 months - manual + exercise + advice in the intervention groups was 0.40 lower (1.51 lower to 0.71 higher)
Pain severity (NRS 0-10) >4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) >4 months	LOW[a] due to risk of bias		The mean pain severity (NRS 0-10) >4 months - manual + exercise + postural therapy + self-management in the control groups was 4.2	The mean pain severity (NRS 0-10) >4 months - manual + exercise + postural therapy + self-management in the intervention groups was 1.8 lower (2.3 to 1.3 lower)
Function (ODI 0-100) ≤4 months Manual therapy + exercise +	150 (1 study)	LOW[a] due to risk of		The mean function (ODI, 0-100) ≤4 months - manual + exercise + postural	The mean function (ODI, 0-100) ≤4 months - manual + exercise + postural

postural therapy + self-management	≤4 months	bias		therapy + self-management in the control groups was 25.3	therapy + self-management in the intervention groups was 9.8 lower (11.45 to 8.15 lower)
Function (RMDQ, 0-24) >4 months Manual therapy + exercise + advice	101 (1 study) >4 months	LOW[b,c] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) >4 months - manual + exercise + advice in the control groups was 8.1	The mean function (RMDQ, 0-24) >4 months - manual + exercise + advice in the intervention groups was 2.3 lower (4.51 to 0.09 lower)
Function (ODI, 0-100) >4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) >4 months	LOW[a] due to risk of bias		The mean function (ODI, 0-100) >4 months - manual + exercise + postural therapy + self-management in the control groups was 27.7	The mean function (ODI, 0-100) >4 months - manual + exercise + postural therapy + self-management in the intervention groups was 15.8 lower (17.48 to 14.12 lower)
Quality of life (SF-36 Physical functioning 0-100) ≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- physical functioning 0-100) ≤ 4 months in the control groups was 63.6	The mean quality of life (SF-36 - physical functioning 0-100) ≤ 4 months in the intervention groups was 20.8 higher (17.49 to 24.11 higher)
Quality of life (SF-36 Emotional role 0-100) ≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - emotional role 0-100) ≤ 4 months in the control groups was 53.9	The mean quality of life (SF-36- emotional role 0-100) ≤ 4 months in the intervention groups was 21.8 higher (15.3 to 28.3 higher)
Quality of life (SF-36 - General health 0-100) ≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - general health 0-100) ≤ 4 months in the control groups was 57.6	The mean quality of life (SF-36 - general health 0-100) ≤ 4 months in the intervention groups was 16.7 higher (12.74 to 20.66 higher)
Quality of life (SF-36 Mental health 0-100) ≤ 4 months Manual therapy + exercise +	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- mental health 0-100) ≤ 4 months in the control groups was	The mean quality of life (SF-36- mental health 0-100) ≤ 4 months in the intervention groups was 23.8 higher

postural therapy + self-management				62.5	(20.34 to 27.26 higher)
Quality of life (SF-36 Physical pain 0-100) ≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- physical pain 0-100) ≤ 4 months in the control groups was 55.2	The mean quality of life (SF-36- physical pain 0-100) ≤ 4 months in the intervention groups was 17.8 higher (13.06 to 22.54 higher)
Quality of life (SF-36 Physical role 0-100) ≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- physical role 0-100) ≤ 4 months in the control groups was 61.6	The mean quality of life (SF-36- physical role 0-100) ≤ 4 months in the intervention groups was 22.5 higher (16.9 to 28.1 higher)
Quality of life (SF-36 Social functioning 0-100)≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- social functioning 0-100) ≤ 4 months in the control groups was 63.4	The mean quality of life (SF-36 - social functioning 0-100) ≤ 4 months in the intervention groups was 18.4 higher (14.8 to 22 higher)
Quality of life (SF-36 Vitality 0-100) ≤ 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) ≤ 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - vitality 0-100) ≤ 4 months in the control groups was 63.8	The mean quality of life (SF-36 - vitality 0-100) ≤ 4 months in the intervention groups was 15.2 higher (11.09 to 19.31 higher)
Quality of life (SF-36 Physical functioning 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - physical functioning 0-100) > 4 months in the control groups was 60.1	The mean quality of life (SF-36 - physical functioning 0-100) > 4 months in the intervention groups was 27.6 higher (24.64 to 30.56 higher)
Quality of life (SF-36 Emotional role 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - emotional role 0-100) > 4 months in the control groups was 45.6	The mean quality of life (SF-36 - emotional role 0-100) > 4 months in the intervention groups was 34.4 higher (28.87 to 39.93 higher)
Quality of life (SF-36 General	150	LOW[a]		The mean quality of life (SF-36 - general	The mean quality of life (SF-36 - general

health 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	(1 study) > 4 months	due to risk of bias		health 0-100) > 4 months in the control groups was 55.7	health 0-100) > 4 months in the intervention groups was 25.9 higher (21.93 to 29.87 higher)
Quality of life (SF-36 Mental health 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - mental health 0-100) > 4 months in the control groups was 64.4	The mean quality of life (SF-36 - mental health 0-100) > 4 months in the intervention groups was 25.5 higher (22.13 to 28.87 higher)
Quality of life (SF-36 Physical pain 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- physical pain 0-100) > 4 months in the control groups was 49.3	The mean quality of life (SF-36- physical pain 0-100) > 4 months in the intervention groups was 27 higher (22.68 to 31.32 higher)
Quality of life (SF-36 Physical role 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - physical role 0-100) > 4 months in the control groups was 60.3	The mean quality of life (SF-36 - physical role 0-100) > 4 months in the intervention groups was 25.8 higher (20.96 to 30.64 higher)
Quality of life (SF-36 Social functioning 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 - social functioning 0-100) > 4 months in the control groups was 61.4	The mean quality of life (SF-36 - social functioning 0-100) > 4 months in the intervention groups was 22.7 higher (19.08 to 26.32 higher)
Quality of life (SF-36 Vitality 0-100) > 4 months Manual therapy + exercise + postural therapy + self-management	150 (1 study) > 4 months	LOW[a] due to risk of bias		The mean quality of life (SF-36- vitality 0-100) > 4 months in the control groups was 61.4	The mean quality of life (SF-36- vitality 0-100) > 4 months in the intervention groups was 23 higher (19.36 to 26.64 higher)
Quality of life (EQ-5D, -0.5 to 1.0) >4 months Manual therapy + exercise + advice	101 (1 study) >4 months	MODERATE[b] due to risk of bias		The mean quality of life (eq-5d -0.5 to 1.0) >4 months in the control groups was 0.72	The mean quality of life (eq-5d -0.5 to 1.0) >4 months in the intervention groups was 0.00 higher (0.11 lower to 0.11 higher)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(c) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 372: MBR programme 2 elements: physical + psychological versus usual care/waiting list control for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/waiting list control	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Pain severity (VAS 0-10) >4 months	106 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		*	The mean pain severity (VAS 0-10) >4 months in the intervention groups was 0.82 lower (1.64 lower to 0.00 higher)
Function (RMDQ, 0-24) >4 months	106 (1 study) >4 months	MODERATE[a] due to risk of bias		*	The mean function (RMDQ, 0-24) >4 months in the intervention groups was 2.56 lower (4.27 to 0.85 lower)
Psychological distress (BDI, 0-63) >4 months	106 (1 study) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		*	The mean psychological distress, BDI (>4 months) in the intervention groups was 0.04 higher (1.71 lower to 1.79 higher)
Return to work >4 months	70 (1 study) >4 months	VERY LOW[b,c] due to risk of bias, imprecision	RR 1.32 (1.05 to 1.67)	Moderate	
				688 per 1000	220 more per 1000 (from 34 more to 461 more)
* No control rate reported in study, only mean difference given					

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1MID
(c) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 373: MBR programme 2 elements: physical + psychological versus single intervention (psychological (cognitive behavioural approaches); mixed modality exercise (aerobic and biomechanical exercise); individual biomechanical exercise) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Pain severity (VAS 0-10) ≤4 months Mixed modality exercise (aerobic + biomechanical)	54 (1 study) 12 weeks	LOW[a] due to risk of bias		The mean pain (VAS 0-10) ≤4 months in the control groups was 5.25	The mean pain (VAS 0-10) ≤4 months in the intervention groups was 2.59 lower (3.28 to 1.90 lower)
Pain severity (VAS, 0-10) ≤4 months Mixed modality exercise (aerobic + biomechanical)	107 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) ≤4 months - mixed modality exercise (aerobic + biomechanical) in the control groups was 0.472	The mean pain severity (VAS 0-10) ≤4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.02 higher (0.88 lower to 0.92 higher)
Pain severity (VAS, 0-10) ≤4 months Psychological - cognitive behavioural approaches	110 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) (4 months - psychological (cognitive behavioural approaches) in the control groups was 1.025	The mean pain severity (VAS 0-10) (4 months - psychological (cognitive behavioural approaches) in the intervention groups was 0.53 lower (1.42 lower to 0.35 higher)
Pain severity (VAS 0-10) >4 months Mixed modality exercise (aerobic + biomechanical)	104 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) >4 months - mixed modality exercise (aerobic + biomechanical) in the control groups was 0.231	The mean pain severity (VAS 0-10) >4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.80 lower (1.71 lower to 0.1 higher)
Pain severity (VAS, 0-10) > 4 months Individual biomechanical exercise	112 (1 study) > 4 months	VERY LOW[b,C] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) >4 months – individual biomechanical exercise in the control groups was -1	The mean pain severity (VAS 0-10) >4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.70 lower (1.61 lower to 0.21 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Pain severity (VAS 0-10) >4 months Psychological - cognitive behavioural approaches	105 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) >4 months - psychological (cognitive behavioural approaches) in the control groups was 0.315	The mean pain severity (VAS 0-10) >4 months - psychological (cognitive behavioural approaches) in the intervention groups was 0.89 lower (1.79 lower to 0.02 higher)
Function (RMDQ, 0-24) ≤ 4 months Mixed modality exercise (aerobic + biomechanical)	54 (1 study) 12 weeks	LOW[a] due to risk of bias		The mean function (RMDQ, 0-24) ≤ 4 months in the control group was 9.88	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 4.55 lower (5.77 to 3.33 lower)
Function (RMDQ, 0-24) ≤4 months Mixed modality exercise (aerobic + biomechanical)	107 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean function (RMDQ, 0-24) ≤4 months - mixed modality exercise (aerobic + biomechanical) in the control groups was 2.42	The mean function (RMDQ, 0-24) ≤4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.05 higher (1.68 lower to 1.78 higher)
Function (RMDQ, 0-24) ≤4 months Psychological - cognitive behavioural approaches	110 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean The mean function (RMDQ, 0-24) ≤4 months - psychological (cognitive behavioural approaches) in the control groups was 3.04	The mean function (RMDQ, 0-24) ≤4 months - psychological (cognitive behavioural approaches) in the intervention groups was 0.57 lower (2.26 lower to 1.12 higher)
Function (RMDQ, 0-24) >4 months Mixed modality exercise (aerobic + biomechanical)	212 (2 studies) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) >4 months - mixed modality exercise (aerobic + biomechanical) in the control groups was 3.25	The mean function (RMDQ, 0-24) >4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 1.19 lower (2.43 lower to 0.04 higher)
Function (RMDQ, 0-24) >4	213	LOW[a,b]		The mean function (RMDQ, 0-24) >4	The mean function (RMDQ, 0-24) >4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
months Psychological - cognitive behavioural approaches	(2 studies) >4 months	due to risk of bias, imprecision		months - psychological (cognitive behavioural approaches) in the control groups was 3.50	months - psychological (cognitive behavioural approaches) in the intervention groups was 1.44 lower (2.64 to 0.24 lower)
Psychological distress (BDI, 0-63) ≤4 months Mixed modality exercise (aerobic + biomechanical)	105 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (BDI, 0-63) ≤4 months - mixed modality exercise (aerobic + biomechanical) in the control groups was 2.86	The mean psychological distress (BDI, 0-63) ≤4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 2.17 lower (4.13 to 0.21 lower)
Psychological distress (BDI, 0-63) ≤4 months Psychological - cognitive behavioural approaches	110 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (BDI, 0-63) ≤4 months - psychological (cognitive behavioural approaches) in the control groups was 2.31	The mean psychological distress (BDI, 0-63) ≤4 months - psychological (cognitive behavioural approaches) in the intervention groups was 1.62 lower (3.56 lower to 0.32 higher)
Psychological distress (BDI, 0-63) >4 months Psychological - cognitive behavioural approaches	105 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean psychological distress (BDI, 0-63) >4 months - psychological (cognitive behavioural approaches) in the control groups was 2.08	The mean psychological distress (BDI, 0-63) >4 months - psychological (cognitive behavioural approaches) in the intervention groups was 0.09 higher (1.88 lower to 2.06 higher)
Psychological distress (BDI, 0-63) >4 months Mixed modality exercise (aerobic + biomechanical)	104 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (BDI, 0-63) >4 months - mixed modality exercise (aerobic + biomechanical) in the control groups was 3.23	The mean psychological distress (BDI, 0-63) >4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 1.06 lower (3.04 lower to 0.92 higher)
Psychological distress (HADS, 0-	83	VERY LOW[b,c]		The mean Psychological distress (HADS,	The mean Psychological distress (HADS, 0-

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
21) >4 months Individual biomechanical exercise	(1 study) > 4 months	due to risk of bias, imprecision		0-21) >4 months – individual biomechanical exercise in the control groups was 13.4	21) >4 months - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.70 lower (3.63 lower to 2.23 higher)
Return to work ≤4 months Individual biomechanical exercise	75 (1 study) > 4 months	VERY LOW[b,c] due to risk of bias, imprecision	RR 1.04 (0.76 to 1.42)	Moderate	
				667 per 1000	27 more per 1000 (from 160 fewer to 280 more)
Return to work >4 months Individual biomechanical exercise	112 (1 study) > 4 months	VERY LOW[b,c] due to risk of bias, imprecision	RR 1.10 (0.96 to 1.25)	Moderate	
				854 per 1000	85 more per 1000 (from 34 fewer to 214 more)
Healthcare utilisation, number of GP visits >4 months Mixed modality exercise (aerobic + biomechanical)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of GP visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups was 2.99	The mean healthcare utilisation, number of GP visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.87 lower (2.52 lower to 0.78 higher)
Healthcare utilisation (number of medical specialist visits) >4 months Mixed modality exercise (aerobic + biomechanical)	108 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean healthcare utilisation, number of medical specialist visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups was 1.7	The mean healthcare utilisation, number of medical specialist visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.15 lower (1.18 lower to 0.88 higher)
Healthcare utilisation (number of radiology visits) >4 months Mixed modality exercise (aerobic	108 (1 study) >4 months	LOW[a,b] due to risk of bias,		The mean healthcare utilisation, number of radiology visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups	The mean healthcare utilisation, number of radiology visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
+ biomechanical)		imprecision		was 0.06	was 0.20 higher (0.19 lower to 0.59 higher)
Healthcare utilisation (number of occupational physician visits) >4 months Mixed modality exercise (aerobic + biomechanical)	108 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean healthcare utilisation, number of occupational physician visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups was 0.1	The mean healthcare utilisation, number of occupational physician visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.02 higher (0.15 lower to 0.19 higher)
Healthcare utilisation (number of psychologist visits) >4 months Mixed modality exercise (aerobic + biomechanical)	108 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean healthcare utilisation, number of psychologist visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups was 0.57	The mean healthcare utilisation, number of psychologist visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 0.23 lower (1.14 lower to 0.68 higher)
Healthcare utilisation (number of therapist sessions) >4 months Mixed modality exercise (aerobic + biomechanical)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of therapist sessions (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups was 4.41	The mean healthcare utilisation, number of therapist sessions (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 2.95 higher (4.17 lower to 10.07 higher)
Healthcare utilisation (number of alternative therapist visits) >4 months Mixed modality exercise (aerobic + biomechanical)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of alternative therapist visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the control groups was 1.85	The mean healthcare utilisation, number of alternative therapist visits (>4 months) - mixed modality exercise (aerobic + biomechanical) in the intervention groups was 1.32 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
					(2.15 lower to 4.79 higher)
Healthcare utilisation (number of GP visits) >4 months Psychological (cognitive behavioural approaches)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of GP visits (>4 months) - psychological (cognitive behavioural approaches) in the control groups was 3.29	The mean healthcare utilisation, number of GP visits (>4 months) - psychological (cognitive behavioural approaches) in the intervention groups was 1.17 lower (2.58 lower to 0.24 higher)
Healthcare utilisation (number of medical specialist care visits) >4 months Psychological (cognitive behavioural approaches)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of medical specialist care visits (>4 months) - psychological (cognitive behavioural approaches) in the control groups was 1.12	The mean healthcare utilisation, number of medical specialist care visits (>4 months) - psychological (cognitive behavioural approaches) in the intervention groups was 0.43 higher (0.44 lower to 1.3 higher)
Healthcare utilisation (number of radiology visits) >4 months Psychological (cognitive behavioural approaches)	108 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean healthcare utilisation, number of radiology visits (>4 months) - psychological (cognitive behavioural approaches) in the control groups was 0.16	The mean healthcare utilisation, number of radiology visits (>4 months) - psychological (cognitive behavioural approaches) in the intervention groups was 0.10 higher (0.31 lower to 0.51 higher)
Healthcare utilisation (number of occupational physician visits) >4 months Psychological (cognitive behavioural approaches)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of occupational physician visits (>4 months) - psychological (cognitive behavioural approaches) in the control groups was 0.24	The mean healthcare utilisation, number of occupational physician visits (>4 months) - psychological (cognitive behavioural approaches) in the intervention groups was 0.12 lower (0.41 lower to 0.17 higher)
Healthcare utilisation (number of psychologist visits) >4 months	108 (1 study)	MODERATE[a] due to risk of		The mean healthcare utilisation, number of psychologist visits (>4 months)-	The mean healthcare utilisation, number of psychologist visits (>4 months)-

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Psychological (cognitive behavioural approaches)	>4 months	bias		psychological (cognitive behavioural approaches) in the control groups was 0.29	psychological (cognitive behavioural approaches) in the intervention groups was 0.05 higher (0.42 lower to 0.52 higher)
Healthcare utilisation (number of therapist visits) >4 months Psychological (cognitive behavioural approaches)	108 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean healthcare utilisation, number of therapist visits (>4 months)- psychological (cognitive behavioural approaches) in the control groups was 9.03	The mean healthcare utilisation, number of therapist visits (>4 months)- psychological (cognitive behavioural approaches) in the intervention groups was 1.67 lower (9.97 lower to 6.63 higher)
Healthcare utilisation (number of alternative therapist visits) >4 months Psychological (cognitive behavioural approaches)	108 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation, number of alternative therapist visits (>4 months)- psychological (cognitive behavioural approaches) in the control groups was 1.5	The mean healthcare utilisation, number of alternative therapist visits (>4 months)- psychological (cognitive behavioural approaches) in the intervention groups was 1.67 higher (1.67 lower to 5.01 higher)

a Downgraded by 1 increment if the majority of the evidence was at high risk of bias
b Downgraded by 1 increment if the confidence interval crossed 1 MID
c Downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 374: MBR programme 2 elements: physical + psychological versus combined intervention (exercise (biomechanical) + manual therapy; exercise (biomechanical) + manual therapy + postural therapy) for low back pain with or without sciatica

Outcomes	No of	Quality of	Relati	Anticipated absolute effects

	Participants (studies) Follow up	the evidence (GRADE)	ve effect (95% CI)	Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Pain severity (NRS 0-10) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation).	90 (1 study) ≤4 months	MODERATE [a] due to risk of bias		The mean pain severity, NRS 0-10 (≤4 months) - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 4.96	The mean pain severity, NRS 0-10 (≤4 months) - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 2.27 lower (2.74 to 1.8 lower)
Pain severity (NRS 0-10) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation + manipulation)	94 (1 studies) ≤4 months	MODERATE [a] due to risk of bias		The mean pain severity, NRS 0-10 (≤4 months) - exercise (biomechanical) + manual therapy (mobilisation + manipulation) in the control groups was 3.8	The mean pain severity, NRS 0-10 (≤4 months) - exercise (biomechanical) + manual therapy (mobilisation + manipulation) in the intervention groups was 2.10 lower 2.83 to 1.37 lower
Pain severity (NRS 0-10) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean pain severity, NRS 0-10 (≤4 months) - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 3	The mean pain severity, NRS 0-10 (≤4 months) - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 1 lower (2.39 lower to 0.39 higher)
Pain severity (NRS 0-10) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE [a] due to risk of bias		The mean pain severity, NRS 0-10 (>4 months)- exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 5.33	The mean pain severity, NRS 0-10 (>4 months)- exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 3.95 lower (4.42 to 3.48 lower)
Pain severity (NRS 0-10) >4 months Exercise (biomechanical) + manual therapy (mobilisation + manipulation)	94 (1 study) >4	LOW[a,c] due to risk of bias,		The mean pain severity, NRS 0-10 (>4 months)- exercise (biomechanical) + manual therapy (mobilisation +	The mean pain severity, NRS 0-10 (>4 months)- exercise (biomechanical) + manual therapy (mobilisation +

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
	months	imprecision		manipulation) in the control groups was 3.8	manipulation) in the intervention groups was 1.50 lower (2.33 to 0.67 lower)
Function (RMDQ, 0-24) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	MODERATE [a] due to risk of bias		The mean function (RMDQ, 0-24) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 11.04	The mean function (RMDQ, 0-24) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 6.0 lower (6.89 to 5.11 lower)
Function (ODI, 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation + manipulation)	94 (1 study) ≤4 months	MODERATE [a] due to risk of bias		The mean function (ODI, 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation + manipulation) in the control groups was 18.5	The mean function (ODI, 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation + manipulation) in the intervention groups was 10.90 lower (13.94 to 7.86 lower)
Function (ODI, 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW [b] due to risk of bias		The mean function (ODI, 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 15	The mean function (ODI, 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 7 lower (11.16 to 2.84 lower)
Function (RMDQ, 0-24) > 4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE [a] due to risk of bias		The mean function (RMDQ, 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was	The mean function (RMDQ, 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
				11	9.69 lower (10.44 to 8.94 lower)
Function (ODI, 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation + manipulation)	94 (1 study) >4 months	LOW[a,c] due to risk of bias, imprecision		The mean function (ODI, 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation + manipulation) in the control groups was 19.7	The mean function (ODI, 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation + manipulation) in the intervention groups was 9.80 lower (14.21 to 5.39 lower)
Quality of life (SF-36 physical functioning 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 - physical functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 57.44	The mean quality of life (SF-36 - physical functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 21.00 higher (12.78 to 29.22 higher)
Quality of life (SF-36 physical functioning 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - physical functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 67	The mean quality of life (SF-36 - physical functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 17 higher (9.77 to 24.23 higher)
Quality of life (SF-36 emotional role 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation).	90 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 - emotional role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control	The mean quality of life (SF-36 - emotional role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
				groups was 55.56	intervention groups was 21.33 higher (9.49 to 33.17 higher)
Quality of life (SF-36 emotional role 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - emotional role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 57	The mean quality of life (SF-36 - emotional role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 20 higher (5.98 to 34.02 higher)
Quality of life (SF-36 general health 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	LOW[a,c] due to risk of bias, imprecision		The mean quality of life (SF-36 - general health 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 44.22	The mean quality of life (SF-36 - general health 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 29.00 higher (21.82 to 36.18 higher)
Quality of life (SF-36 general health 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - general health 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 55	The mean quality of life (SF-36 - general health 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 16 higher (10.15 to 21.85 higher)
Quality of life (SF-36 mental health 0-100) ≤4 months	90 (1 study)	MODERATE[a]		The mean quality of life (SF-36 - general health 0-100) ≤4 months -	The mean quality of life (SF-36 - general health 0-100) ≤4 months - exercise

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Exercise (biomechanical) + manual therapy (mobilisation)	≤4 months	due to risk of bias		exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 55.47	(biomechanical) + manual therapy (mobilisation) in the intervention groups was 26.31 higher (20.84 to 31.78 higher)
Quality of life (SF- 36 mental health 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - general health 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 67	The mean quality of life (SF-36 - general health 0-100) ≤4 months exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 21 higher (11.32 to 30.68 higher)
Quality of life (SF-36 physical pain 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 - physical pain 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 44	The mean quality of life (SF-36 - physical pain 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 24.36 higher (18 to 30.72 higher)
Quality of life (SF-36 physical pain 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	VERY LOW[b,c] due to risk of bias, imprecision		The mean quality of life (SF-36 - physical pain 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 55	The mean quality of life (SF-36 - physical pain 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 10 higher (1.39 to 18.61 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Quality of life (SF-36 physical role 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	MODERATE [a] due to risk of bias		The mean quality of life (SF-36 - physical role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 50.56	The mean quality of life (SF-36 - physical role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 21.66 higher (9.83 to 33.49 higher)
Quality of life (SF-36 physical role 0-100) ≤4 months) Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control).	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - physical role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 59	The mean quality of life (SF-36 - physical role 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 21 higher (8.97 to 33.03 higher)
Quality of life (SF-36 social functioning 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	MODERATE [a] due to risk of bias		The mean quality of life (SF-36- social functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 63.06	The mean quality of life (SF-36- social functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 22.77 higher (15.96 to 29.58 higher)
Quality of life (SF-36 social functioning 0-100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - social functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 61	The mean quality of life (SF-36 - social functioning 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 20 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
					(13.86 to 26.14 higher)
Quality of life (SF-36 vitality 0-100) ≤4 months- Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) ≤4 months	LOW[a,c] due to risk of bias, imprecision		The mean quality of life (SF-36 - vitality 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 51.89	The mean quality of life (SF-36 - vitality 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 25.33 higher (19.01 to 31.65 higher)
Quality of life (SF-36 vitality 0 -100) ≤4 months Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) ≤4 months	LOW[b] due to risk of bias		The mean quality of life (SF-36 - vitality 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the control groups was 62	The mean quality of life (SF-36 - vitality 0-100) ≤4 months - exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control) in the intervention groups was 20 higher (11.57 to 28.43 higher)
Quality of life (SF-36 physical functioning 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 physical functioning 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 62.11	The mean quality of life (SF-36 physical functioning 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 23.56 higher (15.49 to 31.63 higher)
Quality of life (SF-36 emotional role 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 emotional role 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was	The mean quality of life (SF-36 emotional role 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
				58.52	32.59 higher (26.52 to 38.66 higher)
Quality of life (SF-36 general health 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	LOW[a,c] due to risk of bias, imprecision		The mean quality of life (SF-36 general health 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 56.44	The mean quality of life (SF-36 general health 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 28.56 higher (22.41 to 34.71 higher)
Quality of life (SF-36 mental health 0-100)>4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	LOW[a,c] due to risk of bias, imprecision		The mean quality of life (SF-36 mental health 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 54.13	The mean quality of life (SF-36 mental health 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 35.65 higher (30.5 to 40.8 higher)
Quality of life (SF-36 physical pain 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 physical pain 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 52.02	The mean quality of life (SF-36 physical pain 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 26.96 higher (20.57 to 33.35 higher)
Quality of life (SF-36 physical role 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 physical role 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was	The mean quality of life (SF-36 physical role 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combined intervention	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
				60.33	25.78 higher (17.85 to 33.71 higher)
Quality of life (SF-36 social functioning 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	LOW[a,c] due to risk of bias, imprecision		The mean quality of life (SF-36 social functioning 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 54.44	The mean quality of life (SF-36 social functioning 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 36.56 higher (32.05 to 41.07 higher)
Quality of life (SF-36 vitality 0-100) >4 months Exercise (biomechanical) + manual therapy (mobilisation)	90 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean quality of life (SF-36 vitality 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the control groups was 55.33	The mean quality of life (SF-36 vitality 0-100) >4 months - exercise (biomechanical) + manual therapy (mobilisation) in the intervention groups was 34.67 higher (29.98 to 39.36 higher)
Healthcare utilisation, care-seeking after intervention >4 months Exercise (biomechanical) + manual therapy (manipulation + mobilisation)	94 (1 study) >4 months	LOW[a,c] due to risk of bias, imprecision		The mean healthcare utilisation, care-seeking after intervention (>4 months)- exercise (biomechanical) + manual therapy (manipulation + mobilisation) in the control groups was 10.6	The mean healthcare utilisation, care-seeking after intervention (>4 months) - exercise (biomechanical) + manual therapy (manipulation + mobilisation) in the intervention groups was 8.50 lower (12.74 to 4.26 lower)
Healthcare utilisation, medicine use (≤4 months) Exercise (biomechanical) + manual therapy (mobilisation) + postural therapy (postural control)	20 (1 study) >4 months	VERY LOW[b,c] due to risk of bias, imprecision	RR 0.07 (0 to 1.03)	Moderate	
					-

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(c) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 375: MBR programme 2 elements: physical + education versus single intervention (biomechanical exercise – core stability) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + education (95% CI)
Pain severity (VAS 0-10) ≤4 months	272 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) ≤4 months in the control groups was 1.12	The mean pain severity (VAS 0-10) ≤4 months in the intervention groups was 0.53 higher (0.05 lower to 1.11 higher)
Pain severity (VAS 0-10) >4 months	272 (1 study) >4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS 0-10) >4 months in the control groups was 0.86	The mean pain severity, VAS 0-10 (>4 months) in the intervention groups was 0.66 higher (0.09 to 1.23 higher)
Function (RMDQ, 0-24) ≤4 months	272 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Function (RMDQ, 0-24) ≤4 months in the control groups was 1.5	The mean Function (RMDQ, 0-24) ≤4 months in the intervention groups was 1.5 higher (0.34 to 2.66 higher)
Function (RMDQ, 0-24) >4 months	272 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Function (RMDQ, 0-24) >4 months in the control groups was 1.2	The mean Function (RMDQ, 0-24) >4 months in the intervention groups was 2.10 higher (0.81 to 3.39 higher)
Quality of life (SF-36 physical functioning, 0-100) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical functioning, 0-100) ≤4 months in the control groups was 6	The mean Quality of life (SF-36 physical functioning, 0-100) ≤4 months in the intervention groups was 6.20 higher (1.53 to 10.87 higher)
Quality of life (SF-36 emotional role, 0-	272 (1 study)	VERY LOW[a,c] due to risk		The mean Quality of life (SF-36 emotional role, 0-100) ≤4 months in the	The mean Quality of life (SF-36 emotional role, 0-100) ≤4 months in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + education (95% CI)
100) ≤4 months	≤4 months	of bias, imprecision		control groups was 4.3	intervention groups was 3.10 higher (7 lower to 13.2 higher)
Quality of life (SF-36 general health, 0-100) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 general health, 0-100) ≤4 months in the control groups was 1.4	The mean Quality of life (SF-36 general health, 0-100) ≤4 months in the intervention groups was 1.29 lower (5.69 lower to 3.11 higher)
Quality of life (SF-36 mental health, 0-100) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 mental health, 0-100) ≤4 months in the control groups was 6.2	The mean Quality of life (SF-36 mental health, 0-100) ≤4 months in the intervention groups was 0.10 lower (4.75 lower to 4.55 higher)
Quality of life (SF-36 physical pain 0-100) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical pain 0-100) ≤4 months in the control groups was 9.5	The mean Quality of life (SF-36 physical pain 0-100) ≤4 months in the intervention groups was 5.70 higher (0.61 to 10.79 higher)
Quality of life (SF-36 physical role, 0-100) ≤4 months	272 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean Quality of life (SF-36 physical role, 0-100) ≤4 months in the control groups was 13.5	The mean Quality of life (SF-36 physical role, 0-100) ≤4 months in the intervention groups was 3.2 higher (5.75 lower to 12.15 higher)
Quality of life (SF-36 social functioning, 0-200) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 social functioning, 0-200) ≤4 months in the control groups was 7.3	The mean Quality of life (SF-36 social functioning, 0-200) ≤4 months in the intervention groups was 0.40 higher (5.08 lower to 5.88 higher)
Quality of life (SF-36 vitality, 0-100) ≤4	272	LOW[a]		The mean Quality of life (SF-36 vitality,	The mean Quality of life (SF-36 vitality, 0-

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + education (95% CI)
months	(1 study) ≤4 months	due to risk of bias		0-100) ≤4 months in the control groups was 8	100) ≤4 months in the intervention groups was 3.00 higher (2.04 lower to 8.04 higher)
Quality of life (SF-36 physical component summary score, 0-100) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical component summary score, 0-100) ≤4 months in the control groups was 2.8	The mean Quality of life (SF-36 physical component summary score, 0-100) ≤4 months in the intervention groups was 2.20 higher (0.41 to 3.99 higher)
Quality of life (SF-36 mental component summary score, 0-100) ≤4 months	272 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 mental component summary score, 0-100) ≤4 months in the control groups was 2.5	The mean Quality of life (SF-36 mental component summary score, 0-100) ≤4 months in the intervention groups was 0.40 lower (2.89 lower to 2.09 higher)
Quality of life (SF-36 physical functioning, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical functioning, 0-100) >4 months in the control groups was 2	The mean Quality of life (SF-36 physical functioning, 0-100) >4 months in the intervention groups was 10.10 higher (4.92 to 15.28 higher)
Quality of life (SF-36 emotional role, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 emotional role, 0-100) >4 months in the control groups was 8.6	The mean Quality of life (SF-36 emotional role, 0-100) >4 months in the intervention groups was 8.30 higher (2.82 lower to 19.42 higher)
Quality of life (SF-36 general health, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 general health, 0-100) >4 months in the control groups was 2.4	The mean Quality of life (SF-36 general health, 0-100) >4 months in the intervention groups was 2.34 lower (6.47 lower to 1.79 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + education (95% CI)
Quality of life (SF-36 mental health, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 mental health, 0-100) >4 months in the control groups was 4.7	The mean Quality of life (SF-36 mental health, 0-100) >4 months in the intervention groups was 2.90 higher (2.07 lower to 7.87 higher)
Quality of life (SF-36 physical pain, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical pain, 0-100) >4 months in the control groups was 9.8	The mean Quality of life (SF-36 physical pain, 0-100) >4 months in the intervention groups was 4.80 higher (0.42 lower to 10.02 higher)
Quality of life (SF-36 physical role, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical role, 0-100) >4 months in the control groups was 16.9	The mean Quality of life (SF-36 physical role, 0-100) >4 months in the intervention groups was 8.30 higher (1.14 lower to 17.74 higher)
Quality of life (SF-36 social functioning, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 social functioning, 0-100) >4 months in the control groups was 4.2	The mean Quality of life (SF-36 social functioning, 0-100) >4 months in the intervention groups was 4.40 higher (1.97 lower to 10.77 higher)
Quality of life (SF-36 vitality, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 vitality, 0-100) >4 months in the control groups was 5.1	The mean Quality of life (SF-36 vitality, 0-100) >4 months in the intervention groups was 6.50 higher (0.86 to 12.14 higher)
Quality of life (SF-36 physical component summary score, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36 physical component summary score, 0-100) >4 months in the control groups was 1.9	The mean Quality of life (SF-36 physical component summary score, 0-100) >4 months in the intervention groups was 3.20 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Single intervention	Risk difference with MBR programme 2 elements: physical + education (95% CI)
					(1.32 to 5.08 higher)
Quality of life (SF-36- mental component summary score, 0-100) >4 months	272 (1 study) >4 months	LOW[a] due to risk of bias		The mean Quality of life (SF-36- mental component summary score, 0-100) >4 months in the control groups was 2.2	The mean Quality of life (SF-36- mental component summary score, 0-100) >4 months in the intervention groups was 1.60 higher (1.1 lower to 4.3 higher)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 2 increments if the confidence interval crossed both MIDs

Table 376: MBR programme 2 elements: physical (exercise + manipulation) + education versus single intervention (manual therapy - manipulation) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with massage	Risk difference with 2-MBR physical (manipulation + exercise) + education (95% CI)
Pain (McGill Present Pain Intensity 0-5) ≤ 4 months	46 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill present pain intensity 0-5) ≤4 months in the control groups was 1.18	The mean pain (McGill present pain intensity 0-5) ≤4 months in the intervention groups was 0.76 lower (1.43 to 0.09 lower)
Pain (McGill Pain Rating Index 0-78 ≤ 4 months	46 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill pain rating index 0-78) ≤4 months in the control groups was 4.55	The mean pain (McGill pain rating index 0-78) ≤4 months in the intervention groups was 2.26 lower (5.17 lower to 0.65 higher)
Function (RMDQ 0-24) ≤ 4 months	46 (1 study)	VERY LOW[a,b] due to risk of		The mean function (RMDQ 0-24) ≤4 months in the control groups was	The mean function (RMDQ 0-24) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with massage	Risk difference with 2-MBR physical (manipulation + exercise) + education (95% CI)
		bias, imprecision		2.86	1.32 lower (2.84 lower to 0.2 higher)
Psychological distress (Anxiety, STAI 20-80) ≤ 4 months	46 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (anxiety, stai 20-80) ≤4 months in the control groups was 30.73	The mean psychological distress (anxiety, stai 20-80) ≤4 months in the intervention groups was 6.94 lower (11.31 to 2.57 lower)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 377: MBR programme 2 elements: physical (exercise) + education versus single intervention (manual therapy - manipulation) for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with 2-MBR physical (ex) + education (95% CI)
Pain (McGill Present Pain Intensity 0-5) ≤ 4 months	43 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill present pain intensity 0-5) ≤4 months in the control groups was 1.18	The mean pain (McGill present pain intensity 0-5) ≤4 months in the intervention groups was 0.15 higher (0.56 lower to 0.86 higher)
Pain (McGill Pain Rating Index 0-78) ≤ 4 months	43 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain (McGill pain rating index 0-78) ≤4 months in the control groups was 4.55	The mean pain (McGill pain rating index 0-78) ≤4 months in the intervention groups was 0.64 higher (2.37 lower to 3.65 higher)
Function (RMDQ, 0-24) ≤ 4 months	43	VERY LOW[a,b]		The mean Function (RMDQ, 0-24) ≤ 4	The mean Function (RMDQ, 0-24) ≤ 4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with 2-MBR physical (ex) + education (95% CI)
	(1 study)	due to risk of bias, imprecision		months in the control groups was 2.86	months in the intervention groups was 2.85 higher (0.42 to 5.28 higher)
Psychological distress (Anxiety, STAI 20-80) ≤ 4 months	43 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress (anxiety, stai 20-80) ≤4 months in the control groups was 30.73	The mean psychological distress (anxiety, stai 20-80) ≤4 months in the intervention groups was 1.92 lower (7.02 lower to 3.18 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 378: MBR programme 3 elements: physical + psychological (cognitive) + education versus MBR programme 2 elements: physical + education for low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with MBR program 2 elements: physical + education	Risk difference with MBR program 3 elements (psych=cognitive) (95% CI)
Pain Intensity (pain rating chart, 0-5) ≤4 months	35 (2 studies) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain intensity, pain rating chart (≤4 months) in the control groups was 2.89	The mean pain intensity, pain rating chart (≤4 months) in the intervention groups was 0.18 higher (0.33 lower to 0.69 higher)
Pain Intensity (pain rating chart, 0-5) >4 months	29 (2 studies) >4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain intensity, pain rating chart (>4 months)in the control groups was 2.73	The mean pain intensity, pain rating chart (>4 months)in the intervention groups was 0.34 higher (0.32 lower to 1 higher)
Psychological distress (BDI, 0-63) ≤4 months	35 (2 studies)	VERY LOW[a,b] due to risk of		The mean psychological distress, beck depression inventory (≤4 months) in	The mean psychological distress, beck depression inventory (≤4 months) in the

	≤4 months	bias, imprecision		the control groups was 14.28	intervention groups was 3.95 higher (0.31 lower to 8.2 higher)
Psychological distress (BDI, 0-63) >4 months	32 (2 studies) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean psychological distress, beck depression inventory (>4 months)in the control groups was 14.53	The mean psychological distress, beck depression inventory (>4 months)in the intervention groups was 0.36 lower (5.21 lower to 4.48 higher)
Psychological distress (State-Trait Inventory: State) ≤4 months	17 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean psychological distress, state-trait inventory: state (≤4 months) in the control groups was 48.89	The mean psychological distress, state-trait inventory: state (≤4 months) in the intervention groups was 2.24 higher (9.18 lower to 13.66 higher)
Psychological distress (State-Trait Inventory: State) >4 months	15 (1 study) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean psychological distress, state-trait inventory: state (>4 months) in the control groups was 46.56	The mean psychological distress, state-trait inventory: state (>4 months) in the intervention groups was 0.61 higher (14.94 lower to 16.16 higher)
Function (Sickness Impact Profile) ≤4 months	35 (2 studies) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Function, sickness impact profile (≤4 months) in the control groups was 25.71	The mean Function, sickness impact profile (≤4 months) in the intervention groups was 3.23 lower (10.84 lower to 4.39 higher)
Function (Sickness Impact Profile) >4 months	32 (2 studies) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean Function, sickness impact profile (>4 months) in the control groups was 22.13	The mean Function, sickness impact profile (>4 months) in the intervention groups was 1.95 lower (10.02 lower to 6.11 higher)
Healthcare utilisation (medication use) ≤4 months	17 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean medication use (≤4 months) in the control groups was 1.23	The mean medication use (≤4 months) in the intervention groups was 0.02 higher (0.96 lower to 1 higher)
Healthcare utilisation (medication use) >4 months	15 (1 study)	VERY LOW[a,c] due to risk of		The mean medication use (>4 months) in the control groups was	The mean medication use (>4 months) in the intervention groups was

	>4 months	bias, imprecision		1.44	0.23 higher (1.03 lower to 1.49 higher)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed either the MID for benefit or the MID for harm
(c) Downgraded by 2 increments if the confidence interval crossed both the MID for benefit and the MID for harm

Table 379: MBR programme 3 elements: physical + psychological (behavioural) + education versus MBR programme 2 elements: physical + education for low back pain (with or without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with MBR program 2 elements: physical + education	Risk difference with MBR program 3 elements (psych=behavioural) (95% CI)
Pain Intensity (pain rating chart, 0-5) ≤4 months	17 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain intensity, pain rating chart (≤4 months) in the control groups was 3.03	The mean pain intensity, pain rating chart (≤4 months) in the intervention groups was 0.8 lower (1.47 to 0.13 lower)
Pain Intensity (pain rating chart, 0-5) >4 months	13 (1 study) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean pain intensity, pain rating chart (>4 months) in the control groups was 2.7	The mean pain intensity, pain rating chart (>4 months) in the intervention groups was 0.14 lower (1.17 lower to 0.89 higher)
Psychological distress (BDI, 0-63) ≤4 months	17 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean psychological distress, beck depression inventory (≤4 months) in the control groups was 12.11	The mean psychological distress, beck depression inventory (≤4 months) in the intervention groups was 5.02 higher (2.52 lower to 12.56 higher)
Psychological distress (BDI, 0-63) >4 months	15 (1 study) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean psychological distress, beck depression inventory (>4 months) in the control groups was 10.56	The mean psychological distress, beck depression inventory (> 4 months) in the intervention groups was 8.11 higher (0.61 lower to 16.83 higher)
Psychological distress (State-Trait Inventory: State) ≤4 months	17 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean psychological distress, state-trait inventory: state (≤4 months) in the control groups was 48.89	The mean psychological distress, state-trait inventory: state (≤4 months) in the intervention groups was 1.49 higher

					(9.58 lower to 12.56 higher)
Psychological distress (State-Trait Inventory: State) >4 months	15 (1 study) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean psychological distress, state-trait inventory: state (> 4 months) in the control groups was 46.56	The mean psychological distress, state-trait inventory: state (> 4 months) in the intervention groups was 3.73 lower (14.38 lower to 6.92 higher)
Function, Sickness Impact Profile (≤4 months)	17 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Function, sickness impact profile (≤4 months) in the control groups was 25.34	The mean Function, sickness impact profile (≤4 months) in the intervention groups was 7.2 lower (17.52 lower to 3.12 higher)
Function, Sickness Impact Profile (>4 months)	15 (1 study) >4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean Function, sickness impact profile (>4 months) in the control groups was 18.94	The mean Function, sickness impact profile (>4 months) in the intervention groups was 4.91 higher (8.12 lower to 17.94 higher)
Healthcare utilisation (medication use) ≤4 months	17 (1 study) ≤4 months	VERY LOW[a,c] due to risk of bias, imprecision		The mean medication use (≤4 months) in the control groups was 1.23	The mean medication use (≤4 months) in the intervention groups was 0.02 higher (1.08 lower to 1.12 higher)
Healthcare utilisation (medication use) >4 months	15 (1 study) >4 months–1 year	VERY LOW[a,c] due to risk of bias, imprecision		The mean medication use (>4 months) in the control groups was 1.44	The mean medication use (>4 months) in the intervention groups was 0.27 lower (1.53 lower to 0.99 higher)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed either the MID for benefit or the MID for harm
(c) Downgraded by 2 increments if the confidence interval crossed both the MID for benefit and the MID for harm

Table 380: MBR programme 3 elements: physical + psychological + education versus usual care/waiting list control for low back pain (without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/waiting list control	Risk difference with MBR programme 3 elements: physical + psychological + education (95% CI)
Pain severity (Aberdeen pain scale, 0-100, higher scores	179 (1 study)	LOW[a,b] due to risk of		The mean pain severity, Aberdeen pain scale 0-100 (≤4 months) in the control	The mean pain severity, Aberdeen pain scale 0-100 (≤4 months) in the

indicate worse outcome) ≤4 months	≤4 months	bias, imprecision		groups was -8.99	intervention groups was 2.59 higher (0.37 to 4.81 higher)
Pain severity (Aberdeen pain scale, 0-100, higher scores indicate worse outcome) >4 months	171 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity, Aberdeen pain scale 0-100 (>4 months)in the control groups was -8.48	The mean pain severity, Aberdeen pain scale 0-100 (>4 months)in the intervention groups was 4.44 higher (1.01 to 7.87 higher)
Function (RMDQ, 0-24) ≤4 months	179 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean Function (RMDQ, 0-24) ≤4 months in the control groups was -1.94	The mean Function (RMDQ, 0-24) ≤4 months in the intervention groups was 0.92 higher (0.02 lower to 1.86 higher)
Function (RMDQ, 0-24) >4 months	171 (1 study) >4 months	LOW[a,b] due to risk of bias, imprecision		The mean Function (RMDQ, 0-24) >4 months in the control groups was -1.77	The mean Function (RMDQ, 0-24) >4 months in the intervention groups was 1.42 higher (0.29 to 2.55 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 381: MBR programme 2 elements: physical + psychological versus usual care/waiting list control for low back pain (without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/waiting list control	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
Psychological distress (BDI, 0-63) ≤4 months	52 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Psychological distress (BDI, 0-63) ≤4 months in the control groups was 12.6	The mean Psychological distress (BDI, 0-63) ≤4 months in the intervention groups was 0.52 lower (7.37 lower to 6.33 higher)
Psychological distress (STAI state) ≤4 months	52 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Psychological distress (STAI state) ≤4 months in the control groups was 40.84	The mean Psychological distress (STAI state) ≤4 months in the intervention groups was 5.3 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care/waiting list control	Risk difference with MBR programme 2 elements: physical + psychological (95% CI)
					(9.32 to 1.28 lower)
Psychological distress (STAI trait) ≤4 months	52 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Psychological distress (STAI trait) ≤4 months in the control groups was 45.4	The mean Psychological distress (STAI trait) ≤4 months in the intervention groups was 3.82 lower (9.88 lower to 2.24 higher)
Pain severity (VAS 0-10) ≤4 months	52 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Pain severity (VAS 0-10) ≤4 months in the control groups was 4.76	The mean Pain severity (VAS 0-10) ≤4 months in the intervention groups was 1.41 lower (2.85 lower to 0.03 higher)
Function (RMDQ, 0-24) ≤4 months	52 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean Function (RMDQ, 0-24) ≤4 months in the control groups was 8.16	The mean Function (RMDQ, 0-24) ≤4 months in the intervention groups was 2.85 lower (5.88 lower to 0.18 higher)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

17.4 Economic evidence

Published literature

Two economic evaluations were identified that included an **MBR programme** as a comparator and have been included in this review. [94,457] These are summarised in the economic evidence profile below (**Table 382**) and the economic evidence table in Appendix I.

Following the economic evidence profile, if available, results from an employer perspective are also presented for this intervention. This is on the basis that employers may wish to provide return to work interventions. While specific return to work interventions have been analysed separately the GDG noted the overlap with MBR programmes because the distinction between them was not always clear and MBR programs may well include a return to work aspect.

Four economic evaluations relating to MBR programmes were identified but were excluded due to limited applicability.[162,343,372,456] These are listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 382: Economic evidence profile: MBR programmes

Study	Applicability	Limitations	Other comments	Cost [a]	Effects [a]	Incremental costs [b]	Incremental effects [b]	Cost effectiveness [b]	Uncertainty
Critchley 2007[94] (UK)	Partially applicable [c]	Potentially serious limitations [d]	• Within-RCT analysis (same paper) • Population: Low back pain mixed population (with and without sciatica) (>12 weeks) • Three comparators in full analysis 1. Biomechanical exercise 2. Combination: Mixed manual therapy plus self-management. 3. MBR programme (3 elements: physical, psychological, education) • Follow-up: 18 months	3. £165 [e]	3. 1.00 QALYs	Baseline			Probability cost effective at £20k per QALY threshold: 67%
				1. £379 [e]	1. 0.90 QALYs	Dominated by 3			Probability cost effective at £20k per QALY threshold:: ~0%/ ~0%
				2. £474 [e]	2. 0.99 QALYs	Dominated by 3			Probability cost effective at £20k per QALY threshold:: ~33%/~35%
Smeets 2009[457] (Netherlands)	Partially applicable [f]	Potentially serious limitations [g]	• With-RCT analysis (Smeets 2008a[459]/2006[460]) • Cost-utility analysis (QALYs) • Population: mixed (with and without sciatica) (> 3 months resulting in disability (RDQ >3) and ability to walk at least 100m)	2. £1182 [h]	2. 0.723 QALYs	Baseline			Probability cost effective at £20k per QALY threshold:: NR
				1. £2089 [h]	1. 0.693 QALYs	Dominated by 2 (higher costs and lower QALYs. 1-2: £908; -0.03 QALYs))			Probability cost effective at £20k per QALY threshold:: NR Cost and QALY CIs NR

Study	Applicability	Limitations	Other comments	Cost [a]	Effects [a]	Incremental costs [b]	Incremental effects [b]	Cost effectiveness [b]	Uncertainty
			• Three comparators in full analysis 1. Mixed modality exercise 2. cognitive behavioural approaches 3. MBR (2 core elements: physical, psychological). Combination of interventions 1 and 2. • Follow-up: 62 weeks	3. £2618 [h]	3. 0.679 QALYs	Dominated by 2 (higher costs and lower QALYs. 3-2: £1433; -0.045 QALYs)			Probability cost effective at £20k per QALY threshold:: NR (3-2 CI: £1166 to £1688; -0.119 to 0.029 QALYs)

ICER = incremental cost effectiveness ratio; n/a = not available; NR = not reported; RCT = randomised clinical trial; QALY = quality-adjusted life year; Prob. CE= Probability intervention is cost-effective at a £20,000/£30,000 threshold.

(a) Cost/effect in order of least to most costly intervention.

(b) Full incremental analysis of available strategies: first strategies are ruled out that are dominated (another strategy is more effective and has lower costs) or subject to extended dominance (the strategy is more effective and more costly but the incremental cost effectiveness ratio is higher than the next most effective option and so it would never be the most cost effective option); incremental costs, incremental effects and incremental cost effectiveness ratios are calculated for the remaining strategies by comparing each to the next most effective option.

(c) Resource use data (2002-2005) and unit costs (2003/3) may not reflect the current NHS context. EQ-5D tariff used is not stated (although as UK study judged likely to be UK tariff). Study does not include all non-invasive treatment options.

(d) Time horizon may not be sufficient to capture all benefits and costs if benefits persist beyond 18 months. Within-trial analysis and so does not reflect full body of available evidence for this intervention; Critchley 2007 is 1 of 19 studies included in the clinical review for MBR.

(e) Cost components incorporated: interventions, primary care contacts (GP, practice nurse, physiotherapist, other), secondary care contacts (hospital admissions and outpatient appointments).

(f) Dutch resource use data (2002-2004) and unit costs (2003) may not reflect current NHS context. Study does not include all non-invasive treatment options.

(g) Within-trial analysis and so does not reflect full body of available evidence for these interventions; Smeets 2006/2008a is 1 of 9 studies included in the clinical review for cognitive behavioural therapy and 1 of 19 included for MBR programmes.

(h) 2003 Netherlands euros converted to UK pounds.[394] Cost components incorporated: Interventions, GP, medical specialist including radiology, occupational physician, physiotherapist, manual therapist, Cesar or Mensensieck therapist, psychologist, medication, hospitalisation, medical procedures. Note: paper reported societal perspective, here only healthcare costs have been presented

Costs from an employer perspective are presented below. These typically consider the cost to the employer of lost productivity. When interpreting productivity costs based on days taken off work there are a number of issues to consider including:

- The actual productivity loss to the employer will not necessarily equate to the number of sick days taken by the employee. Time taken off work may be compensated for in some way: for example, another colleague may be able to undertake the tasks the absent employee would have been doing or the employee may be able to make up the time off when back at work within their contracted hours. The ability to compensate will depend on the type of work.
- Employees who return to work may not necessarily be fully productive if still suffering symptoms.

Table 383: MBR programmes – employer perspective

Study	Intervention cost	Productivity savings with MBR programme
Smeets 2009[457] (Netherlands)	NR	Total lost productivity costs (based on absence from paid work): Compared to mixed modality exercise: MBR saved £1137 (95% CI: -£6706 to £4511; p=NR) Compared to cognitive behavioural approaches: MBR increased costs £3051 (95% CI: -£2933 to £8862; p=NR)

Interventions costs exploration

Following GDG discussion of the MBR programmes review the GDG felt that the clinical evidence for benefit of MBR programmes primarily came from the Vibe Fersum, Monticone et al 2013 and Monticone et al 2015 RCTs. The only evidence of MBR being cost effective was from the Critchley RCT. The GDG noted that there were differences in intensity, and thus potential cost, of these interventions and so it was agreed to look at this in more detail to help inform GDG decision making.

Table 384 below contains more details about the intervention resource use and costs reported in the Critchley et al. RCT that included an economic evaluation. Note that while hours of treatment are highest for MBR, costs are lowest; this is because MBR treatment is delivered entirely in group sessions and so personnel costs are reduced. Note that before the trial started all patients underwent a clinical assessment but this cost is not included in the intervention cost below.

Table 384: MBR programmes: Critchley et al. intervention costs in detail

Comparators (a)	Intervention resource use description	Actual sessions(b)		Estimated hours of treatment(c)			Average cost (d) (2003/4)
		Individual	Group	Individual	Group	Total	
MBR (3 element)	• Delivery period not specified • Maximum 8 group sessions (group size not specified) • Sessions = 90 minutes • Supervised by a senior physiotherapist and physiotherapy assistant	0	5.66	0.00	8.49	8.49	£75
Biomechanical exercise	• Delivery period not specified	0.98	4.94	0.49	7.41	7.90	£80

Comparators (a)	Intervention resource use description	Actual sessions(b)		Estimated hours of treatment(c)			Average cost (d)
	1 individual training session followed by maximum 8 group sessions (group size not specified) • Individual sessions = length not specified; group sessions = 90 minutes • Individual sessions: personnel not specified; group sessions: supervised by senior physiotherapist and physiotherapy assistant.						
Combination: MT + ex	• Delivery period not specified • Maximum 12 individual sessions • Sessions = 30 minutes • Delivered by physiotherapist (details of personnel not specified i.e. unclear if senior physiotherapist alone or with assistant)	5.36	0.19	2.68	0.29	2.97	£90

(a) For descriptions of intervention see Table 361: Summary of studies included in the review
(b) As reported by Critchley et al 2007[94]
(c) Calculated based on the number of sessions reported and the session lengths described by Critchley et al[94]. The length of the individual sessions in the biomechanical exercise group was not reported and so it has been assumed here that they were 30 minutes as reported for the combination group.
(d) As reported by Critchley et al 2007[94]; 2003 unit costs reported as used for trial physiotherapy in costing were: individual sessions £24 per hour £12; group session £6 per hour.

Table 385 below summarises the resource use for delivering the MBR interventions in the studies from the clinical review reported by Vibe Fersum et al, Monticone et al 2013, and Monticone et al 2015. As economic evaluations have not been published relating to these trials estimates of intervention costs are presented calculated based on these descriptions and national unit costs. Note that these costs may not include all costs for example administration, supervision of the staff delivering the interventions, specialist training costs in delivering the intervention, patient transport.

Table 385: MBR programmes: resource use and cost estimates based on selected trials

Trial	MBR category	Intervention resource use description	Estimated cost per patient (2014) (a)

Trial	MBR category	Intervention resource use description	Estimated cost per patient (2014) (a)
Vibe 2013[518]	2 CORE ELEMENTS: physical + psychological	• Delivered over 12 weeks • Weekly sessions for 2 or 3 weeks, followed by a session every 2-3 weeks (equates to 4 – 6 sessions) • Session type not specified, assumed individual for calculations • Sessions = 1 hour (initial), 30-45 minutes (follow-up) • Delivered by experienced physiotherapists	Total hours: • Physiotherapist (band 7) = 3.25 to 4.75 Cost: £400 to £584
Monticone 2013[351]	2 CORE ELEMENTS: physical + psychological	• Delivered over 12 months **Psychological element** • 16 cognitive behavioural approach sessions (once a week for 5 weeks, then monthly for rest of year) • Session type: individual • Sessions = 60 minute • Delivered by psychologist **Physical element** • 10 sessions (over initial 5 weeks), then advised to continue at home for rest of year with monthly telephone encouragement • Session type not specified, assumed individual for calculations • Sessions = 60 minute; duration of encouragement calls unspecified, assumed 15 minutes per call for calculations • Physiotherapist (under supervision of physiatrist - a doctor specialising in rehabilitation; time input not specified, physiotherapist are professionally autonomous in UK, therefore cost of supervision not included) **Other** • GP asked to actively support compliance and inform staff if any difficulty was encountered (time input not described, therefore cost not currently included)	Total hours: • Psychologist (band 8a) = 16 • Physiotherapist (band 6) = 12.75 Costs: • Psychologist = £2,208 • Physiotherapist = £1,301 • Total = £3,509
Monticone 2015	3 CORE ELEMENTS: physical + psychological + educational	• Delivered over 5 weeks **Psychological element** • 5 cognitive behavioural approach sessions (once a week for 5 weeks) • Session type: small group of five patients • Sessions = 60 minute • Delivered by a psychologist **Physical element** • 10 sessions over 5 weeks, then advised to continue at home (time frame not specified). • Session type: individually planned exercises performed in a small group of five patients. • Sessions = 60 minutes	Total hours: • Psychologist (band 8a) = 1 • Physiotherapist (band 6) = 2 Costs: • Psychologist = £138 • Physiotherapist = £204 • Total = £342

Trial	MBR category	Intervention resource use description	Estimated cost per patient (2014) (a)
		• Delivered by a physiotherapist **Educational element** • Education on nature of pain and physiology. This was delivered alongside the psychological element of the programme, therefore no additional cost incurred.	

(a) Unit costs based on Unit Costs of Health and Social Care 2014, PSSRU[100] (some costs have been adapted to reflected salary bands other than those used in publication, the ratio of face to face client contact to total working hours was not reported for physiotherapists and so was assumed to be the same as for psychologists 1:2.25): community physiotherapist (band 7) £123/hour client contact (including qualifications); community physiotherapist (band 6) £102/hour client contact (including qualifications); community clinical psychologist (band 8a) £138/hour of client contact (excluding qualification (not available)

A threshold analysis was conducted using the quality of life measures reported in two papers. Both Monticone et al. 2013 and Monticone et al. 2015 determined quality of life using the validated Italian SF-36 survey and presented the scores across eight sub-scales. To determine the utility gain using NICE's preferred measure of quality of life (EQ-5D), the SF-36 scores were converted using an algorithm (model 4) from Ara et al. 2008 [19] into EQ-5D scores.

For Monticone et al. 2013 the mapping results showed a utility gain for a two element MBR programme (physical, cognitive) compared with the combination of biomechanical exercise and manual therapy of 0.27 at 12 months follow up, and 0.22 at 24 months follow up. This allowed for threshold analyses to be undertaken to determine the maximum additional cost a treatment can incur relative to its comparator for it to be a cost-effective option (at £20,000 cost/QALY gain threshold) given the utility gain that it provides. The threshold analysis determined that the addition of the cognitive behavioural approach would be cost-effective up to incurring an additional cost of £5,405 at 12 months, and £4,419 at 24 months. The intervention cost analysis shown above estimates that the cost of the psychological element is £2,284 for the 12 months of treatment. This is below the cost identified in the threshold analysis, suggesting that the two element MBR programme is cost-effective unless it increases the use of other health care resources.

For Monticone et al. 2015 the mapping results showed a utility gain for three-element MBR (physical, cognitive, educational) treatment compared with the combination of exercise, manual therapy, postural therapy and self-management of 0.22 at 12 months follow up and 0.24 at 24 months follow up. The threshold analysis determined that the three-element MBR programme would be cost-effective up to incurring an additional cost of £4,428 at 12 months, and £4,705 at 24 months. Both groups in the study received the same amount of time of physical training, and education was delivered alongside the psychological element of the MBR programme, therefore the difference in personnel cost between these two programmes is the additional cost of the clinical psychologist. This cost is estimated in the intervention costing analysis above to be an additional £138. This lies below the cost identified in the threshold analysis, suggesting that the three-element MBR programme is cost-effective unless it increases the use of other health care resources up to over £4,000.

17.5 Evidence statements

17.5.1 Clinical

The majority of the evidence was from people with low back pain with or without sciatica. However, there were two comparisons that were conducted in people with low back pain without sciatica.

These were: 3-element MBR versus usual care, and 2-element MBR (physical and psychological components) versus waiting list control.

17.5.1.1 3-element MBR programmes (physical, psychological and education elements)

Evidence from one study (low to very low quality; n=53) comparing 3-element MBR to usual care/waiting list control suggested clinical benefit of 3-element MBR for pain severity, but benefit of usual care/waiting list for function at > 4 months. The mixed results were not confirmed in people with low back pain without sciatica, with a single study (low quality, n=179) suggesting no clinical difference between interventions for pain and function both at short and long term.

A single study (very low to moderate quality; n=100) comparing 3-element MBR to single intervention (biomechanical exercise) found no clinical difference between the two interventions for quality of life (SF-12), pain severity and function outcomes both ≤ 4 and >4 months.

Evidence from 2 studies comparing 3 element MBR to combined intervention (manual + self-management; exercise + manual therapy +/- postural therapy + self-management) showed mixed results. The studies could not be meta-analysed because one study (n=150) included postural therapy as a comparator and there was marked heterogeneity in the outcomes. One study showed benefit for the MBR programme for pain and quality of life (SF-36) in the short and long term, but no difference in function(low quality, n=150). The other study showed no clinical benefit in function, pain or quality of life in the long term (low quality; n=101).

17.5.1.2 2-element MBR programmes (physical and psychological elements)

Evidence from 2 studies comparing 2-element MBR (physical and psychological elements) to usual care/waiting list control showed clinical benefit of MBR for Function (waiting list control; moderate quality; n=106) and return to work (usual care control; very low quality; n=70) at > 4 months, but no clinical difference for pain or psychological distress outcomes (waiting list control; very low to low quality; n= 106). Evidence in the population with low back pain without sciatica (one study; very low quality, n=52) suggested clinical benefit for pain, function and psychological distress (by STAI state) when compared to waiting list control.

When a 2-element MBR was compared to single intervention (mixed modality exercise or psychological intervention - cognitive behavioural approaches), there was mixed evidence for pain severity and function (2 studies; moderate to low quality; n=107, n=54), with 1 study showing evidence of clinical benefit of MBR ≤ 4 months. Further evidence from 2 studies showed no clinical difference between interventions for functional outcomes >4 months (low quality; n=213, n=212). No clinical difference was reported for psychological distress (2 studies, very low to moderate quality, n=105, n=104) and some healthcare utilisation outcomes. There was evidence of both clinical harm and clinical benefit for the healthcare utilisation (number of therapist sessions) outcome when MBR was compared to exercise and psychological intervention, respectively (1 study, both comparisons n=108). When a 2-element MBR was compared to individual biomechanical exercise, there was no clinical benefit for pain or psychological distress in the longer term (>4 months) or return to work in either the short or long term (very low quality; range of n=75-112).

Three studies (very low to moderate quality; n=20, n=90, n=94) compared a 2-element MBR programme to a combination of interventions (manual therapy + exercise + postural therapy; manual therapy + biomechanical exercise). Clinical benefit of MBR was observed for pain severity, function, quality of life, and healthcare utilisation outcomes both ≤ 4 and >4 months.

17.5.1.3 2-element MBR programmes (physical and education elements)

Evidence from a single study comparing 2-element MBR (physical and education elements) to single intervention (biomechanical exercise) showed mixed results. There was no clinical difference

between the two interventions for pain severity at either short or long term. There was evidence of harm of the MBR programme for function and quality of life (SF-36 general health domain) at > 4 months. Clinical benefit was shown for most of the quality of life outcome subdomains (physical functioning, pain, physical role, vitality and physical component summary score both at ≤ 4 and > 4 months; emotional role, mental health, social functioning at > 4 months) (very low to low quality, n=286).

A single study comparing 2-element MBR (physical and education elements) to manual therapy (manipulation) found clinical benefit in pain severity in the short term, when the physical component of MBR comprised both exercise and manipulation, and clinical benefit favouring spinal manipulation in function when it comprised only exercise (very low quality, n=43-46). No clinical difference was reported in psychological distress in either case.

17.5.1.4 3 element MBR programmes versus 2 element MBR programmes (physical + education)

Evidence from 2 studies) comparing a 3-element MBR programme with a cognitive component to a 2-element MBR programme (physical + education) showed no clinical benefit for any of the outcomes reported (pain intensity, psychological distress, function, healthcare utilisation) both at short and long term (very low quality; n=29, n=35.

Two studies compared a 3-element MBR programme with a behavioural component to a 2-element MBR programme (physical + education). Clinical benefit of 3-element MBR for pain intensity at ≤ 4 months but the two interventions showed no clinical difference at > 4 months. Some evidence of clinical benefit favouring the two-element MBR programme was observed in psychological distress (BDI) at > 4 months (very low quality; range of n=15-35). There was no clinical difference in function and healthcare utilisation outcomes.

17.5.2 Economic

One cost–utility analysis found that a 3-element MBR (physical, psychological, education) programme was dominant (less costly and more effective) compared to biomechanical exercise and a combination of mixed manual therapy plus self-management for treating low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.

One cost–utility analysis found that a 2-element MBR (physical, psychological) programme was dominated (more costly and less effective) compared to cognitive behavioural approaches and mixed manual therapy plus self-management for treating low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations

17.6 Recommendations and link to evidence

Recommendations	**30. Consider a combined physical and psychological programme, incorporating a cognitive behavioural approach (preferably in a group context that takes into account a person's specific needs and capabilities), for people with persistent low back pain or sciatica:** • **when they have significant psychosocial obstacles to recovery (for example, avoiding normal activities based on inappropriate beliefs about their condition) or** • **when previous treatments have not been effective.**
Research recommendation	**4. What is the cost-effectiveness of providing long term support (>12 months) for people with chronic, low back pain with or without sciatica, in reducing health care utilization?**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (>30% for pain and function), adverse events, healthcare utilisation and return to work were also considered as important. In this review, there was evidence for all the critical outcomes for all 3-element and 2-element MBR programmes. Of the important outcomes, there was only evidence for health care utilisation for both the 3-element MBR programmes, and for the programmes containing the two core elements of physical and psychological. Studies included for the two core element physical and psychological MBR programmes, also provided evidence for return to work. There was no evidence for any of the important outcomes in the studies included for the MBR programmes with the two core elements of physical and education.
Trade-off between clinical benefits and harms	The GDG discussed the necessity of a body of evidence to show specific intervention effects, that is, over and above any contextual or placebo effects. It was therefore agreed that if placebo or sham-controlled evidence is available, this should inform decision making in preference to contextual effects. However, if there was a lack of placebo or sham-controlled evidence, evidence against usual care will be given priority when decision making. The GDG noted that there was very little evidence for usual care comparisons and no studies were identified that could be classified as a placebo/sham comparison. **3-element MBR programmes (physical, psychological and educational elements)** Compared to waiting list control in people with or without sciatica, there was evidence of long-term clinical benefit for pain, but benefit of comparator for function (> 4 months). There was no difference in pain or function between interventions in people without sciatica. The GDG considered these improvement in pain (for the waiting list control comparison) to be of some value, but noted that the evidence was low and very low quality and from a small single study (n=65). The GDG also noted that a waiting list control comparison would be likely to overestimate the benefit of the MBR programmes because of the negative effect on people randomised to wait. There was no evidence of benefit when 3-element MBR was compared to single intervention (biomechanical exercise). When compared to combined intervention, two studies showed mixed results. There was some evidence of clinical benefit of 3-element MBR for pain outcomes in the short and long term, but no difference in

function. The GDG observed that 3-element MBR was clinically beneficial in terms of quality of life in the short and long term, compared to combined intervention (manual therapy in combination with exercise, postural therapy and self-management) (n=150), but no effect was seen in another study that compared 3-element MBR to a combined intervention without postural advice (n=101).

2-element MBR programmes (physical and psychological elements)

The GDG noted that mixed evidence for 2 element programmes (physical and psychological) was from a single study compared to waiting list control. Another study comparing 2-element MBR (physical and psychological) versus usual care showed a clinical benefit for functional outcome and return to work in the longer term (> 4 months) (n=106), but not for pain outcomes.

Mixed evidence was also available for pain and function outcomes when the 2-element MBR was compared to single intervention (psychological; exercise). There was evidence of both clinical harm and clinical benefit for the healthcare utilisation (number of therapist sessions) outcome when MBR was compared to exercise and psychological intervention, respectively.

When compared to combinations of interventions (biomechanical exercise and manual therapy; biomechanical exercise with manual therapy and postural therapy), there was clinical benefit in favour of MBR in terms of most of the outcomes (pain, function, quality of life, and healthcare utilisation) reported in both the short-term and longer term follow-up. Pain levels were noted to be higher at 12 months than at 3 months, but the GDG discussed that this may reflect that the intervention time for one of the studies was shorter (12 weeks) than the final follow-up period (12 months) and could be related to a failure to build on the initial improvements because of the difficulties in generalisation outside an intensive treatment setting. Data came from 3 studies of very different treatment intensity. All studies were of people with chronic low back pain (>3 months duration), however one consisted of a 12 week intervention, with weekly sessions for the first 2-3 weeks then 1 session every 2-3 weeks; another featured 6-8 weeks intervention followed by 3 months follow up, whereas the third one was in a specialised rehabilitation centre with 1 individual cognitive behavioural approaches session per week for 5 weeks followed by once a month for 11 months, accompanied by 10 exercise sessions over 5 weeks and encouragement to continue for the rest of the year by telephone. All studies demonstrated improvements in outcomes in favour of MBR programmes. For the more intensive programme results have been reported at 1 year in this review, and the study reported that benefits remained at 3 years. The GDG noted that one of the shorter studies created subgroups within the participants and tailored both the exercise and cognitive-behavioural components to movements that were painful. It was consequently not possible to determine exactly which element in this study was responsible for the effects, however, it was considered that that tailoring the approach would be reflective of how the treatment would be delivered in clinical practice. The GDG discussed that the year-long programme would not be feasible to implement in a UK NHS setting, but the shorter programmes, which also demonstrated benefits, would be feasible in an NHS setting.

The GDG considered that the benefits seen in multiple outcome measures when using a 2-element MBR programme, involving physical and psychological elements (compared to usual care and to combinations of interventions), outweighed the small harms seen in healthcare use when compared to a single intervention.

2-element MBR programmes (physical and education elements)

The GDG noted that there was no evidence for 2 element (physical and education) MBR programmes with a usual care or waiting list control comparison. All evidence came from a single large study and only looked at single intervention comparisons (biomechanical exercise). The evidence was mixed, showing some benefit of this type of MBR programme for several outcomes (most of the SF-36 domains).

	However there was evidence of clinical harm of MBR for function (RMDQ) and one quality of life (SF-36) domain at >4 months. The GDG noted the mixed evidence in terms of benefits, harms or lack of effect for each of the outcome measures, and were therefore unable to recommend that an educational component should be part of an MBR programme. **3 element MBR programmes versus 2 element MBR programmes (physical and education)** When the 3 element MBR programme (using a cognitive approach) was compared to the 2 element MBR programmes (physical and education), the evidence showed no clinical benefit for any of the outcomes reported. Another study with a 3 element MBR programme (using a behavioural approach) was compared to a 2 element MBR programme (physical and education). However, the evidence for these comparisons was very low quality and from single small studies so the GDG were unable to draw any conclusions from this. **Summary** In summary, the GDG found the evidence for MBR programmes to be mixed with clinical benefits seen for some comparisons, but also many instances where no benefit was observed and a few where the comparator was favoured over MBR. In addition interpretation was complicated by the variety of comparators used in the studies. However, the quantity, quality and applicability of the evidence where a benefit for MBR was observed, was considered higher by the GDG. This was mostly from three studies consisting of 3-element MBR containing physical, psychological and educational elements, 2-element MBR with physical and psychological elements and 2-element MBR with physical and psychological elements. The GDG considered this evidence alongside the evidence from the individual non-invasive intervention reviews discussed earlier in this guideline involving cognitive behavioural approaches, and agreed that MBR programmes should be recommended. It was not clear from the evidence reviewed if 3-element MBR offered benefits over the 2-element MBR. However the GDG noted that the consistent components of the programmes with benefit were physical and psychological components. The recommendation was therefore made for MBR with a physical and psychological element. The majority of the evidence for the psychological element in this review and in the combination and single reviews was for a cognitive behavioural approach and so the GDG felt the psychological element of a combined programme should incorporate a cognitive behavioural approach. The GDG noted that evidence was mixed for the 2 element programmes which included education, but also noted that the 3 element programme compared to a 2 element programme which included education showed no difference. The GDG were unable to determine which aspect of the educational intervention was important and chose not to make a recommendation in this regard.
Trade-off between net clinical effects and costs	Two within-trial economic analyses were included. The first, in a low back pain with or without sciatica population, included three comparators: 3-element MBR, a combination of mixed manual therapy and self-management, and biomechanical exercise.[94] MBR had the lowest costs and highest QALYs and so was found to be the most cost effective option. Uncertainty was assessed and there was found to be a 67% probability that MBR was the most cost effective option at a £20,000 per QALY threshold. In this study patients received up to 8 group sessions of 90 minutes in the MBR group (mean 5.66) and the biomechanical exercise group (mean 4.94), plus the exercise group received an additional initial individual session. The mixed manual therapy and self-management group received up to 12 individual 30 minute sessions (mean 5.36). This analysis only included three treatment options and ideally assessment of cost effectiveness would be based on an analysis of all clinical treatment options. The GDG noted that this evidence related to one course of treatment and it was unknown if treatment effectiveness and thus cost effectiveness

would be the same if repeated. In addition, in this study the EQ-5D and pain outcomes were not clinically important. In a probabilistic analysis where uncertainty over the mean values is taken into account, MBR was cost effective only in 67% of the simulations, which shows a high uncertainty.

The second included economic analysis, in a mixed population with or without sciatica included 3 comparators: 2-element MBR (physical + psychological); mixed modality exercise and cognitive behavioural approaches. In contrast to the first analysis MBR was not the most cost effective option – cognitive behavioural approaches had the lowest costs and highest QALYs and so was found to be the most cost effective option.[457]

Taking into account the overall body of clinical effectiveness evidence for 2-element MBR (physical and psychological) the GDG concluded that the evidence for a clinical benefit (which largely came from 2 RCTS)[349,351,518] was more compelling than the evidence of no benefit from other studies which included the RCT used to inform the economic analysis in this review.

These 3 RCTs[349,351,518] did not have associated economic analyses however MBR intervention costs were estimated using the intervention descriptions from these trials. The two-element (physical and psychological) MBR programme in the Vibe Fersum study equated to 4-6 sessions over 12 weeks (initial session 1 hour, subsequent sessions 30-45 minutes) delivered by physiotherapists. Assuming these were individual sessions this equated to a personnel cost estimate of £400-£584.

The two-element MBR programme (physical + psychological) in the study by Monticone et al. 2013 was much more intensive with an estimated 16 hours with a psychologist (individual sessions) and 13 hours with a physiotherapist (assumed to be individual sessions) delivered over a year. This equated to a personnel cost estimate of £3,509. The GDG noted that while the cost of the supervising physician referred to in Monticone et al. 2013 was not incorporated in the cost estimate based on described resource use, due to insufficient information, this probably would not apply to the UK setting where physiotherapists operate with more autonomy. In addition, it was noted that while the cost of GP support was also not incorporated into the cost estimate, due to insufficient information, again this is unlikely to form part of clinical practice if implemented. In addition the GDG noted that for both interventions there may also be additional costs in practice such as patient transport and specialist training for staff delivering the interventions. These costs are both higher than in MBR intervention costs reported in the Critchley et al. analysis (£75) – this is because the programme was delivered in group sessions. However, the clinical benefits observed in Vibe Fersum et al. and Monticone et al. 2013 were also much greater (although EQ5D was not reported for direct comparability).

The three-element MBR programme (physical + psychological + educational) in the study by Monticone et al 2015 was again intensive with ten hours with a physiotherapist and five hours with a psychologist delivered in five weeks. However, both elements were delivered in a small group of five patients and therefore this equated to a personnel cost estimate of only £342. It was noted that the GDG considered the physical and psychological components in this study to be similar to what the GDG were considering for recommendation. For this reason, a threshold analysis was conducted on this paper as well as on the 2013 study.

Both Monticone et al. 2013 and Monticone et al. 2015 reported SF-36 scores which were mapped to estimate equivalent EQ-5D scores in order to carry out threshold analysis. For Monticone et al. 2013 the threshold analysis determined that the two element MBR programme would be cost-effective up to incurring an additional cost of £5,405 at 12 months, and £4,419 at 24 months when compared to the combination of biomechanical exercise and manual therapy (same as the physical element of the MBR programme). The estimated additional cost of the psychological element for Monticone et al.2013 lay below the cost identified in the threshold analysis at £2,238. This suggests that the 2 element MBR programme is cost-

	effective unless the programme increases the use of other health care resources to a cost greater than this threshold. For Monticone et al.2015 the threshold analysis determined that the three-element MBR programme would be cost-effective compared with the combination of exercise, manual therapy, postural therapy and self-management up to incurring an additional cost of £4,428 at 12 months, and £4,705 at 24 months. Both groups in the study received the same amount of time of physical training, and the educational element was delivered alongside the psychological element of the MBR, therefore the difference in personnel cost between these two programmes is the addition of the clinical psychologist. This cost is estimated in the intervention costing analysis to be an additional £138. This lies below the cost identified in the threshold analysis, suggesting that the three-element MBR programme is cost-effective unless it increases the use of other health care resources up to over £4,000. The GDG also noted that there may be specialist training costs associated with delivering the specific approaches used in the MBR programmes in the trials and these may vary depending on the specific approach implemented. For example, a weekend training course is available on the approach used in Vibe Fersum et al. In addition, ongoing mentoring may be required from more experienced practitioners. It was noted that the intervention costs above do not take account of the possibility that MBR might be offered as an alternative to another active treatment option – if this were the case then the incremental cost would be the difference between MBR and the cost of the other active treatment, which would be less than the cost of MBR. Taking into account the overall body of clinical effectiveness evidence for MBR programmes the GDG concluded there was mixed evidence of its effectiveness and cost-effectiveness, in particular in the economic study showing MBR to be cost effective the EQ5D and pain outcomes were not clinically important. However, based on the considerations already discussed in the 'Trade-off between clinical benefits and harms' section, the GDG considered MBR to be likely to be cost effective. If MBR is effective, upfront intervention costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. The Vibe study found a benefit in terms of healthcare utilisation with care seeking reduced after the intervention, suggesting that downstream costs may be reduced. Given this and the evidence of clinical benefit for 2-element MBR programmes with a physical and psychological element the GDG concluded that it was sufficiently likely that an intervention based on that reported in Vibe Fersum et al. would be cost effective and therefore support a recommendation.
Quality of evidence	The evidence included in the review ranged from a GRADE quality rating of moderate to very low. This was due to the high risk of bias within the studies included as a result of inadequate blinding and high drop-out rates. The best quality evidence available in this review was from active treatment comparisons (which was mostly rated as moderate or low quality). The GDG noted that one of the studies informing the recommendation reported a high drop-out rate and used per protocol analysis. It is therefore possible that these factors might have underestimated the effect of the MBR programme and had more people continued in the trial, or an intention to treat analysis been used, that the results may have differed. The population recruited was also very specific (low back pain where the pain could be provoked and relieved with specific postures, movements or activities, and where the movement behaviours had a clear association with their pain disorder), for which the classification based-cognitive functional therapy intervention was designed. The GDG therefore considered this narrow population and risk of bias limits the applicability of this evidence to clinical practice. However as benefits were observed in trials that included less specific populations, it was considered that the benefit of this type of MBR programme

	might be transferable. One of the other key studies informing the recommendation was a 3-yearlong study with a 1 year treatment period. It was noted that there were no reported drop-outs from this study. The population recruited in the study was considered by the GDG to be applicable to clinical practice as patients were low back pain lasting >3 months, and all causes of specific low back pain were excluded. However, this potential bias was accounted for in the quality rating of the in the outcomes reported and the evidence remained as moderate quality.
Other considerations	For recommendations on Exercise therapies, Manual therapy, and Psychological interventions, please see chapters 9, 12, and 15, respectively. The GDG noted that interpreting the evidence in terms of when and which people should be offered MBR was complicated. The group discussed tailoring treatments for individual patients or selecting populations of patients to receive specific treatments, including a psychosocial approach. The GDG noted that the papers included in this review did not stratify people on the basis of severity but noted that evidence from the risk stratification review (see chapter 6) informed recommendations for identifying people who might benefit from a combined physical and psychological approach. However, the GDG acknowledged that an MBR programme is usually undertaken by people with chronic low back pain. Furthermore, the GDG debated whether people who had undertaken a course of MBR should have repeated treatment if their back pain didn't resolve or recurred. They highlighted that trials often excluded people who had the intervention before and so did not address this key clinical issue. For all interventions it was agreed important to note that the person delivering the therapy would have a large effect on the outcome of treatment. The GDG discussed that in practice the psychological element of this type of intervention may be delivered by a psychologist or by another healthcare professional trained in these techniques. It was considered important that the individual was appropriately trained with the competency to deliver the intervention. It was considered that this may have been a factor in the studies included in the review. The GDG felt strongly that where a psychologist was not delivering the intervention directly, services should to set up such that the team included a psychologist to train and support those delivering the intervention, as was generally the case in the trials where this occurred. The GDG commented that the delivery of the cognitive behavioural approaches programmes reviewed required clinical expertise in health-related psychology rather than in treating psycho-pathology. The GDG debated whether a psychological intervention in the context of an MBR programme would have an impact on people who do not show fear-avoidance behaviours or psychosocial distress. It was noted that the studies included in the review did not consider stratification of participants on a psychological basis. The GDG also pointed out the low scores on the Tampa scale for Kinesiophobia reported in by the relevant study. The GDG noted that the psychological aspects of low back pain should be considered and a group psychological intervention should be favoured where possible. Furthermore, the GDG felt that a psychologically informed physiotherapy or rehabilitation programme would be particularly useful for people with chronic pain and psychosocial distress, i.e. people with low back pain or sciatica and significant psychosocial obstacles to recovery (for example, avoidance of normal activities based on inappropriate beliefs about their condition). However, the GDG advised that main focus for their recommendation for combined physical and psychological treatments was for people with psychosocial distress resulting from chronic low back pain and sciatica, rather than people presenting with pain and additional psychological problems. The GDG therefore felt that people who have not responded to previous treatments, for example when they have failed to improve pain adequately, or have not helped enough to enable people to return to normal

	activity of daily life, including work, would also benefit from a psychologically informed rehabilitation programme, as part of a risk assessment-based, stepped care approach. The GDG noted that the Cochrane review [261] reached similar conclusions that patients with chronic low back pain receiving MBR will experience less pain related disability than those receiving usual care or exercise treatment. The GDG noted that the intensity of the interventions where clinical benefits were seen varied and it was not clear whether the more intensive interventions produced better results – although this was not studied directly. **Research recommendation** Chronic low back pain is a very common, potentially disabling, long-term health condition and by definition not amenable to curative medical treatment. In the absence of effective self-management strategies people with long-term conditions are likely to disengage from their normal roles, becoming increasingly disabled and dependent on health and social care. The Kings Fund 2013 long term conditions report cites evidence that multidisciplinary rehabilitation programmes (MBR), in the form of self-management support, have been shown to reduce unplanned hospital admissions for other long term conditions such as chronic obstructive pulmonary disease and asthma and to improve adherence to treatment and medication, but evidence that this translates into cost savings, particularly in reduced healthcare utilization is unclear.[380] Further the cost effectiveness of providing long term support beyond MBR programmes for people with low back pain is unknown.

18 Return to work programmes

18.1 Introduction

Back problems and employment are often closely linked in the minds of patients, employers, other stakeholders and the general public. Low back pain or sciatica commonly begins in people of working age, and a high proportion of people are in employment at the time that they develop back problems. Employment-related factors might contribute to the onset of back symptoms, and onset of symptoms might occur during or shortly after engagement in activities undertaken in the course of employment.

Low back pain and sciatica are common causes of work disability, leading not only to absenteeism, but also impaired productivity in those who continue to work (presenteeism). Back problems pose challenges to both patient and employer due to disability and the unpredictability of recurrent episodes. Inability to work contributes to poverty through loss of income, and work and socioeconomic status are the main drivers of social gradients in health. Loss of employment can contribute to altered self-image, psychological distress and social exclusion.

Presentation to health care providers with back problems might sometimes be an indication of other difficulties at work such as conflicts with management or low job satisfaction. Therefore, an inappropriate return to employment might adversely affect both physical and psychological health. However, for many people, an early return to work might be an effective means of encouraging physical activity and increasing fitness, reducing the risk of chronic disability from low back problems. Return to work is an important outcome for many people with low back problems, and might mediate improvements in pain and other aspects of health, quality of life and well-being. The shifts from work to sickness absence to unemployment can occur over short time frames and return to work might be more difficult for those who have already lost their employment.

Return to work programmes are structured interventions with the specific aim of facilitating return to gainful employment. They share much with programmes designed to improve clinical outcomes, often being multidisciplinary and including components of exercise and education, as well as commonly addressing psychological factors. However, their primary focus is on vocational rehabilitation and engaging corresponding specialised skills.

18.2 Review question: What is the clinical and cost effectiveness of return to work programmes in the management of non-specific low back pain and sciatica?

For full details see review protocol in Appendix C.

Table 386: PICO characteristics of review question

Population	People aged 16 or above with non-specific low back pain. People aged 16 or above with sciatica.
Interventions	• Interventions/multidisciplinary programmes with a specified return to work focus (or including ergonomic interventions): 1. Uni-disciplinary programmes including combined concepts 2. Multidisciplinary biopsychosocial programmes Inclusion criteria - RTW must be the main focus of the intervention

	- Including any combinations of interventions or 'programmes' - Irrespective of the number of people who deliver the intervention - Tailored components are acceptable as long as these components are described, and must be given in addition to a defined component (eg. acupuncture + tailored versus tailored = acceptable; tailored versus tailored = exclude). Tailored studies will be analysed separately (different strata). - Irrespective of whether patients are sick listed **Exclusion criteria** - If the study does not clearly describe the interventions used (it must specify the modality as well as the class) - If the intervention or comparison group contains an invasive intervention (eg. surgery, epidurals, facet-joint blocks/injections) - Studies where all the interventions are tailored
Comparisons	• Placebo/Sham/Attention control • Usual care/waiting list • To each other • Any other non-invasive interventions in the guideline • Combination of interventions: any combination of the non-invasive interventions in the guideline
Outcomes	Critical • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI) • Return to work Important • Responder criteria (> 30% improvement in pain or function) • Adverse events: 1. morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

18.3 Clinical evidence

Eight RCTs (reported in a total of 12 papers) were included in the review; these are summarised in **Table 387** below. Six studies reported multidisciplinary programmes.[14,190,292,465,505,542] In Anema et al., participants were first randomised to a multidisciplinary return to work programme or usual care (primary randomisation); people who were still sick-listed at 8 weeks were re-randomised to a unidisciplinary graded activity programme or usual care (secondary randomisation). [15] Two further studies described unidisciplinary programmes.[253,297]

Four further papers were found reporting data from 2 studies described above:

- Steenstra 2006[467] and Steenstra 2006A[468] are part of the Anema 2007 study.
- Hlobil 2005[222] and Hlobil 2007[223] are part of the Staal 2004 study.

Most studies provided programmes to individuals;[14,252,253,292,296,465,542] two provided therapy in both group and individual formats.[190,505]

One further study was identified which met the inclusion criteria in terms of the population (people sick listed for 8-12 weeks for low back pain), interventions (brief intervention plus exercise), comparator (brief intervention only) and outcomes (return to work).[417] However, this paper was excluded from our review because the outcome data for the 2 arms was combined, rather than reported separately for each group.

One Cochrane review on return to work programmes was identified but it was not included as it included studies in people with back pain but not specifically low back pain, and therefore did not meet the review protocol[438,438]. The studies included in this Cochrane review were individually assessed and included if they matched the review protocol.

Evidence from the included studies is summarised in the GRADE clinical evidence profile / clinical evidence summary below. See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Table 387: Summary of studies included in the review

Study	Intervention	Comparison	Population	Outcomes	Comments
Individual programme					
Anema 2007 (Steenstra 2006) Steenstra 2006A[14,467,468]	Multidisciplinary programme with a return to work focus (individual workplace intervention) plus usual care	Usual care following the Dutch occupational guideline on low back pain.	Low back pain with or without sciatica. All participants were sick-listed due to their low back pain. n=196 Length of study: 12 months The Netherlands	Function (RMDQ) Pain (NRS) Return to work Quality of life (EQ-5D) Healthcare utilisation (GP visits, manual therapist visits, occupational physician consultations, physiotherapy sessions).	Concomitant treatments not stated. This study had 2 randomisation stages: first randomisation occurred at 2 weeks for all recruited participants into the two intervention groups, second randomisation was at 8 weeks for only those people who were still off work due to their back pain.
Jensen 2012b[253]	Unidisciplinary return to work programme (individual counselling, workplace visit by occupational physician)	Usual care: Brief instruction in exercises, or readmission to GP for further contact with physiotherapist or chiropractic	Low back pain with or without sciatica n=300 Length of study: 3 months Denmark	Pain (NRS) Function (RMDQ) Quality of life (SF-36) Sick leave >8 weeks	Concomitant care: not stated.

Study	Intervention	Comparison	Population	Outcomes	Comments
		treatment			
Lambeek 2010a[292]	Multidisciplinary return to work programme (individual workplace intervention and graded activity programme)	Usual care: Patients allocated to the usual care group received the usual treatment from their medical specialist, occupational physician, general practitioner, and/or allied health professionals.	Low back pain with or without sciatica n=134 Length of study: 12 months. The Netherlands	Healthcare utilisation (occupational physician, GP, physiotherapist, graded activity therapist, manual therapist, cesar therapist, physiotherapist, psychologist, alternative therapist, medical specialist, diagnostic tests, drugs for back pain) Pain (VAS) Function (RMDQ) Quality of life[(a)]	Concomitant care: additional treatments including physiotherapy and a range of alternative care was received by the multidisciplinary return to work participants.
Lee 2013a[297]	Unidisciplinary return to work programme (individual cognitive behavioural approaches/graded activity by physio) versus conventional physiotherapy	Combination of interventions: Physiotherapists: individual treatment. The treatment in the conventional treatment group was broadly based on the patients' symptoms at presentation and on their response to treatment. It was normally a combination of treatment, including electrophysical agents for pain relief such as interferential therapy, transcutaneous electrical nerve	Low back pain without sciatica N=47 Length of study: 3 months Hong Kong China	Pain (pain level 0-10) Function (RMDQ)	Concomitant care: not stated.

Study	Intervention	Comparison	Population	Outcomes	Comments
		stimulation, lumbar traction, manual therapy, and exercise therapy.			
Staal 2004 Hlobil 2005 Hlobil 2007[222,223,465]	Multidisciplinary return to work programme (individual graded activity, case management) and usual care	Usual care: Usual care and guidance from occupational physician. GPs could treat according to Dutch College of General Practitioners guidelines	Low back pain without sciatica N=134 Length of study: 6 months The Netherlands	Return to work Function (RMDQ) Pain (NRS) (3 months data from Staal 2004 and 12 months data from Hlobil 2005) Healthcare utilisation (consultations with GP, with occupational physician, with specialist, alternative therapist, CT/MRI scans, X-ray, physio/paramedical therapy, pain medication, visits to manual therapist) (Hlobil 2007)	Concomitant care: Multidisciplinary return to work team also received usual care as described for the usual care group; furthermore some of the participants used non-steroidal anti-inflammatory drugs and other analgesics for pain relief.
Whitfill 2010[542]	Multidisciplinary return to work programme (individual physical and behavioural therapy, some patients had work transition)	Usual care: Standard care (no further details)	Low back pain with or without sciatica n=142 Length of follow-up: 12 months. USA	Return to work Pain (VAS) Psychological (BDI)	Concomitant treatment: not stated. Participants randomised into 3 groups: early intervention (n=47), early intervention plus work transition (n=43) or standard care (n=52). Early intervention and early intervention

Study	Intervention	Comparison	Population	Outcomes	Comments
					plus work transition groups combined in analysis (called Treatment group T) and compared with standard care. Results of return to work shown for only 42/142 patients. Quality of life outcome was not eligible as reported as SF-36 overall score.
Group and individual return to work programme					
Haldorsen 1998[190]	Multidisciplinary return to work programme (multi-modal cognitive behavioural approaches, partly group and partly individual)	Usual care: Followed up by GP without any feedback or advice on therapy; given usual care e.g. physiotherapy	Low back pain with or without sciatica n=223 Length of study: 12 months Norway	Return to work	Concomitant treatment: not stated
Van Den Hout 2003[505]	Multidisciplinary return to work programme (graded activity + problem solving: GAPS)	Multidisciplinary return to work programme (graded activity and group education: GAGE)	Low back pain without sciatica n=84 Length of study: 12 months The Netherlands	Return to work	Concomitant treatments: All participants agreed to stop any other on-going treatments for back disorders.

(a) EQ-5D was collected but not reported by the study apart from as QALYs in the economic analysis

18.3.1 Clinical evidence summary tables

Table 388: Individually delivered return to work programme (multidisciplinary) versus usual care in low back pain with or without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual multidisciplinary RTW programme (95% CI)
Quality of life (EQ-5D 0-1, change score) ≤ 4 months	186 (1 study)	HIGH		The mean quality of life (eq-5d 0-1, change score) ≤ 4 months in the control groups was 0.26	The mean quality of life (eq-5d 0-1, change score) ≤4 months in the intervention groups was 0.05 lower (0.13 lower to 0.03 higher)
Pain (NRS 0-10, change score) ≤ 4 months	188 (1 study)	MODERATE[a] due to risk of bias		The mean pain (NRS 0-10, change score) ≤ 4 months in the control groups was -2.66	The mean pain (NRS 0-10, change score) ≤ 4 months in the intervention groups was 0.21 higher (0.55 lower to 0.97 higher)
Pain (NRS 0-10) >4 months	117 (1 study)	MODERATE[b] due to imprecision		The mean pain (NRS 0-10) >4 months in the control groups was 1.85	The mean pain (NRS 0-10) >4 months in the intervention groups was 0.21 lower (0.34 to 0.8 lower)
Pain (NRS 0-10) >4 months	141 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (NRS 0-10) >4 months in the control groups was 5.07	The mean pain (NRS 0-10) >4 months in the intervention groups was 1.16 lower (2.12 to 0.2 lower)
Function (RMDQ 0-24, change score) ≤ 4 months	188 (1 study)	MODERATE[a] due to risk of bias		The mean function (RMDQ 0-24, change score) ≤ 4 months in the control groups was -8.75	The mean function (RMDQ 0-24, change score) ≤ 4 months in the intervention groups was 0.91 higher (0.8 lower to 2.62 higher)
Function (RMDQ 0-24, change score) >4	117	LOW[b]		The mean function (RMDQ 0-24,	The mean function (RMDQ 0-24, change

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual multidisciplinary RTW programme (95% CI)
months	(1 study)	due to imprecision		change score) >4 months in the control groups was 4.43	score) >4 months in the intervention groups was 2.73 higher (2.47 to 2.99 higher)
Psychological distress (BDI, 0-63) > 4 months	141 (1 study)	MODERATE[a] due to risk of bias		The mean psychological distress (BDI, 0-63) > 4 months in the control groups was 10.11	The mean psychological distress (BDI, 0-63) > 4 months in the intervention groups was 1.3 lower (4.71 lower to 2.11 higher)
Days to return to work (final value) ≤ 4 months	196 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean days to return to work (final value) ≤ 4 months in the control groups was 130.12	The mean days to return to work (final value) ≤ 4 months in the intervention groups was 29.98 lower (53.6 to 6.36 lower)
Return to work >4 months	42 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.39 (0.96 to 2.02)	Moderate	
				667 per 1000	260 more per 1000 (from 27 fewer to 680 more)
Return to work >4 months	57 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	HR 1.7 (1.2 to 2.41)	Moderate	
				0 per 1000	-
Absenteeism from unpaid work (hours) > 4 months	196 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean absenteeism from unpaid work (hours) > 4 months in the control groups was 225.8	The mean absenteeism from unpaid work (hours) > 4 months in the intervention groups was 16 higher (52.36 lower to 84.36 higher)
Healthcare utilisation (occupational	134	LOW[b]	RR 0.64	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual multidisciplinary RTW programme (95% CI)
physician, n of patients) > 4 months	(1 study)	due to imprecision	(0.32 to 1.31)	235 per 1000	85 fewer per 1000 (from 160 fewer to 73 more)
Healthcare utilisation (GP, n of patients) > 4 months	134 (1 study)	LOW[b] due to imprecision	RR 0.94 (0.43 to 2.06)	Moderate	
				162 per 1000	10 fewer per 1000 (from 92 fewer to 172 more)
Healthcare utilisation (physiotherapist, n of patients) > 4 months	134 (1 study)	MODERATE[b] due to imprecision	RR 0.56 (0.39 to 0.82)	Study population	
				618 per 1000	272 fewer per 1000 (from 111 fewer to 377 fewer)
Healthcare utilisation (graded activity therapist, n of patients) > 4 months	134 (1 study)	LOW[b] due to imprecision	RR 114.31 (7.21 to 1813.19)	Moderate	
					-
Healthcare utilisation (manual therapist, n of patients) > 4 months	134 (1 study)	HIGH	RR 0.31 (0.13 to 0.72)	Moderate	
				294 per 1000	203 fewer per 1000 (from 82 fewer to 256 fewer)
Healthcare utilisation (cesar therapist, n of patients) > 4 months	134 (1 study)	LOW[b] due to imprecision	RR 0.62 (0.15 to 2.48)	Moderate	
				74 per 1000	28 fewer per 1000 (from 63 fewer to 110 more)
Healthcare utilisation (physiotherapist, n of patients) > 4 months	134 (1 study)	LOW[b] due to imprecision	RR 0.41 (0.08 to 2.05)	Moderate	
				74 per 1000	44 fewer per 1000 (from 68 fewer to 78 more)
Healthcare utilisation (psychologist, n of patients) > 4 months	134 (1 study)	LOW[b] due to imprecision	RR 0.41 (0.08 to 2.05)	Moderate	
				74 per 1000	44 fewer per 1000 (from 68 fewer to 78 more)
Healthcare utilisation (alternative therapist, n of patients) > 4 months	134 (1 study)	LOW[b] due to	RR 0.77 (0.4 to	Moderate	
				235 per 1000	54 fewer per 1000

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual multidisciplinary RTW programme (95% CI)
		imprecision	1.51)		(from 141 fewer to 120 more)
Healthcare utilisation (medical specialist, n of patients) > 4 months	134 (1 study)	MODERATE[b] due to imprecision	RR 0.46 (0.26 to 0.81)	Moderate	
				426 per 1000	230 fewer per 1000 (from 81 fewer to 315 fewer)
Healthcare utilisation (diagnostic tests, n of patients) > 4 months	134 (1 study)	HIGH	RR 0.49 (0.33 to 0.73)	Moderate	
				647 per 1000	330 fewer per 1000 (from 175 fewer to 433 fewer)
Healthcare utilisation (drugs for back pain, n of patients)	134 (1 study)	MODERATE[b] due to imprecision	RR 0.7 (0.49 to 0.99)	Moderate	
				588 per 1000	176 fewer per 1000 (from 6 fewer to 300 fewer)
Healthcare utilisation (consultations with GP) >4 months	57 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (consultations with GP) >4 months in the control groups was 1.8	The mean healthcare utilisation (consultations with GP) >4 months in the intervention groups was 0.9 lower (1.76 to 0.04 lower)
Healthcare utilisation (consultation with occupational physician, minutes) >4 months	57 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (consultation with occupational physician, minutes) >4 months in the control groups was 110.4	The mean healthcare utilisation (consultation with occupational physician, minutes) >4 months in the intervention groups was 0.5 higher (22.22 lower to 23.22 higher)
Healthcare utilisation (physio/paramedical therapy) > 4 months	57 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (physio/paramedical therapy) > 4 months in the control groups was 13.2	The mean healthcare utilisation (physio/paramedical therapy) > 4 months in the intervention groups was 3.2 lower (8.58 lower to 2.18 higher)
Healthcare utilisation (Visits to manual therapist) >4 months	57 (1 study)	VERY LOW[a,b] due to risk of		The mean healthcare utilisation (visits to manual therapist) >4	The mean healthcare utilisation (visits to manual therapist) >4 months in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual multidisciplinary RTW programme (95% CI)
		bias, imprecision		months in the control groups was 4.1	intervention groups was 2.2 lower (5.29 lower to 0.89 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 389: individually delivered return to work programme (multidisciplinary) versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Individual multidisciplinary RTW programme (95% CI)
Pain severity (NRS, 0-10 change score) ≤ 4 months	124 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (NRS, 0-10 change score) ≤ 4 months in the control groups was -2.5	The mean pain severity (NRS, 0-10 change score) ≤ 4 months in the intervention groups was 0.30 lower (1.22 lower to 0.62 higher)
Pain severity (NRS, 0-10 change score) > 4 months	119 (1 study)	MODERATE[a] due to risk of bias		The mean pain severity (NRS, 0-10 change score) > 4 months in the control groups was -2.7	The mean pain severity (NRS, 0-10 change score) > 4 months in the intervention groups was 0.20 lower (1.3 lower to 0.9 higher)
Function (RMDQ, 0-24) ≤ 4 months	126 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ, 0-24) ≤ 4 months in the control groups was -4.9	The mean function (RMDQ, 0-24) ≤ 4 months in the intervention groups was 1.4 lower (3.66 lower to 0.86 higher)
Function (RMDQ, 0-24) > 4 months	120 (1 study)	MODERATE[a] due to risk of		The mean function (RMDQ, 0-24) > 4 months in the control groups was	The mean function (RMDQ, 0-24) > 4 months in the intervention groups was

		bias		-6.7	0.6 lower (2.88 lower to 1.68 higher)
Healthcare utilisation (consultation with GP) > 4 months	134 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (consultation with GP) > 4 months in the control groups was 4.5	The mean healthcare utilisation (consultation with GP) > 4 months in the intervention groups was 2.3 lower (4.22 to 0.38 lower)
Healthcare utilisation (Consultation with occupational physician) >4 months	134 (1 study)	MODERATE[b] due to imprecision		The mean healthcare utilisation (consultation with occupational physician) >4 months in the control groups was 4.8	The mean healthcare utilisation (consultation with occupational physician) >4 months in the intervention groups was 0.9 lower (2.19 lower to 0.39 higher)
Healthcare utilisation (CT scans/MRI scans) >4 months	134 (1 study)	MODERATE[b] due to imprecision		The mean healthcare utilisation (CT scans/MRI scans) >4 months in the control groups was 0.03	The mean healthcare utilisation (CT scans/MRI scans) >4 months in the intervention groups was 0.17 higher (0.05 lower to 0.39 higher)
Healthcare utilisation (X-ray lumbar back) >4 months	134 (1 study)	HIGH		The mean healthcare utilisation (x-ray lumbar back) >4 months in the control groups was 0.4	The mean healthcare utilisation (x-ray lumbar back) >4 months in the intervention groups was 0.1 higher (0.43 lower to 0.63 higher)
Healthcare utilisation (Physio/paramedical therapy) >4 months	134 (1 study)	MODERATE[b] due to imprecision		The mean healthcare utilisation (physio/paramedical therapy) >4 months in the control groups was 27.6	The mean healthcare utilisation (physio/paramedical therapy) >4 months in the intervention groups was 7.5 higher (5.29 lower to 20.29 higher)
Healthcare utilisation (Consultations to specialist) >4 months	134 (1 study)	HIGH		The mean healthcare utilisation (consultations to specialist) >4 months in the control groups was 1.4	The mean healthcare utilisation (consultations to specialist) >4 months in the intervention groups was 0 higher (0.36 lower to 0.36 higher)
Healthcare utilisation (Consultations to	134	HIGH		The mean healthcare utilisation	The mean healthcare utilisation

alternative therapist) >4 months	(1 study)			(consultations to alternative therapist) >4 months in the control groups was 0.3	(consultations to alternative therapist) >4 months in the intervention groups was 0.7 lower (2.38 lower to 0.98 higher)
Healthcare utilisation (Pain medication) >4 months	134 (1 study)	MODERATE[b] due to imprecision		The mean healthcare utilisation (pain medication) >4 months in the control groups was 1.6	The mean healthcare utilisation (pain medication) >4 months in the intervention groups was 0.4 lower (1.2 lower to 0.4 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 390: Individually delivered return to work programme (unidisciplinary) versus usual care in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with RTW individual unidisciplinary (95% CI)
Quality of life (SF-36 Bodily Pain, 0-100) ≤ 4 months	224 (1 study)	LOW[a] due to risk of bias		The mean quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the control groups was 7.3	The mean quality of life (SF-36 bodily pain, 0-100) ≤ 4 months in the intervention groups was 6.2 higher (0.79 to 11.61 higher)
Quality of life (SF-36 Physical functioning, 0-100) ≤ 4 months	224 (1 study) 3 months	LOW[a] due to risk of bias		The mean quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the control groups was 4.8	The mean quality of life (SF-36 physical functioning, 0-100) ≤ 4 months in the intervention groups was 5.6 higher (1.48 to 9.72 higher)
Pain (NRS 0-10, change score) ≤ 4 months	224 (1 study)	LOW[a] due to risk of bias		The mean pain (NRS 0-10, change score) ≤ 4 months in the control groups was -1.9	The mean pain (NRS 0-10, change score) ≤ 4 months in the intervention groups was 0.7 lower (1.46 lower to 0.06 higher)

Function (RMDQ 0-24, change score) ≤ 4 months	224 (1 study)	LOW[a] due to risk of bias		The mean function (RMDQ 0-24, change score) ≤ 4 months in the control groups was -2.2	The mean function (RMDQ 0-24, change score) ≤ 4 months in the intervention groups was 1 lower (2.3 lower to 0.3 higher)
Sick leave ≤ 4 months	300 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.59 (0.34 to 1.02)	193 per 1000	79 fewer per 1000 (from 128 fewer to 4 more)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID or downgraded by 2 increments if the confidence interval crossed both MIDs

Table 391: individually delivered return to work programme (multidisciplinary) versus combination of interventions in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Combination of interventions	Risk difference with Return to work programme (individual) (95% CI)
Pain (NRS 0-10, final value) ≤ 4 months	47 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean pain (NRS 0-10, final value) ≤ 4 months in the control groups was 3.14	The mean pain (NRS 0-10, final value) ≤ 4 months in the intervention groups was 0.72 lower (1.96 lower to 0.52 higher)
Function (RMDQ 0-24, final value) ≤ 4 months	47 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ 0-24, final value) ≤ 4 months in the control groups was 6.59	The mean function (RMDQ 0-24, final value) ≤ 4 months in the intervention groups was 0.76 lower (3.65 lower to 2.13 higher)

(a) Downgraded by 1 increment if the majority of the evidence was at high risk of bias

(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 392: mixed group and individually delivered return to work programme versus usual care in low back pain with or without sciatica

Outcomes	No of	Quality of the	Relative	Anticipated absolute effects

	Participants (studies) Follow up	evidence (GRADE)	effect (95% CI)	Risk with usual care	Risk difference with Return to work programme (group and individual) (95% CI)
Return to work >4 months	223 (1 study)	MODERATE[a]	RR 0.86 (0.67 to 1.1)	580 per 1000	81 fewer per 1000 (from 191 fewer to 58 more)
a Downgraded by 1 increment if the confidence interval crossed 1 MID					

(a) Downgraded by 1 increment if the confidence interval crossed 1 MID

Table 393: mixed group and individually delivered return to work programme (graded activity, cognitive behavioural approaches and education) (versus return to work programme (graded activity and education) in low back pain without sciatica

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with RTW programme	Risk difference with RTW (group and individual, multidisciplinary) (95% CI)
Return to work >4 months	76 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.36 (1.02 to 1.8)	629 per 1000	226 more per 1000 (from 13 more to 503 more)

(a) Downgraded by 1 increment if the majority of evidence was at high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID

18.4 Economic evidence

Published literature

Three economic evaluations were identified that included a return to work intervention as a comparator and have been included in this review.[223,291 468] These are summarised in the economic evidence profile (**Table 394**) and the economic evidence table in Appendix I.

Following the economic evidence profile, if available, results from an employer perspective are also presented for this intervention. This is on the basis that employers may wish to provide such interventions.

See also the economic article selection flow chart in Appendix F.

Table 394: Economic evidence profile: combination interventions – return to work interventions

Study	Applicability	Limitations	Other comments	Incremental costs	Incremental effects	Cost effectiveness	Uncertainty
Hlobil 2007[223] (Netherlands)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-RCT analysis (Staal 2004[465]) • Cost-consequence analysis (various health outcomes) • Population: Low back pain (without sciatica) (> 4 weeks and sick listed) • Two comparators: 1. Usual care 2. Graded activity programme (return to work intervention) • Follow-up: 1 year	2-1: saves £60 [(c)]	From clinical review: • Pain (VAS): -0.20 (CI: -1.30, 0.90) • Function (RMDQ): -0.06 (CI: -2.88, 1,68)	n/a	Cost 95% CI: -£336 to £181
Lambeek 2010[291] (Netherlands)	Partially applicable [(d)]	Potentially serious limitations [(e)]	• Within-RCT analysis (Lambeek2010A[292]) • Cost-utility analysis (QALYs) • Population: Low back pain (with or without sciatica) (>12 weeks and on sick leave) • Two comparators: 1. Usual care 2. Integrated care return to work intervention • Follow-up: 1 year	2-1: £271[(f)]	2-1: 0.09 QALYs	£3011 per QALY gained	Prob CE: NR Cost 95% CI: NR QALY 95% CI: 0.01 to 0.16
Steenstra 2006[468] (Netherlands)	Partially applicable [(g)]	Potentially serious limitations [(h)]	• Within-RCT analysis (Anema2007[14]) • Cost-utility analysis (QALYs) • Population: Low back pain with or without sciatica (on sick	2-1: £228 [(j)]	2-1: -0.04 QALYs	Usual care dominates usual care plus multidisciplinary programme with a	Probability cost-effective NR Cost 95% CI: -£116 to £557 QALY 95% CI: -

Study	Applicability	Limitations	Other comments	Incremental costs	Incremental effects	Cost effectiveness	Uncertainty
			leave 2-6 weeks) • Two comparators [(i)]: 1. Usual care 2. Usual care plus multidisciplinary programme with a return to work focus • Follow-up: 1 year			return to work focus (lower costs and higher QALYs)	0.12 to 0.04

95% CI = 95% confidence interval; ICER = incremental cost effectiveness ratio; n/a = not available; NR = not reported; RCT = randomised clinical trial; QALY = quality-adjusted life year; Prob. CE= Probability intervention is cost-effective at a £20,000/£30,000 threshold.

(a) Dutch resource use data (1999-2002) and unit costs (1999) may not reflect current NHS context. QALYs were not used as the health outcome measure.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison. Staal 2004 is 1 of 8 studies included in the clinical review for return to work interventions. Limited sensitivity analyses were undertaken.

(c) 1999 Netherlands euros converted to UK pounds.[394] Cost components incorporated: intervention, physiotherapy, scans, x-rays, consultations (GP, specialist, alternative therapist), pain medication.

(d) Dutch resource use data (2005-2009) and unit costs (2009) may not reflect current NHS context. Dutch EQ5D tariff used (time-trade off method).

(e) Within-trial analysis and so does not reflect full body of available evidence for this comparison. Lambeek2010A is 1 of 8 studies included in the clinical review for return to work interventions. Although uncertainty was explored in the analysis, no sensitivity analyses were available for the healthcare perspective relevant to the guideline.

(f) 2007 Netherlands euros converted to UK pounds by authors using purchasing power parities. Cost components incorporated: GP, physiotherapist, occupational physician, manual therapy, psychologist, clinical occupational physician, diagnostic tests, hospital stay, medical specialist.

(g) Dutch resource use (2000-2003) and unit cost (year not stated) data may not reflect current NHS context. The CUA ICER is calculated as the difference in EQ5D utility between baseline and last follow-up rather than using the time spent at different EQ5D levels to calculate QALYs. There is a significant difference in baseline EQ5D between two of the arms.

(h) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Amena2007 is 1 of 8 studies included in the clinical review for return to work interventions. Limited sensitivity analyses.

(i) Note, this study has 2 randomisation stages; first randomisation occurred at 2 weeks for all recruited participants into the two intervention groups, second randomisation was at 8 weeks for only those people who were still off work due to their back pain. In this second randomisation they were re-randomised to either graded activity or usual care. Only the first randomisation is presented here.

(j) 2002 Netherlands Euros converted to UK pounds.[394] Cost components incorporated: intervention costs, additional healthcare visits (GP, manual therapist, physiotherapist, medical specialist, other healthcare professionals), prescription medication, professional home care and hospitalisation. Note: paper reported societal perspective; here only healthcare costs have been presented.

Costs from an employer perspective are presented below on the basis that employers may wish to provide return to work interventions. These typically consider the cost of lost productivity to the employer. When interpreting productivity costs based on days taken off work there are a number of issues to consider including:

- The actual productivity loss to the employer will not necessary equate to the number of sick days taken by the employee. Time taken off work may be compensated for in some way: for example, another colleague may be able to undertake the tasks the absent employee would have been doing or the employee may be able to make up the time off when back at work within their contracted hours. The ability to compensate will depend on the type of work.
- Employees who return to work may not necessarily be fully productive if still suffering symptoms.

Table 395: Return to work interventions – employer perspective

Study	Intervention cost	Productivity savings compared to usual care
Hlobil 2007[223] (Netherlands)	£342	Gross lost productivity over 3 years (total days workers were completely or partially sick listed) • Saves 79.2 days (95% CI: -23.8 to 192.3) • Saves £5455 (95% CI: -£2,347 to £12,483) Net lost productivity (percentage work absence, that is accounting for partial lost days; assuming 100% productivity during hours of partial work resumption) • Saves 12.0 days (95% CI:--50.2 to 64.9) • Saves £1195 (95% CI: -£2989 to £4974; p=NR)
Lambeek 2010[291] (Netherlands)	£1077	Lost productivity over 1 year (assuming 100% productivity during hours of partial work resumption) • Saves 41.9 days (95% CI NR) • Saves £5527 (95% CI:-£10,042 to -£391)
Steenstra 2006[468](Netherlands)	NR	Lost productivity over 1 year (net days on sick leave) • Saves £467 (95% CI: -£1,381 to £495)

95% CI = 95% confidence interval; NR = not reported.

18.5 Evidence statements

18.5.1 Clinical

The majority of the evidence was from populations of people with low back pain with or without sciatica. However, there was also evidence from populations of people with low back pain without sciatica.

18.5.1.1 Individually delivered, multidisciplinary return to work programme versus usual care in low back pain with or without sciatica

Evidence from 1 study suggested clinical harm of a multidisciplinary programme with a return to work focus for quality of life, when compared to usual care (high quality; n=186). There was no evidence of clinical difference in pain at short and long term (3 single studies; low to moderate quality; n=188, n=117, n=141) and psychological distress at > 4 months (1 study; moderate quality; n=141,). Benefit in favour of usual care compared to return to work programmes was observed for function in the longer term follow up (1 study, n=117, low quality) but not at short term (1 study;

moderate quality; n=188). Other evidence was mixed for days to return to work, absenteeism from unpaid work (very low quality; n=196), return to work (2 single studies, low to very low quality) and healthcare utilisation outcomes (2 single studies; very low to moderate quality; n=134, n=57).

18.5.1.2 Individually delivered, multidisciplinary return to work programme versus usual care in low back pain without sciatica

Evidence from a single study demonstrated no clinical difference of the multidisciplinary programme for pain and function, both at short term and long term follow ups (low to high quality; n=124-134). There was also evidence of no clinical difference for all healthcare utilisation outcomes at longer term follow up, with the exception of physio/paramedical therapy which was increased in the group receiving the multidisciplinary programme. There was no evidence available for psychological distress or quality of life in this population.

18.5.1.3 Individually delivered, unidisciplinary return to work programme versus usual care in low back pain without sciatica

Evidence from a single study suggested clinical benefit of a return to work programme for quality of life (SF-36 bodily pain and physical functioning subscales) and sick leave at short term, when compared to usual care (low quality; n=224). However, there was no clinical difference in terms of pain or function in the short term. There was no evidence available for psychological distress for this comparison.

18.5.1.4 Individually delivered return to work programme versus combination of interventions in low back pain without sciatica

Evidence from a small, single study showed no clinical difference between return to work programme and combination of interventions for pain and function outcomes at less than 4 months (low quality; n=47). No evidence was available for quality of life or psychological distress.

18.5.1.5 Mixed group and individually delivered return to work programme versus usual care in low back pain with or without sciatica

No clinical difference between intervention and usual care was found in return to work at greater than 4 months follow-up (1 single study; moderate quality; n=223).

18.5.1.6 Mixed group and individually delivered return to work programme (graded activity, cognitive behavioural approaches and education) versus return to work programme (graded activity and education) in low back pain without sciatica

Evidence from a single study (low quality; n=76) showed no clinical difference between 2 return to work programmes in return to work at the long term follow up. No available evidence was found for any other critical outcomes.

18.5.2 Economic

- One cost–utility analysis found that a return to work intervention was cost effective compared to usual care for treating low back pain (with or without sciatica) (ICER: £3,011 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost-utility analysis found that usual care was dominant (less costly and more effective) compared to return-to-work interventions for the management of low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.

- One cost–consequence analysis found that a return to work intervention was less costly and more effective than usual care for low back pain (without sciatica) (saves £60 per patient, pain [VAS]: 0.20 lower, disability [RMDQ] 0.06 lower). This analysis was assessed as partially applicable with potential serious limitations.

18.6 Recommendations and link to evidence

Recommendations	31. Promote and facilitate return to work or normal activities of daily living for people with low back pain with or without sciatica.
Relative values of different outcomes	The GDG considered return to work, in addition to health related quality of life, pain severity, function and psychological distress as critical outcomes for decision making in this review. Health care utilisation, responder criteria and adverse events were considered as important outcomes. In this review however there was no evidence available for the outcomes responder criteria or adverse events. Return to work was noted as reported by included studies, including number of people returned to work as well as number of days absent from work to capture all of the available evidence informing this outcome relevant to work participation.
Trade-off between clinical benefits and harms	**Low back pain with or without sciatica** The majority of evidence included in this review reported no clinically important difference of individually delivered, multidisciplinary programmes with a specific return to work focus when compared to usual care. There was also some evidence reporting clinically important differences in favour of the comparator intervention in terms of quality of life and function, and mixed evidence of benefit and harm in terms of return to work (number of people returning to work; number of days to return to work for a sick-listed population during an 8 week intervention period). Some evidence of benefit was seen in healthcare utilisation outcomes at 12 months follow-up. No clinical difference was seen in return to work when a mixed group and individually delivered programme with a specific return to work focus was compared to usual care. **Low back pain without sciatica** Some clinical benefit of an individually delivered unidisciplinary programme with return to work focus was seen compared to usual care in terms of quality of life and return to work (number of people on sick leave for greater than 8 weeks during a 3 month intervention period). The return to work intervention programme consisted of counselling sessions delivered by an occupational physician with work place visits/assessments. No clinical difference was seen in pain, function or healthcare utilisation outcomes (with the exception of an increase in physiotherapy and paramedical therapy) when an individually delivered multidisciplinary return to work programme was compared to usual care. No clinical difference was seen in either pain or function when an individually delivered programme with focus on return to work was compared to a combination of interventions, or in return to work outcome when compared to a different return to work programme. The GDG discussed that the evidence from Van der Hout *et al* comparing two mixed group and individually delivered return work programmes was not very informative on the benefit of a return to work focussed programme, as it had a return to work element in both intervention arms. Rather it demonstrated a clinically important benefit of having a cognitive behavioural therapy element on the outcome return to work at 12 months in a low back pain population. **Summary** The GDG considered that many people with low back pain will return to work

	following a period of sick leave without an intervention with a specific focus on occupational health. However, there was no known evidence to support the use of a tool to predict the need for a return to work intervention. Therefore any return to work programme eventually offered would need to be available to all people with low back pain unable to undertake their usual activities. The GDG accepted this may not be feasible. It was noted that most of the included studies used tailored intervention programmes that were too intensive to be relevant to the UK healthcare context. Two of the studies were from the Netherlands however, and the GDG considered that this is a comparable population in terms of sick leave rates. Of these, it was considered that the study featuring a programme delivered by a single practitioner consisting of individual counselling and a workplace visit by an occupational physician, would be most relevant to the UK healthcare setting. The GDG discussed that although the evidence from the review was not compelling, there was some evidence of benefit from certain programmes suggesting a need for treatment programmes to be tailored to the individual. The GDG were also aware of a government research report suggesting that returning to work has many benefits for people.[529] The benefits of returning to work for those who were away due to sickness or disability included promoting recovery and rehabilitation, better health outcomes, improved quality of life and a reduction in the harmful physical and mental long-term side effects of absence. For these reasons the GDG agreed that facilitation of returning patients to work, where applicable, should be encouraged and this should be considered in consultation with people with low back pain to suggest this as one of the goals of treatment. However, they felt that specific return to work programmes separate from other clinical interventions should not be recommended for the NHS. The GDG also considered whether to make a recommendation that employers should consider providing such interventions. However, they felt that while the goals and benefits to employers were much more clear-cut, the evidence they had considered for specific programmes was still not sufficiently compelling to make such a recommendation.
Trade-off between net clinical effects and costs	Three economic evaluations of return to work interventions were included. All evaluated different return to work interventions but overall the evidence about cost effectiveness relevant to an NHS (health care cost) perspective was mixed; one study showed little difference in costs or health outcomes;[223] although mean differences suggested a cost saving and health improvement, the magnitude of effect was small and there was uncertainty with the confidence interval crossing the line of no effect). Another study showed a return to work intervention to be cost effective[292] while a different study showed usual care to be more cost effective than the return to work interventions.[468] Evidence was also presented from an employer's perspective to allow the GDG to consider whether a recommendation for employers might be appropriate. In line with the NHS perspective, Lambeek *et al*. found a saving in terms of productivity costs, while Hlobil *et al*. reported possible savings but high uncertainty with a wide confidence interval spanning no difference. The results from Steenstra *et al*. were also uncertain with confidence intervals spanning no difference. The limitations in the assessment of productivity costs were also noted. The GDG concluded that it was difficult to come to a conclusion regarding the cost effectiveness of return to work interventions (from either an NHS or employer perspective) based on this evidence. The GDG decided not to recommend specific return to work programmes separate from other clinical interventions as they may not be cost effective; however they considered that encouraging people who are absent from work due to their low back pain and/or sciatica to return to work or usual activities could be done as part of usual care and therefore unlikely to incur additional costs to the NHS, therefore this would be cost effective and should be

	recommended.
Quality of evidence	For the majority of evidence in this review, the quality ranged from a GRADE rating of high to very low. This was due to the high number of drop outs and lack of blinding in some of the included studies resulting in high risk of bias ratings, as well as the imprecise nature of the results. Evidence for individually delivered programmes with specific return to work focus versus usual care had high quality GRADE ratings for the outcomes quality of life at up to 4 months in a low back pain with or without sciatica population, and healthcare utilisation over 4 months in both people with low back pain without sciatica with or without sciatica. High quality GRADE rating was also seen in evidence for mixed group and individually delivered programmes with specific return to work focus versus usual care for the outcome return to work at longer term follow-up in a low back pain with or without sciatica population. The design of the study by Anema *et al*. was discussed. The GDG noted that this study had two randomisation stages; the first randomisation took place for all the sick-listed participants into either the return to work programme or usual care arm. The second randomisation at 8 weeks was only for those participants who still hadn't returned to work. The second randomisation split participants into 4 arms; return to work programme, return to work programme with a graded activity programme, usual care and usual care with a graded activity programme. Most of the results from the second randomisation were presented as pooled outcomes of both the return to work arms and both the usual care arms, and therefore could not be included in this review. However, where separated, data for people who had not switched groups was reported. This places uncertainty in the reliability of the results from the longer term follow-up (post second randomisation) as not all of the randomised participants are included in the analysis. The economic evidence was assessed as partially applicable with potentially serious limitations.
Other considerations	When setting out the protocol for this review the GDG highlighted a priori the difficulty isolating 'return to work' interventions and their effect given that many general rehabilitation programmes will address peoples individual goals which might include returning to work although this may not be explicitly specified or the primary goal of the intervention. As such they felt it should be clear that a lack of evidence from this particular review does not negate the importance of returning to work per se as they felt this was well-established to be valued by people with low back pain and the general population. The GDG discussed that although the aim of returning to work was of importance to a large proportion of the population suffering with low back pain, there was equally a large proportion would not be working, either due to not being of working age, or for other reasons such as caring for a child, or family member, disability, amongst others. It was noted that these people also should be considered and return to usual activities was equally important, the recommendation was drafted to take this into account. It was noted that there are different types of programmes which would not be included by this evidence review, such as 'stay at work' programmes. The GDG are unable to comment on these programmes from this evidence review. The GDG were also aware that recently the Department for Work and Pensions is introducing a scheme called Fit for Work with the aim of helping people on long-term sick leave return to work. People can be referred by their GP if they have been off work for 4 weeks or more. Once referred, they are assessed by an occupational health professional and will receive a plan to help them return to work. While this is not low back pain specific the GDG felt it was important that GPs knew about and were confident to refer into this existing service. The GDG were aware of existing NICE public health guidance for Managing long-term

	sickness and incapacity for work https://www.nice.org.uk/guidance/ph19 which, while not directly relevant to this review, should also be considered in those who are unable to return to work for a prolonged period. Due to the lack of evidence for a specific intervention or programme that could be recommended to enable people to return to work and the existing services available, alongside the broader evidence highlighting benefits of enabling people to return to work or their usual activities, the GDG agreed that a consensus recommendation should be made for this to be encouraged as part of all treatment for people with low back pain and/or sciatica.

19 Reference list

1 NHS Supply Chain Catalogue. NHS Supply Chain, 2014. Available from: http://www.supplychain.nhs.uk/

2 Review Manager (RevMan) [Computer program]. Version 5. Copenhagen. The Nordic Cochrane Centre, The Cochrane Collaboration, 2015. Available from: http://tech.cochrane.org/Revman

3 Aboagye E, Karlsson ML, Hagberg J, Jensen I. Cost-effectiveness of early interventions for non-specific low back pain: a randomized controlled study investigating medical yoga, exercise therapy and self-care advice. Journal of Rehabilitation Medicine. 2015; 47(2):167-173

4 Adamczyk A, Kiebzak W, Wilk-Franczuk M, Sliwinski Z. Effectiveness of holistic physiotherapy for low back pain. Ortopedia, Traumatologia, Rehabilitacja. 2009; 11(6):562-576

5 Ajimsha MS, Daniel B, Chithra S. Effectiveness of Myofascial release in the management of chronic low back pain in nursing professionals. Journal of Bodywork and Movement Therapies. 2014; 18(2):273-281

6 Alaranta H, Hurri H. Compliance and subjective relief by corset treatment in chronic low back pain. Scandinavian Journal of Rehabilitation Medicine. 1988; 20(3):133-136

7 Alayat MSM, Atya AM, Ali MME, Shosha TM. Long-term effect of high-intensity laser therapy in the treatment of patients with chronic low back pain: a randomized blinded placebo-controlled trial. Lasers in Medical Science. 2014; 29(3):1065-1073

8 Albert HB, Manniche C. The efficacy of systematic active conservative treatment for patients with severe sciatica: a single-blind, randomized, clinical, controlled trial. Spine. 2012; 37(7):531-542

9 Albert HB, Sorensen JS, Christensen BS, Manniche C. Antibiotic treatment in patients with chronic low back pain and vertebral bone edema (Modic type 1 changes): a double-blind randomized clinical controlled trial of efficacy. European Spine Journal. 2013; 22(4):697-707

10 Alcoff J, Jones E, Rust P, Newman R. Controlled trial of imipramine for chronic low back pain. Journal of Family Practice. 1982; 14(5):841-846

11 Alexander A, Woolley SM, Bisesi M, Schaub E. The effectiveness of back belts on occupational back injuries and worker perception. Professional Safety. 1995; September:22-26

12 Alp A, Mengi G, Avsaroglu AH, Mert M, Sigirli D. Efficacy of core-stabilization exercise and its comparison with home-based conventional exercise in low back pain patients. Turkiye Fiziksel Tip Ve Rehabilitasyon Dergisi. 2014; 60(Suppl.1):S36-S42

13 Amlie E, Weber H, Holme I. Treatment of acute low-back pain with piroxicam: results of a double-blind placebo-controlled trial. Spine. 1987; 12(5):473-476

14 Anema JA, Steenstra IA, Bongers PM, de Vet HC, Knol DL, Loisel P et al. Multidisciplinary rehabilitation for subacute low back pain: graded activity or workplace intervention or both? a randomized controlled trial. Spine. 2007; 32(3):291-298

15 Anema JR, Steenstra IA, Urlings IJM, Bongers PM, de Vroome EMM, van Mechelen W. Participatory ergonomics as a return-to-work intervention: a future challenge? American Journal of Industrial Medicine. 2003; 44(3):273-281

16 Ansari NN, Ebadi S, Talebian S, Naghdi S, Mazaheri H, Olyaei G et al. A randomized, single blind placebo controlled clinical trial on the effect of continuous ultrasound on low back pain. Electromyography and Clinical Neurophysiology. 2006; 46(6):329-336

17 Apeldoorn AT, Bosmans JE, Ostelo RW, de Vet HC, van Tulder MW. Cost-effectiveness of a classification-based system for sub-acute and chronic low back pain. European Spine Journal. 2012; 21(7):1290-1300

18 Apeldoorn AT, Ostelo RW, van Helvoirt H, Fritz JM, Knol DL, van Tulder MW et al. A randomized controlled trial on the effectiveness of a classification-based system for subacute and chronic low back pain. Spine. 2012; 37(16):1347-1356

19 Ara R, Brazier J. Deriving an algorithm to convert the eight mean SF-36 dimension scores into a mean EQ–5D preference based score from published studies (where patient level data are not available). Value in Health. 2008; 11(7):1131-1143

20 Assendelft WJ, Morton SC, Yu EI, Suttorp MJ, Shekelle PG. WITHDRAWN: Spinal manipulative therapy for low-back pain. Cochrane Database of Systematic Reviews. 2013; Issue 1:CD000447. DOI:10.1002/14651858.CD000447.pub3

21 Atkinson JH, Slater MA, Wahlgren DR, Williams RA, Zisook S, Pruitt SD et al. Effects of noradrenergic and serotonergic antidepressants on chronic low back pain intensity. Pain. 1999; 83(2):137-145

22 Atkinson JH, Slater MA, Williams RA, Zisook S, Patterson TL, Grant I et al. A placebo-controlled randomized clinical trial of nortriptyline for chronic low back pain. Pain. 1998; 76(3):287-296

23 Atkinson JH, Slater MA, Capparelli EV, Wallace MS, Zisook S, Abramson I et al. Efficacy of noradrenergic and serotonergic antidepressants in chronic back pain: a preliminary concentration-controlled trial. Journal of Clinical Psychopharmacology. 2007; 27(2):135-142

24 Aure OF, Nilsen JH, Vasseljen O. Manual therapy and exercise therapy in patients with chronic low back pain: a randomized, controlled trial with 1-year follow-up. Spine. 2003; 28(6):525-2

25 Ay S, Dogan SK, Evcik D. Is low-level laser therapy effective in acute or chronic low back pain? Clinical Rheumatology. 2010; 29(8):905-910

26 Baena-Beato PA, Artero EG, Arroyo-Morales M, Robles-Fuentes A, Gatto-Cardia MC, Delgado-Fernandez M. Aquatic therapy improves pain, disability, quality of life, body composition and fitness in sedentary adults with chronic low back pain. A controlled clinical trial. Clinical Rehabilitation. 2014; 28(4):350-360

27 Baena-Beato PA, Artero EG, Arroyo-Morales M, Robles-Fuentes A, Gatto-Cardia MC, elgado-Fernandez M. Aquatic therapy improves pain, disability, quality of life, body composition and fitness in sedentary adults with chronic low back pain. A controlled clinical trial. Clinical Rehabilitation. 2014; 28(4):350-360

28 Banth S, Ardebil MD. Effectiveness of mindfulness meditation on pain and quality of life of patients with chronic low back pain. International Journal of Yoga. 2015; 8(2):128-133

29 Basford JR, Sheffield CG, Harmsen WS. Laser therapy: a randomized, controlled trial of the effects of low-intensity Nd:YAG laser irradiation on musculoskeletal back pain. Archives of Physical Medicine and Rehabilitation. 1999; 80(6):647-652

30 Basmajian JV. Cyclobenzaprine hydrochloride effect on skeletal muscle spasm in the lumbar region and neck: two double-blind controlled clinical and laboratory studies. Archives of Physical Medicine and Rehabilitation. 1978; 59(2):58-63

31 Bendix AE, Bendix T, Haestrup C, Busch E. A prospective, randomized 5-year follow-up study of functional restoration in chronic low back pain patients. European Spine Journal. 1998; 7(2):111-119

32 Bendix AF, Bendix T, Labriola M, Boekgaard P. Functional restoration for chronic low back pain. Two-year follow-up of two randomized clinical trials. Spine. 1998; 23(6):717-725

33 Bendix AF, Bendix T, Ostenfeld S, Bush E, Andersen. Active treatment programs for patients with chronic low back pain: a prospective, randomized, observer-blinded study. European Spine Journal. 1995; 4(3):148-152

34 Beneciuk JM, Bishop MD, Fritz JM, Robinson ME, Asal NR, Nisenzon AN et al. The STarT back screening tool and individual psychological measures: evaluation of prognostic capabilities for low back pain clinical outcomes in outpatient physical therapy settings. Physical Therapy. 2013; 93(3):321-333

35 Beneciuk JM, Fritz JM, George SZ. The STarT Back Screening Tool for prediction of 6-month clinical outcomes: relevance of change patterns in outpatient physical therapy settings. Journal of Orthopaedic and Sports Physical Therapy. 2014; 44(9):656-664

36 Beneciuk JM, George SZ. Pragmatic Implementation of a Stratified Primary Care Model for Low Back Pain Management in Outpatient Physical Therapy Settings: Two-Phase, Sequential Preliminary Study. Physical Therapy. 2015; 95(8):1120-1134

37 Bentsen H, Lindgarde F, Manthorpe R. The effect of dynamic strength back exercise and/or a home training program in 57-year-old women with chronic low back pain. Results of a prospective randomized study with a 3-year follow-up period. Spine. 1997; 22(13):1494-1500

38 Berry H, Hutchinson DR. A multicentre placebo-controlled study in general practice to evaluate the efficacy and safety of tizanidine in acute low-back pain. Journal of International Medical Research. 1988; 16(2):75-82

39 Berry H, Hutchinson DR. Tizanidine and ibuprofen in acute low-back pain: results of a double-blind multicentre study in general practice. Journal of International Medical Research. 1988; 16(2):83-91

40 Bertocco P, Montesano A, Baccalaro G, Parisio C, Vismara L. Controlled study on the efficacy of two different treatments in obese patients affected by chronic low back pain, assessed by an isokinetic device: Analysis of muscle strength and spine mobility. Europa Medicophysica. 2002; 38(4):187-193

41 Beurskens AJ, de Vet HC, Koke AJ, Lindeman E, Regtop W, van der Heijden GJ et al. Efficacy of traction for non-specific low back pain: a randomised clinical trial. Lancet. 1995; 346(8990):1596-1600

42 Beurskens AJ, de Vet HC, Koke AJ, Regtop W, van der Heijden GJ, Lindeman E et al. Efficacy of traction for nonspecific low back pain. 12-week and 6-month results of a randomized clinical trial. Spine. 1997; 22(23):2756-2762

43 Bialosky JE, George SZ, Horn ME, Price DD, Staud R, Robinson ME. Spinal manipulative therapy-specific changes in pain sensitivity in individuals with low back pain (NCT01168999). Journal of Pain. 2014; 15(2):136-148

44 Birbara CA, Puopolo AD, Munoz DR, Sheldon EA, Mangione A, Bohidar NR et al. Treatment of chronic low back pain with etoricoxib, a new cyclo-oxygenase-2 selective inhibitor: improvement in pain and disability--a randomized, placebo-controlled, 3-month trial. Journal of Pain. 2003; 4(6):307-315

45 Bishop PB, Quon JA, Fisher CG, Dvorak MF. The Chiropractic Hospital-based Interventions Research Outcomes (CHIRO) study: a randomized controlled trial on the effectiveness of clinical practice guidelines in the medical and chiropractic management of patients with acute mechanical low back pain. Spine Journal. 2010; 10(12):1055-1064

46 Borman P, Keskin D, Bodur H. The efficacy of lumbar traction in the management of patients with low back pain. Rheumatology International. 2003; 23(2):82-86

47 Brandt Y, Currier L, Plante TW, Schubert Kabban CM, Tvaryanas AP. A Randomized Controlled Trial of Core Strengthening Exercises in Helicopter Crewmembers with Low Back Pain. Aerospace Medicine and Human Performance. 2015; 86(10):889-894

48 Brealey S, Burton K, Coulton S, Farrin A, Garratt A, Harvey E et al. UK Back pain Exercise And Manipulation (UK BEAM) trial--national randomised trial of physical treatments for back pain in primary care: objectives, design and interventions [ISRCTN32683578]. BMC Health Services Research. 2003; 3(1):16

49 Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. European Journal of Pain. 2006; 10(4):287-333

50 Brennan GP, Fritz JM, Hunter SJ, Thackeray A, Delitto A, Erhard RE. Identifying subgroups of patients with acute/subacute "nonspecific" low back pairesults of a randomized clinical trial. Spine. 2006; 31(6):623-631

51 Brinkhaus B, Witt CM, Jena S, Linde K, Streng A, Wagenpfeil S et al. Acupuncture in patients with chronic low back pain: a randomized controlled trial. Archives of Internal Medicine. 2006; 166(4):450-457

52 Bronfort G. A controlled trial of chiropractic spinal manipulation and exercise for low back pain: a pilot study. FCER Proceedings of the International Conference on Spinal Manipulation. 1990;62-65

53 Bronfort G, Goldsmith CH, Nelson CF, Boline PD, Anderson AV. Trunk exercise combined with spinal manipulative or NSAID therapy for chronic low back pain: a randomized, observer-blinded clinical trial. Journal of Manipulative and Physiological Therapeutics. 1996; 19(9):570-582

54 Bronfort G, Hondras MA, Schulz CA, Evans RL, Long CR, Grimm R. Spinal manipulation and home exercise with advice for subacute and chronic back-related leg pain: a trial with adaptive allocation. Annals of Internal Medicine. 2014; 161(6):381-391

55 Bronfort G, Maiers MJ, Evans RL, Schulz CA, Bracha Y, Svendsen KH et al. Supervised exercise, spinal manipulation, and home exercise for chronic low back pain: a randomized clinical trial. Spine. 2011; 11(7):585-598

56 Buchmuller A, Navez M, Milletre-Bernardin M, Pouplin S, Presles E, Lanteri-Minet M et al. Value of TENS for relief of chronic low back pain with or without radicular pain. European Journal of Pain. 2012; 16(5):656-665

57 Burton K. The Back Book. 2nd edition. The Stationary Office; 2015. Available from: http://www.tsoshop.co.uk/bookstore.asp?FO=1160007&DI=346223&CLICKID=002289

58 Buynak R, Shapiro DY, Okamoto A, Van Hove I, Rauschkolb C, Steup A et al. Efficacy and safety of tapentadol extended release for the management of chronic low back pain: results of a prospective, randomized, double-blind, placebo- and active-controlled Phase III study. Expert Opinion on Pharmacotherapy. 2010; 11(11):1787-1804

59 Calmels P, Queneau P, Hamonet C, Le PC, Maurel F, Lerouvreur C et al. Effectiveness of a lumbar belt in subacute low back pain: an open, multicentric, and randomized clinical study. Spine. 2009; 34(3):215-220

60 Cambron JA, Gudavalli MR, McGregor M, Jedlicka J, Keenum M, Ghanayem AJ et al. Amount of health care and self-care following a randomized clinical trial comparing flexion-distraction with exercise program for chronic low back pain. Chiropractic and Osteopathy. 2006; 14:9

61 Cambron JA, Schneider M, Dexheimer JM, Iannelli G, Chang M, Terhorst L et al. A pilot randomized controlled trial of flexion-distraction dosage for chiropractic treatment of lumbar spinal stenosis. Journal of Manipulative and Physiological Therapeutics. 2014; 37(6):396-406

62 Cambron JA, Duarte M, Dexheimer J, Solecki T. Shoe orthotics for the treatment of chronic low back pain: a randomized controlled pilot study. Journal of Manipulative and Physiological Therapeutics. 2011; 34(4):254-260

63 Cambron JA, Gudavalli MR, Hedeker D, McGregor M, Jedlicka J, Keenum M et al. One-year follow-up of a randomized clinical trial comparing flexion distraction with an exercise program for chronic low-back pain. Journal of Alternative and Complementary Medicine. 2006; 12(7):659-668

64 Carpenter KM, Stoner SA, Mundt JM, Stoelb B. An online self-help CBT intervention for chronic lower back pain. Clinical Journal of Pain. 2012; 28(1):14-22

65 Castro-Mendez A, Munuera PV, Albornoz-Cabello M. The short-term effect of custom-made foot orthoses in subjects with excessive foot pronation and lower back pain: a randomized, double-blinded, clinical trial. Prosthetics and Orthotics International. 2013; 37(5):384-390

66 Celestini M, Marchese A, Serenelli A, Graziani G. A randomized controlled trial on the efficacy of physical exercise in patients braced for instability of the lumbar spine. Europa Medicophysica. 2005; 41(3):223-231

67 Chan CW, Mok NW, Yeung EW. Aerobic exercise training in addition to conventional physiotherapy for chronic low back pain: a randomized controlled trial. Spine. 2011; 92(10):1681-1685

68 Chaparro LE, Furlan AD, Deshpande A, Mailis-Gagnon A, Atlas S, Turk DC. Opioids compared with placebo or other treatments for chronic low back pain: an update of the Cochrane Review. Spine. 2014; 39(7):556-563

69 Charlusz M, Gasztych J, Irzmanski R, Kujawa J. Comparative analysis of analgesic efficacy of selected physiotherapy methods in low back pain patients. Ortopedia, Traumatologia, Rehabilitacja. 2010; 12(3):225-236

70 Cheing GL, Hui-Chan CW. Transcutaneous electrical nerve stimulation: nonparallel antinociceptive effects on chronic clinical pain and acute experimental pain. Archives of Physical Medicine and Rehabilitation. 1999; 80(3):305-312

71 Chen HM, Wang HH, Chen CH, Hu HM. Effectiveness of a stretching exercise program on low back pain and exercise self-efficacy among nurses in Taiwan: a randomized clinical trial. Pain Management Nursing. 2014; 15(1):283-291

72 Cherkin D, Deyo R, Battie M, Street J, Barlow W. A comparison of physical therap, chiropractic manipulation and provision of an educational booklet for the treatment of patients with low back pain. New England Journal of Medicine. 1998; 339(15):1021-1029

73 Cherkin DC, Deyo RA, Street JH, Hunt M, Barlow W. Pitfalls of patient education. Limited success of a program for back pain in primary care. Spine. 1996; 21(3):345-355

74 Cherkin DC, Eisenberg D, Sherman KJ, Barlow W, Kaptchuk TJ, Street J et al. Randomized trial comparing traditional Chinese medical acupuncture, therapeutic massage, and self-care education for chronic low back pain. Archives of Internal Medicine. 2001; 161(8):1081-1088

75 Cherkin DC, Sherman KJ, Avins AL, Erro JH, Ichikawa L, Barlow WE et al. A randomized trial comparing acupuncture, simulated acupuncture, and usual care for chronic low back pain. Archives of Internal Medicine. 2009; 169(9):858-866

76 Cherkin DC, Sherman KJ, Kahn J, Wellman R, Cook AJ, Johnson E et al. A comparison of the effects of 2 types of massage and usual care on chronic low back pain: a randomized, controlled trial. Annals of Internal Medicine. 2011; 155(1):1-9

77 Childs JD, Fritz JM, Flynn TW, Irrgang JJ, Johnson KK, Majkowski GR et al. A clinical prediction rule to identify patients with low back pain most likely to benefit from spinal manipulation: a validation study. Annals of Internal Medicine. 2004; 141(12):920-928

78 Childs JD, Piva SR. Psychometric properties of the functional rating index in patients with low back pain. European Spine Journal. 2005; 14(10):1008-1012

79 Cho HK, Moon W, Kim J. Effects of yoga on stress and inflammatory factors in patients with chronic low back pain: A non-randomized controlled study. European Journal of Integrative Medicine. 2015; 7(2):118-123

80 Cho HY, Kim EH, Kim J. Effects of the CORE Exercise Program on Pain and Active Range of Motion in Patients with Chronic Low Back Pain. Journal of Physical Therapy Science. 2014; 26(8):1237-1240

81 Cho Y. Effects of tai chi on pain and muscle activity in young males with acute low back pain. Journal of Physical Therapy Science. 2014; 26(5):679-681

82 Cho YK, Kim DY, Jung SY, Seong JH. Synergistic effect of a rehabilitation program and treadmill exercise on pain and dysfunction in patients with chronic low back pain. Journal of Physical Therapy Science. 2015; 27(4):1187-1190

83 Cho YJ, Song YK, Cha YY, Shin BC, Shin IH, Park HJ et al. Acupuncture for chronic low back pain: a multicenter, randomized, patient-assessor blind, sham-controlled clinical trial. Spine. 2013; 38(7):549-557

84 Chok B, Lee R, Latimer J, Tan SB. Endurance training of the trunk extensor muscles in people with subacute low back pain. Physical Therapy. 1999; 79(11):1032-1042

85 Choudhry N and Milstein A. Do Chiropractic Physician Services for Treatment of Low Back and Neck Pain Improve the Value of Health Benefit Plans: an evidence-based assessment of incremental impact on population health and total health care spending. Mercer, 2009

86 Chu LF, D'Arcy N, Brady C, Zamora AK, Young CA, Kim JE et al. Analgesic tolerance without demonstrable opioid-induced hyperalgesia: a double-blinded, randomized, placebo-controlled trial of sustained-release morphine for treatment of chronic nonradicular low-back pain. Pain. 2012; 153(8):1583-1592

87 Chuang LH, Soares MO, Tilbrook H, Cox H, Hewitt CE, Aplin J et al. A pragmatic multicentered randomized controlled trial of yoga for chronic low back pain: economic evaluation. Spine. 2012; 37(18):1593-1601

88 Clarke JA, van Tulder MW, Blomberg SE, de Vet HC, van der Heijden GJ, Bronfort G et al. Traction for low-back pain with or without sciatica. Cochrane Database of Systematic Reviews. 2007;(Issue 2):CD003010. DOI:10.1002/14651858.CD003010.pub4

89 Clinical Standards Advisory Group.Committee on Back Pain. Back Pain: Report of a CSAG Committee on Back Pain. CSAG reports. UK. H.M. Stationery Office, 1994

90 Coan RM, Wong G, Ku SL, Chan YC, Wang L, Ozer FT et al. The acupuncture treatment of low back pain: a randomized controlled study. American Journal of Chinese Medicine. 1980; 8(1-2):181-189

91 Cook C, Cook A, Worrell T. Manual therapy provided by physical therapists in a hospital-based setting: a retrospective analysis. Journal of Manipulative and Physiological Therapeutics. United States 2008; 31(5):338-343

92 Cook C, Learman K, Showalter C, Kabbaz V, O'Halloran B. Early use of thrust manipulation versus non-thrust manipulation: a randomized clinical trial. Manual Therapy. 2013; 18(3):191-198

93 Cox H, Tilbrook H, Aplin J, Semlyen A, Torgerson D, Trewhela A et al. A randomised controlled trial of yoga for the treatment of chronic low back pain: results of a pilot study. Complementary Therapies in Clinical Practice. 2010; 16(4):187-193

94 Critchley DJ, Ratcliffe J, Noonan S, Jones RH, Hurley M, V. Effectiveness and cost-effectiveness of three types of physiotherapy used to reduce chronic low back pain disability: a pragmatic randomized trial with economic evaluation. Spine. 2007; 32(14):1474-1481

95 Croft PR, Macfarlane GJ, Papageorgiou AC, Thomas E, Silman AJ. Outcome of low back pain in general practice: A prospective study. BMJ. 1998; 316(7141):1356-1359

96 Crow WT, Willis DR. Estimating cost of care for patients with acute low back pain: a retrospective review of patient records. Journal of the American Osteopathic Association. 2009; 109(4):229-233

97 Cruz-Diaz D, Martinez-Amat A, De la Torre-Cruz M, Casuso RA, de Guevara NML, Hita-Contreras F. Effects of a six-week Pilates intervention on balance and fear of falling in women aged over 65 with chronic low-back pain: A randomized controlled trial. Maturitas. 2015; 82(4):371-376

98 Cuesta-Vargas AI, Adams N, Salazar JA, Belles A, Hazanas S, Arroyo-Morales M. Deep water running and general practice in primary care for non-specific low back pain versus general practice alone: randomized controlled trial. Clinical Rheumatology. 2012; 31(7):1073-1078

99 Curtis L. Unit costs of health and social care 2013. Canterbury: Personal Social Services Research Unit, University of Kent; 2013. Available from: http://www.pssru.ac.uk/project-pages/unit-costs/2013/index.php

100 Curtis L. Unit costs of health and social care 2014. Canterbury: Personal Social Services Research Unit, University of Kent; 2014. Available from: http://www.pssru.ac.uk/project-pages/unit-costs/2014/index.php

101 Dagfinrud H, Storheim K, Magnussen LH, Odegaard T, Hoftaniska I, Larsen LG et al. The predictive validity of the Orebro Musculoskeletal Pain Questionnaire and the clinicians' prognostic assessment following manual therapy treatment of patients with LBP and neck pain. Manual Therapy. 2013; 18(2):124-129

102 Dahm KT, Brurberg KG, Jamtvedt G, Hagen KB. Advice to rest in bed versus advice to stay active for acute low-back pain and sciatica. Cochrane Database of Systematic Reviews. 2010; Issue 6:CD007612. DOI:10.1002/14651858.CD007612.pub2

103 Dapas F, Hartman SF, Martinez L. Baclofen for the treatment of acute low-back syndrome: A double-blind comparison with placebo. Spine. 1985; 10(4):345-349

104 Davies JE, Gibson T, Tester L. The value of exercises in the treatment of low back pain. Rheumatology Rehabilitation. 1979; 18(4):243-247

105 de Sousa K, Orfale AG, Meireles SM, Leite JR, Natour J. Assessment of a biofeedback program to treat chronic low back pain. Journal of Musculoskeletal Pain. 2009; 17(4):369-377. DOI:http://dx.doi.org/10.3109/10582450903284828

106 del Pozo-Cruz B, Gusi N, del Pozo-Cruz J, Adsuar JC, Hernandez-Mocholi M, Parraca JA. Clinical effects of a nine-month web-based intervention in subacute non-specific low back pain patients: a randomized controlled trial. Clinical Rehabilitation. 2013; 27(1):28-39

107 Delitto A, Erhard RE, Bowling RW. A treatment-based classification approach to low back syndrome: identifying and staging patients for conservative treatment. Physical Therapy. 1995; 75(6):470-479

108 Department of Health. Our health, our care, our say: a new direction for community services. London. The Stationery Office, 2006

109 Department of Health. NHS reference costs 2012-13. 2013. Available from: https://www.gov.uk/government/publications/nhs-reference-costs-2012-to-2013 [Last accessed: 2 May 2014]

110 Department of Health. Reference costs 2012-2013, 2013. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/261154/nhs_reference_costs_2012-13_acc.pdf

111 Deyo RA, Diehl AK, Rosenthal M. Reducing roentgenography use. Can patient expectations be altered? Archives of Internal Medicine. 1987; 147(1):141-145

112 Deyo RA, Walsh NE, Martin DC, Schoenfeld LS, Ramamurthy S. A controlled trial of transcutaneous electrical nerve stimulation (TENS) and exercise for chronic low back pain. New England Journal of Medicine. 1990; 322(23):1627-1634

113 Diab AAM, Moustafa IM. The efficacy of lumbar extension traction for sagittal alignment in mechanical low back pain: a randomized trial. Spine. 2013; 26(2):213-220

114 Dickens C, Jayson M, Sutton C, Creed F. The relationship between pain and depression in a trial using paroxetine in sufferers of chronic low back pain. Psychosomatics. 2000; 41(6):490-499

115 Ding Y, Yang MY. Electroacupuncture assisted by squatting stances for lumbar disc herniation: 128 cases. World Journal of Acupuncture - Moxibustion. 2015; 25(1):47-50

116 Djais N, Kalim H. The role of lumbar spine radiography in the outcomes of patients with simple acute low back pain. APLAR Journal of Rheumatology. 2005; 8(1):45-50

117 Djavid GE, Mehrdad R, Ghasemi M, Hasan-Zadeh H, Sotoodeh-Manesh A, Pouryaghoub G. In chronic low back pain, low level laser therapy combined with exercise is more beneficial than exercise alone in the long term: a randomised trial. Australian Journal of Physiotherapy. 2007; 53(3):155-160

118 Doran DM, Newell DJ. Manipulation in treatment of low back pain: a multicentre study. BMJ. 1975; 2(5964):161-164

119 Dougherty PE, Karuza J, Dunn AS, Savino D, Katz P. Spinal Manipulative Therapy for Chronic Lower Back Pain in Older Veterans: A Prospective, Randomized, Placebo-Controlled Trial. Geriatric Orthopaedic Surgery and Rehabilitation. 2014; 5(4):154-164

120 Dreiser RL, Marty M, Ionescu E, Gold M, Liu JH. Relief of acute low back pain with diclofenac-K 12.5 mg tablets: a flexible dose, ibuprofen 200 mg and placebo-controlled clinical trial. International Journal of Clinical Pharmacology and Therapeutics. 2003; 41(9):375-385

121 Dufour N, Thamsborg G, Oefeldt A, Lundsgaard C, Stender S. Treatment of chronic low back pain: a randomized, clinical trial comparing group-based multidisciplinary biopsychosocial rehabilitation and intensive individual therapist-assisted back muscle strengthening exercises. Spine. 2010; 35(5):469-476

122 Durmus D, Alayli G, Goktepe AS, Taskaynatan MA, Bilgici A, Kuru O. Is phonophoresis effective in the treatment of chronic low back pain? A single-blind randomized controlled trial. Rheumatology International. 2013; 33(7):1737-1744

123 Durmus D, Durmaz Y, Canturk F. Effects of therapeutic ultrasound and electrical stimulation program on pain, trunk muscle strength, disability, walking performance, quality of life, and depression in patients with low back pain: a randomized-controlled trial. Rheumatology International. 2010; 30(7):901-910

124 Eadie J, van de Water AT, Lonsdale C, Tully MA, van MW, Boreham CA et al. Physiotherapy for sleep disturbance in people with chronic low back pain: results of a feasibility randomized controlled trial. Archives of Physical Medicine and Rehabilitation. 2013; 94(11):2083-2092

125 Eadie J, Van Der Water A, Tully M, Mechelen W, Boreham C, Mcdonnagh S et al. The effectiveness of a walking programme, supervised exercise programme and usual physiotherapy on sleep disturbance in chronic low back pain: 3-month results of a feasibility randomized controlled trial. Spine. 2010; 19:274

126 Ebadi S, Ansari NN, Naghdi S, Jalaei S, Sadat M, Bagheri H et al. The effect of continuous ultrasound on chronic non-specific low back pain: a single blind placebo-controlled randomized trial. BMC Musculoskeletal Disorders. 2012; 13:192

127 Ebadi S, Henschke N, Nakhostin AN, Fallah E, van Tulder MW. Therapeutic ultrasound for chronic low-back pain. Cochrane Database of Systematic Reviews. 2014; Issue 3:CD009169. DOI:10.1002/14651858.CD009169.pub2

128 Edelist G, Gross AE, Langer F. Treatment of low back pain with acupuncture. Canadian Anaesthetists Society Journal. 1976; 23(3):303-306

129 Ehrlich GE. Alexander technique lessons were effective for chronic or recurrent back pain at 1 year. Evidence-Based Medicine. 2009; 14(1):13

130 Engers AJ, Jellema P, Wensing M, van der Windt Daniëlle AWM, Grol R, van Tulder MW. Individual patient education for low back pain. Cochrane Database of Systematic Reviews. 2008; Issue 1:CD004057. DOI:10.1002/14651858.CD004057.pub3

131 Erhard RE, Delitto A, Cibulka MT. Relative effectiveness of an extension program and a combined program of manipulation and flexion and extension exercises in patients with acute low back syndrome. Physical Therapy. 1994; 74(12):1093-1100

132 Evans C, Gilbert JR, Taylor W, Hildebrand A. A randomized controlled trial of flexion exercises, education and bed rest for patients with acute low back pain. Physiother Canada. 1987; 39(2):96-101

133 Evans DW, Lucas N. What is 'manipulation'? A reappraisal. Manual Therapy. 2010; 15(3):286-291

134 Faas A, Chavannes AW, van Eijk JT, Gubbels JW. A randomized, placebo-controlled trial of exercise therapy in patients with acute low back pain. Spine. 1993; 18(11):1388-1395

135 Facci LM, Nowotny JP, Tormem F, Trevisani VFM. Effects of transcutaneous electrical nerve stimulation (TENS) and interferential currents (IFC) in patients with nonspecific chronic low back pain: randomized clinical trial. Sao Paulo Medical Journal. 2011; 129(4):206-216

136 Ferrari R. Effects of customized foot orthotics on reported disability and analgesic use in patients with chronic low back pain associated with motor vehicle collisions. Journal of Chiropractic Medicine. 2013; 12(1):15-19

137 Ferreira PH, Ferreira ML, Maher CG, Refshauge K, Herbert RD, Hodges PW. Changes in recruitment of transversus abdominis correlate with disability in people with chronic low back pain. British Journal of Sports Medicine. 2010; 44(16):1166-1172

138 Ferrell BA, Josephson KR, Pollan AM, Loy S, Ferrell BR. A randomized trial of walking versus physical methods for chronic pain management. Aging. 1997; 9(1-2):99-105

139 Fiore P, Panza F, Cassatella G, Russo A, Frisardi V, Solfrizzi V et al. Short-term effects of high-intensity laser therapy versus ultrasound therapy in the treatment of low back pain: a randomized controlled trial. European Journal of Physical Medicine and Rehabilitation. 2011; 47(3):367-373

140 Fitzsimmons D, Phillips CJ, Bennett H, Jones M, Williams N, Lewis R et al. Cost-effectiveness of different strategies to manage patients with sciatica. Pain. 2014; 155(7):1318-1327

141 Fordyce WE, Brockway JA, Bergman JA, Spengler D. Acute back pain: a control-group comparison of behavioral vs traditional management methods. Journal of Behavioral Medicine. 1986; 9(2):127-140

142 Fordyce WE, Fowler RS, Jr., Lehmann JF, Delateur BJ, Sand PL, Trieschmann RB. Operant conditioning in the treatment of chronic pain. Archives of Physical Medicine and Rehabilitation. 1973; 54(9):399-408

143 Fordyce WE. Behavioral methods for chronic pain and illness. CV Mosby; 1976

144 Foster L, Clapp L, Erickson M, Jabbari B. Botulinum toxin A and chronic low back pain: a randomized, double-blind study. Neurology. 2001; 56(10):1290-1293

145 Foster NE, Hill JC, O'Sullivan P, Hancock M. Stratified models of care. Best Practice and Research: Clinical Rheumatology. 2013; 27(5):649-661

146 Foster NE, Mullis R, Hill JC, Lewis M, Whitehurst DGT, Doyle C et al. Effect of stratified care for low back pain in family practice (IMPaCT Back): a prospective population-based sequential comparison. Annals of Family Medicine. 2014; 12(2):102-111

147 Friedrich M, Gittler G, Halberstadt Y, Cermak T, Heiller I. Combined exercise and motivation program: effect on the compliance and level of disability of patients with chronic low back pain: a randomized controlled trial. Spine. 1998; 79(5):475-487

148 Frilander H, Solovieva S, Mutanen P, Pihlajamaki H, Heliovaara M, Viikari-Juntura E. Role of overweight and obesity in low back disorders among men: A longitudinal study with a life course approach. BMJ Open. 2015; 5(8):e007805

149 Fritz JM, Brennan GP, Hunter SJ, Magel JS. Initial management decisions after a new consultation for low back pain: implications of the usage of physical therapy for subsequent health care costs and utilization. Archives of Physical Medicine and Rehabilitation. 2013; 94(5):808-816

150 Fritz JM, Brennan GP, Leaman H. Does the evidence for spinal manipulation translate into better outcomes in routine clinical care for patients with occupational low back pain? A case-control study. Spine Journal : Official Journal of the North American Spine Society. 2006; 6(3):289-295

151 Fritz JM, Delitto A, Erhard RE. Comparison of classification-based physical therapy with therapy based on clinical practice guidelines for patients with acute low back pain: a randomised clinical trial. Spine. 2003; 28(13):1363-1371

152 Fritz JM, Lindsay W, Matheson JW, Brennan GP, Hunter SJ, Moffit SD et al. Is there a subgroup of patients with low back pain likely to benefit from mechanical traction? Results of a randomized clinical trial and subgrouping analysis. Journal of Orthopaedic & Sports Physical Therapy. 2008; 38(1):A29

153 Fritz JM, George SZ. Identifying psychosocial variables in patients with acute work-related low back pain: the importance of fear-avoidance beliefs. Physical Therapy. 2002; 82(10):973-983

154 Fritz JM, Whitman JM, Childs JD. Lumbar spine segmental mobility assessment: an examination of validity for determining intervention strategies in patients with low back pain. Archives of Physical Medicine and Rehabilitation. 2005; 86(9):1745-1752

155 Froud R, Eldridge S, Lall R, Underwood M. Estimating the number needed to treat from continuous outcomes in randomised controlled trials: methodological challenges and worked example using data from the UK Back Pain Exercise and Manipulation (BEAM) trial. BMC Medical Research Methodology. 2009; 9:35

156 Fuentes J, Armijo-Olivo S, Funabashi M, Miciak M, Dick B, Warren S et al. Enhanced therapeutic alliance modulates pain intensity and muscle pain sensitivity in patients with chronic low back pain: an experimental controlled study. Physical Therapy. 2014; 94(4):477-489

157 Furlan A, Yazdi F, Tsertsvadze A, Gross A, Van T, M et al. Complementary and alternative therapies for back pain II. United States. Agency for Healthcare Research and Quality (AHRQ), 2010. Available from: http://www.ahrq.gov/downloads/pub/evidence/pdf/backpaincam/backcam2.pdf

158 Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. Cochrane Database of Systematic Reviews. 2008; Issue 4:CD001929. DOI:10.1002/14651858.CD001929.pub2

159 Furlan AD, van Tulder MW, Cherkin D, Tsukayama H, Lao L, Koes BW et al. Acupuncture and dry-needling for low back pain. Cochrane Database of Systematic Reviews. 2005; Issue 1:CD001351. DOI:10.1002/14651858.CD001351.pub2

160 Gabel CP, Melloh M, Yelland M, Burkett B, Roiko A. Predictive ability of a modified Orebro Musculoskeletal Pain Questionnaire in an acute/subacute low back pain working population. European Spine Journal. 2011; 20(3):449-457

161 Galantino ML, Bzdewka TM, Eissler-Russo JL, Holbrook ML, Mogck EP, Geigle P et al. The impact of modified Hatha yoga on chronic low back pain: a pilot study. Alternative Therapies in Health and Medicine. 2004; 10(2):56-59

162 Gatchel RJ, Polatin PB, Noe C, Gardea M, Pulliam C, Thompson J. Treatment- and cost-effectiveness of early intervention for acute low-back pain patients: a one-year prospective study. Journal of Occupational Rehabilitation. United States 2003; 13(1):1-9

163 Geisser ME, Wiggert EA, Haig AJ, Colwell MO. A randomized, controlled trial of manual therapy and specific adjuvant exercise for chronic low back pain. Spine. 2005; 21(6):463-470

164 Gilbert FJ, Grant AM, Gillan MG, Vale LD, Campbell MK, Scott NW et al. Low back pain: influence of early MR imaging or CT on treatment and outcome. Multicenter randomized trial. Radiology. 2004; 231(2):343-351

165 Gilbert FJ, Grant AM, Gillan MGC, Vale L, Scott NW, Campbell MK. Does early magnetic resonance imaging influence management or improve outcome in patients referred to secondary care with low back pain? A pragmatic randomised controlled trial. Health Technology Assessment. England 2004; 8(17)

166 Gilbert JR, Taylor DW, Hildebrand A, Evans C. Clinical trial of common treatments for low back pain in family practice. BMJ. 1985; 291(6498):791-794

167 Gillan MG, Gilbert FJ, Andrew JE, Grant AM, Wardlaw D, Valentine NW et al. Influence of imaging on clinical decision making in the treatment of lower back pain. Radiology. 2001; 220(2):393-399

168 Gladwell V, Head S, Haggar M, Beneke R. Does a program of Pilates improve chronic non-specific low back pain? 449. Journal of Sport Rehabilitation. 2006; 2006 Nov; 15(4):338-350

169 Gohner W, Schlicht W. Preventing chronic back pain: evaluation of a theory-based cognitive-behavioural training programme for patients with subacute back pain. Patient Education and Counseling. 2006; 64(1-3):87-95

170 Goldby LJ, Moore AP, Doust J, Trew ME. A randomized controlled trial investigating the efficiency of musculoskeletal physiotherapy on chronic low back disorder. Spine. 2006; 31(10):1083-1093

171 Goldie I. A clinical trial with indomethacin (indomee(R)) in low back pain and sciatica. Acta Orthopaedica Scandinavica. 1968; 39(1):117-128

172 Goodkin K, Gullion CM, Agras WS. A randomized, double-blind, placebo-controlled trial of trazodone hydrochloride in chronic low back pain syndrome. Journal of Clinical Psychopharmacology. 1990; 10(4):269-278

173 Goren A, Yildiz N, Topuz O, Findikoglu G, Ardic F. Efficacy of exercise and ultrasound in patients with lumbar spinal stenosis: a prospective randomized controlled trial. Clinical Rehabilitation. 2010; 24(7):623-631

174 Gottlieb H, Strite LC, Koller R, Madorsky A, Hockersmith V, Kleeman M et al. Comprehensive rehabilitation of patients having chronic low back pain. Archives of Physical Medicine and Rehabilitation. 1977; 58(3):101-108

175 GRADE Working Group. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group website. 2011. Available from: http://www.gradeworkinggroup.org/ [Last accessed: 1 October 2011]

176 Graham GG, Davies MJ, Day RO, Mohamudally A, Scott KF. The modern pharmacology of paracetamol: Therapeutic actions, mechanism of action, metabolism, toxicity and recent pharmacological findings. Inflammopharmacology. 2013; 21(3):201-232

177 Grant DJ, Bishop-Miller J, Winchester DM, Anderson M, Faulkner S. A randomized comparative trial of acupuncture versus transcutaneous electrical nerve stimulation for chronic back pain in the elderly. Pain. 1999; 82(1):9-13

178 Graves JM, Fulton-Kehoe D, Jarvik JG, Franklin GM. Early imaging for acute low back pain: one-year health and disability outcomes among Washington State workers. Spine. 2012; 37(18):1617-1627

179 Graves JM, Fulton-Kehoe D, Jarvik JG, Franklin GM. Health care utilization and costs associated with adherence to clinical practice guidelines for early magnetic resonance imaging among workers with acute occupational low back pain. Health Services Research. 2014; 49(2):645-665

180 Gunay S, Yildirim Y, Karadibak D. The effect of the muscle endurance training on the chronic low back pain. Fizyoterapi Rehabilitasyon. 2014; 25(1):28-34

181 Gunn CC, Milbrandt WE, Little AS, Mason KE. Dry needling of muscle motor points for chronic low-back pain: a randomized clinical trial with long-term follow-up. Spine. 1980; 5(3):279-291

182 Gur A, Karakoc M, Cevik R, Nas K, Sarac AJ, Karakoc M. Efficacy of low power laser therapy and exercise on pain and functions in chronic low back pain. Lasers in Surgery and Medicine. 2003; 32(3):233-238

183 Gyulai F, Raba K, Baranyai I, Berkes E, Bender T. BEMER Therapy Combined with Physiotherapy in Patients with Musculoskeletal Diseases: A Randomised, Controlled Double Blind Follow-Up Pilot Study. Evidence-Based Complementary and Alternative Medicine. 2015; 2015:245742

184 Haake M, Muller HH, Schade-Brittinger C, Basler HD, Schafer H, Maier C et al. German Acupuncture Trials (GERAC) for chronic low back pain: randomized, multicenter, blinded, parallel-group trial with 3 groups. Archives of Internal Medicine. 2007; 167(17):1892-1898

185 Haas M. Commentary on McKenzie therapy and manipulation have similar effects and costs and provide only marginally better outcomes than an educational booklet. Australian Journal of Physiotherapy. 1999; 45(1):46

186 Haas M, Groupp E, Muench J, Kraemer D, Brummel-Smith K, Sharma R et al. Chronic disease self-management program for low back pain in the elderly. Journal of Manipulative and Physiological Therapeutics. 2005; 28(4):228-237

187 Haas M, Vavrek D, Peterson D, Polissar N, Neradilek MB. Dose-response and efficacy of spinal manipulation for care of chronic low back pain: a randomized controlled trial. Spine Journal. 2014; 14(7):1106-1116

188 Hagen EM, Eriksen HR, Ursin H. Does early intervention with a light mobilization program reduce long-term sick leave for low back pain? Spine. 2000; 25(15):1973-1976

189 Hagen KB, Hilde G, Jamtvedt G, Winnem M. WITHDRAWN: Bed rest for acute low-back pain and sciatica. Cochrane Database of Systematic Reviews. 2010; Issue 6:CD001254. DOI:10.1002/14651858.CD001254.pub3

190 Haldorsen EMH, Kronholm K, Skouen JS, Ursin H. Predictors for outcome of a multi-modal cognitive behavioural treatment program for low back pain patients - A 12-month follow-up study. European Journal of Pain. 1998; 2(4):293-307

191 Hale M. Erratum: Once-daily OROS hydromorphone ER compared with placebo in opioid-tolerant patients with chronic low back pain (Current Medical Research and Opinion (2010) 26 (1505-1518)). Current Medical Research and Opinion. 2010; 26(8):1904

192 Hale M, Khan A, Kutch M, Li S. Once-daily OROS hydromorphone ER compared with placebo in opioid-tolerant patients with chronic low back pain. Current Medical Research and Opinion. 2010; 26(6):1505-1518

193 Hale ME, Dvergsten C, Gimbel J. Efficacy and safety of oxymorphone extended release in chronic low back pain: results of a randomized, double-blind, placebo- and active-controlled phase III study. Journal of Pain. 2005; 6(1):21-28

194 Hall AM, Maher CG, Lam P, Ferreira M, Latimer J. Tai chi exercise for treatment of pain and disability in people with persistent low back pain: a randomized controlled trial. Arthritis Care and Research. 2011; 63(11):1576-1583

195 Hallegraeff JM, de Greef M, Winters JC, Lucas C. Manipulative therapy and clinical prediction criteria in treatment of acute nonspecific low back pain. Perceptual and Motor Skills. 2009; 108(1):196-208

196 Han G, Cho M, Nam G, Moon T, Kim J, Kim S et al. The effects on muscle strength and visual analog scale pain of aquatic therapy for individuals with low back pain. Journal of Physical Therapy Science. 2011; 23(1):57-60

197 Hancock MJ, Maher CG, Latimer J, McLachlan AJ, Cooper CW, Day RO et al. Assessment of diclofenac or spinal manipulative therapy, or both, in addition to recommended first-line treatment for acute low back pain: a randomised controlled trial. Lancet. 2007; 370(9599):1638-1643

198 Hancock MJ, Maher CG, Latimer J, McLachlan AJ, Day RO, Davies RA. Can predictors of response to NSAIDs be identified in patients with acute low back pain? Clinical Journal of Pain. 2009; 25(8):659-665

199 Hansen FR, Bendix T, Skov P, Jensen CV, Kristensen JH, Krohn L et al. Intensive, dynamic back-muscle exercises, conventional physiotherapy, or placebo-control treatment of low-back pain. A randomized, observer-blind trial. Spine. 1993; 18(1):98-108

200 Harts CC, Helmhout PH, de Bie RA, Staal JB. A high-intensity lumbar extensor strengthening program is little better than a low-intensity program or a waiting list control group for chronic low back pain: a randomised clinical trial. Australian Journal of Physiotherapy. 2008; 54(1):23-31

201 Hartvigsen J, Morso L, Bendix T, Manniche C. Supervised and non-supervised Nordic walking in the treatment of chronic low back pain: a single blind randomized clinical trial. BMC Musculoskeletal Disorders. 2010; 11:30

202 Hasegawa TM, Baptista AS, de Souza MC, Yoshizumi AM, Natour J. Acupuncture for acute non-specific low back pain: a randomised, controlled, double-blind, placebo trial. Acupuncture in Medicine. 2014; 32(2):109-115

203 Hawk C, Long CR. Use of a pilot to refine the design of a study to develop a manual placebo treatment. Journal of the Neuromusculoskeletal System. 2000; 8(2):39-48

204 Hawk C, Long CR, Rowell RM, Gudavalli MR, Jedlicka J. A randomized trial investigating a chiropractic manual placebo: a novel design using standardized forces in the delivery of active and control treatments. Journal of Alternative and Complementary Medicine. 2005; 11(1):109-117

205 Hayes SC, Strosahl KD, Wilson KG. Acceptance and commitment therapy: An experiential approach to behavior change. Guilford Press; 1999

206 Hazard RG, Reid S, Haugh LD, McFarlane G. A controlled trial of an educational pamphlet to prevent disability after occupational low back injury. Spine. 2000; 25(11):1419-1423

207 He C, Chen P, Wang X, Ding M, Lan Q, Han M. The clinical effect of herbal magnetic corsets on lumbar disc herniation. Clinical Rehabilitation. 2006; 20(12):1058-1065

208 Hemmila HM. Quality of life and cost of care of back pain patients in Finnish general practice. Spine. 2002; 27(6):647-653

209 Hemmila HM, Keinanen-Kiukaanniemi SM, Levoska S, Puska P. Long-term effectiveness of bone-setting, light exercise therapy, and physiotherapy for prolonged back pain: a randomized controlled trial. Journal of Manipulative and Physiological Therapeutics. 2002; 25(2):99-104

210 Henchoz Y, Pinget C, Wasserfallen JB, Paillex R, de GP, Norberg M et al. Cost-utility analysis of a three-month exercise programme vs usual care following multidisciplinary rehabilitation for chronic low back pain. Spine. 2010; 42(9):846-852

211 Henchoz Y, de Goumoens P, So AKL, Paillex R. Functional multidisciplinary rehabilitation versus outpatient physiotherapy for non specific low back pain: randomized controlled trial. Swiss Medical Weekly. 2010; 140:w13133

212 Heneweer H, Aufdemkampe G, van Tulder MW, Kiers H, Stappaerts KH, Vanhees L. Psychosocial variables in patients with (sub)acute low back pain: an inception cohort in primary care physical therapy in The Netherlands. Spine. 2007; 32(5):586-592

213 Henschke N, Maher CG, Ostelo RW, de Vet HC, Macaskill P, Irwig L. Red flags to screen for malignancy in patients with low-back pain. Cochrane Database of Systematic Reviews. 2013; Issue 2:CD008686. DOI:10.1002/14651858.CD008686.pub2

214 Henschke N, Ostelo Raymond WJG, van Tulder MW, Vlaeyen Johan WS, Morley S, Assendelft Willem JJ et al. Behavioural treatment for chronic low-back pain. Cochrane Database of Systematic Reviews. 2010; Issue 7:CD002014. DOI:10.1002/14651858.CD002014.pub3

215 Herman E, Williams R, Stratford P, Fargas-Babjak A, Trott M. A randomized controlled trial of transcutaneous electrical nerve stimulation (CODETRON) to determine its benefits in a rehabilitation program for acute occupational low back pain. Spine. 1994; 19(5):561-568

216 Hernandez-Reif M, Field T, Krasnegor J, Theakston H. Lower back pain is reduced and range of motion increased after massage therapy. International Journal of Neuroscience. 2001; 106(3-4):131-145

217 Hicks GE, Fritz JM, Delitto A, McGill SM. Preliminary development of a clinical prediction rule for determining which patients with low back pain will respond to a stabilization exercise program. Archives of Physical Medicine and Rehabilitation. 2005; 86(9):1753-1762

218 Hilde G, Hagen KB, Jamtvedt G, Winnem M. Advice to stay active as a single treatment for low-back pain and sciatica [withdrawn]. Cochrane Database of Systematic Reviews. 2006; Issue 2:CD003632. DOI:10.1002/14651858.CD003632.pub2

219 Hill JC, Dunn KM, Lewis M, Mullis R, Main CJ, Foster NE et al. A primary care back pain screening tool: identifying patient subgroups for initial treatment. Arthritis and Rheumatism. 2008; 59(5):632-641

220 Hill JC, Whitehurst DG, Lewis M, Bryan S, Dunn KM, Foster NE et al. Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. Lancet. 2011; 378(9802):1560-1571

221 Hill P. Psychosocial aspects of chronic pain. Journal of Pain and Palliative Care Pharmacotherapy. 2016; 28(4):399-401

222 Hlobil H, Staal JB, Twisk J, Koke A, Ariens G, Smid T et al. The effects of a graded activity intervention for low back pain in occupational health on sick leave, functional status and pain: 12-month results of a randomized controlled trial. Journal of Occupational Rehabilitation. 2005; 15(4):569-580

223 Hlobil H, Uegaki K, Staal JB, Bruyne M, Smid T, Mechelen W. Substantial sick-leave costs savings due to a graded activity intervention for workers with non-specific sub-acute low back pain. European Spine Journal. 2007; 16(7):919-924

224 Hoiriis KT, Pfleger B, McDuffie FC, Cotsonis G, Elsangak O, Hinson R et al. A randomized clinical trial comparing chiropractic adjustments to muscle relaxants for subacute low back pain. Journal of Manipulative and Physiological Therapeutics. 2004; 27(6):388-398

225 Hollinghurst S, Sharp D, Ballard K, Barnett J, Beattie A, Evans M et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain: economic evaluation. BMJ. 2008; 337:a2656

226 Hondras MA, Long CR, Cao Y, Rowell RM, Meeker WC. A randomized controlled trial comparing 2 types of spinal manipulation and minimal conservative medical care for adults 55 years and older with subacute or chronic low back pain. Journal of Manipulative and Physiological Therapeutics. 2009; 32(5):330-343

227 Horng MS. Yoga improves funtion in patients with chronic low back pain. Journal of Clinical Outcomes Management. 2006; 13(3):140-141

228 Hoy D, Brooks P, Blyth F, Buchbinder R. The Epidemiology of low back pain. Best Practice and Research: Clinical Rheumatology. 2010; 24(6):769-781

229 Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Annals of the Rheumatic Diseases. 2014; 73(6):968-974

230 Hsieh CY, Phillips RB, Adams AH, Pope MH. Functional outcomes of low back pain: comparison of four treatment groups in a randomized controlled trial. Journal of Manipulative and Physiological Therapeutics. 1992; 15(1):4-9

231 Hsieh CY, Adams AH, Tobis J, Hong CZ, Danielson C, Platt K et al. Effectiveness of four conservative treatments for subacute low back pain: a randomized clinical trial. Spine. 2002; 27(11):1142-1148

232 Hsieh RL, Lee WC. One-shot percutaneous electrical nerve stimulation vs. transcutaneous electrical nerve stimulation for low back pain: comparison of therapeutic effects. American Journal of Physical Medicine and Rehabilitation. 2002; 81(11):838-843

233 Huber J, Lisinski P, Samborski W, Wytrazek M. The effect of early isometric exercises on clinical and neurophysiological parameters in patients with sciatica: An interventional randomized single-blinded study. Isokinetics and Exercise Science. 2011; 19(3):207-214

234 Hunter RF, McDonough SM, Bradbury I, Liddle SD, Walsh DM, Dhamija S et al. Exercise and Auricular Acupuncture for Chronic Low-back Pain: A Feasibility Randomized-controlled Trial. Clinical Journal of Pain. 2012; 28(3):259-267

235 Hurley DA, Minder PM, McDonough SM, Walsh DM, Moore AP, Baxter DG. Interferential therapy electrode placement technique in acute low back pain: a preliminary investigation. Archives of Physical Medicine and Rehabilitation. 2001; 82(4):485-493

236 Hurley DA, McDonough SM, Dempster M, Moore AP, Baxter GD. A randomized clinical trial of manipulative therapy and interferential therapy for acute low back pain. Spine. 2004; 29(20):2207-2216

237 Hurwitz EL, Morgenstern H, Harber P, Kominski GF, Belin TR, Yu F et al. A randomized trial of medical care with and without physical therapy and chiropractic care with and without physical modalities for patients with low back pain: 6-month follow-up outcomes from the UCLA low back pain study. Spine. 2002; 27(20):2193-2204

238 Hussain I, Hussain Shah SI, Amjad I. Efficacy of spinal manual therapy in non-specific acute low back pain. Rawal Medical Journal. 2013; 38(4):358-360

239 Hyup Lee J, Lee CS, Ultracet ER Study Group. A randomized, double-blind, placebo-controlled, parallel-group study to evaluate the efficacy and safety of the extended-release tramadol hydrochloride/acetaminophen fixed-dose combination tablet for the treatment of chronic low back pain. Clinical Therapeutics. 2013; 35(11):1830-1840

240 Innes GD, Croskerry P, Worthington J, Beveridge R, Jones D. Ketorolac versus acetaminophen-codeine in the emergency department treatment of acute low back pain. Journal of Emergency Medicine. 1998; 16(4):549-556

241 Inoue M, Kitakoji H, Ishizaki N, Tawa M, Yano T, Katsumi Y et al. Relief of low back pain immediately after acupuncture treatment--a randomised, placebo controlled trial. Acupuncture in Medicine. 2006; 24(3):103-108

242 Irvine AB, Russell H, Manocchia M, Mino DE, Cox Glassen T, Morgan R et al. Mobile-Web app to self-manage low back pain: randomized controlled trial. Journal of Medical Internet Research. 2015; 17(1):e1

243 Itoh K, Itoh S, Katsumi Y, Kitakoji H. A pilot study on using acupuncture and transcutaneous electrical nerve stimulation to treat chronic non-specific low back pain. Complementary Therapies in Clinical Practice. 2009; 15(1):22-25

244 Iversen MD, Fossel AH, Katz JN. Enhancing function in older adults with chronic low back pain: a pilot study of endurance training. Spine. 2003; 84(9):1324-1331

245 Jarvik JG, Gold LS, Comstock BA, Heagerty PJ, Rundell SD, Turner JA et al. Association of early imaging for back pain with clinical outcomes in older adults. JAMA. 2015; 313(11):1143-1153

246 Jarzem PF, Harvey EJ, Arcaro N, Kaczorowski J. Transcutaneous electrical nerve stimulation [TENS] for short-term treatment of low back pain - Randomized double blind crossover study of sham versus conventional TENS. Journal of Musculoskeletal Pain. 2005; 13(2):11-17

247 Jellema P, van der Roer N, Van Der Windt DAWM, van Tulder MW, Van Der Horst HE, Stalman WAB et al. Low back pain in general practice: Cost-effectiveness of a minimal psychosocial intervention versus usual care. European Spine Journal. 2007; 16(11):1812-1821

248 Jellema P, van der Windt DA, Van Der Horst HE, Twisk JW, Stalman WA, Bouter LM. Should treatment of (sub)acute low back pain be aimed at psychosocial prognostic factors? Cluster randomised clinical trial in general practice. BMJ. 2005; 331(7508):84

249 Jellema P, van Tulder MW, Van Poppel MN, Nachemson AL, Bouter LM. Lumbar supports for prevention and treatment of low back pain: a systematic review within the framework of the cochrane back review group. Spine. 2001; 26(4):377-386

250 Jellema P, van der Windt DAWM, van der Horst HE, Stalman WAB, Bouter LM. Prediction of an unfavourable course of low back pain in general practice: comparison of four instruments. British Journal of General Practice. 2007; 57(534):15-22

251 Jenkins DG, Ebbutt AF, Evans CD. Tofranil in the treatment of low back pain. Journal of International Medical Research. 1976; 4(2 Suppl.):28-40

252 Jensen C, Jensen OK, Nielsen CV. Sustainability of return to work in sick-listed employees with low-back pain. Two-year follow-up in a randomized clinical trial comparing multidisciplinary and brief intervention. BMC Musculoskeletal Disorders. 2012; 13:156

253 Jensen LD, Maribo T, Schiottz-Christensen B, Madsen FH, Gonge B, Christensen M et al. Counselling low-back-pain patients in secondary healthcare: a randomised trial addressing experienced workplace barriers and physical activity. Occupational and Environmental Medicine. 2012; 69(1):21-28

254 Jensen RK, Claus M, Leboeuf-Yde C. Routine versus needs-based MRI in patients with prolonged low back pain: a comparison of duration of treatment, number of clinical contacts and referrals to surgery. Chiropractic and Osteopathy. Denmark 2010; 18:19

255 Johnstone R, Donaghy M, Martin D. A pilot study of a cognitive-behavioural therapy approach to physiotherapy, for acute low back pain patients, who show signs of developing chronic pain. Advances in Physiotherapy. 2002; 4(4):182-188

256 Joint Formulary Committee. British National Formulary (BNF). 66th edition. London: British Medical Association and The Royal Pharmaceutical Society of Great Britain; 2013. Available from: http://www.bnf.org.uk

257 Jousset N, Fanello S, Bontoux L, Dubus V, Billabert C, Vielle B et al. Effects of functional restoration versus 3 hours per week physical therapy: a randomized controlled study. Spine. 2004; 29(5):487-493

258 Juni P, Battaglia M, Nuesch E, Hammerle G, Eser P, van Beers R et al. A randomised controlled trial of spinal manipulative therapy in acute low back pain. Annals of the Rheumatic Diseases. 2009; 68(9):1420-1427

259 Kalita J, Kohat AK, Misra UK, Bhoi SK. An open labeled randomized controlled trial of pregabalin versus amitriptyline in chronic low backache. Journal of the Neurological Sciences. 2014; 342(1-2):127-132

260 Kamper SJ, Apeldoorn AT, Chiarotto A, Smeets RJEM, Ostelo RWJG, Guzman J et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. BMJ. 2015; 350:h444

261 Kamper SJ, Apeldoorn AT, Chiarotto A, Smeets Rob JEM, Ostelo Raymond WJG, Guzman J et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain. Cochrane Database of Systematic Reviews. 2014; Issue 9:CD000963. DOI:10.1002/14651858.CD000963.pub3

262 Kamper SJ, Maher CG, Hancock MJ, Koes BW, Croft PR, Hay E. Treatment-based subgroups of low back pain: a guide to appraisal of research studies and a summary of current evidence. Best Practice and Research: Clinical Rheumatology. 2010; 24(2):181-191

263 Katz N, Kopecky EA, O'Connor M, Brown RH, Fleming AB. A phase 3, multicenter, randomized, double-blind, placebo-controlled, safety, tolerability, and efficacy study of Xtampza ER in patients with moderate-to-severe chronic low back pain. Pain. 2015; 156(12):2458-2467

264 Katz NP, Mou J, Trudeau J, Xiang J, Vorsanger G, Orman C et al. Development and preliminary validation of an integrated efficacy-tolerability composite measure for the evaluation of analgesics. Pain. 2015; 156(7):1357-1365

265 Kell RT, Asmundson GJ. A comparison of two forms of periodized exercise rehabilitation programs in the management of chronic nonspecific low-back pain. Journal of Strength and Conditioning Research. 2009; 23(2):513-523

266 Keller S, Ehrhardt-Schmelzer S, Herda C, Schmid S, Basler HD. Multidisciplinary rehabilitation for chronic back pain in an outpatient setting: a controlled randomized trial. European Journal of Pain. 1997; 1(4):279-292

267 Kendrick D, Fielding K, Bentley E, Kerslake R, Miller P, Pringle M. Radiography of the lumbar spine in primary care patients with low back pain: randomised controlled trial. BMJ. 2001; 322(7283):400-405

268 Kendrick D, Fielding K, Bentley E, Miller P, Kerslake R, Pringle M. The role of radiography in primary care patients with low back pain of at least 6 weeks duration: a randomised (unblinded) controlled trial. Health Technology Assessment. England 2001; 5(30)

269 Kennedy S, Baxter GD, Kerr DP, Bradbury I, Park J, McDonough SM. Acupuncture for acute non-specific low back pain: a pilot randomised non-penetrating sham controlled trial. Complementary Therapies in Medicine. 2008; 16(3):139-146

270 Kent PM, Keating JL. Can we predict poor recovery from recent-onset nonspecific low back pain? A systematic review. Manual Therapy. 2008; 13(1):12-28

271 Kerry S, Hilton S, Patel S, Dundas D, Rink E, Lord J. Routine referral for radiography of patients presenting with low back pain: is patients' outcome influenced by GPs' referral for plain radiography. Health Technology Assessment. 2000; 4(20)

272 Kerry S, Hilton S, Dundas D, Rink E, Oakeshott P. Radiography for low back pain: a randomised controlled trial and observational study in primary care. British Journal of General Practice. 2002; 52(479):469-474

273 Khan M, Akhter S, Soomro RR, Ali SS. The effectiveness of Cognitive Behavioral Therapy (CBT) with general exercises versus general exercises alone in the management of chronic low back pain. Pakistan Journal of Pharmaceutical Sciences. 2014; 27(4 Suppl):1113-1116

274 Kilpikoski S, Alen M, Paatelma M, Simonen R, Heinonen A, Videman T. Outcome comparison among working adults with centralizing low back pain: Secondary analysis of a randomized controlled trial with 1-year follow-up. Advances in Physiotherapy. 2009; 11(4):210-217

275 Kim JD, Oh HW, Lee JH, Cha JY, Ko IG, Jee YS. The effect of inversion traction on pain sensation, lumbar flexibility and trunk muscles strength in patients with chronic low back pain. Isokinetics and Exercise Science. 2013; 21(3):237-246

276 Kim N, Yang B, Lee T, Kwon S. An economic analysis of usual care and acupuncture collaborative treatment on chronic low back pain: A Markov model decision analysis. BMC Complementary and Alternative Medicine. 2010; 10:74

277 Kim SS, Min WK, Kim JH, Lee BH. The effects of VR-based Wii Fit yoga on physical function in middle-aged female LBP patients. Journal of Physical Therapy Science. 2014; 26(4):549-552

278 Kim TH, Kim EH, Cho HY. The effects of the CORE programme on pain at rest, movement-induced and secondary pain, active range of motion, and proprioception in female office workers with chronic low back pain: a randomized controlled trial. Clinical Rehabilitation. 2015; 29(7):653-662

279 Klein RG, Eek BC. Low-energy laser treatment and exercise for chronic low back pain: double-blind controlled trial. Archives of Physical Medicine and Rehabilitation. 1990; 71(1):34-37

280 Koes BW, Bouter LM, Mameren H, Essers AH, Verstegen GM, Hofhuizen DM et al. Randomised clinical trial of manipulative therapy and physiotherapy for persistent back and neck complaints: results of one year follow up. BMJ. 1992; 304(6827):601-605

281 Kofotolis ND, Vlachopoulos SP, Kellis E. Sequentially allocated clinical trial of rhythmic stabilization exercises and TENS in women with chronic low back pain. Clinical Rehabilitation. 2008; 22(2):99-111

282 Koldas Dogan S, Sonel Tur B, Kurtais Y, Atay MB. Comparison of three different approaches in the treatment of chronic low back pain. Clinical Rheumatology. 2008; 27(7):873-881

283 Kole-Snijders AM, Vlaeyen JW, Goossens ME, Rutten-van Molken MP, Heuts PH, van Breukelen G et al. Chronic low-back pain: what does cognitive coping skills training add to operant behavioral treatment? Results of a randomized clinical trial. Journal of Consulting and Clinical Psychology. 1999; 67(6):931-944

284 Kominski GF, Heslin KC, Morgenstern H, Hurwitz EL, Harber PI. Economic evaluation of four treatments for low-back pain: results from a randomized controlled trial. Medical Care. 2005; 43(5):428-435

285 Konstantinovic LM, Kanjuh ZM, Milovanovic AN, Cutovic MR, Djurovic AG, Savic VG et al. Acute low back pain with radiculopathy: a double-blind, randomized, placebo-controlled study. Photomedicine and Laser Surgery. 2010; 28(4):553-560

286 Krammer A, Horton S, Tumilty S. Pulsed electromagnetic energy as an adjunct to physiotherapy for the treatment of acute low back pain: a randomised controlled trial. New Zealand Journal of Physiotherapy. 2015; 43(1):16-22

287 Kwon Y, Lee S, Lee C, Jung S, Kim D, Choi S. The short-term efficacy of acupuncture for chronic low back pain: randomised sham controlled trial. Journal of Oriental Rehabilitation Medicine. 2007; 17(2):123-132

288 Lamb SE, Hansen Z, Lall R, Castelnuovo E, Withers EJ, Nichols V et al. Group cognitive behavioural treatment for low-back pain in primary care: a randomised controlled trial and cost-effectiveness analysis. Lancet. United Kingdom 2010; 375(9718):916-923

289 Lamb SE, Lall R, Hansen Z, Castelnuovo E, Withers EJ, Nichols V et al. A multicentred randomised controlled trial of a primary care-based cognitive behavioural programme for low back pain. the back skills training (BeST) trial. Health Technology Assessment. 2010; 14(41)

290 Lamb SE, Mistry D, Lall R, Hansen Z, Evans D, Withers EJ et al. Group cognitive behavioural interventions for low back pain in primary care: extended follow-up of the Back Skills Training Trial (ISRCTN54717854). Pain. 2012; 153(2):494-501

291 Lambeek LC, Bosmans JE, van Royen BJ, van Tulder MW, van MW, Anema JR. Effect of integrated care for sick listed patients with chronic low back pain: economic evaluation alongside a randomised controlled trial. BMJ. 2010; 341:c6414

292 Lambeek LC, van Mechelen W, Knol DL, Loisel P, Anema JR. Randomised controlled trial of integrated care to reduce disability from chronic low back pain in working and private life. BMJ. 2010; 340:c1035

293 Lasko B, Levitt RJ, Rainsford KD, Bouchard S, Rozova A, Robertson S. Extended-release tramadol/paracetamol in moderate-to-severe pain: a randomized, placebo-controlled study in patients with acute low back pain. Current Medical Research and Opinion. 2012; 28(5):847-857

294 Lau PMY, Chow DHK, Pope MH. Early physiotherapy intervention in an Accident and Emergency Department reduces pain and improves satisfaction for patients with acute low back pain: a randomised trial. Australian Journal of Physiotherapy. 2008; 54(4):243-249

295 Lawand P, Lombardi J, I, Jones A, Sardim C, Ribeiro LH, Natour J. Effect of a muscle stretching program using the global postural reeducation method for patients with chronic low back pain: A randomized controlled trial. Joint, Bone, Spine. 2015; 82(4):272-277

296 Lee SH, Kim JM, Chan V, Kim HJ, Kim HI. Ultrasound-guided cervical periradicular steroid injection for cervical radicular pain: relevance of spread pattern and degree of penetration of contrast medium. Pain Medicine. 2013; 14(1):5-13

297 Lee WYA, Lee WCE, Law S-W, Lau WKA, Leung S-M, Sieh K-M et al. Managing Psychosocial Contributors in Low Back Pain Patients-A Randomised Controlled Trial. Journal of Orthopaedics, Trauma and Rehabilitation. 2013; 17(1):46-51

298 Leeuw M, Goossens MEJB, van Breukelen GJP, de Jong JR, Heuts PHTG, Smeets RJEM et al. Exposure in vivo versus operant graded activity in chronic low back pain patients: results of a randomized controlled trial. Pain. 2008; 138(1):192-207

299 Lehmann TR, Russell DW, Spratt KF, Colby H, Liu YK, Fairchild ML et al. Efficacy of electroacupuncture and TENS in the rehabilitation of chronic low back pain patients. Pain. 1986; 26(3):277-290

300 Leibing E, Leonhardt U, Koster G, Goerlitz A, Rosenfeldt JA, Hilgers R et al. Acupuncture treatment of chronic low-back pain -- a randomized, blinded, placebo-controlled trial with 9-month follow-up. Pain. 2002; 96(1-2):189-196

301 Lewis JS, Hewitt JS, Billington L, Cole S, Byng J, Karayiannis S. A randomized clinical trial comparing two physiotherapy interventions for chronic low back pain. Spine. 2005; 30(7):711-721

302 Lewis R, Williams N, Matar HE, Din N, Fitzsimmons D, Phillips C et al. The clinical effectiveness and cost-effectiveness of management strategies for sciatica: systematic review and economic model. Health Technology Assessment. 2011; 15(39)

303 Licciardone JC, Aryal S. Clinical response and relapse in patients with chronic low back pain following osteopathic manual treatment: results from the OSTEOPATHIC Trial. Manual Therapy. 2014; 19(6):541-548

304 Licciardone JC, Gatchel RJ, Kearns CM, Minotti DE. Depression, somatization, and somatic dysfunction in patients with nonspecific chronic low back pain: results from the OSTEOPATHIC Trial. Journal of the American Osteopathic Association. 2012; 112(12):783-791

305 Licciardone JC, Kearns CM. Somatic dysfunction and its association with chronic low back pain, back-specific functioning, and general health: results from the OSTEOPATHIC Trial. Journal of the American Osteopathic Association. 2012; 112(7):420-428

306 Licciardone JC, Kearns CM, Minotti DE. Outcomes of osteopathic manual treatment for chronic low back pain according to baseline pain severity: results from the OSTEOPATHIC Trial. Manual Therapy. 2013; 18(6):533-540

307 Licciardone JC, Minotti DE, Gatchel RJ, Kearns CM, Singh KP. Osteopathic manual treatment and ultrasound therapy for chronic low back pain: a randomized controlled trial. Annals of Family Medicine. 2013; 11(2):122-129

308 Linden M, Scherbe S, Cicholas B. Randomized controlled trial on the effectiveness of cognitive behavior group therapy in chronic back pain patients. Journal of Back and Musculoskeletal Rehabilitation. 2014; 27(4):563-568

309 Little P, Stuart B, Stokes M, Nicholls C, Roberts L, Preece S et al. Alexander technique and supervised physiotherapy exercises in back paiN (ASPEN): a four-group randomised feasibility trial. Southampton. NIHR Journals Library (Efficacy and Mechanism Evaluation, No. 1.2.), 2014

310 Little P, Lewith G, Webley F, Evans M, Beattie A, Middleton K et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain. BMJ. 2008; 337:a884

311 Little P, Lewith G, Webley F, Evans M, Beattie A, Middleton K et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain. BMJ. 2008; 337:a884

312 Liu J, Li N. Clinical observation of a combination of acupuncture and drug administration for non-specific acute lumbar sprain. Journal of Acupuncture and Tuina Science. 2010; 8(1):47-49

313 Ljunggren AE, Walker L, Weber H, Amundsen T. Manual traction versus isometric exercises in patients with herniated intervertebral lumbar discs. Physiotherapy Theory and Practice. 1992; 8(4):207-213

314 Lloyd A, Scott DA, Akehurst RL, Lurie-Luke E, Jessen G. Cost-effectiveness of low-level heat wrap therapy for low back pain. Value in Health. 2004; 7(4):413-422

315 Lorig KR, Laurent DD, Deyo RA, Marnell ME, Minor MA, Ritter PL. Can a Back Pain E-mail Discussion Group improve health status and lower health care costs?: A randomized study. Archives of Internal Medicine. 2002; 162(7):792-796

316 Macfarlane GJ, Norrie G, Atherton K, Power C, Jones GT. The influence of socioeconomic status on the reporting of regional and widespread musculoskeletal pain: Results from the 1958 British Birth Cohort Study. Annals of the Rheumatic Diseases. 2009; 68(10):1591-1595

317 Machado LAC, Azevedo DC, Capanema MB, Neto TN, Cerceau DM. Client-centered therapy vs exercise therapy for chronic low back pain: a pilot randomized controlled trial in Brazil. Pain Medicine. 2007; 8(3):251-258

318 Machado LAC, Maher CG, Herbert RD, Clare H, McAuley JH. The effectiveness of the McKenzie method in addition to first-line care for acute low back pain: a randomized controlled trial. BMC Medicine. 2010; 8:10

319 MacRae CS, Shortland A, Lewis J, Morrissey M, Critchley D. Rocker sole shoes are no more beneficial than flat sole shoes in the management of chronic low back pain. Spine. 2013; 52:i39-i40

320 MacRae CS, Lewis JS, Shortland AP, Morrissey MC, Critchley D. Effectiveness of rocker sole shoes in the management of chronic low back pain: a randomized clinical trial. Spine. 2013; 38(22):1905-1912

321 Maher CG, Grotle M. Evaluation of the predictive validity of the Orebro Musculoskeletal Pain Screening Questionnaire. Clinical Journal of Pain. 2009; 25(8):666-670

322 Majchrzycki M, Kocur P, Kotwicki T. Deep tissue massage and nonsteroidal anti-inflammatory drugs for low back pain: a prospective randomized trial. TheScientificWorldJournal. 2014; 2014:287597

323 Malmivaara A, Hakkinen U, Aro T, Heinrichs ML, Koskenniemi L, Kuosma E et al. The treatment of acute low back pain--bed rest, exercises, or ordinary activity? New England Journal of Medicine. 1995; 332(6):351-355

324 Mannion AF, Muntener M, Taimela S, Dvorak J. A randomized clinical trial of three active therapies for chronic low back pain. Spine. 1999; 24(23):2435-2448

325 Mannion AF, Muntener M, Taimela S, Dvorak J. Comparison of three active therapies for chronic low back pain: results of a randomized clinical trial with one-year follow-up. Rheumatology. 2001; 40(7):772-778

326 Marchand S, Charest J, Li J, Chenard JR, Lavignolle B, Laurencelle L. Is TENS purely a placebo effect? A controlled study on chronic low back pain. Pain. 1993; 54(1):99-106

327 Marignan M. Auriculotherapy treatment protocol for low-back pain: A randomized trial. Medical Acupuncture. 2014; 26(3):154-160

328 Marshall P, Murphy B. Self-report measures best explain changes in disability compared with physical measures after exercise rehabilitation for chronic low back pain. Spine. 2008; 33(3):326-338

329 Marshall PWM, Kennedy S, Brooks C, Lonsdale C. Pilates exercise or stationary cycling for chronic nonspecific low back pain: does it matter? a randomized controlled trial with 6-month follow-up. Spine. 2013; 38(15):E952-E959

330 Maruish ME. User's manual for the SF-36v2 Health Survey. 3rd edition. Lincoln, RI: QualityMetric Incorporated; 2015

331 Masharawi Y, Nedaf N. The effect of non-weight bearing group-exercising on females with non-specific chronic low back pain: A randomize single blind controlled pilot study. Journal of Back and Musculoskeletal Rehabilitation. 2013; 26(4):353-360

332 Mathers NJ, Gask L. Surviving the 'heartsink' experience. Family Practice. 1995; 12(2):176-183

333 McCleane GJ. Does gabapentin have an analgesic effect on background, movement and referred pain? A randomised, double-blind, placebo controlled study. Pain Clinic. 2001; 13(2):103-107

334 McDonough SM, Tully MA, Boyd A, O'Connor SR, Kerr DP, O'Neill SM et al. Pedometer-driven walking for chronic low back pain: a feasibility randomized controlled trial. Spine. 2013; 29(11):972-981

335 McIlveen B, Robertson VJ. A randomised controlled study of the outcome of hydrotherapy for subjects with low back or back and leg pain. Spine. 1998; 84(1):17-26

336 Melzack R, Vetere P, Finch L. Transcutaneous electrical nerve stimulation for low back pain. A comparison of TENS and massage for pain and range of motion. Physical Therapy. 1983; 63(4):489-493

337 Meng CF, Wang D, Ngeow J, Lao L, Peterson M, Paget S. Acupuncture for chronic low back pain in older patients: a randomized, controlled trial. Rheumatology. 2003; 42(12):1508-1517

338 Menzel NN, Robinson ME. Back pain in direct patient care providers: early intervention with cognitive behavioral therapy. Pain Management Nursing. 2006; 7(2):53-63

339 Miller K, Yarlas A, Wen W, Dain B, Lynch SY, Ripa SR et al. The impact of buprenorphine transdermal delivery system on activities of daily living among patients with chronic low back pain: an application of the international classification of functioning, disability and health. Clinical Journal of Pain. 2014; 30(12):1015-1022

340 Miller P, Kendrick D, Bentley E, Fielding K. Cost-effectiveness of lumbar spine radiography in primary care patients with low back pain. Spine. 2002; 27(20):2291-2297

341 Mirovsky Y, Grober A, Blankstein A, Stabholz L. The effect of ambulatory lumbar traction combined with treadmill on patients with chronic low back pain. Journal of Back and Musculoskeletal Rehabilitation. 2006; 19(2/3):73-78

342 Miyamoto GC, Costa LOP, Galvanin T, Cabral CMN. Efficacy of the addition of modified Pilates exercises to a minimal intervention in patients with chronic low back pain: a randomized controlled trial. Physical Therapy. 2013; 93(3):310-320

343 Moffett JK, Torgerson D, Bell-Syer S, Jackson D, Llewlyn-Phillips H, Farrin A et al. Randomised controlled trial of exercise for low back pain: clinical outcomes, costs and preferences. Spine. 1999; 319:279-83:279-283

344 Moffett JK, Frost H. Back to Fitness Programme. Physiotherapy. 2000; 86(6):295-305

345 Mohseni-Bandpei MA, Critchley J, Staunton T, Richardson B. A prospective randomised controlled trial of spinal manipulation and ultrasound in the treatment of chronic low back pain. Physiotherapy. 2006; 92(1):34-42

346 Moll W. [Therapy of acute lumbovertebral syndromes through optimal muscle relaxation using diazepam. Results of a double-blind study on 68 cases]. Med Welt. 1973; 24(45):1747-1751

347 Molsberger AF, Mau J, Pawelec DB, Winkler J. Does acupuncture improve the orthopedic management of chronic low back pain--a randomized, blinded, controlled trial with 3 months follow up. Pain. 2002; 99(3):579-587

348 Monro R, Bhardwaj AK, Gupta RK, Telles S, Allen B, Little P. Disc extrusions and bulges in nonspecific low back pain and sciatica: Exploratory randomised controlled trial comparing yoga therapy and normal medical treatment. Journal of Back and Musculoskeletal Rehabilitation. 2015; 28(2):383-392

349 Monticone M, Ambrosini E, Rocca B, Cazzaniga D, Liquori V, Foti C. Group-based task-oriented exercises aimed at managing kinesiophobia improved disability in chronic low back pain. European Journal of Pain. 2015; [epublication]

350 Monticone M, Ambrosini E, Rocca B, Magni S, Brivio F, Ferrante S. A multidisciplinary rehabilitation programme improves disability, kinesiophobia and walking ability in subjects with chronic low back pain: results of a randomised controlled pilot study. European Spine Journal. 2014; 23(10):2105-2113

351 Monticone M, Ferrante S, Rocca B, Baiardi P, Farra FD, Foti C. Effect of a long-lasting multidisciplinary program on disability and fear-avoidance behaviors in patients with chronic low back pain: results of a randomized controlled trial. Spine. 2013; 29(11):929-938

352 Moon TY, Kim JH, Gwon HJ, Hwan BS, Kim GY, Smith N et al. Effects of exercise therapy on muscular strength in firefighters with back pain. Journal of Physical Therapy Science. 2015; 27(3):581-583

353 Morera-Dominguez C, Ceberio-Balda F, Florez G, Masramon X, Lopez-Gomez V. A cost-consequence analysis of pregabalin versus usual care in the symptomatic treatment of

refractory low back pain: sub-analysis of observational trial data from orthopaedic surgery and rehabilitation clinics. Clinical Drug Investigation. 2010; 30(8):517-531

354 Moret NC, van der Stap M, Hagmeijer R, Molenaar A, Koes BW. Design and feasibility of a randomized clinical trial to evaluate the effect of vertical traction in patients with a lumbar radicular syndrome. Manual Therapy. 1998; 3(4):203-211

355 Morone NE, Greco CM, Weiner DK. Mindfulness meditation for the treatment of chronic low back pain in older adults: a randomized controlled pilot study. Pain. 2008; 134(3):310-319

356 Morone NE, Rollman BL, Moore CG, Li Q, Weiner DK. A mind-body program for older adults with chronic low back pain: results of a pilot study. Pain Medicine. 2009; 10(8):1395-1407

357 Morrisette DC, Cholewicki J, Logan S, Seif G, McGowan S. A randomized clinical trial comparing extensible and inextensible lumbosacral orthoses and standard care alone in the management of lower back pain. Spine. 2014; 39(21):1733-1742

358 Morso L, Kent P, Albert HB, Hill JC, Kongsted A, Manniche C. The predictive and external validity of the STarT Back Tool in Danish primary care. European Spine Journal. 2013; 22(8):1859-1867

359 Morso L, Kent P, Manniche C, Albert HB. The predictive ability of the STarT Back Screening Tool in a Danish secondary care setting. European Spine Journal. 2014; 23(1):120-128

360 Morton JE. Manipulation in the treatment of acute low back pain. Journal of Manual and Manipulative Therapy. 1999; 7(4):182-189

361 Moustafa IM, Diab AA. The effect of adding forward head posture corrective exercises in the management of lumbosacral radiculopathy: a randomized controlled study. Journal of Manipulative and Physiological Therapeutics. 2015; 38(3):167-178

362 Muehlbacher M, Nickel MK, Kettler C, Tritt K, Lahmann C, Leiberich PK et al. Topiramate in treatment of patients with chronic low back pain: a randomized, double-blind, placebo-controlled study. Clinical Journal of Pain. 2006; 22(6):526-531

363 Muller R, Giles LG. Long-term follow-up of a randomized clinical trial assessing the efficacy of medication, acupuncture, and spinal manipulation for chronic mechanical spinal pain syndromes. Journal of Manipulative and Physiological Therapeutics. 2005; 28(1):3-11

364 Myounggi L, Changho S, Younggwan J, Donghun H, Dongwook H. The effects of core muscle release technique on lumbar spine deformation and low back pain. Journal of Physical Therapy Science. 2015; 27(5):1519-1522

365 Nachemson AL. Orthotic treatment for injuries and diseases of the spinal column. Phys Med Rehabil. 1987; 1(2):11-24

366 Nadler SF, Steiner DJ, Erasala GN, Hengehold DA, Hinkle RT, Beth Goodale M et al. Continuous low-level heat wrap therapy provides more efficacy than Ibuprofen and acetaminophen for acute low back pain. Spine. 2002; 27(10):1012-1017

367 Nahit ES, Hunt IM, Lunt M, Dunn G, Silman AJ, Macfarlane GJ. Effects of psychosocial and individual psychological factors on the onset of musculoskeletal pain: Common and site-specific effects. Annals of the Rheumatic Diseases. 2003; 62(8):755-760

368 Nalamachu SR, Narayana A, Janka L. Long-term dosing, safety, and tolerability of fentanyl buccal tablet in the management of noncancer-related breakthrough pain in opioid-tolerant patients. Current Medical Research and Opinion. 2011; 27(4):751-760

369 Nalamachu S, Hale M, Khan A. Hydromorphone extended release for neuropathic and non-neuropathic/nociceptive chronic low back pain: a post hoc analysis of data from a randomized, multicenter, double-blind, placebo-controlled clinical trial. Journal of Opioid Management. 2014; 10(5):311-322

370 Nambi GS, Inbasekaran D, Khuman R, Devi S, Shanmugananth, Jagannathan K. Changes in pain intensity and health related quality of life with Iyengar yoga in nonspecific chronic low back pain: A randomized controlled study. International Journal of Yoga. 2014; 7(1):48-53

371 Nassif H, Brosset N, Guillaume M, Delore-Milles E, Tafflet M, Buchholz F et al. Evaluation of a randomized controlled trial in the management of chronic lower back pain in a French automotive industry: an observational study. Spine. 2011; 92(12):1927-1936

372 National Collaborating Centre for Primary Care and Royal College of General Practitioners. Low Back Pain: Early Management of Persistent Non-specific Low Back Pain; Appendix E Health Economics Model. London. National Institute of Clinical Excellence, 2009. Available from: http://www.nice.org.uk/guidance/cg88/evidence/cg88-low-back-pain-full-guideline-appendix-e2

373 National Institute for Health and Care Excellence. Neuropathic pain - pharmacological management: the pharmacological management of neuropathic pain in adults in non-specialist settings. NICE clinical guideline 173. London. National Institute for Health and Care Excellence, 2013. Available from: http://guidance.nice.org.uk/CG173

374 National Institute for Health and Care Excellence. Developing NICE guidelines: the manual. London. National Institute for Health and Care Excellence, 2014. Available from: http://www.nice.org.uk/article/PMG20/chapter/1%20Introduction%20and%20overview

375 National Institute for Health and Clinical Excellence. Social value judgements: principles for the development of NICE guidance. 2nd edition. London: National Institute for Health and Clinical Excellence; 2008. Available from: http://www.nice.org.uk/media/C18/30/SVJ2PUBLICATION2008.pdf

376 National Institute for Health and Clinical Excellence. The guidelines manual. London: National Institute for Health and Clinical Excellence; 2012. Available from: http://publications.nice.org.uk/the-guidelines-manual-pmg6/

377 National Institute for Health and Clinical Excellence. Guide to the methods of technology appraisal 2013. 2nd edition. London: National Institute for Health and Clinical Excellence; 2013. Available from: http://publications.nice.org.uk/pmg9

378 National Institute for Health and Clinical Excellence. Peripheral nerve-field stimulation for chronic low back pain. NICE interventional procedure guidance 451. London. National Institute for Health and Clinical Excellence (NICE), 2013. Available from: http://guidance.nice.org.uk/IPG451

379 Natour J, Cazotti LdA, Ribeiro LH, Baptista AS, Jones A. Pilates improves pain, function and quality of life in patients with chronic low back pain: a randomized controlled trial. Clinical Rehabilitation. 2015; 29(1):59-68

380 Naylor C, Imison C, Addicott R, Buck D, Goodwin N, Harrison T et al. Transforming our health care system. The King's Fund, 2015. Available from: http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/10PrioritiesFinal2.pdf

381 Newcomer KL, Vickers Douglas KS, Shelerud RA, Long KH, Crawford B. Is a videotape to change beliefs and behaviors superior to a standard videotape in acute low back pain? A randomized controlled trial. Spine Journal. United States 2008; 8(6):940-947

382 Newell D, Field J, Pollard D. Using the STarT Back Tool: Does timing of stratification matter? Manual Therapy. 2015; 20(4):533-539

383 NHS Business Services Authority. NHS electronic drug tariff. 2011. Available from: http://www.ppa.org.uk/edt/August_2011/mindex.htm [Last accessed: 1 August 2011]

384 Nicholas MK, Wilson PH, Goyen J. Operant-behavioural and cognitive-behavioural treatment for chronic low back pain. Behaviour Research and Therapy. 1991; 29(3):225-238

385 Nicholas MK, Wilson PH, Goyen J. Comparison of cognitive-behavioral group treatment and an alternative non-psychological treatment for chronic low back pain. Pain. 1992; 48(3):339-347

386 Niemistö L. Manipulative therapy, stabilizing exercises and specialist consultation as a treatment for chronic low back pain. Randomized controlled trial. Suomen Ortopedia Ja Traumatologia. 2005; 28(3):392-395

387 Niemisto L, Rissanen P, Sarna S, Lahtinen-Suopanki T, Lindgren K-A, Hurri H. Cost-effectiveness of combined manipulation, stabilizing exercises, and physician consultation compared to physician consultation alone for chronic low back pain: a prospective randomized trial with 2-year follow-up. Spine. 2005; 30(10):1109-1115

388 Niemisto L, Lahtinen-Suopanki T, Rissanen P, Lindgren KA, Sarna S, Hurri H. A randomized trial of combined manipulation, stabilizing exercises, and physician consultation compared to physician consultation alone for chronic low back pain. Spine. 2003; 28(19):2185-2191

389 Niemisto L, Sarna S, Lahtinen-Suopanki T, Lindgren KA, Hurri H. Predictive factors for 1-year outcome of chronic low back pain following manipulation, stabilizing exercises, and physician consultation or physician consultation alone. Journal of Rehabilitation Medicine. 2004; 36(3):104-109

390 Norton G, McDonough CM, Cabral H, Shwartz M, Burgess JF. Cost-utility of cognitive behavioral therapy for low back pain from the commercial payer perspective. Spine. 2015; 40(10):725-733

391 Nouwen A. EMG biofeedback used to reduce standing levels of paraspinal muscle tension in chronic low back pain. Pain. 1983; 17(4):353-360

392 O'Sullivan P. Diagnosis and classification of chronic low back pain disorders: Maladaptive movement and motor control impairments as underlying mechanism. Manual Therapy. 2005; 10(4):242-255

393 Olah M, Molnar L, Dobai J, Olah C, Feher J, Bender T. The effects of weightbath traction hydrotherapy as a component of complex physical therapy in disorders of the cervical and lumbar spine: A controlled pilot study with follow-up. Rheumatology International. 2008; 28(8):749-756

394 Organisation for Economic Co-operation and Development (OECD). Purchasing power parities (PPP). 2012. Available from: http://www.oecd.org/std/ppp [Last accessed: 1 November 2015]

395 Paatelma M, Kilpikoski S, Simonen R, Heinonen A, Alen M, Videman T. Orthopaedic manual therapy, McKenzie method or advice only for low back pain in working adults: a randomized controlled trial with one year follow-up. Journal of Rehabilitation Medicine. 2008; 40(10):858-863

396 Page I, Abboud J, Shaughnessy O, Laurencelle L, Descarreaux M. Chronic low back pain clinical outcomes present higher associations with the STarT Back Screening Tool than with physiologic measures: a 12-month cohort study. BMC Musculoskeletal Disorders. 2015; 16:201

397 Pal B, Mangion P, Hossain MA, Diffey BL. A controlled trial of continuous lumbar traction in the treatment of back pain and sciatica. British Journal of Rheumatology. 1986; 25(2):181-183

398 Pallay RM, Seger W, Adler JL, Ettlinger RE, Quaidoo EA, Lipetz R et al. Etoricoxib reduced pain and disability and improved quality of life in patients with chronic low back pain: a 3 month, randomized, controlled trial. Scandinavian Journal of Rheumatology. 2004; 33(4):257-266

399 Pareek A, Chandurkar N, Chandanwale AS, Ambade R, Gupta A, Bartakke G. Aceclofenac-tizanidine in the treatment of acute low back pain: a double-blind, double-dummy, randomized, multicentric, comparative study against aceclofenac alone. European Spine Journal. 2009; 18(12):1836-1842

400 Park JH, Lee SH, Ko DS. The Effects of the Nintendo Wii Exercise Program on Chronic Work-related Low Back Pain in Industrial Workers. Journal of Physical Therapy Science. 2013; 25(8):985-988

401 Peloso PM, Fortin L, Beaulieu A, Kamin M, Rosenthal N, Protocol TRP. Analgesic efficacy and safety of tramadol/ acetaminophen combination tablets (Ultracet) in treatment of chronic low back pain: a multicenter, outpatient, randomized, double blind, placebo controlled trial. Journal of Rheumatology. 2004; 31(12):2454-2463

402 Pengel LHM, Refshauge KM, Maher CG, Nicholas MK, Herbert RD, McNair P. Physiotherapist-directed exercise, advice, or both for subacute low back pain: a randomized trial. Annals of Internal Medicine. 2007; 146(11):787-796

403 Perrot S, Krause D, Crozes P, Naim C, GRTF ZAL. Efficacy and tolerability of paracetamol/tramadol (325 mg/37.5 mg) combination treatment compared with tramadol (50 mg) monotherapy in patients with subacute low back pain: a multicenter, randomized, double-blind, parallel-group, 10-day treatment study. Clinical Therapeutics. 2006; 28(10):1592-1606

404 Petersen T, Christensen R, Juhl C. Predicting a clinically important outcome in patients with low back pain following McKenzie therapy or spinal manipulation: a stratified analysis in a randomized controlled trial. BMC Musculoskeletal Disorders. 2015; 16:74

405 Peterson CK, Leemann S, Lechmann M, Pfirrmann CWA, Hodler J, Humphreys BK. Symptomatic magnetic resonance imaging-confirmed lumbar disk herniation patients: A comparative effectiveness prospective observational study of 2 age- and sex-matched cohorts treated with either high-velocity, low-amplitude spinal manipulative therapy or imaging-guided lumbar nerve root injections. Journal of Manipulative and Physiological Therapeutics. 2013; 36(4):218-225

406 Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. Spine. 2002; 27(5):E109-E120

407 Pivec R, Stokes M, Chitnis AS, Paulino CB, Harwin SF, Mont MA. Clinical and economic impact of TENS in patients with chronic low back pain: analysis of a nationwide database. Orthopedics. 2013; 36(12):922-928

408 Pope MH, Phillips RB, Haugh LD, Hsieh CY, MacDonald L, Haldeman S. A prospective randomized three-week trial of spinal manipulation, transcutaneous muscle stimulation, massage and corset in the treatment of subacute low back pain. Spine. 1994; 19(22):2571-2577

409 Preyde M. Effectiveness of massage therapy for subacute low-back pain: a randomized controlled trial. CMAJ. 2000; 162(13):1815-1820

410 Quinn K, Bary S, Barry L. Do patients with chronic low back pain benefit from attending Pilates classes after completing conventional physiotherapy treatment? Physiotherapy Ireland. 2011; 32(1):5-12

411 Rantonen J, Luoto S, Vehtari A, Hupli M, Karppinen J, Malmivaara A et al. The effectiveness of two active interventions compared to self-care advice in employees with non-acute low back symptoms: a randomised, controlled trial with a 4-year follow-up in the occupational health setting. Occupational and Environmental Medicine. 2012; 69(1):12-20

412 Rasmussen J, Laetgaard J, Lindecrona AL, Qvistgaard E, Bliddal H. Manipulation does not add to the effect of extension exercises in chronic low-back pain (LBP). A randomized, controlled, double blind study. Joint, Bone, Spine. 2008; 75(6):708-713

413 Rasmussen-Barr E, Nilsson-Wikmar L, Arvidsson I. Stabilizing training compared with manual treatment in sub-acute and chronic low-back pain. Manual Therapy. 2003; 8(4):233-241

414 Rasmussen-Barr E, Ang B, Arvidsson I, Nilsson-Wikmar L. Graded exercise for recurrent low-back pain: a randomized, controlled trial with 6-, 12-, and 36-month follow-ups. Spine. 2009; 34(3):221-228

415 Ratcliffe J, Thomas KJ, MacPherson H, Brazier J. A randomised controlled trial of acupuncture care for persistent low back pain: cost effectiveness analysis. BMJ. 2006; 333:626-628

416 Reilly K, Lovejoy B, Willams R, Roth H. Differences between a supervised and independent strength and conditioning program with chronic low back syndromes. Journal of Occupational Medicine. 1989; 31(6):547-550

417 Reme SE, Hagen EM, Eriksen HR. Expectations, perceptions, and physiotherapy predict prolonged sick leave in subacute low back pain. BMC Musculoskeletal Disorders. 2009; 10:139

418 Riipinen M, Niemisto L, Lindgren KA, Hurri H. Psychosocial differences as predictors for recovery from chronic low back pain following manipulation, stabilizing exercises and physician consultation or physician consultation alone. Journal of Rehabilitation Medicine. 2005; 37(3):152-158

419 Risch SV, Norvell NK, Pollock ML, Risch ED, Langer H, Fulton M et al. Lumbar strengthening in chronic low back pain patients. Physiologic and psychological benefits. Spine. 1993; 18(2):232-238

420 Roche G, Ponthieux A, Parot-Shinkel E, Jousset N, Bontoux L, Dubus V et al. Comparison of a functional restoration program with active individual physical therapy for patients with chronic low back pain: a randomized controlled trial. Archives of Physical Medicine and Rehabilitation. 2007; 88(10):1229-1235

421 Roche-Leboucher G, Petit-Lemanac'h A, Bontoux L, Dubus-Bausiere V, Parot-Shinkel E, Fanello S et al. Multidisciplinary intensive functional restoration versus outpatient active physiotherapy in chronic low back pain: a randomized controlled trial. Spine. 2011; 36(26):2235-2242

422 Roelofs PDDM, Deyo RA, Koes BW, Scholten Rob JPM, van Tulder MW. Non-steroidal anti-inflammatory drugs for low back pain. Cochrane Database of Systematic Reviews. 2008; Issue 1:CD000396. DOI:10.1002/14651858.CD000396.pub3

423 Roelofs PDDM, Deyo RA, Koes BW, Scholten RJPM, van Tulder MW. Nonsteroidal anti-inflammatory drugs for low back pain: an updated Cochrane review. Spine. 2008; 33(16):1766-1774

424 Roland M, Dixon M. Randomized controlled trial of an educational booklet for patients presenting with back pain in general practice. Journal of the Royal College of General Practitioners. 1989; 39(323):244-246

425 Rosner AL, Conable KM, Edelmann T. Influence of foot orthotics upon duration of effects of spinal manipulation in chronic back pain patients: a randomized clinical trial. Journal of Manipulative and Physiological Therapeutics. 2014; 37(2):124-140

426 Rubinstein SM, Terwee CB, Assendelft Willem JJ, de Boer MR, van Tulder MW. Spinal manipulative therapy for acute low-back pain. Cochrane Database of Systematic Reviews. 2012; Issue 9:CD008880. DOI:10.1002/14651858.CD008880.pub2

427 Rubinstein SM, van MM, Assendelft Willem JJ, de Boer MR, van Tulder MW. Spinal manipulative therapy for chronic low-back pain. Cochrane Database of Systematic Reviews. 2011; Issue 2:CD008112. DOI:10.1002/14651858.CD008112.pub2

428 Ruoff GE, Rosenthal N, Jordan D, Karim R, Kamin M, Protocol CAPS. Tramadol/acetaminophen combination tablets for the treatment of chronic lower back pain: a multicenter, randomized, double-blind, placebo-controlled outpatient study. Clinical Therapeutics. 2003; 25(4):1123-1141

429 Ryan CG, Gray HG, Newton M, Granat MH. Pain biology education and exercise classes compared to pain biology education alone for individuals with chronic low back pain: a pilot randomised controlled trial. Manual Therapy. 2010; 15(4):382-387

430 Rydeard R, Leger A, Smith D. Pilates-based therapeutic exercise: effect on subjects with nonspecific chronic low back pain and functional disability: a randomized controlled trial. Journal of Orthopaedic and Sports Physical Therapy. 2006; 36(7):472-484

431 Sahar T, Cohen MJ, Ne'eman V, Kandel L, Odebiyi DO, Lev I et al. Insoles for prevention and treatment of back pain. Cochrane Database of Systematic Reviews. 2007; Issue 4:CD005275. DOI:10.1002/14651858.CD005275.pub2

432 Sakai Y, Ito K, Hida T, Ito S, Harada A. Pharmacological management of chronic low back pain in older patients: a randomized controlled trial of the effect of pregabalin and opioid administration. European Spine Journal. 2015; 24(6):1309-1317

433 Sanderson KB, Roditi D, George SZ, Atchison JW, Banou E, Robinson ME. Investigating patient expectations and treatment outcome in a chronic low back pain population. Journal of Pain Research. 2012; 5:15-22

434 Santilli V, Beghi E, Finucci S. Chiropractic manipulation in the treatment of acute back pain and sciatica with disc protrusion: a randomized double-blind clinical trial of active and simulated spinal manipulations. Spine Journal. 2006; 6(2):131-137

435 Santos J, Alarcão J, Fareleira F, Vaz-Carneiro A, Costa J. Tapentadol for chronic musculoskeletal pain in adults. Cochrane Database of Systematic Reviews. 2015; Issue 5:CD009923. DOI:10.1002/14651858.CD009923.pub2

436 Saper RB, Sherman KJ, Cullum-Dugan D, Davis RB, Phillips RS, Culpepper L. Yoga for chronic low back pain in a predominantly minority population: a pilot randomized controlled trial. Alternative Therapies in Health and Medicine. 2009; 15(6):18-27

437 Sato N, Sekiguchi M, Kikuchi S, Shishido H, Sato K, Konno S. Effects of long-term corset wearing on chronic low back pain. Fukushima Journal of Medical Science. 2012; 58(1):60-65

438 Schaafsma FG, Whelan K, van der Beek AJ, van der Es-Lambeek Ludeke, Ojajärvi A, Verbeek JH. Physical conditioning as part of a return to work strategy to reduce sickness absence for workers with back pain. Cochrane Database of Systematic Reviews. 2013; Issue 8:CD001822. DOI:10.1002/14651858.CD001822.pub3

439 Schenk RJ, Jozefczyk C, Kopf A. A randomized trial comparing interventions in patients with lumbar posterior derangement. Journal of Manual and Manipulative Therapy. 2003; 11(2):95-102

440 Schimmel JJP, de Kleuver M, Horsting PP, Spruit M, Jacobs WCH, van Limbeek J. No effect of traction in patients with low back pain: a single centre, single blind, randomized controlled trial of Intervertebral Differential Dynamics Therapy. European Spine Journal. 2009; 18(12):1843-1850

441 Schiphorst Preuper HR, Geertzen JHB, van Wijhe M, Boonstra AM, Molmans BHW, Dijkstra PU et al. Do analgesics improve functioning in patients with chronic low back pain? An explorative triple-blinded RCT. European Spine Journal. 2014; 23(4):800-806

442 Schneider M, Haas M, Glick R, Stevans J, Landsittel D. Comparison of spinal manipulation methods and usual medical care for acute and subacute low back pain: a randomized clinical trial. Spine. 2015; 40(4):209-217

443 Schnitzer TJ, Gray WL, Paster RZ, Kamin M. Efficacy of tramadol in treatment of chronic low back pain. Journal of Rheumatology. 2000; 27(3):772-778

444 Seferlis T, Lindholm L, Nemeth G. Cost-minimisation analysis of three conservative treatment programmes in 180 patients sick-listed for acute low-back pain. Scandinavian Journal of Primary Health Care. 2000; 18(1):53-57

445 Senna MK, Machaly SA. Does maintained spinal manipulation therapy for chronic nonspecific low back pain result in better long-term outcome? Spine. 2011; 36(18):1427-1437

446 Shankar N, Thakur M, Tandon OP, Saxena AK, Arora S, Bhattacharya N. Autonomic status and pain profile in patients of chronic low back pain and following electro acupuncture therapy: a randomized control trial. Indian Journal of Physiology and Pharmacology. 2011; 55(1):25-36

447 Shaughnessy M, Caulfield B. A pilot study to investigate the effect of lumbar stabilisation exercise training on functional ability and quality of life in patients with chronic low back pain. International Journal of Rehabilitation Research. 2004; 27(4):297-301

448 Sherman KJ, Cherkin DC, Erro J, Miglioretti DL, Deyo RA. Comparing yoga, exercise, and a self-care book for chronic low back pain: a randomized, controlled trial. Annals of Internal Medicine. 2005; 143(12):849-856

449 Sherman KJ, Cherkin DC, Wellman RD, Cook AJ, Hawkes RJ, Delaney K et al. A randomized trial comparing yoga, stretching, and a self-care book for chronic low back pain. Archives of Internal Medicine. 2011; 171(22):2019-2026

450 Shin JS, Ha IH, Lee J, Choi Y, Kim MR, Park BY et al. Effects of motion style acupuncture treatment in acute low back pain patients with severe disability: a multicenter, randomized, controlled, comparative effectiveness trial. Pain. 2013; 154(7):1030-1037

451 Shirado O, Doi T, Akai M, Hoshino Y, Fujino K, Hayashi K et al. Multicenter randomized controlled trial to evaluate the effect of home-based exercise on patients with chronic low back pain: the Japan low back pain exercise therapy study. Spine. 2010; 35(17):E811-E819

452 Siemonsma PC, Stuive I, Roorda LD, Vollebregt JA, Walker MF, Lankhorst GJ et al. Cognitive treatment of illness perceptions in patients with chronic low back pain: a randomized controlled trial. Physical Therapy. 2013; 93(4):435-448

453 Skljarevski V, Desaiah D, Liu-Seifert H, Zhang Q, Chappell AS, Detke MJ et al. Efficacy and safety of duloxetine in patients with chronic low back pain. Spine. 2010; 35(13):E578-E585

454 Skljarevski V, Ossanna M, Liu-Seifert H, Zhang Q, Chappell A, Iyengar S et al. A double-blind, randomized trial of duloxetine versus placebo in the management of chronic low back pain. European Journal of Neurology. 2009; 16(9):1041-1048

455 Skljarevski V, Zhang S, Desaiah D, Alaka KJ, Palacios S, Miazgowski T et al. Duloxetine versus placebo in patients with chronic low back pain: A 12-week, fixed-dose, randomized, double-blind trial. Journal of Pain. 2010; 11(12):1282-1290

456 Skouen JS, Grasdal AL, Haldorsen EMH, Ursin H. Relative cost-effectiveness of extensive and light multidisciplinary treatment programs versus treatment as usual for patients with chronic low back pain on long-term sick leave: randomized controlled study. Spine. 2002; 27(9):901-910

457 Smeets RJEM. Do lumbar stabilising exercises reduce pain and disability in patients with recurrent low back pain? Australian Journal of Physiotherapy. 2009; 55(2):138

458 Smeets RJEM, Beelen S, Goossens MEJB, Schouten EGW, Knottnerus JA, Vlaeyen JWS. Treatment expectancy and credibility are associated with the outcome of both physical and cognitive-behavioral treatment in chronic low back pain. Clinical Journal of Pain. 2008; 24(4):305-315

459 Smeets RJEM, Vlaeyen JWS, Hidding A, Kester ADM, van der Heijden GJMG, Knottnerus JA. Chronic low back pain: physical training, graded activity with problem solving training, or both? The one-year post-treatment results of a randomized controlled trial. Spine. 2008; 134(3):263-276

460 Smeets RJEM, Vlaeyen JWS, Hidding A, Kester ADM, van der Heijden GJMG, van Geel ACM et al. Active rehabilitation for chronic low back pain: cognitive-behavioral, physical, or both? First direct post-treatment results from a randomized controlled trial [ISRCTN22714229]. BMC Musculoskeletal Disorders. 2006; 7:5

461 Smeets RJEM, Vlaeyen JWS, Kester ADM, Knottnerus JA. Reduction of pain catastrophizing mediates the outcome of both physical and cognitive-behavioral treatment in chronic low back pain. Journal of Pain. 2006; 7(4):261-271

462 Smith AL, Kolt GS, McConville JC. The effect of the Feldenkrais method on pain and anxiety in people experiencing chronic low back pain. New Zealand Journal Physiotherapy. 2001; 29(1):6-14

463 Soriano F, Rios R. Gallium Arsenide laser treatement of chronic low back pain: a prospective, randomized and double blind study. Laser Therapy. 1998; 10(4):175-180

464 Sparkes V, Chidwick N, Coales P. Effect of The Back Book on fear-avoidance beliefs, disability, and pain levels in subjects with low back pain. International Journal of Therapy & Rehabilitation. 2012; 19(2):79-86

465 Staal JB, Hlobil H, Twisk JWR, Smid T, Koke AJA, van Mechelen W. Graded activity for low back pain in occupational health care: a randomized, controlled trial. Annals of Internal Medicine. 2004; 140(2):77-84

466 Steele J, Bruce-Low S, Smith D, Jessop D, Osborne N. A randomized controlled trial of limited range of motion lumbar extension exercise in chronic low back pain. Spine. 2013; 38(15):1245-1252

467 Steenstra IA, Anema JR, Bongers PM, de Vet HCW, Knol DL, van Mechelen W. The effectiveness of graded activity for low back pain in occupational healthcare. Occupational and Environmental Medicine. 2006; 63(11):718-725

468 Steenstra IA, Anema JR, van Tulder MW, Bongers PM, de Vet HC, van MW. Economic evaluation of a multi-stage return to work program for workers on sick-leave due to low back pain. Journal of Occupational Rehabilitation. 2006; 16(4):557-578

469 Steffens D, Hancock MJ, Pereira LS, Kent PM, Latimer J, Maher CG. Do MRI findings identify patients with low back pain or sciatica who respond better to particular interventions? A systematic review. European Spine Journal. 2015; [Epublication]

470 Stein D, Peri T, Edelstein E, Elizur A, Floman Y. The efficacy of amitriptyline and acetaminophen in the management of acute low back pain. Psychosomatics. 1996; 37(1):63-70

471 Steiner DJ, Sitar S, Wen W, Sawyerr G, Munera C, Ripa SR et al. Efficacy and safety of the seven-day buprenorphine transdermal system in opioid-naive patients with moderate to severe chronic low back pain: an enriched, randomized, double-blind, placebo-controlled study. Journal of Pain and Symptom Management. 2011; 42(6):903-917

472 Sternbach RA. Pain patients: traits and treatment. Academic press; 1974

473 Storheim K, Bo K. The effect of intensive group exercise in patients with chronic low back pain. Advances in Physiotherapy. 2000; 2(3):113-123

474 Storheim K, Brox JI, Holm I, Koller AK, Bo K. Intensive group training versus cognitive intervention in sub-acute low back pain: short-term results of a single-blind randomized controlled trial. Journal of Rehabilitation Medicine. 2003; 35(3):132-140

475 Straube S, Derry S, Moore RA, McQuay HJ. Vitamin D for the treatment of chronic painful conditions in adults. Cochrane Database of Systematic Reviews. 2010; Issue 1:CD007771. DOI:10.1002/14651858.CD007771.pub2

476 Stuckey SJ, Jacobs A, Goldfarb J. EMG biofeedback training, relaxation training, and placebo for the relief of chronic back pain. Perceptual and Motor Skills. 1986; 63(3):1023-1036

477 Sullivan M. The new subjective medicine: Taking the patient's point of view on health care and health. Social Science and Medicine. 2003; 56(7):1595-1604

478 Szpalski M, Hayez JP. Objective functional assessment of the efficacy of tenoxicam in the treatment of acute low back pain. A double-blind placebo-controlled study. British Journal of Rheumatology. 1994; 33(1):74-78

479 Szulc P, Wendt M, Waszak M, Tomczak M, Cieslik K, Trzaska T. Impact of McKenzie Method Therapy Enriched by Muscular Energy Techniques on Subjective and Objective Parameters Related to Spine Function in Patients with Chronic Low Back Pain. Medical Science Monitor. 2015; 21:2918-2932

480 Taylor P, Pezzullo L, Grant SJ, Bensoussan A. Cost-effectiveness of acupuncture for chronic nonspecific low back pain. Pain Practice. Australia 2013; 14(7):599-606

481 Tervo T, Petaja L, Lepisto P. A controlled clinical trial of a muscle relaxant analgesic combination in the treatment of acute lumbago. British Journal of Clinical Practice. 1976; 30(3):62-64

482 The British Pain Society. Guidelines for pain management programmes for adults: An evidence-based review prepared on behalf of the British Pain Society. London. The British Pain Society, 2016. Available from: https://www.britishpainsociety.org/static/uploads/resources/files/pmp2013_main_FINAL_v6.pdf

483 Thomas KJ, Fitter M, Brazier J, MacPherson H, Campbell M, Nicholl JP et al. Longer-term clinical and economic benefits of offering acupuncture to patients with chronic low back pain assessed as suitable for primary care management. Complementary Therapies in Medicine. 1999; 7(2):91-100

484 Thomas KJ, MacPherson H, Ratcliffe J, Thorpe L, Brazier J, Campbell Mea. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. Health Technology Assessment. 2005; 9(32)

485 Thomas KJ, MacPherson H, Thorpe L, Brazier J, Fitter M, Campbell MJ et al. Randomised controlled trial of a short course of traditional acupuncture compared with usual care for persistent non-specific low back pain. BMJ. 2006; 333(7569):623

486 Thomas KJ, MacPherson H, Thorpe L, Brazier J, Fitter M, Campbell MJ et al. Randomized controlled trial of a short course of traditional acupuncture compared with usual care for persistent non-specific low back pain. Journal of the Acupuncture Association of Chartered Physiotherapists. 2007;(3):47-56

487 Thompson JW, Bower S, Tyrer SP. A double blind randomised controlled clinical trial on the effect of transcutaneous spinal electroanalgesia (TSE) on low back pain. European Journal of Pain. 2008; 12(3):371-377

488 Tilbrook HE, Cox H, Hewitt CE, Kang'ombe AR, Chuang LH, Jayakody S et al. Yoga for chronic low back pain. Annals of Internal Medicine. 2011; 155(9):569-578

489 Tilbrook HE, Hewitt CE, Aplin JD, Semlyen A, Trewhela A, Watt I et al. Compliance effects in a randomised controlled trial of yoga for chronic low back pain: A methodological study. Physiotherapy. 2014; 100(3):256-262

490 Topuz O, Ozfidan E, Ozgen M, Ardic F. Efficacy of transcutaneous electrical nerve stimulation and percutaneous neuromodulation therapy in chronic low back pain. Journal of Back and Musculoskeletal Rehabilitation. 2004; 17(3-4):127-133

491 Torstensen TA, Ljunggren AE, Meen HD, Odland E, Mowinckel P, Geijerstam S. Efficiency and costs of medical exercise therapy, conventional physiotherapy, and self-exercise in patients with chronic low back pain. A pragmatic, randomized, single-blinded, controlled trial with 1-year follow-up. Spine. 1998; 23(23):2616-2624

492 Triano JJ, McGregor M, Hondras MA, Brennan PC. Manipulative therapy versus education programs in chronic low back pain. Spine. 1995; 20(8):948-955

493 Tsukayama H, Yamashita H, Amagai H, Tanno Y. Randomised controlled trial comparing the effectiveness of electroacupuncture and TENS for low back pain: a preliminary study for a pragmatic trial. Acupuncture in Medicine. 2002; 20(4):175-180

494 Turk DCMD, Genest M. Pain and behavioural medicine: a cognitive-behavioural perspective. Cambridge University Press; 1983

495 Turner JA, Clancy S. Comparison of operant behavioral and cognitive-behavioral group treatment for chronic low back pain. Journal of Consulting and Clinical Psychology. 1988; 56(2):261-266

496 Turner JA, Clancy S, McQuade KJ, Cardenas DD. Effectiveness of behavioral therapy for chronic low back pain: a component analysis. Journal of Consulting and Clinical Psychology. 1990; 58(5):573-579

497 Turner JA, Jensen MP. Efficacy of cognitive therapy for chronic low back pain. Pain. 1993; 52(2):169-177

498 UK BEAM Trial Team. United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: Cost effectiveness of physical treatments for back pain in primary care. BMJ. 2004; 329(7479):1381-1385

499 UK BEAM Trial Team. United Kingdom back pain exercise and manipulation (UK BEAM) randomised trial: Effectiveness of physical treatments for back pain in primary care. BMJ. 2004; 329(7479):1377-1381

500 Underwood M, Mistry D, Lall R, Lamb S. Predicting response to a cognitive-behavioral approach to treating low back pain: Secondary analysis of the BeST data set. Arthritis Care and Research. 2011; 63(9):1271-1279

501 Unlu Z, Tasci S, Tarhan S, Pabuscu Y, Islak S. Comparison of 3 physical therapy modalities for acute pain in lumbar disc herniation measured by clinical evaluation and magnetic resonance imaging. Journal of Manipulative and Physiological Therapeutics. 2008; 31(3):191-198

502 Urquhart DM, Hoving JL, Assendelft Willem JJ, Roland M, van Tulder MW. Antidepressants for non-specific low back pain. Cochrane Database of Systematic Reviews. 2008; Issue 1:CD001703. DOI:10.1002/14651858.CD001703.pub3

503 Vad VB, Bhat AL, Tarabichi Y. The role of the Back Rx exercise program in diskogenic low back pain: a prospective randomized trial. Spine. 2007; 88(5):577-582

504 Vallone F, Benedicenti S, Sorrenti E, Schiavetti I, Angiero F. Effect of diode laser in the treatment of patients with nonspecific chronic low back pain: a randomized controlled trial. Photomedicine and Laser Surgery. 2014; 32(9):490-494

505 van den Hout JHC, Vlaeyen JWS, Heuts PHTG, Zijlema JHL, Wijnen JAG. Secondary prevention of work-related disability in nonspecific low back pain: does problem-solving therapy help? A randomized clinical trial. Clinical Journal of Pain. 2003; 19(2):87-96

506 van der Heijden GJM, Beurskens AJH, Dirx MJM, Bouter LM, Lindeman E. Efficacy of lumbar traction: a randomised clinical trial. Physiotherapy. 1995; 81(1):29-35

507 Van Der Windt DAWM, Simons E, Riphagen I, Ammendolia C, Verhagen AP, Laslett M et al. Physical examination for lumbar radiculopathy due to disc herniation in patients with low-back pain. Cochrane Database of Systematic Reviews. 2008; Issue 4:CD007431. DOI:1002/14651858.CD007431

508 van der Windt DA, Simons E, Riphagen II, Ammendolia C, Verhagen AP, Laslett M et al. Physical examination for lumbar radiculopathy due to disc herniation in patients with low-back pain. Cochrane Database of Systematic Reviews. 2010; Issue 2:CD007431. DOI:10.1002/14651858.CD007431.pub2

509 van Duijvenbode I, Jellema P, van Poppel Mireille, van Tulder MW. Lumbar supports for prevention and treatment of low back pain. Cochrane Database of Systematic Reviews. 2008; Issue 2:CD001823. DOI:10.1002/14651858.CD001823.pub3

510 van Tulder MW, Koes B, Malmivaara A. Outcome of non-invasive treatment modalities on back pain: an evidence-based review. European Spine Journal. 2006; 15(Suppl.1):S64-S81

511 van Tulder MW, Ostelo R, Vlaeyen JW, Linton SJ, Morley SJ, Assendelft WJ. Behavioral treatment for chronic low back pain: a systematic review within the framework of the Cochrane Back Review Group. Spine. 2000; 25(20):2688-2699

512 van Tulder MW, Scholten RJ, Koes BW, Deyo RA. Nonsteroidal anti-inflammatory drugs for low back pain: a systematic review within the framework of the Cochrane Collaboration Back Review Group. Spine. 2000; 25(19):2501-2513

513 van Tulder MW, Touray T, Furlan AD, Solway S, Bouter LM. Muscle relaxants for non-specific low-back pain. Cochrane Database of Systematic Reviews. 2003; Issue 4:CD004252. DOI:10.1002/14651858.CD004252

514 van Tulder MW, Touray T, Furlan AD, Solway S, Bouter LM, Cochrane Back Review Group. Muscle relaxants for nonspecific low back pain: a systematic review within the framework of the cochrane collaboration. Spine. 2003; 28(17):1978-1992

515 Vas J, Aranda JM, Modesto M, Benitez-Parejo N, Herrera A, Martinez-Barquin DM et al. Acupuncture in patients with acute low back pain: a multicentre randomised controlled clinical trial. Pain. 2012; 153(9):1883-1889

516 Vavrek D, Sharma R, Haas M. Cost-analysis related to dose-response for spinal manipulative therapy for chronic low back pain: outcomes from a randomized controlled trial. Journal of Alternative and Complementary Medicine. 2014; 20(5):A18

517 Verbeek JH, Martimo KP, Karppinen J, Kuijer PPF, Viikari-Juntura E, Takala EP. Manual material handling advice and assistive devices for preventing and treating back pain in workers. Cochrane Database of Systematic Reviews. 2011; Issue 6:CD005958. DOI:10.1002/14651858.CD005958.pub3

518 Vibe Fersum K., O'Sullivan P, Skouen JS, Smith A, Kvale A. Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: a randomized controlled trial. European Journal of Pain. 2013; 17(6):916-928

519 Vickers AJ, Cronin AM, Maschino AC, Lewith G, Macpherson H, Foster NE et al. Acupuncture for chronic pain: individual patient data meta-analysis. Archives of Internal Medicine. 2012; 172(19):1444-1453

520 Vincent A, Hill J, Kruk KM, Cha SS, Bauer BA. External qigong for chronic pain. American Journal of Chinese Medicine. 2010; 38(4):695-703

521 Vincent HK, George SZ, Seay AN, Vincent KR, Hurley RW. Resistance exercise, disability, and pain catastrophizing in obese adults with back pain. Medicine and Science in Sports and Exercise. 2014; 46(9):1693-1701

522 von Heymann WJ, Schloemer P, Timm J, Muehlbauer B. Spinal high-velocity low amplitude manipulation in acute nonspecific low back pain: a double-blinded randomized controlled trial in comparison with diclofenac and placebo. Spine. 2013; 38(7):540-548

523 Von Korff M, Glasgow RE, Sharpe M. ABC of psychological medicine: Organising care for chronic illness. BMJ. 2002; 325(7355):92-94

524 Von Korff M, Shortreed SM, Saunders KW, LeResche L, Berlin JA, Stang P et al. Comparison of back pain prognostic risk stratification item sets. Journal of Pain. 2014; 15(1):81-89

525 Vondrackova D, Leyendecker P, Meissner W, Hopp M, Szombati I, Hermanns K et al. Analgesic efficacy and safety of oxycodone in combination with naloxone as prolonged release tablets in patients with moderate to severe chronic pain. Journal of Pain. 2008; 9(12):1144-1154

526 Vorsanger GJ, Xiang J, Gana TJ, Pascual ML, Fleming RR. Extended-release tramadol (tramadol ER) in the treatment of chronic low back pain. Journal of Opioid Management. 2008; 4(2):87-97

527 Vroomen PC, de Krom MC, Wilmink JT, Kester AD, Knottnerus JA. Lack of effectiveness of bed rest for sciatica. New England Journal of Medicine. 1999; 340(6):418-423

528 Waagen GN, Haldeman S, Cook G, Lopez D, Deboer KF. Short term trial of chiropractic adjustments for the relief of chronic low back pain. Manual Medicine. 1986; 2:63-67

529 Waddell G and Burton AK. Is work good for your health and well-being? Norwich. TSO (The Stationary Office), 2006. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/214326/hwwb-is-work-good-for-you.pdf

530 Walker BF, French SD, Grant W, Green S. Combined chiropractic interventions for low-back pain. Cochrane Database of Systematic Reviews. 2010; Issue 4:CD005427. DOI:10.1002/14651858.CD005427.pub2

531 Watson T. Electrotherapy on the Web. 2015. Available from: http://www.electrotherapy.org/ [Last accessed: 30 January 2016]

532 Webster BS, Choi Y, Bauer AZ, Cifuentes M, Pransky G. The cascade of medical services and associated longitudinal costs due to nonadherent magnetic resonance imaging for low back pain. Spine. 2014; 39(17):1433-1440

533 Webster LR, Butera PG, Moran LV, Wu N, Burns LH, Friedmann N. Oxytrex minimizes physical dependence while providing effective analgesia: a randomized controlled trial in low back pain. Journal of Pain. 2006; 7(12):937-946

534 Wegner I, Widyahening IS, van Tulder MW, Blomberg Stefan EI, de Vet Henrica CW, Brønfort G et al. Traction for low-back pain with or without sciatica. Cochrane Database of Systematic Reviews. 2013; Issue 8:CD003010. DOI:10.1002/14651858.CD003010.pub5

535 Weiner DK, Perera S, Rudy TE, Glick RM, Shenoy S, Delitto A. Efficacy of percutaneous electrical nerve stimulation and therapeutic exercise for older adults with chronic low back pain: a randomized controlled trial. Pain. 2008; 140(2):344-357

536 Weiner DK, Rudy TE, Glick RM, Boston JR, Lieber SJ, Morrow LA et al. Efficacy of percutaneous electrical nerve stimulation for the treatment of chronic low back pain in older adults. Journal of the American Geriatrics Society. 2003; 51(5):599-608

537 Weiss J, Quante S, Xue F, Muche R, Reuss-Borst M. Effectiveness and acceptance of acupuncture in patients with chronic low back pain: results of a prospective, randomized, controlled trial. Journal of Alternative and Complementary Medicine. 2013; 19(12):935-941

538 Werners R, Pynsent PB, Bulstrode CJ. Randomized trial comparing interferential therapy with motorized lumbar traction and massage in the management of low back pain in a primary care setting. Spine. 1999; 24(15):1579-1584

539 Whitehurst DG, Bryan S, Lewis M, Hay EM, Mullis R, Foster NE. Implementing stratified primary care management for low back pain: cost-utility analysis alongside a prospective, population-based, sequential comparison study. Spine. 2015; 40(6):405-414

540 Whitehurst DGT, Bryan S, Lewis M, Hill J, Hay EM. Exploring the cost-utility of stratified primary care management for low back pain compared with current best practice within risk-defined subgroups. Annals of Rheumatic Diseases. 2012; 71(11):1796-1802

541 Whitehurst DGT, Lewis M, Yao GL, Bryan S, Raftery JP, Mullis R et al. A brief pain management program compared with physical therapy for low back pain: results from an economic analysis alongside a randomized clinical trial. Arthritis and Rheumatism. 2007; 57(3):466-473

542 Whitfill T, Haggard R, Bierner SM, Pransky G, Hassett RG, Gatchel RJ. Early intervention options for acute low back pain patients: a randomized clinical trial with one-year follow-up outcomes. Journal of Occupational Rehabilitation. 2010; 20(2):256-263

543 Wielage R, Bansal M, Wilson K, Klein R, Happich M. Cost-effectiveness of duloxetine in chronic low back pain: a Quebec societal perspective. Spine. 2013; 38(11):936-946

544 Wielage RC, Bansal M, Andrews JS, Wohlreich MM, Klein RW, Happich M. The cost-effectiveness of duloxetine in chronic low back pain: a US private payer perspective. Value in Health. 2013; 16(2):334-344

545 Wiesel SW, Cuckler JM, Deluca F, Jones F, Zeide MS, Rothman RH. Acute low-back pain. An objective analysis of conservative therapy. Spine. 1980; 5(4):324-330

546 Wilkinson MJ. Does 48 hours' bed rest influence the outcome of acute low back pain? British Journal of General Practice. 1995; 45(398):481-484

547 Williams CM, Hancock MJ, Maher CG, McAuley JH, Lin CWC, Latimer J. Predicting rapid recovery from acute low back pain based on the intensity, duration and history of pain: a validation study. European Journal of Pain. 2014; 18(8):1182-1189

548 Williams CM, Maher CG, Latimer J, McLachlan AJ, Hancock MJ, Day RO et al. Efficacy of paracetamol for acute low-back pain: a double-blind, randomised controlled trial. Lancet. 2014; 384(9954):1586-1596

549 Williams K, Abildso C, Steinberg L, Doyle E, Epstein B, Smith D et al. Evaluation of the effectiveness and efficacy of Iyengar yoga therapy on chronic low back pain. Spine. 2009; 34(19):2066-2076

550 Williams KA, Petronis J, Smith D, Goodrich D, Wu J, Ravi N et al. Effect of Iyengar yoga therapy for chronic low back pain. Spine. 2005; 115(1-2):107-117

551 Witt CM, Jena S, Selim D, Brinkhaus B, Reinhold T, Wruck K et al. Pragmatic randomized trial evaluating the clinical and economic effectiveness of acupuncture for chronic low back pain. American Journal of Epidemiology. 2006; 164(5):487-496

552 Yamato T, Maher CG, Saragiotto BT, Hancock MJ, Ostelo Raymond WJG, Cabral Cristina MN et al. Pilates for low back pain. Cochrane Database of Systematic Reviews. 2015; Issue 7:CD010265. DOI:10.1002/14651858.CD010265.pub2

553 Yarlas A, Miller K, Wen W, Lynch SY, Munera C, Pergolizzi JVJ et al. Buprenorphine transdermal system compared with placebo reduces interference in functioning for chronic low back pain. Postgraduate Medicine. 2015; 127(1):38-45

554 Yeung CKN, Leung MCP, Chow DHK. The use of electro-acupuncture in conjunction with exercise for the treatment of chronic low-back pain. Journal of Alternative and Complementary Medicine. 2003; 9(4):479-490

555 Yip YB, Tse SHM. The effectiveness of relaxation acupoint stimulation and acupressure with aromatic lavender essential oil for non-specific low back pain in Hong Kong: a randomised controlled trial. Complementary Therapies in Medicine. 2004; 12(1):28-37

556 Yousefi-Nooraie R, Schonstein E, Heidari K, Rashidian A, Pennick V, Akbari-Kamrani M et al. Low level laser therapy for nonspecific low-back pain. Cochrane Database of Systematic Reviews. 2008; Issue 2:CD005107. DOI:10.1002/14651858.CD005107.pub4

557 Yun M, Xiong N, Guo M, Zhang J, Liu D, Luo Y et al. Acupuncture at the back-pain-acupoints for chronic low back pain of Peacekeepers in Lebanon: A randomized controlled trial. Journal of Musculoskeletal Pain. 2012; 20(2):107-115

558 Yun M, Shao Y, Zhang Y, He S, Xiong N, Zhang J et al. Hegu acupuncture for chronic low-back pain: a randomized controlled trial. Journal of Alternative and Complementary Medicine. 2012; 18(2):130-136

559 Zaringhalam J, Manaheji H, Rastqar A, Zaringhalam M. Reduction of chronic non-specific low back pain: a randomised controlled clinical trial on acupuncture and baclofen. Chinese Medicine. 2010; 5:15

560 Zhang Y, Wan L, Wang X. The effect of health education in patients with chronic low back pain. Journal of International Medical Research. 2014; 42(3):815-820

561 Zhang Y, Tang S, Chen G, Liu Y. Chinese massage combined with core stability exercises for nonspecific low back pain: a randomized controlled trial. Complementary Therapies in Medicine. 2015; 23(1):1-6

562 Zheng Z, Wang J, Gao Q, Hou J, Ma L, Jiang C et al. Therapeutic evaluation of lumbar tender point deep massage for chronic non-specific low back pain. Journal of Traditional Chinese Medicine. 2012; 32(4):534-537

563 Zomalheto Z, Agbodande A, Avimadje M. Effect of plaster corset in acute low back pain in less developed country. Egyptian Rheumatologist. 2015; 37(3):147-150

564 Zylbergold RS, Piper MC. Lumbar disc disease: comparative analysis of physical therapy treatments. Archives of Physical Medicine and Rehabilitation. 1981; 62(4):176-179

20 Acronyms and abbreviations

Acronym or abbreviation	Description
ACT	Acceptance and Commitment Therapy
ADL	Activities of daily living
ALBP	Aberdeen Low Back Pain
ALBPSQ	Acute low back pain screening questionnaire (alternative name for OMPQ)
APTA	American Physical Therapy Association
ATEAM	Alexander technique lessons, technology and massage
AUC	Area under curve
BDI	Beck depression inventory
BPI	Brief Pain Inventory
CFT	Compassion Focused Therapy
CI	Confidence interval
CPG	Clinical Practice Guidelines
CPR	Clinical prediction rule
CTIP	Cognitive treatment of illness perception
CUA	Cost-utility analysis
DRAM	Distress and Risk Assessment Method
EIFEL	French version of the Roland Morris disability questionnaire
EMG	Electromyographic
FABQ	Fear Avoidance Beliefs Questionnaire
FRI	Functional Rating Index
GDG	Guideline Development Group
GHQ	General Health Quality
GPR	Global Posture Re-education
HADS	Hospital Anxiety and Depression Scale
HILT	High Intensity Laser Therapy
HTA	Health Technology Assessment
ICER	Incremental cost-effectiveness ratio
iLSO	Inextensible lumbosacral orthotics
IQR	Interquartile range
LBP	Low back pain
MET	Muscle energy technique
MBR	Multi-disciplinary biopsychosocial rehabilitation
MBSR	Mindfulness-Based Stress Reduction
MCS	Mental Component Score
MID	Minimum important difference
MODI	Modified Oswestry disability index
MPQ	McGill Pain Questionnaire
MVAS	Million Visual Analogue Scale
NICE	National Institute for Health and Care Excellence
NIOSH	National Institute for Occupational Safety and Health

Acronym or abbreviation	Description
NRS	Numeric pain rating scale
NR	Not reported
NRS	Numeric rating scale
NSAID	Non-steroidal anti-inflammatory drug
ODI	Oswestry disability index
OECD	Organisation for Economic Co-operation and Development
ÖMPQ	Örebro musculoskeletal pain questionnaire
OMSQ	Modified Orebro Musculoskeletal Screening Questionnaire
PACE	Paracetamol for Low Back Pain
PCS	Physical Component Score
PDI	Pain disability index
PENS	Percutaneous electrical nerve stimulation
PGIC	Patient's global impression of change
PICO	Population, intervention, comparator, outcome
PT	Physical therapists
QALY	Quality-adjusted life year
QBPDQ	Quebec Back Pain Disability Questionnaire
QOL	Quality of life
RCT	Randomised controlled trial
RMDQ	Roland Morris disability questionnaire
ROC	Receiver operator characteristic
SBT	STarT Back Screening Tool
SFI	Spine functional index
SIP	Sickness impact profile
SR	Systematic review
STAI	State –Trait Anxiety Inventory
TENS	Transcutaneous electrical nerve stimulation
TSK	Tampa scale of kinesiophobia
UC	Usual care
VAS	Visual analogue scale

21 Glossary

The NICE Glossary can be found at www.nice.org.uk/glossary.

21.1 Guideline-specific terms

Term	Definition
Acceptance and commitment therapy (ACT)	An empirically-based psychological intervention that uses acceptance and mindfulness strategies, with commitment and behaviour change strategies, to increase psychological flexibility.
Acupuncture	Acupuncture is a treatment derived from ancient Chinese medicine in which fine needles are inserted at certain sites in the body for therapeutic or preventative purposes
Acute	Symptoms with a duration of less than 3 months.
Behavioural therapies	Treatment to help change potentially self-destructing behaviours in people with chronic low back pain.
Cognitive behavioural approaches	Cognitive approaches are aimed at altering unhelpful or inappropriate beliefs as a basis for changing behaviour, such as fear-avoidance.
Disc replacement	Also known as spinal arthroplasty, disc replacement is a surgical procedure to relieve low back pain. It involves replacing invertebral units with artificial discs that can act as a functional prosthetic replacement. The pain relief stems from removal of the painful disc.
Effectiveness	A term used broadly within the guideline to include efficacy. All of the evidence reviews look to determine both efficacy and effectiveness.
Electrotherapies	Umbrella term consisting of TENS, PENS, interferential therapy, LLLT, and therapeutic ultrasound, involving the application of forms of energy to the body with the goal of improving symptoms or recovery of low back pain.
Epidural injections	An injection into the epidural space within the spine, using either corticosteroids or anti-TNF agents for their anti-inflammatory and immunosuppressant properties.
Exercise therapies	A wide variation of physical exercise to prevent or treat low back pain. These can be performed on a one-to-one basis or in a group environment. The guideline covers biomechanical, aerobic, mind-body and mixed modality exercise.
Imaging	Radiographic techniques to produce images of the spinal column to assist clinical decision-making when assessing people with low back pain with or without sciatica. These are defined in the guideline by X-rays, CT scans and MRI scans.
Manual therapies	Active or passive movements delivered to the neuromusculoskeletal system focussing on joints and soft tissues to improve mobility and function, and to decrease pain. Mobilisation and soft tissue techniques are performed by a wide variety of practitioners; whereas spinal manipulation is usually performed by chiropractors or osteopaths, and by doctors or physiotherapists who have undergone additional training in manipulation. Manual therapies are reviewed in the guideline by soft tissue techniques, traction, manipulation or mobilisation and mixed modality manual therapy.
Mindfulness therapy	Therapy to make patient aware of the present moment, and non-judgmentally to the unfolding of experience moment by moment to alter behaviours towards low back pain.
Multidisciplinary biopsychosocial	An intervention that involves a physical component (such as specific exercise modalities, mobilisation, massage) and at least one other element from a

Term	Definition
rehabilitation programmes	biopsychosocial approach, that is psychological or social and occupational or educational (defined educational intervention e.g. education on anatomy, psychology, imaging, coping, medication, family, work and social life). The different components of the intervention had to be offered as an integrated programme involving communication between the providers responsible for the different components. These programmes may include various components delivered by one individual, or by a number of people, such as the multi-disciplinary aspect applies to the interventions included in the package (across disciplines), not to the number of people / disciplines delivering this.
Multimodal treatment package	Exercise alongside at least one of: self-management, manual therapy or psychological therapy (for example, cognitive behavioural therapy).
Non-specific low back pain	Pain in the back between the bottom of the rib cage and the buttock creases.
Orthotics and appliances	Generic or bespoke insoles, corsets, belts or supports aiming to reduce the impact or provide support to the lower back and pelvic muscles.
Pharmacological interventions	Oral/sublingual, rectal, intra-muscular and transdermal drug treatments to relieve low back pain with or without sciatica. This does not include pharmacological treatment for the management of sciatica alone.
Postural therapies	Postural therapies aim to prevent or reduce low back pain by focusing on the correction of postures that are theorised to be suboptimal and place excessive or damaging loads upon the spine.
Radiofrequency denervation	A minimally invasive and percutaneous procedure performed under local anaesthesia or light intravenous sedation. Radiofrequency energy is delivered along an insulated needle in contact with the target nerves to denature the nerve.
Risk assessment tools	Tools developed to support clinical decision-making. These include: the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMSPQ), the STarT Back Screening Tool and the Distress and Risk Assessment Method (DRAM).
Risk stratification	Risk stratified care strategies were developed in order to avoid a 'one size fits all' approach. There are many different stratifications and it is appreciated that there can be overlap between groups.
Self-management	Programmes to assist people with low back pain and sciatica returning to normal activities. This includes education and advice for staying active.
Spinal decompression	Removal of pressure from the nervous structures within the spinal column. This guideline covers the following procedures: laminectomy, discectomy, facetectomy, foraminotomy, fenestration, spinal decompression, sequestration and laminotomy.
Spinal fusion	Spinal fusion is an operation performed to achieve solid bone union between spinal vertebrae to prevent movement, using either the patient's own bone or artificial bone substitutes.
Spinal injections	Variations of injected agents which aim to either reduce inflammation in tissue or induce inflammation to stimulate healthy tissue regrowth. These include facet joint injections, medial branch blocks, intradiscal therapy and prolotherapy.

21.2 General terms

Term	Definition
Abstract	Summary of a study, which may be published alone or as an introduction to a full scientific paper.
Algorithm (in guidelines)	A flow chart of the clinical decision pathway described in the guideline, where decision points are represented with boxes, linked with arrows.
Allocation concealment	The process used to prevent advance knowledge of group assignment in an RCT. The allocation process should be impervious to any influence by the individual making the allocation, by being administered by someone who is not responsible for recruiting participants.
Applicability	How well the results of a study or NICE evidence review can answer a clinical question or be applied to the population being considered.
Arm (of a clinical study)	Subsection of individuals within a study who receive one particular intervention, for example placebo arm.
Association	Statistical relationship between 2 or more events, characteristics or other variables. The relationship may or may not be causal.
Base case analysis	In an economic evaluation, this is the main analysis based on the most plausible estimate of each input. In contrast, see Sensitivity analysis.
Baseline	The initial set of measurements at the beginning of a study (after run-in period where applicable), with which subsequent results are compared.
Bias	Influences on a study that can make the results look better or worse than they really are. (Bias can even make it look as if a treatment works when it does not.) Bias can occur by chance, deliberately or as a result of systematic errors in the design and execution of a study. It can also occur at different stages in the research process, for example, during the collection, analysis, interpretation, publication or review of research data. For examples see selection bias, performance bias, information bias, confounding factor, and publication bias.
Blinding	A way to prevent researchers, doctors and patients in a clinical trial from knowing which study group each patient is in so they cannot influence the results. The best way to do this is by sorting patients into study groups randomly. The purpose of 'blinding' or 'masking' is to protect against bias. A single-blinded study is one in which patients do not know which study group they are in (for example whether they are taking the experimental drug or a placebo). A double-blinded study is one in which neither patients nor the researchers and doctors know which study group the patients are in. A triple blind study is one in which neither the patients, clinicians or the people carrying out the statistical analysis know which treatment patients received.
Carer (caregiver)	Someone who looks after family, partners or friends in need of help because they are ill, frail or have a disability.
Clinical effectiveness	How well a specific test or treatment works when used in the 'real world' (for example, when used by a doctor with a patient at home), rather than in a carefully controlled clinical trial. Trials that assess clinical effectiveness are sometimes called management trials. Clinical effectiveness is not the same as efficacy.
Clinician	A healthcare professional who provides patient care. For example, a doctor, nurse or physiotherapist.
Cochrane Review	The Cochrane Library consists of a regularly updated collection of evidence-based medicine databases including the Cochrane Database of Systematic Reviews (reviews of randomised controlled trials prepared by the Cochrane

Term	Definition
	Collaboration).
Cohort study	A study with 2 or more groups of people – cohorts – with similar characteristics. One group receives a treatment, is exposed to a risk factor or has a particular symptom and the other group does not. The study follows their progress over time and records what happens. See also observational study.
Comparability	Similarity of the groups in characteristics likely to affect the study results (such as health status or age).
Confidence interval (CI)	There is always some uncertainty in research. This is because a small group of patients is studied to predict the effects of a treatment on the wider population. The confidence interval is a way of expressing how certain we are about the findings from a study, using statistics. It gives a range of results that is likely to include the 'true' value for the population. The CI is usually stated as '95% CI', which means that the range of values has a 95 in a 100 chance of including the 'true' value. For example, a study may state that "based on our sample findings, we are 95% certain that the 'true' population blood pressure is not higher than 150 and not lower than 110". In such a case the 95% CI would be 110 to 150. A wide confidence interval indicates a lack of certainty about the true effect of the test or treatment – often because a small group of patients has been studied. A narrow confidence interval indicates a more precise estimate (for example, if a large number of patients have been studied).
Control group	A group of people in a study who do not receive the treatment or test being studied. Instead, they may receive the standard treatment (sometimes called 'usual care') or a dummy treatment (placebo). The results for the control group are compared with those for a group receiving the treatment being tested. The aim is to check for any differences. Ideally, the people in the control group should be as similar as possible to those in the treatment group, to make it as easy as possible to detect any effects due to the treatment.
Cost-consequences analysis (CCA)	Cost-consequences analysis is one of the tools used to carry out an economic evaluation. This compares the costs (such as treatment and hospital care) and the consequences (such as health outcomes) of a test or treatment with a suitable alternative. Unlike cost-benefit analysis or cost-effectiveness analysis, it does not attempt to summarise outcomes in a single measure (like the quality-adjusted life year) or in financial terms. Instead, outcomes are shown in their natural units (some of which may be monetary) and it is left to decision-makers to determine whether, overall, the treatment is worth carrying out.
Cost-effectiveness analysis (CEA)	Cost-effectiveness analysis is one of the tools used to carry out an economic evaluation. The benefits are expressed in non-monetary terms related to health, such as symptom-free days, heart attacks avoided, deaths avoided or life years gained (that is, the number of years by which life is extended as a result of the intervention).
Cost-effectiveness model	An explicit mathematical framework, which is used to represent clinical decision problems and incorporate evidence from a variety of sources in order to estimate the costs and health outcomes.
Cost-utility analysis (CUA)	Cost-utility analysis is one of the tools used to carry out an economic evaluation. The benefits are assessed in terms of both quality and duration of life, and expressed as quality-adjusted life years (QALYs). See also utility.
Discounting	Costs and perhaps benefits incurred today have a higher value than costs and benefits occurring in the future. Discounting health benefits reflects

Term	Definition
	individual preference for benefits to be experienced in the present rather than the future. Discounting costs reflects individual preference for costs to be experienced in the future rather than the present.
Dominance	A health economics term. When comparing tests or treatments, an option that is both less effective and costs more is said to be 'dominated' by the alternative.
Drop-out	A participant who withdraws from a trial before the end.
Economic evaluation	An economic evaluation is used to assess the cost-effectiveness of healthcare interventions (that is, to compare the costs and benefits of a healthcare intervention to assess whether it is worth doing). The aim of an economic evaluation is to maximise the level of benefits – health effects – relative to the resources available. It should be used to inform and support the decision-making process; it is not supposed to replace the judgement of healthcare professionals. There are several types of economic evaluation: cost-benefit analysis, cost-consequences analysis, cost-effectiveness analysis, cost-minimisation analysis and cost-utility analysis. They use similar methods to define and evaluate costs, but differ in the way they estimate the benefits of a particular drug, programme or intervention.
Effect (as in effect measure, treatment effect, estimate of effect, effect size)	A measure that shows the magnitude of the outcome in one group compared with that in a control group. For example, if the absolute risk reduction is shown to be 5% and it is the outcome of interest, the effect size is 5%. The effect size is usually tested, using statistics, to find out how likely it is that the effect is a result of the treatment and has not just happened by chance (that is, to see if it is statistically significant).
Effectiveness	How beneficial a test or treatment is under usual or everyday conditions, compared with doing nothing or opting for another type of care.
Efficacy	How beneficial a test, treatment or public health intervention is under ideal conditions (for example, in a laboratory), compared with doing nothing or opting for another type of care.
EQ-5D (EuroQol 5 dimensions)	A standardised instrument used to measure health-related quality of life. It provides a single index value for health status.
Evidence	Information on which a decision or guidance is based. Evidence is obtained from a range of sources including randomised controlled trials, observational studies, expert opinion (of clinical professionals or patients).
Exclusion criteria (literature review)	Explicit standards used to decide which studies should be excluded from consideration as potential sources of evidence.
Exclusion criteria (clinical study)	Criteria that define who is not eligible to participate in a clinical study.
Extended dominance	If Option A is both more clinically effective than Option B and has a lower cost per unit of effect, when both are compared with a do-nothing alternative then Option A is said to have extended dominance over Option B. Option A is therefore cost-effective and should be preferred, other things remaining equal.
Extrapolation	An assumption that the results of studies of a specific population will also hold true for another population with similar characteristics.
Follow-up	Observation over a period of time of an individual, group or initially defined population whose appropriate characteristics have been assessed in order to observe changes in health status or health-related variables.

Term	Definition
Generalisability	The extent to which the results of a study hold true for groups that did not participate in the research. See also external validity.
GRADE, GRADE profile	A system developed by the GRADE Working Group to address the shortcomings of present grading systems in healthcare. The GRADE system uses a common, sensible and transparent approach to grading the quality of evidence. The results of applying the GRADE system to clinical trial data are displayed in a table known as a GRADE profile.
Harms	Adverse effects of an intervention.
Health economics	Study or analysis of the cost of using and distributing healthcare resources.
Health-related quality of life (HRQoL)	A measure of the effects of an illness to see how it affects someone's day-to-day life.
Heterogeneity or Lack of homogeneity	The term is used in meta-analyses and systematic reviews to describe when the results of a test or treatment (or estimates of its effect) differ significantly in different studies. Such differences may occur as a result of differences in the populations studied, the outcome measures used or because of different definitions of the variables involved. It is the opposite of homogeneity.
Imprecision	Results are imprecise when studies include relatively few patients and few events and thus have wide confidence intervals around the estimate of effect.
Inclusion criteria (literature review)	Explicit criteria used to decide which studies should be considered as potential sources of evidence.
Incremental analysis	The analysis of additional costs and additional clinical outcomes with different interventions.
Incremental cost	The extra cost linked to using one test or treatment rather than another. Or the additional cost of doing a test or providing a treatment more frequently.
Incremental cost-effectiveness ratio (ICER)	The difference in the mean costs in the population of interest divided by the differences in the mean outcomes in the population of interest for one treatment compared with another.
Indirectness	The available evidence is different to the review question being addressed, in terms of PICO (population, intervention, comparison and outcome).
Intention-to-treat analysis (ITT)	An assessment of the people taking part in a clinical trial, based on the group they were initially (and randomly) allocated to. This is regardless of whether or not they dropped out, fully complied with the treatment or switched to an alternative treatment. Intention-to-treat analyses are often used to assess clinical effectiveness because they mirror actual practice: that is, not everyone complies with treatment and the treatment people receive may be changed according to how they respond to it.
Intervention	In medical terms this could be a drug treatment, surgical procedure, diagnostic or psychological therapy. Examples of public health interventions could include action to help someone to be physically active or to eat a more healthy diet.
Length of stay	The total number of days a participant stays in hospital.
Licence	See 'Product licence'.
Life years gained	Mean average years of life gained per person as a result of the intervention compared with an alternative intervention.
Likelihood ratio	The likelihood ratio combines information about the sensitivity and specificity. It tells you how much a positive or negative result changes the likelihood that a patient would have the disease. The likelihood ratio of a

Term	Definition
	positive test result (LR+) is sensitivity divided by (1 minus specificity).
Long-term care	Residential care in a home that may include skilled nursing care and help with everyday activities. This includes nursing homes and residential homes.
Loss to follow-up	A patient, or the proportion of patients, actively participating in a clinical trial at the beginning, but whom the researchers were unable to trace or contact by the point of follow-up in the trial
Meta-analysis	A method often used in systematic reviews. Results from several studies of the same test or treatment are combined to estimate the overall effect of the treatment.
Multivariate model	A statistical model for analysis of the relationship between 2 or more predictor (independent) variables and the outcome (dependent) variable.
Observational study	Individuals or groups are observed or certain factors are measured. No attempt is made to affect the outcome. For example, an observational study of a disease or treatment would allow 'nature' or usual medical care to take its course. Changes or differences in one characteristic (for example, whether or not people received a specific treatment or intervention) are studied without intervening. There is a greater risk of selection bias than in experimental studies.
Odds ratio	Odds are a way to represent how likely it is that something will happen (the probability). An odds ratio compares the probability of something in one group with the probability of the same thing in another. An odds ratio of 1 between 2 groups would show that the probability of the event (for example a person developing a disease, or a treatment working) is the same for both. An odds ratio greater than 1 means the event is more likely in the first group. An odds ratio less than 1 means that the event is less likely in the first group. Sometimes probability can be compared across more than 2 groups – in this case, one of the groups is chosen as the 'reference category', and the odds ratio is calculated for each group compared with the reference category. For example, to compare the risk of dying from lung cancer for non-smokers, occasional smokers and regular smokers, non-smokers could be used as the reference category. Odds ratios would be worked out for occasional smokers compared with non-smokers and for regular smokers compared with non-smokers. See also confidence interval, risk ratio.
Opportunity cost	The loss of other healthcare programmes displaced by investment in or introduction of another intervention. This may be best measured by the health benefits that could have been achieved had the money been spent on the next best alternative healthcare intervention.
Outcome	The impact that a test, treatment, policy, programme or other intervention has on a person, group or population. Outcomes from interventions to improve the public's health could include changes in knowledge and behaviour related to health, societal changes (for example, a reduction in crime rates) and a change in people's health and wellbeing or health status. In clinical terms, outcomes could include the number of patients who fully recover from an illness or the number of hospital admissions, and an improvement or deterioration in someone's health, functional ability, symptoms or situation. Researchers should decide what outcomes to measure before a study begins.
P value	The p value is a statistical measure that indicates whether or not an effect is statistically significant. For example, if a study comparing 2 treatments found that one seems

Term	Definition
	more effective than the other, the p value is the probability of obtaining these results by chance. By convention, if the p value is below 0.05 (that is, there is less than a 5% probability that the results occurred by chance) it is considered that there probably is a real difference between treatments. If the p value is 0.001 or less (less than a 1% probability that the results occurred by chance), the result is seen as highly significant. If the p value shows that there is likely to be a difference between treatments, the confidence interval describes how big the difference in effect might be.
Placebo	A fake (or dummy) treatment given to participants in the control group of a clinical trial. It is indistinguishable from the actual treatment (which is given to participants in the experimental group). The aim is to determine what effect the experimental treatment has had – over and above any placebo effect caused because someone has received (or thinks they have received) care or attention.
Postoperative	Pertaining to the period after patients leave the operating theatre, following surgery.
Power (statistical)	The ability to demonstrate an association when one exists. Power is related to sample size; the larger the sample size, the greater the power and the lower the risk that a possible association could be missed.
Preoperative	The period before surgery commences.
Primary care	Healthcare delivered outside hospitals. It includes a range of services provided by GPs, nurses, health visitors, midwives and other healthcare professionals and allied health professionals such as dentists, pharmacists and opticians.
Primary outcome	The outcome of greatest importance, usually the one in a study that the power calculation is based on.
Probabilistic analysis	In economic evaluation, this is an analysis that uses a probability distribution for each input. In contrast, see Deterministic analysis.
Product licence	An authorisation from the MHRA to market a medicinal product.
Prognosis	A probable course or outcome of a disease. Prognostic factors are patient or disease characteristics that influence the course. Good prognosis is associated with low rate of undesirable outcomes; poor prognosis is associated with a high rate of undesirable outcomes.
Publication bias	Publication bias occurs when researchers publish the results of studies showing that a treatment works well and don't publish those showing it did not have any effect. If this happens, analysis of the published results will not give an accurate idea of how well the treatment works. This type of bias can be assessed by a funnel plot.
Quality of life	See 'Health-related quality of life'.
Quality-adjusted life year (QALY)	A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health. QALYS are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality of life score (on a scale of 0 to 1). It is often measured in terms of the person's ability to perform the activities of daily life, freedom from pain and mental disturbance.
Randomisation	Assigning participants in a research study to different groups without taking any similarities or differences between them into account. For example, it could involve using a random numbers table or a computer-

Term	Definition
	generated random sequence. It means that each individual (or each group in the case of cluster randomisation) has the same chance of receiving each intervention.
Randomised controlled trial (RCT)	A study in which a number of similar people are randomly assigned to 2 (or more) groups to test a specific drug or treatment. One group (the experimental group) receives the treatment being tested, the other (the comparison or control group) receives an alternative treatment, a dummy treatment (placebo) or no treatment at all. The groups are followed up to see how effective the experimental treatment was. Outcomes are measured at specific times and any difference in response between the groups is assessed statistically. This method is also used to reduce bias.
RCT	See 'Randomised controlled trial'.
Receiver operated characteristic (ROC) curve	A graphical method of assessing the accuracy of a diagnostic test. Sensitivity is plotted against 1 minus specificity. A perfect test will have a positive, vertical linear slope starting at the origin. A good test will be somewhere close to this ideal.
Reference standard	The test that is considered to be the best available method to establish the presence or absence of the outcome – this may not be the one that is routinely used in practice.
Reporting bias	See 'Publication bias'.
Retrospective study	A research study that focuses on the past and present. The study examines past exposure to suspected risk factors for the disease or condition. Unlike prospective studies, it does not cover events that occur after the study group is selected.
Review question	In guideline development, this term refers to the questions about treatment and care that are formulated to guide the development of evidence-based recommendations.
Risk ratio (RR)	The ratio of the risk of disease or death among those exposed to certain conditions compared with the risk for those who are not exposed to the same conditions (for example, the risk of people who smoke getting lung cancer compared with the risk for people who do not smoke). If both groups face the same level of risk, the risk ratio is 1. If the first group had a risk ratio of 2, subjects in that group would be twice as likely to have the event happen. A risk ratio of less than 1 means the outcome is less likely in the first group. The risk ratio is sometimes referred to as relative risk.
Secondary outcome	An outcome used to evaluate additional effects of the intervention deemed a priori as being less important than the primary outcomes.
Selection bias	Selection bias occurs if: a) The characteristics of the people selected for a study differ from the wider population from which they have been drawn, or b) There are differences between groups of participants in a study in terms of how likely they are to get better.
Sensitivity	How well a test detects the thing it is testing for. If a diagnostic test for a disease has high sensitivity, it is likely to pick up all cases of the disease in people who have it (that is, give a 'true positive' result). But if a test is too sensitive it will sometimes also give a positive result in people who don't have the disease (that is, give a 'false positive'). For example, if a test were developed to detect if a woman is 6 months pregnant, a very sensitive test would detect everyone who was 6 months pregnant, but would probably also include those who are 5 and 7 months

Term	Definition
	pregnant. If the same test were more specific (sometimes referred to as having higher specificity), it would detect only those who are 6 months pregnant, and someone who was 5 months pregnant would get a negative result (a 'true negative'). But it would probably also miss some people who were 6 months pregnant (that is, give a 'false negative'). Breast screening is a 'real-life' example. The number of women who are recalled for a second breast screening test is relatively high because the test is very sensitive. If it were made more specific, people who don't have the disease would be less likely to be called back for a second test but more women who have the disease would be missed.
Sensitivity analysis	A means of representing uncertainty in the results of economic evaluations. Uncertainty may arise from missing data, imprecise estimates or methodological controversy. Sensitivity analysis also allows for exploring the generalisability of results to other settings. The analysis is repeated using different assumptions to examine the effect on the results. One-way simple sensitivity analysis (univariate analysis): each parameter is varied individually in order to isolate the consequences of each parameter on the results of the study. Multi-way simple sensitivity analysis (scenario analysis): 2 or more parameters are varied at the same time and the overall effect on the results is evaluated. Threshold sensitivity analysis: the critical value of parameters above or below which the conclusions of the study will change are identified. Probabilistic sensitivity analysis: probability distributions are assigned to the uncertain parameters and are incorporated into evaluation models based on decision analytical techniques (for example, Monte Carlo simulation).
Specificity	The proportion of true negatives that are correctly identified as such. For example in diagnostic testing the specificity is the proportion of non-cases correctly diagnosed as non-cases. See related term 'Sensitivity'. In terms of literature searching a highly specific search is generally narrow and aimed at picking up the key papers in a field and avoiding a wide range of papers.
Stakeholder	An organisation with an interest in a topic that NICE is developing a clinical guideline or piece of public health guidance on. Organisations that register as stakeholders can comment on the draft scope and the draft guidance. Stakeholders may be: • manufacturers of drugs or equipment • national patient and carer organisations • NHS organisations • organisations representing healthcare professionals.
Systematic review	A review in which evidence from scientific studies has been identified, appraised and synthesised in a methodical way according to predetermined criteria. It may include a meta-analysis.
Time horizon	The time span over which costs and health outcomes are considered in a decision analysis or economic evaluation.
Transition probability	In a state transition model (Markov model), this is the probability of moving from one health state to another over a specific period of time.
Univariate	Analysis which separately explores each variable in a data set.

Term	Definition
Utility	In health economics, a 'utility' is the measure of the preference or value that an individual or society places upon a particular health state. It is generally a number between 0 (representing death) and 1 (perfect health). The most widely used measure of benefit in cost–utility analysis is the quality-adjusted life year, but other measures include disability-adjusted life years (DALYs) and healthy year equivalents (HYEs).

National Institute for Health and Care Excellence

Final version

Low back pain and sciatica in over 16s: assessment and management

Invasive treatments

NICE guideline NG59

Methods, evidence and recommendations

November 2016

Final, 2016

Developed by the National Guideline Centre,
Hosted by the Royal College of Physicians

Disclaimer
Healthcare professionals are expected to take NICE clinical guidelines fully into account when exercising their clinical judgement. However, the guidance does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of each patient, in consultation with the patient and, where appropriate, their guardian or carer.

ISBN
978-1-4731-2188-1

Contents

Acknowledgements, GDG membership, algorithm and methods

Further details on acknowledgements, GDG membership, algorithm and methods used to develop this guideline can be found in part 1 of the guideline, 'Low back pain and sciatica: assessment and non-invasive treatments'.

Full list of recommendations

The term 'low back pain' is used to include any non-specific low back pain which is not due to cancer, fracture, infection or an inflammatory disease process.

1. Consider using risk stratification (for example, the STarT Back risk assessment tool) at first point of contact with a healthcare professional for each new episode of low back pain with or without sciatica to inform shared decision-making about stratified management.
2. Based on risk stratification, consider:
    - simpler and less intensive support for people with low back pain with or without sciatica likely to improve quickly and have a good outcome (for example, reassurance, advice to keep active and guidance on self-management)
    - more complex and intensive support for people with low back pain with or without sciatica at higher risk of a poor outcome (for example, exercise programmes with or without manual therapy or using a psychological approach).
3. Do not routinely offer imaging in a non-specialist setting for people with low back pain with or without sciatica.
4. Explain to people with low back pain with or without sciatica that if they are being referred for specialist opinion, they may not need imaging.
5. Consider imaging in specialist settings of care (for example, a musculoskeletal interface clinic or hospital) for people with low back pain with or without sciatica only if the result is likely to change management.
6. Think about alternative diagnoses when examining or reviewing people with low back pain, particularly if they develop new or changed symptoms. Exclude specific causes of low back pain, for example, cancer, infection, trauma or inflammatory disease such as spondyloarthritis. If serious underlying pathology is suspected, refer to relevant NICE guidance on:
    - Metastatic spinal cord compression in adults
    - Spinal injury
    - Spondyloarthritis
    - Suspected cancer
7. Provide people with advice and information, tailored to their needs and capabilities, to help them self-manage their low back pain with or without sciatica, at all steps of the treatment pathway. Include:
    - information on the nature of low back pain and sciatica
    - encouragement to continue with normal activities.
8. Consider a group exercise programme (biomechanical, aerobic, mind–body or a combination of approaches) within the NHS for people with a specific episode or flare-up of low back pain with or without sciatica. Take people's specific needs, preferences and capabilities into account when choosing the type of exercise.

9. Do not offer belts or corsets for managing low back pain with or without sciatica.
10. Do not offer foot orthotics for managing low back pain with or without sciatica.
11. Do not offer rocker sole shoes for managing low back pain with or without sciatica.
12. Do not offer traction for managing low back pain with or without sciatica.
13. Consider manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage) for managing low back pain with or without sciatica, but only as part of a treatment package including exercise, with or without psychological therapy.
14. Do not offer acupuncture for managing low back pain with or without sciatica.
15. Do not offer ultrasound for managing low back pain with or without sciatica.
16. Do not offer percutaneous electrical nerve simulation (PENS) for managing low back pain with or without sciatica.
17. Do not offer transcutaneous electrical nerve simulation (TENS) for managing low back pain with or without sciatica.
18. Do not offer interferential therapy for managing low back pain with or without sciatica.
19. Consider psychological therapies using a cognitive behavioural approach for managing low back pain with or without sciatica but only as part of a treatment package including exercise, with or without manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage).
20. For recommendations on pharmacological management of sciatica, see NICE's guideline on neuropathic pain in adults.
21. Consider oral non-steroidal anti-inflammatory drugs (NSAIDs) for managing low back pain, taking into account potential differences in gastrointestinal, liver and cardio-renal toxicity, and the person's risk factors, including age.
22. When prescribing oral NSAIDs for low back pain, think about appropriate clinical assessment, ongoing monitoring of risk factors, and the use of gastroprotective treatment.
23. Prescribe oral NSAIDs for low back pain at the lowest effective dose for the shortest possible period of time.
24. Consider weak opioids (with or without paracetamol) for managing acute low back pain only if an NSAID is contraindicated, not tolerated or has been ineffective.
25. Do not offer paracetamol alone for managing low back pain.
26. Do not routinely offer opioids for managing acute low back pain (see recommendation 24).
27. Do not offer opioids for managing chronic low back pain.
28. Do not offer selective serotonin reuptake inhibitors, serotonin–norepinephrine reuptake inhibitors or tricyclic antidepressants for managing low back pain.

29. Do not offer anticonvulsants for managing low back pain.
30. Consider a combined physical and psychological programme, incorporating a cognitive behavioural approach (preferably in a group context that takes into account a person's specific needs and capabilities), for people with persistent low back pain or sciatica:
    - when they have significant psychosocial obstacles to recovery (for example, avoiding normal activities based on inappropriate beliefs about their condition) or
    - when previous treatments have not been effective.
31. Promote and facilitate return to work or normal activities of daily living for people with low back pain with or without sciatica.
32. Do not offer spinal injections for managing low back pain.
33. Consider referral for assessment for radiofrequency denervation for people with chronic low back pain when:
    - non-surgical treatment has not worked for them and
    - the main source of pain is thought to come from structures supplied by the medial branch nerve and
    - they have moderate or severe levels of localised back pain (rated as 5 or more on a visual analogue scale, or equivalent) at the time of referral.
34. Only perform radiofrequency denervation in people with chronic low back pain after a positive response to a diagnostic medial branch block.
35. Do not offer imaging for people with low back pain with specific facet join pain as a prerequisite for radiofrequency denervation.
36. Consider epidural injections of local anaesthetic and steroid in people with acute and severe sciatica.
37. Do not use epidural injections for neurogenic claudication in people who have central spinal canal stenosis.
38. Do not allow a person's BMI, smoking status or psychological distress to influence the decision to refer them for a surgical opinion for sciatica.
39. Do not offer disc replacement in people with low back pain.
40. Do not offer spinal fusion for people with low back pain unless as part of a randomised controlled trial.
41. Consider spinal decompression for people with sciatica when non-surgical treatment has not improved pain or function and their radiological findings are consistent with sciatic symptoms.

Key research recommendations

1. What is the clinical and cost-effectiveness of codeine with and without paracetamol for the acute management of low back pain?
2. What is the clinical and cost-effectiveness of benzodiazepines for the acute management of low back pain?

3. What is the clinical and cost effectiveness of image-guided compared with non-image-guided epidural injections for people with acute sciatica?

4. What is the clinical and cost effectiveness of radiofrequency denervation for chronic low back pain in the long term?

5. Should people with low back pain be offered spinal fusion as a surgical option?

22 Spinal injections

22.1 Introduction

There are many different types of spinal injections performed for low back pain. There are a variety of different techniques, and many are used in conjunction with other therapies, for example, fitness, stretching and exercise programmes. Many injections can be used. Usually the injected agents aim to sooth inflamed tissue or calm excessive nerve activity, but some (sclerosants) aim to induce inflammation and stimulate healthy new tissue growth. Whilst prolotherapy and trigger point injections are not spinal injections as such, these were considered as they can also be used for low back pain. This chapter excludes epidural injections and facet joint radiofrequency denervation, which are considered elsewhere.

Facet joint injections target the small joints linking the spinal vertebrae, known as the facet joints. Each vertebra has 2 connections below, one each side, and 2 above. Injections of local anaesthetic or steroid into selected joints are used to try to temporarily reduce or stop back pain. It is usually used in conjunction with an exercise programme. It is unlikely that the substances injected would remain for long.

Medial branch blocks are injections of local anaesthetic on to the medial branch nerves that supply the facet joints. It is usually done to define those who would respond to radiofrequency denervation of the positive tested levels.

Intradiscal therapy is aimed at treating internal disc disruption (IDD), which some therapists believe can be a cause of low back pain. Both steroids and non-steroidal anti-inflammatory drugs have been injected into the disc in an attempt to suppress inflammation and reduce pain.

Prolotherapy (also known as proliferation therapy or regenerative injection therapy) involves injecting tissue with an irritant solution. This may be a joint, ligament or tendon insertion, or injected into connective tissue or muscle.

Trigger Point Injections use various mixtures of local anaesthetics and a steroid, or botulinum toxin. A trigger point is argued to be a painful or irritable knot in a muscle. Injections are usually carried out in an outpatient setting, and repeated at intervals.

The GDG agreed that the main area of uncertainty that this review would address was the effectiveness of various agents, rather than the route or mode of administration.

22.2 Review question: What is the clinical and cost effectiveness of spinal injections in the management of non-specific low back pain?

For full details see review protocol in Appendix C.

Table 1: PICO characteristics of review question

Population	People aged 16 years or above with non-specific low back pain. • Populations with low back pain only and low back pain with or without sciatica will be pooled for analysis.
Interventions	**Agents (alone and in combination):** • Steroid • Local anaesthetic • Sclerosants (prolotherapy, phenol, hypertonic glucose, dextrose, glycerol)

	• Botulinum toxin • Hyaluronans **Strata:** • Image guided facet joint injections • Other image guided injections • Prolotherapy/sclerosants • Other non-image guided injections (for example, trigger point injections)
Comparison(s)	Interventional agents to be compared versus each other (across class comparisons) and versus other treatments below: • Sham (needle alone)/placebo/saline • Usual care • Other treatment (non-invasive and invasive treatments being considered by the guideline)

Outcomes	**Critical**
	• Health-related quality of life (for example, SF-12, SF-36 or EQ-5D).
	• Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).
	• Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index).
	• Psychological distress (HADS, GHQ, BPI, BDI, STAI)
	Important
	• Responder criteria (>30% improvement in pain or function)
	• Adverse events:
	  ○ morbidity
	  ○ mortality
	• Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)

Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found (for strata rather than agent), non-randomised studies will be included.

22.3 Clinical evidence

Thirty one studies were included in the review (several studies were published in multiple papers).[9,20,22,27,33,41,49,62,68,76,78,80,83,90,96,98,104,106-108,110,111,113,115,116,118,128,130,151,158,180]

The search was extended to cohort studies for all comparisons due to insufficient evidence and 2 studies were identified that met the inclusion criteria.[23,71]

A combined search for the epidurals injections for sciatica review and the spinal injections review identified four Cochrane reviews [31,162,163,174]. One of them[163] was not included as it included studies in people with neuropathic pain syndromes and not low back pain. The other reviews[31,162,174] were not included as the stratification of people with low back pain, low back pain with or without sciatica and sciatica was unclear. The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol. The included studies have been summarised in **Table 2**, **Table 3**, **Table 4** and **Table 5** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (**Table 7** to **Table 16**). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

22.3.1 Heterogeneity

For the comparison of steroid versus saline within the "other image guided injection" strata, there was substantial heterogeneity between the studies when they were meta-analysed for pain and function at both time points reported. Pre-specified subgroup analyses were performed on these outcomes (splitting the studies by different agents that were injected). The subgroup analysis explained the heterogeneity for pain and function, in both the short and long term. However, it could not be applied as people the injection agents were the same in both Cao 2011-1 and Cao 2011-1 populations. [20] These studies remained pooled together in the subgroup analyses as a result.

Table 2: Summary of studies included in the review: strata of image-guided facet joint injections

Study	Intervention and comparison	Population	Outcomes	Comments
Monotherapy				
Carette 1991[22]	Steroid (20 mg, 1 ml methylprednisolone mixed with 1 ml saline) Saline (2 ml)	n=97 Single injection with 6 months follow-up Canada	Pain (VAS) Function-Mean Sickness Impact Profile (MSIP)-less known scale (study downgraded)	Fluoroscopic guided. Injections in the lower 2 lumbar facet joints (L4-L5 and L5-SI). Initial testing of facet joint etiology, using prior image guided injections of local anaesthetic; if this reduced pain then a facet joint etiology was confirmed. These participants were then eligible for study if the pain returned within 2 weeks at a severity of at least 50% of their original pain. Letter sent to referring physician and explained to patients that concurrent treatment needed to be limited. At each visit, patients were given supply of acetaminophen and information on intake and other treatment was recorded.
Fuchs 2005[49]	Steroid (10 mg triamcinolone acetonide in 1 ml crystalline suspension) Hyaluronan (10 mg sodium hyaluronate in a 1 ml buffer)	n=60 Multiple injections at weekly intervals for 3 weeks with 6 months follow-up Germany	Pain (VAS) Function (ODI/RMDQ/ LBOS)	CT guided Intra-articular Injections given in the facet joints at the three levels in the lower lumbar spine(L5-S1, L5-L4 AND L4-L3). No concurrent treatment details reported.
Jackson 1992[62]	Anaesthetic (1% Lidocaine, 1 ml) Saline (1 ml)	n=25 Single injection with 1 year follow-up	Function (Mean Motion Pain Assessment (MPA)Score)-differences in	Fluoroscopic guided (facet joint arthrograms). Unilateral intra-articular injection of the L4-L5 and

Study	Intervention and comparison	Population	Outcomes	Comments
		USA	MPA scores termed as "pain relief", however scores reported for ten specific movements which rendered data un-usable	L5-SI facet joints corresponding to the side and site of pain. No concurrent treatment reported.
Combination therapy				
Lilius 1989[96] Lumbar Facet Joint Syndrome trial	Steroid + anaesthetic: into joints (6 ml/30 mg bupivacaine mixed with 2 ml/80 mg methylprednisolone – injection into the 2 facet joints) Steroid + anaesthetic: pericapsularly around joints (6 ml/30 mg bupivacaine mixed with 2 ml/80 mg methylprednisolone – injection to the 2 facet joints) Saline: into joints (8 ml into the 2 facet joints)	n=109 Single injection (in each of the 2 facet joints) with 3 month follow-up Finland	Pain (subjective pain scale, 0-100)results reported graphically so data un-usable)	Fluoroscopy guided. Pericapsular injections in the facet joints at L3/L4 and L4/L5 in 15 patients and L4/L5 and L5/SI in 94 patients. No concurrent treatment.
Mayer 2004[118]	Combined biomechanical exercise/injection- Steroid + anaesthetic) + (1ml 0.5% bupivacaine and 1ml of a depot corticosteroid preparation mixed with 1 ml 2% lidocaine) Biomechanical exercise only controls	n=70 Single injection with 24 months follow-up USA	Pain (VAS) Function (Million Visual Analog Scale (MVAS)) Responder criteria (pain relief >50%) Responder criteria (improvement in disability>50%)	Fluoroscopic guided. Intra-articular injections into 1 to 3 levels bilaterally. Prior to treatment facet blocks were given to confirm a facet joint etiology. Other invasive and non-invasive treatments: both groups received home exercise programme of stretches, taught at the pre-treatment assessment session and subsequently supervised by a physiotherapist at each successive visit. In between follow-up measures patients were also supervised twice a week and advised on exercises as part of the stretching programme. In the final week there were daily sessions.

Study	Intervention and comparison	Population	Outcomes	Comments
				No concurrent treatment reported.
Kawu 2011[71]	Steroid plus anaesthetic: into facet joints (0.5ml (20 mg) of Methylprednisolone acetate and 0.5ml of 0.25% Bupivacaine Biomechanical Exercise (McKenzie regimen)	n=18 unclear how many injections with a 6 month follow-up Nigeria	Pain (VAS) Function (ODI)	X-Ray guided. Facet joint infiltrated and levels to be injected were selected by tenderness elicited over the joint which correlated to MRI findings. No concurrent treatment reported.

Table 3: Summary of studies included in the review: strata of other image guided injections

Study	Intervention and comparison	Population	Outcomes	Comments
Monotherapy				
Cao 2011-1[20]	Steroid (betamethasone, 3 ml) Saline (3 ml)	n=60 Single injection with 6 months follow-up China	Pain (VAS) Function (ODI)	CT guided Intradiscal injections n=60 with type 1 Modic changes to endplates. 60 patients randomised to 3 subgroups, each with 20 patients each. One subgroup consisting of 20 patients not included in review as had non-protocol treatment (herbal remedy). No concurrent treatment reported.
Cao 2011-2[20]	Steroid (betamethasone, 3ml) Saline (3ml)	n=60 Single injection with 6 months follow-up China	Pain (VAS) Function (ODI)	CT guided. Intradiscal injections n=60 with type 2 Modic changes to endplates. 60 patients randomised to 3 subgroups, each with 20 patients each. One subgroup consisting of 20 patients not included in review as had non-protocol treatment (herbal remedy). No concurrent treatment reported.
Khot 2004[76]	Steroid (Methylprednisolone acetate 40 mg in 1 ml) Saline (1ml)	n=120 Single injection with 1 year follow-up UK	Function (ODI)	Fluoroscopic guided. Intradiscal injections. No concurrent treatment reported.
Simmons	Steroid(Methylpredni	n=25	Pain (VAS– graph	Fluoroscopic guided.

Study	Intervention and comparison	Population	Outcomes	Comments
1992[153]	solone(Depo-Medrol) Anaesthetic(1.5ml) (Bupivacaine 0.5%)	Unclear how many injections with a follow-up of 10-14 days US	results reported so data was unusable) Function(ODI– graph results reported so data was unusable)	Intradiscal injections. No concurrent treatment reported.
Yu 2012[180]	Discography +Steroid (5 mg of dexamethasone) Discography +Saline	n=45 Single injection with 24 months follow-up China	Pain (VAS 0-10) Function (ODI)	CT-guided. Interdiscal injections. All patients had discography prior to the injection treatment. No concurrent treatment reported.
Combination therapy				
Kader 2012[68]	Steroid + anaesthetic (methylprednisolone 80mg and bupivacaine 1-2 ml of 0.5%) Other mixed modality exercise (Back education and standard physiotherapy - pain talk, ergonomics advise, anatomy teaching and goal setting. Warm up on bike, pain relief via heat/ice, US, IFC or PSWD, McKenzie, Maitland or Mulligan exercise/manual therapy. Some retraining of transversus/multifidus without a gym ball and daily home exercise programme -20 minutes swimming or walking)	n=63 Single injection with 10 weeks follow-up UK	Pain (McGill) Function (ODI) QoL (EQ-5D)	Image-intensifier guided. Perifacet injections at L4/5 and L4/SI levels bilaterally. Type and frequency of analgesic intake was recorded and reported. Authors report that daily analgesic had been cut down/stopped at the end of the intervention in the majority of patients who had physiotherapy compared to perifacet injections.
Manchikanti 2007[101,113] (Manchikanti 2008[101,115], Manchikanti 2010[101,116])	Steroid + anaesthetic (betamethasone at 0.15 mg/ml mixed with bupivacaine) Anaesthetic (bupivacaine 0.25%)	n=30 Single injection with 12 months follow-up USA	Pain (NRS 0-10) Function (ODI) Responder criteria (pain relief >50%)	Fluoroscopy guided nerve blocks. Injected in the indicated medial branches at L1-L4 levels and L5 dorsal ramus Diagnostic blocks using 1% lidocaine. Patients with lidocaine-positive results

Study	Intervention and comparison	Population	Outcomes	Comments
				were further studied using 0.25% bupivacaine on a separate occasion, usually 3 to 4 weeks after the first injection. Concurrent treatment: opioid and non-opioid analgesics, adjuvant analgesics as prescribed prior to treatment. If significant improvements and there was no medical necessity for these drugs to be continued, medications were stopped or doses decreased. If required, doses were also increased. Patients also continued previously directed exercise programs.
Manchikanti 2008C[101,110] (Manchikanti 2011[101,111], Manchikanti 2012[101,104])	Steroid + anaesthetic (betamethasone 6 mg, or non-particulate betamethasone 6 mg, or methylprednisolone 40 mg mixed with lidocaine 0.5% 10 ml) Anaesthetic (lidocaine 0.5% 10 ml)	n=120 Single injection with 24 months follow-up USA	Pain (NRS 0-10) Function (ODI)	Fluoroscopy guided. Caudal epidural injections. All participants received facet joint nerve blocks with lidocaine (0.5 ml 1%); blockade of facet joint nerve was conducted with 0.25% bupivacaine. Repeat caudal epidural injections were performed when increased levels of pain were reported with deteriorating relief below 50%. Non-responsive participants treated with conservative management were followed without further epidural injections with medical management. Nearly all participants were undergoing conservative management before joining the study i.e. analgesic (opioid/non-opioid) or exercise, drug dosages were decreased/stopped if no longer needed and increased if needed. Exercise and job attendance was

Study	Intervention and comparison	Population	Outcomes	Comments
				continued.
Manchikanti 2010C[101,107] (Manchikanti 2012[101,106], Manchikanti 2013[101,108])	Steroid + anaesthetic (6mg non particulate betamethasone mixed with 5ml lidocaine) Anaesthetic (6ml lidocaine hydrochloride 0.5%)	n=120 Single injection with 24 months follow-up USA	Pain (NRS 0-10) Function (ODI) Adverse events (mortality)	Fluoroscopy guided. Interlaminar space injection. Preceded by diagnostic facet nerve block tests to exclude facet joint etiology. Concurrent treatment: continuation of previously directed structured exercise programs, employment, and medical therapy.
Carrasco 2003[23]	Botox (12.5 units in 1 ml volume at each of the 8 sites for a total of 100 units per patient) Steroid (2mg/ml-1.5 ml to each of the 4-6 sites) +anaesthetic (bupivacaine 0.5%)	n=51 multiple injections with unclear follow-up USA	Pain (VAS)- study reported change in pain scores from pre-treatment values narratively	EMG guided. Trigger-point injections. Patients were selected from a list of patients that had all received Botox treatment in the 3 month preceding data collection in this retrospective cohort study. No concurrent treatment reported.

Table 4: Summary of studies included in the review: strata of prolotherapy/sclerosants

Study	Intervention and comparison	Population	Outcomes	Comments
Monotherapy				
Kotilainen 1997[83]	Sclerosant (1 ml of 50% glycerol) Anaesthetic (2 ml of 0.5% Bupivacaine)	n=15 Single injection with 1 month follow-up Finland	Pain (VAS)	Fluoroscopy guided. Intradiscal injection into 1 disc interspace. No concurrent treatment.
Combination therapy:				
Dechow 1999[33]	Sclerosant + anaesthetic (solution of 5 ml of dextrose 25%, glycerine 25% and phenol 2.4% made up to 100 ml with sterile water combined with 5 ml of 1% Lignocaine) Anaesthetic (normal saline solution combined with 5 ml of 1% lignocaine)	n=74 3 injections once/week with 6 months follow-up UK	Pain (McGill) Function (ODI)	Non-image guided. All injections were made from a single insertion into the following sites: tip of the spinous process of L4 and L5, and associated supraspinous and interspinous ligaments, apophyseal joint capsules at L4-5 and L5-SI; attachment of

Study	Intervention and comparison	Population	Outcomes	Comments
				the iliolumbar ligaments at the transverse processes of the L5;attachment of the iliolumbar and dorsolumbar fascia to the iliac crest; and attachments of the long and short fibres of the posterior sacroiliac ligaments and the sacral and iliac attachments of the interosseous sacroiliac ligaments. Outcomes reported as general and not meta-analysed.
Klein 1993[79,80]	Sclerosant + anaesthetic (30mls total: dextrose,25%; glycerine, 25% and phenol 2.4% made up to 100% with pyrogen-free water. 15 ml of this solution was combined with 15 ml of 0.5% lidocaine) Anaesthetic (30 ml total: 15 ml of 0.5% lidocaine and 15 ml saline)	n=79 Multiple injections (1 every week for 6 weeks) with 6 months follow-up USA	Pain (VAS 0-8) Function (RMDQ)	Fluoroscopy guided Injection was directed at the following structures: apophyseal joint capsules and laminae at L4-5 and L5-S1, iliolumbar ligaments and dorsolumbar fascia, posterior sacroiliac and interosseous sacroiliac ligaments, L4-5 supraspinous and interspinous ligaments, and the interspinous ligaments and decussating tendons of the erector spinae L5-SI. Concurrent treatment: 6 patients were taking narcotics (codeine or Percodan) at entry into the study and 57% were using pain medications or muscle relaxants.
Ongley 1987[130]	Sclerosant + anaesthetic (Dextrose 25%, Glycerine 25%, phenol 2.5% and pyrogen-free water to 100%. Solution was diluted with an	n=82 Multiple injections with 6 months follow-up USA	Pain (VAS 0-7.5) Function (RMDQ)	Non-image guided Injection was directed at the following structures: apophyseal joint capsules and laminae at L4-5 and L5-S1, iliolumbar ligaments and

Study	Intervention and comparison	Population	Outcomes	Comments
	equal volume of 0.5% plain Lignocaine to make comparable to the placebo injection) and single forceful manipulation on first day of treatment Saline (0.9%) and less forceful manipulation (compared to intervention group) on first day of treatment.			dorsolumbar fascia, posterior sacroiliac and interosseous sacroiliac ligaments, L4-5 supraspinous and interspinous ligaments, and the interspinous ligaments and decussating tendons of the erector spinae L5-SI. Concurrent treatment: patients were advised to stop all treatments apart from paracetamol and avoid any other treatments during course of study.

Table 5: Summary of studies included in the review: strata of other non-image guided injections

Study	Intervention and comparison	Population	Outcomes	Comments
Monotherapy				
Foster 2001[41]	Botox (100U/ml in saline – 40units given at each site) Saline	n=31 Injection at each of the 5 lumbar sites at 8 weeks follow-up USA	Responder criteria (≥50% improvement in pain)	Non-image guided Injections were given at 5 lumbar (L1 to L5) or if pain involved the upper sacral region, lumbosacral (L2 to S1) sites; each site received 40 units (total 200 units). All patients were injected only once unilaterally on the side of the pain or pain predominance. Concomitant treatment: variety of analgesic and antispasmodic medications, including baclofen, NSAIDs, antidepressants, and muscle relaxants. No numbers reported.
Combination therapy				
Bourne	Steroid+ Anaesthetic -	n=57	Responder criteria	Non-image guided

Study	Intervention and comparison	Population	Outcomes	Comments
1984[9]	methylprednisolone 40mg/ml 0.25 ml water for injection 0.75 ml + 2% lignocaine hydrochloride solution 1.0 ml) Steroid + Anaesthetic - triamcinolone 10 mg/ml 1 ml + 2% lignocaine hydrochloride injection Anaesthetic (1% Lignocaine hydrochloride, 2ml)	Multiple injections at various average period of treatments(range :3.6-5.6) and a 2 week follow-up UK	(but definition does not meet protocol inclusion criteria)	No concurrent treatment reported. No baseline values reported.
Colhado 2013[27]	Steroid + anaesthetic (methylprednisolone acetate 80mg + 5ml levobupivacaine + 3 ml Saline) Steroid (80 mg methylprednisolone mixed with 8 ml saline)	n=60 2 epidural blocks per group with a 24 hours follow-up Brazil	Pain (VAS and NRS 0-100)	Non-image guided. Epidural injections. All patients underwent 2 epidural blocks separated by an interval of 15 days but were randomised according to agent given. Hence the study is shown to have four arms to reflect each group at the first and second epidural block. No concurrent treatment reported.
Sonne 1985[158]	Steroid + Anaesthetic (1 ml of Methylprednisolone mixed with 5 ml of 1% Lignocaine) Saline (5 ml of isotonic saline)	n=30 Max of three injections given at 1 week intervals 2 weeks follow-up Denmark	Pain (VAS – graph results reported so data was unusable) Responder criteria (definition not given so data was unusable)	Non-image guided Injected at the site of iliolumbar ligament. No concurrent treatment reported.
Serrao 1992[151]	Steroid + Sclerosant (80 mg of methylprednisolone suspended in 10 ml normal saline + 3 ml 5% dextrose) Anaesthetic + Sclerosant (10 ml of normal saline and 2 mg midazolam dissolved in 3 ml 5% dextrose)	n=28 Single injection with 2 months follow-up UK	Pain (VAS– graph results reported so data was unusable) Pain (McGill-– graph results reported so data was unusable) Psychological distress (HADS-narrative description that neither treatment	Steroid + sclerosant: steroid injected into lumbar epidural space and sclerosant injected into the lumbar intrathecal space. Anaesthetic + Sclerosant: saline injected into the lumbar epidural

Study	Intervention and comparison	Population	Outcomes	Comments
			improved the depression scores at 2 months when compared with pre-treatment values)	space; steroid + sclerosant mixture injected into the lumbar intrathecal space. Concurrent treatment: patients were instructed not to change their self-medication attitudes but to adjust to their doses according to their normal custom.

22.3.2 Data unsuitable for meta-analysis

Table 6: Other image guided injections: Botox versus saline

Study	Outcome	Intervention results	Risk of bias
Carrasco 2003[23]	Pain (Scale not specified), at >4 months - 1 year	Significant decrease in pain (no scale specified) with a mean reduction of 0.83 points from pre-treatment baseline. Conversely no significant difference in pain scores with anaesthetic/steroid injection (mean decrease of 0.50 points from baseline).	Very high
	Pain (Margolis Pain Scale), at >4 months - 1 year	There was no significant difference in either treatment group with the Margolis pain scale though Botox injections were slightly more effective than standard anaesthetic/steroids in reducing pain scale scores from the pre-treatment baseline (mean decrease of 0.58 ± 0.46 points with Botox compared with 0.48±0.74 points with steroids).	Very high
	Adverse events	Both therapies were safe and well tolerated although mild flu like symptoms lasting 3-4 days were noted.	Very high

22.3.3 Clinical evidence summary tables

22.3.3.1 Image-guided facet joint injections

Table 7: Evidence Summary table: Steroid versus saline

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Saline	Risk difference with Image-guided FJI: Steroid (95% CI)
Pain Severity (VAS, 0-10) ≤ 4 months	96 (1 study)	LOW[a] due to risk of bias		The mean pain severity(VAS,0-10) ≤ 4 months in the control groups was 4.7	The mean pain severity(VAS,0-10) ≤ 4 months in the intervention groups was 0.2 lower (1.14 lower to 0.74 higher)
Pain Severity (VAS,0-10) >4 months	95	VERY LOW [a,b]		The mean pain severity(VAS,0-10) >4	The mean pain severity(VAS,0-10) >4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Saline	Risk difference with Image-guided FJI: Steroid (95% CI)
	(1 study) >4 months	due to risk of bias, imprecision		months in the control groups was 5.0	months in the intervention groups was 1 lower (1.94 to 0.06 lower)
Function (MSIP, 0-100) ≤ 4 months	96 (1 study) ≤4 months	LOW[1] due to risk of bias		The mean function(msip) ≤ 4 months in the control groups was 9.8	The mean function(msip) ≤ 4 months in the intervention groups was 0.5 lower (2.72 lower to 1.72 higher)
Function (MSIP, 0-100) >4 months	95 (1 study) >4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function(msip) >4 months in the control groups was 10.8	The mean function(msip) >4 months in the intervention groups was 3 lower (6.16 lower to 0.16 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 8: Evidence Summary table: Steroid versus hyaluronans

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Hyaluronans	Risk difference with Image-guided FJI: Steroid (95% CI)
Pain Severity (VAS, 0-10) ≤ 4 months	59 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS, 0-10) ≤ 4 months in the control groups was 3.01	The mean pain severity(VAS, 0-10) ≤ 4 months in the intervention groups was 1.07 higher (0.18 lower to 2.32 higher)
Pain Severity (VAS, 0-10) >4 months	59 (1 study) >4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS, 0-10) >4 months in the control groups was 3.34	The mean pain severity(VAS, 0-10) >4 months in the intervention groups was 0.46 higher (0.73 lower to 1.65 higher)
Function (ODI, 0-	59	LOW[a]		The mean function (ODI) ≤ 4 month in	The mean function (ODI) ≤ 4 month) in the

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Hyaluronans	Risk difference with Image-guided FJI: Steroid (95% CI)
100) ≤4 month	(1 study) ≤4 months	due to risk of bias		the control groups was 6.15	intervention groups was 0.95 higher (1.41 lower to 3.31 higher)
Function (ODI, 0-100) >4 months	59 (1 study) >4 months - 1 year	LOW[a] due to risk of bias		The mean function (ODI)>4 months in the control groups was 6.50	The mean function (ODI)>4 months in the intervention groups was 0.20 lower (2.37 lower to 1.97 higher)
Function (RMDQ, 0-24) ≤ 4months	59 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean function (RMDQ) ≤ 4 months in the control groups was 7.2	The mean function (RMDQ) ≤ 4 months in the intervention groups was 1.20 higher (1.48 lower to 3.88 higher)
Function (RMDQ, 0-24) >4 months	59 (1 study)	LOW[a] due to risk of bias		The mean function(RMDQ) >4 months in the control groups was 8.32	The mean function (RMDQ) >4 months in the intervention groups was 1.22 lower (3.83 lower to 1.39 higher)
Function (LBOS, 0-75) ≤4 months	59 (1 study) ≤4 months	VERY LOW[a.b] due to risk of bias, imprecision		The mean function(LBOS) ≤4 months in the control groups was 31.3	The mean function(LBOS) ≤4 months in the intervention groups was 0.4 higher (30.53 lower to 31.33 higher)
Function (LBOS, 0-10) >4 months	59 (1 study)	VERY LOW[a.b] due to risk of bias, imprecision		The mean function(LBOS) >4 months in the control groups was 30.9	The mean function(LBOS) >4 month in the intervention groups was 1.9 lower (32.39 lower to 28.59 higher)

a Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
b Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 9: Evidence Summary table: Steroid plus biomechanical exercise versus biomechanical exercise

Outcomes	No of	Quality of	Relativ	Anticipated absolute effects

	Participants (studies) Follow up	the evidence (GRADE)	e effect (95% CI)	Risk with Biomechanical Exercise	Risk difference with Image-guided FJI: steroid+ biomechanical exercise (95% CI)
Pain severity (VAS,0-10) ≤ 4 months	70 (1 study) 6 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(VAS,0-10) ≤ 4 months in the control groups was 5.9	The mean pain severity(VAS,0-10) ≤ 4 months in the intervention groups was 0.5 lower (1.38 lower to 0.38 higher)
Function (MVAS,0-150) ≤ 4 months	70 (1 study) 6 weeks	VERY LOW[a.b] due to risk of bias, imprecision		The mean function(mvas,0-150) ≤ 4 months in the control groups was 92.2	The mean function(mvas,0-150) ≤ 4 months in the intervention groups was 6.6 lower (17.58 lower to 4.38 higher)
Positive Responders (Pain VAS>50%) ≤4 months	70 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.06 (0.67 to 1.67)	Moderate	
				500 per 1000	30 more per 1000 (from 165 fewer to 335 more)
Positive Responders (Disability MVAS>50%) ≤4 months	70 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.07 (0.78 to 1.45)	Moderate	
				677 per 1000	47 more per 1000 (from 149 fewer to 305 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID

Table 10: Evidence Summary table: Steroid plus anaesthetic versus biomechanical exercise (cohort)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Biomechanical Exercise	Risk difference with Image guided FJI: cohort: Steroid plus anaesthetic (95% CI)
Pain Severity (VAS,0-10) ≤4 months	18 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(VAS,0-10) ≤4 months in the control groups was 5.5	The mean pain severity(VAS,0-10) ≤4 months in the intervention groups was 1.2 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Biomechanical Exercise	Risk difference with Image guided FJI: cohort: Steroid plus anaesthetic (95% CI)
					(2.55 lower to 0.15 higher)
Pain Severity (VAS,0-10) >4 months	18 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(VAS,0-10) >4 months - 1 year in the control groups was 5.0	The mean pain severity(VAS,0-10) >4 months in the intervention groups was 1 lower (2.45 lower to 0.45 higher)
Function(ODI, 0-100) ≤4 months	18 (1 study) ≤4 months	VERY LOW[a] due to risk of bias		The mean function(ODI,0-100) ≤4 months in the control groups was 46.2	The mean function(ODI,0-100) ≤4 months in the intervention groups was 5.6 lower (11.63 lower to 0.43 higher)
Function(ODI, 0-100) >4 months	18 (1 study) >4 months - 1 year	VERY LOW[a] due to risk of bias		The mean function(ODI,0-100) >4 months in the control groups was 46.2	The mean function(ODI,0-100) >4 months in the intervention groups was 6.1 lower (14.47 lower to 2.27 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID

22.3.3.2 Other image-guided injections

Table 11: Evidence Summary table: Steroid versus saline

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Saline	Risk difference with Other Image-guided Injections: Steroid (95% CI)
Pain Severity (VAS,0-10) ≤4 months	125 (3 studies)	LOW[á] due to risk of bias		The mean pain severity(VAS,0-10) ≤4 months in the control groups was 6.81	The mean pain severity(VAS,0-10) ≤4 months in the intervention groups was 4.19 lower (4.55 to 3.82 lower)

Pain Severity (VAS,0-10) ≤4 months - Injection agent: Betamethasone	80 (2 studies)	VERY LOW[a,c] due to risk of bias, inconsistency		The mean pain severity(VAS,0-10) ≤4 months - injection agent: betamethasone in the control groups was 6.9	The mean pain severity(VAS,0-10) ≤4 months - injection agent: betamethasone in the intervention groups was 5.2 lower (5.66 to 4.74 lower)
Pain Severity (VAS,0-10) ≤4 months - Injection agent: Dexamethasone	45 (1 study)	LOW[a] due to risk of bias		The mean pain severity(VAS,0-10) ≤4 months - injection agent: dexamethasone in the control groups was 6.72	The mean pain severity(VAS,0-10) ≤4 months - injection agent: dexamethasone in the intervention groups was 2.44 lower (3.04 to 1.84 lower)
Pain Severity (VAS,0-10) >4 months	125 (3 studies)	LOW[a] due to risk of bias		The mean pain severity(VAS,0-10) >4 months in the control groups was 6.81	The mean pain severity(VAS,0-10) >4 months in the intervention groups was 3.38 lower (3.76 to 3.01 lower)
Pain Severity (VAS,0-10) >4 months - Injection agent: Betamethasone	80 (2 studies)	VERY LOW[a, c] due to risk of bias, inconsistency		The mean pain severity(VAS,0-10) >4 months - injection agent: betamethasone in the control groups was 6.95	The mean pain severity(VAS,0-10) >4 months - injection agent: betamethasone in the intervention groups was 4.76 lower (5.2 to 4.31 lower)
Pain Severity (VAS,0-10) >4 months - Injection agent: Dexamethasone	45 (1 study)	LOW[a] due to risk of bias		The mean pain severity(VAS,0-10) >4 months - injection agent: dexamethasone in the control groups was 6.67	The mean pain severity(VAS,0-10) >4 months - injection agent: dexamethasone in the intervention groups was 0.28 lower (0.95 lower to 0.39 higher)
Function (ODI, 0-100) ≤4 months	125 (3 studies)	LOW[a] due to risk of bias		The mean function(ODI), 0-100 ≤4 months in the control groups was 42.18	The mean function(ODI), 0-100 ≤4 months in the intervention groups was 21.4 lower (24.09 to 18.71 lower)

Function (ODI, 0-100) ≤4 months - Injection agent: Betamethasone	80 (2 studies)	VERY LOW[a,c] due to risk of bias, inconsistency		The mean function(ODI), 0-100 ≤4 months - injection agent: betamethasone in the control groups was 37.65	The mean function(ODI), 0-100 ≤4 months - injection agent: betamethasone in the intervention groups was 27.95 lower (31.72 to 24.19 lower)
Function(ODI, 0-100) ≤4 months - Injection agent: Dexamethasone	45 (1 study)	LOW[a] due to risk of bias		The mean function(ODI), 0-100 ≤4 months - injection agent: dexamethasone in the control groups was 46.7	The mean function(ODI), 0-100 ≤4 months - injection agent: dexamethasone in the intervention groups was 14.6 lower (18.44 to 10.76 lower)
Function(ODI, 0-100) >4 months	223 (4 studies)	VERY LOW[a.b] due to risk of bias, imprecision		The mean function(ODI,0-100) >4 months in the control groups was 46.63	The mean function(ODI,0-100) >4 months in the intervention groups was 12.02 lower (14.79 to 9.24 lower)
Function(ODI, 0-100) >4 months - Injection agent: Betamethasone	80 (2 studies)	VERY LOW[a,b] due to risk of bias, inconsistency		The mean function(ODI,0-100) >4 months - injection agent: betamethasone in the control groups was 39.1	The mean function(ODI,0-100) >4 months - injection agent: betamethasone in the intervention groups was 24.06 lower (28.13 to 20 lower)
Function(ODI, 0-100) >4 months - Injection agent: Methyprednisolone acetate	98 (1 study)	LOW[a] due to risk of bias		The mean function(ODI,0-100) >4 months - injection agent: methyprednisolone acetate in the control groups was 49.8	The mean function(ODI,0-100) >4 months - injection agent: methyprednisolone acetate in the intervention groups was 1.1 lower (7.11 lower to 4.91 higher)
Function(ODI, 0-100) >4 months - Injection agent: Dexamethasone	45 (1 study)	LOW[a] due to risk of bias		The mean function(ODI,0-100) >4 months - injection agent: dexamethasone in the control groups was 51.0	The mean function(ODI,0-100) >4 months - injection agent: dexamethasone in the intervention groups was 1.8 lower (6.7 lower to 3.1 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 or 2 increments because of Heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis

[c] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID

Table 12: Evidence Summary table: Steroid plus anaesthetic versus anaesthetic

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with Other image-guided injections: Steroid+ Anaesthetic (95% CI)
Pain Severity(NRS,0-10)≤ 4 months	270 (3 studies) <4 months	MODERATE[a] due to risk of bias		The mean pain severity(NRS,0-10)≤ 4 months in the control groups was 3.7	The mean pain severity(NRS,0-10)≤ 4 months in the intervention groups was 0.19 lower (0.49 lower to 0.1 higher)
Pain Severity(NRS,0-10) >4 months	248 (3 studies) >4 months	LOW[a,c] due to risk of bias		The mean pain severity(NRS,0-10) >4 months in the control groups was 3.8	The mean pain severity(NRS,0-10) >4 months in the intervention groups was 0.24 lower (0.59 lower to 0.12 higher)
Function(ODI,0-100) ≤ 4 months	270 (3 studies) <4 months	MODERATE[a] due to risk of bias		The mean function(odi,0-100) ≤ 4 months in the control groups was 14.9	The mean function(odi,0-100) ≤ 4 months in the intervention groups was 0.41 lower (1.67 lower to 0.85 higher)
Function (ODI,0-100) >4 months	248 (3 studies) >4 months	MODERATE[a] due to risk of bias		The mean function (odi,0-100) >4 months in the control groups was 14.9	The mean function (odi,0-100) >4 months in the intervention groups was 0.00 higher (1.4 lower to 1.4 higher)
Pain improvement(>50%) ≤ 4 months	150 (2 studies) <4 months	MODERATE[a] due to risk of bias	RR 0.95 (0.84 to 1.09)	Moderate	
				850 per 1000	43 fewer per 1000 (from 136 fewer to 77 more)
Pain improvement(>50%) >4 months	150 (2 studies) >4 months	LOW[a,b] due to risk of bias, inconsistency	RR 0.97 (0.81 to 1.16)	Moderate	
				758 per 1000	23 fewer per 1000 (from 144 fewer to 121 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with	Risk difference with Other image-guided injections: Steroid+ Anaesthetic (95% CI)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 or 2 increments because heterogeneity, I2=50%, p=0.04, unexplained by subgroup analysis.

C Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID

Table 13: Evidence Summary table: Steroid plus anaesthetic versus mixed modality exercise

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with mixed modality exercise	Risk difference with Image-guided FJI: Steroid + anaesthetic (95% CI)
Quality of life (EQ5D, 0-1)	36 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean QoL(EQ5D) in the control groups was 0.32	The mean QoL(EQ5D) in the intervention groups was 0.02 lower (0.55 lower to 0.51 higher)
Pain Severity (McGill, 0-78) ≤4 months	36 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean pain severity(McGill) ≤ 4 months in the control groups was 23	The mean pain severity(McGill) ≤ 4 months in the intervention groups was 7.6 lower (16.22 lower to 1.02 higher)
Function (ODI, 0-100) ≤4 month	36 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean function(ODI) ≤ 4 month in the control groups was 23.9	The mean function(ODI) ≤ 4 month in the intervention groups was 3.5 higher (5.23 lower to 12.23 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID

22.3.3.3 Prolotherapy injections

Table 14: Evidence Summary table: Sclerosant versus anaesthetic

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Anaesthetic	Risk difference with Prolotherapy Injections: Sclerosant (95% CI)
Pain Severity (VAS,0-10)≤ 4 months	11 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(VAS,0-10)≤ 4 months in the control groups was 5.0	The mean pain severity(VAS,0-10)≤ 4 months in the intervention groups was 0.10 lower (8.06 lower to 7.86 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID

Table 15: Evidence Summary table: Sclerosant plus anaesthetic versus saline

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Saline	Risk difference with Prolotherapy Injections: Sclerosant + anaesthetic (95% CI)
Pain Severity (VAS,0-7.5) ≤4 months	81 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity(VAS,0-7.5)≤ 4 months in the control groups was 2.93	The mean pain severity(VAS,0-7.5)≤ 4 months in the intervention groups was 1.16 lower (1.81 to 0.51 lower)
Pain Severity (VAS,0-7.5)>4 months	81 (1 study) >4 months	LOW[a.,b] due to risk of bias, imprecision		The mean pain severity(VAS,0-7.5)>4 months in the control groups was 3.08	The mean pain severity(VAS,0-7.5)>4 months in the intervention groups was 1.58 lower (2.26 to 0.9 lower)
Function (RMDQ,0-33)≤ 4 months	81 (1 study) ≤4 months	MODERATE[b] due to imprecision		The mean function(RMDQ)≤ 4 months in the control groups was 8.49	The mean function(RMDQ)≤ 4 months in the intervention groups was 3.79 lower (6.28 to 1.3 lower)
Function (RMDQ, 0-33)>4	81	MODERATE[b]		The mean function (RMDQ)>4 months	The mean function (RMDQ)>4 months in the

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Saline	Risk difference with Prolotherapy Injections: Sclerosant + anaesthetic (95% CI)
months	(1 study) >4 months	due to imprecision		in the control groups was 8.29	intervention groups was 4.86 lower (7.44 to 2.28 lower)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 16: Evidence Summary table: Sclerosant plus anaesthetic versus anaesthetic

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Anaesthetic	Risk difference with Prolotherapy Injections: Sclerosant + anaesthetic (95% CI)
Pain Severity (VAS,0-8) >4 months	79 (1 study) >4 months	MODERATE[a] due to imprecision		The mean pain severity(VAS,0-8)>4 months in the control groups was 2.85	The mean pain severity(VAS,0-8)>4 months in the intervention groups was 0.56 lower (1.34 lower to 0.22 higher)
Function (RMDQ, 0-24) >4 months	79 (1 study) >4 months	MODERATE[a] due to imprecision		The mean function(RMDQ)>4 months in the control groups was 4.38	The mean function(RMDQ)>4 months in the intervention groups was 0.34 lower (2.05 lower to 1.37 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

22.3.3.4 Other non-image guided injections

Table 17: Evidence Summary table: Botox versus saline

Outcomes	No of Participants (studies)	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Saline	Risk difference with Other Non-Image guided Injections: Botox (95% CI)

	Follow-up				
Responder criteria (VAS>50%) ≤4 months	30 (1 study) ≤4 months	MODERATE[a] due to imprecision	RR 4.50 (1.16 to 17.44)	Moderate	
				133 per 1000	465 more per 1000 (from 21 more to 1000 more)

[a] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 18: Evidence Summary table: Steroid+ anaesthetic versus steroid

Outcomes	No of Participants (studies) Follow-up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Steroid	Risk difference with Other Non-Image guided Injections: Steroid + anaesthetic (95% CI)
Pain Severity (First Block NRS,0-10) ≤4 month	60 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(first block NRS,0-10) ≤4 month in the control groups was 2.6	The mean pain severity(first block NRS,0-10) ≤4 month in the intervention groups was 0.44 higher (0.72 lower to 1.6 higher)
Pain Severity (Second Block NRS,0-10) ≤4 month	60 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(second block NRS,0-10) ≤4 month in the control groups was 2.057	The mean pain severity(second block NRS,0-10) ≤4 month in the intervention groups was 0.44 higher (0.77 lower to 1.66 higher)
Pain Severity (First Block VAS,0-10) ≤4 month	60 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(first block VAS,0-10) ≤4 month in the control groups was 2.79	The mean pain severity(first block VAS,0-10) ≤4 month in the intervention groups was 0.57 higher (0.61 lower to 1.75 higher)
Pain Severity (Second Block VAS,0-10) ≤4 month	60 (1 study) ≤4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(second block VAS,0-10) ≤4 month in the control groups was 2.13	The mean pain severity(second block VAS,0-10) ≤4 month in the intervention groups was 0.25 higher (0.94 lower to 1.44 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high

risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

22.4 Economic evidence

Published literature

No relevant economic evaluations were identified.

See also the economic article selection flow chart in Appendix F.

Unit costs

The unit cost for image-guided injections would be based either on intermediate or major pain procedures: £521 (HRG code: AB05Z) and £714 (HRG code: AB04Z), respectively (NHS reference costs 2013-2014).[36]

22.5 Evidence statements

22.5.1 Clinical

22.5.1.1 Image guided facet joint injections

In people with low back pain there was clinical benefit for steroid injections compared with saline demonstrated in evidence from 1 study for both pain and function greater than 4 months (very low quality, n=95), but no clinically important difference at equal to or less than 4 months.

Clinical benefit for steroid compared to hyaluronans was seen in pain in the short term (very low quality; 1 study; n=59) with no clinically important difference between treatments in any other outcome reported at either short or long term.

There was no clinically important difference seen when a steroid injection was given in combination with biomechanical exercise compared to biomechanical exercise. Clinical benefit was seen however in pain at short and long term, but not in function, when injections of steroid and anaesthetic plus biomechanical exercise were compared to biomechanical exercise in a nonrandomised study (very low quality; n=18).

22.5.1.2 Other image-guided injections

Evidence from 3 studies showed a clinical benefit in terms of improving pain and function in the group receiving a steroid injection (bethametasone or dexamethasone) versus saline in the short term (low quality, range of n = 45-80). Evidence from 2 studies also showed clinical benefit of steroid injections (betamethasone) for pain and function in the long term (very low quality; n=80), but this was not observed when dexamethasone (low quality; n=45), or methylprednisolone acetate in the case of function (low quality; n=98), was used as injectate.

Evidence from 3 studies showed that there was no clinically important difference between treatments for all outcomes reported when steroid plus anaesthetic was injected compared to anaesthetic injection alone irrespective of route of administration being caudal epidural, medial branch blocks or interlaminar injections(moderate quality, n=270). Evidence from 1 study comparing steroid plus anaesthetic versus mixed modality exercise reported no benefit of injection for quality of life, pain or function in the short term (low quality; n=36).

22.5.1.3 Prolotherapy injections

There was no clinically important difference between treatments for outcomes reported when a sclerosant was injected compared to anaesthetic (1 study; very low quality; n=11) or an injection of sclerosant in combination with an anaesthetic was compared to anaesthetic (1 study; moderate quality; n=79). However, evidence from a single study demonstrated a clinical benefit favouring the injection of sclerosant plus anaesthetic compared to saline for pain and function in both the short and long term (low to moderate quality; n=81).

22.5.1.4 Other non-image-guided injections

Evidence from 1 study for the comparison of botulinum toxin versus saline showed clinical benefit of botulinum toxin for responder criteria in pain (moderate quality; n=30). Evidence from 1 study for the comparison of steroid in combination with anaesthetic versus steroid alone demonstrated no clinically important difference between the treatments for pain (first or second block) at either short or long term (very low quality; n=60).

22.5.2 Economic

- No relevant economic evaluations were identified.

22.6 Recommendations and link to evidence

Recommendations	32.Do not offer spinal injections for managing low back pain.
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (>30% improvement in pain or function), adverse events, and healthcare utilisation were also considered as important. Evidence was reported for all of outcomes except for psychological distress and healthcare utilisation. For image guided facet joint injections, evidence was only available for pain, function and responder criteria. There was no evidence for any of the other outcomes. For other image guided injections, evidence was only available for pain, function, quality of life (EQ-5D) and for responder criteria. Evidence for prolotherapy injections was only available for pain and function and for other non-image guided injections, evidence was found for pain and responder criteria only. The majority of outcomes described in other non-image guided stratum were in a format that rendered the data un-suitable for meta-analysis.
Trade-off between clinical benefits and harms	**Image guided facet joint injections** **Steroid versus saline** A clinical benefit in pain (VAS) was observed in the long term (greater than 4 months - 1 year) although no clinically important difference was seen short term (less than 4 months). A similar effect was also seen for function (MSIP), however, it was noted that the baseline values were very low and therefore it was unlikely that much improvement could be demonstrated from this baseline. The GDG noted that the lack of short term effect with some evidence of a long term effect raised some doubt on the long term effect being solely due to the injection. The authors of the study stated that there was no pharmacological/biological reason for the observed effect and were uncertain about the validity of the results. The GDG noted that image guided facet joint injections of steroid are widely used but there is a paucity of evidence to support their ongoing use. It was noted that there was no evidence of clinical harm from the studies reviewed.

Steroid versus hyaluronans

Very low quality evidence demonstrated that steroids were more effective at improving pain (assessed by VAS) than hyalurons in the short term although no clinically important difference between treatments was seen long term. It was noted that use of hyalurons may cause inflammation and therefore an increase in pain, although both groups did improve from their baseline pain levels. Three different measures of function were reported (ODI, RMDQ and Low Back Pain Outcome Score (LBOS)); all of which showed no clinically important difference between treatments.

Steroid plus biomechanical exercise versus biomechanical exercise

No clinically important difference in pain, function or responder criteria was observed at the short term follow ups. As there was uncertainty around the effects reported from this single trial, the GDG considered that no clear conclusion could be made about the benefits of steroid injections compared to biomechanical exercise from this very low quality evidence.

Steroid plus anaesthetic versus biomechanical exercise

Very low quality non randomised evidence for this comparison came from a very small trial and demonstrated a clinical benefit in pain (VAS) in both the short and long term although no clinically important difference was observed for function (assessed by ODI) at any time point.

Other image guided injections

Steroid versus saline

An overall clinical benefit in pain (assessed by VAS) and function (assessed by ODI) favouring the use of steroid injected intra-discally was seen in the short term and long term. Subgroup analysis by injection agent to address heterogeneity revealed no clinically important difference in pain in the long term from low quality evidence at high risk of bias taken from 1 small trial. The results for function in the long term were more heterogeneous; subgroup analysis by injection agent showed benefit favouring steroid was only maintained in the long term in results taken from 1 trial. This very low quality evidence at high risk of bias reported inconsistent results separately for 2 distinct populations with or without modic changes. There was concern raised by the GDG that the inpatient population set in a hospital in China was not reflective of current UK practise and did not have confidence in the effects reported as a result.

The potential risk of harm for intra-discal injections was also highlighted including risk of infection and risk of prolapse (although this risk is not captured by RCTs). Given the applicability issue and risk of potential harm, the GDG concluded that the evidence in this area was inadequate to base a recommendation on.

Steroid in combination with anesthetic versus anesthetic

Moderate quality evidence from 3 studies showed no clinically important difference in pain (assessed by VAS), function (assessed by ODI) and responder criteria for pain improvement exceeding 50% in either the short or long term irrespective of the route of administration of the injection.

Steroid in combination with anesthetic versus combined treatment

One study included assessed the effects of steroid plus anaesthetic versus a combination package of self-management (back education and home exercise), biomechanical exercise (McKenzie and stability), manual therapy (manipulation/mobilisation, Maitland and Mulligan), electrotherapy (ultrasound) and heat/ice. There was no clinical benefit seen in terms of any of the outcomes reported in this study. The GDG noted that the study was a very small trial and that the baseline scores for all outcomes were different between groups and both groups were in the 'normal' range at baseline, and therefore it would be unlikely to observe a meaningful change over the course of the trial. It was however also highlighted

that the comparator arm consisted of a 10 week intensive rehabilitation programme -is a very active intervention. The GDG discussed that the lack of a difference observed between arms could be indicative of positive evidence for both injections of steroid and anaesthetic as well as the combination of education and physiotherapy. However, the limitations of the single small study precluded firm conclusions being drawn.

Prolotherapy Injections

Sclerosant versus anaesthetic

The only evidence identified for this comparison was from a very small trial that reported only 1 outcome relevant to the review protocol (pain assessed by VAS). This showed no difference between treatments in the short term with considerable uncertainty in the direction of the effect.

Sclerosant plus anaesthetic versus saline

Evidence from 1 study indicated that injection of sclerosant and anaesthetic was more effective than saline in improving pain (assessed by VAS) and function (assessed by RMDQ) in both the short and long term. The GDG expressed caution with the interpretation of these results as people in the intervention group received a forceful manipulation, concurrent to the injection on the first day of treatment, whereas those in the saline group received non-forceful manipulation. The GDG were unable to be certain that the clinical benefit in pain and function was directly attributable to the spinal injections.

Sclerosant plus anaesthetic versus anaesthetic

No clinically important difference was seen between treatments in terms of pain (assessed by VAS) and function (assessed by RMDQ) in the long term. No data was presented for short term results.

Other non-image guided injections

Botulinum toxin versus saline

A clinical benefit in responder criteria for pain improvement exceeding 50% was seen in favour of botulinum toxin in the short-term. However, as this was from a single small trial (15 patients in each arm) and was not in a critical outcome measure, the GDG felt that this was insufficient evidence to make a recommendation.

Steroid plus anaesthetic versus steroid

Evidence from 1 study demonstrated no short-term clinically important difference between treatments in terms of pain (NRS) between injections of steroid and anaesthetic or steroid alone. The evidence was from a study which stratified participants according to how many diagnostic blocks they had received, however the outcome was the same for each strata. The GDG expressed concern with the interpretation of the study as the description provided suggested the population may be people with sciatica although the study specifically stated it was for treatment of low back pain. In addition, the study only looked at the immediate short term effect of the diagnostic blocks up till a maximum of 24 hours which the GDG did not feel was very useful information.

It was noted that in the studies included in this review, no data were available on adverse events. The GDG noted that they are aware of studies/clinical reports (that did not meet inclusion criteria for this review) reporting serious adverse effects of spinal injections although these were relatively rare.

Summary

Overall the GDG agreed that there was no consistent good quality evidence to recommend the use of spinal injections for the management of low back pain. There was minimal evidence of benefit from injections, and reason to believe that there was a risk of harm, even if rare. The GDG consequently agreed that it was appropriate to recommend against the use of spinal injections for people with low

	back pain.
Trade-off between net clinical effects and costs	No economic evaluations were identified from the published literature. Use of injections for low back pain will be associated with costs relating to the drugs, consumables and equipment (e.g. imaging) used and the personnel time required to deliver the therapy. Intervention costs will also depend on the number of injections given. If effective, upfront intervention costs may be offset by downstream cost savings due to reduced healthcare utilisation or may be justified due to the benefits to the patient. However, given the GDG's conclusions that there was a lack of evidence of clinical benefit for injections (for any of the agents or modalities reviewed), intervention costs were not considered justified.
Quality of evidence	**Image guided facet joint injections** Low to very low quality evidence for this stratum came from 4 studies of which 2 reported data graphically and the third was a small trial comparing steroid and hyaluronan. The weight of evidence rested on 1 main RCT, in which Mean Sickness Impact Profile (MSIP) was used to assess improvement in function. However, the GDG were unclear as to what magnitude of change could be considered meaningful and therefore were unable to place much significance on this outcome. **Other image guided injections** The evidence for this stratum was rated as low or very low quality, mainly due to risk of bias (and sometimes due to additional imprecision). The majority of evidence for the comparison steroid versus saline came from a reasonably sized trial which reported outcomes separately for 2 very distinct populations with or without modic changes. The results reported were often inconsistent and there was concern that the study population wouldn't be entirely representative of the guideline population, however the GDG agreed that the same response would be expected in either case. There was concern that the results reported in this study had not been reproducible in other similar studies and whilst they may be clinically important, there was considerable doubt regarding their validity. The applicability of this study to a UK setting was also questioned as this study population were all in-patients. The GDG did not consider the study Manchikanti 2007 to be suitable for inclusion in the image guided facet joint strata despite the study classifying the injections as facet joint injections. This was because the agents were administered to the medial branches at L1-L4 levels and L5 dorsal ramus which the GDG did not feel qualified as a facet joint injection. The study was therefore included in the 'other image guided injections' strata. The small study population received numerous injections during the study period which further compromised the quality of the outcomes reported; the GDG did not feel they could make accurate judgement of clinical importance for these reasons. **Prolotherapy injections** The majority of evidence in this stratum was of low quality as there was serious imprecision attached to all the effects reported. One trial reported the inclusion of forceful manipulation in the treatment arm which the GDG considered to be a risk of bias affecting interpretation of the evidence. They did not feel they could make accurate judgement of clinical importance from this evidence as the manipulation could have compromised the clinical benefit shown for the combination treatment for both the outcomes pain and function in the short and long term periods. **Other non-image guided injections** Overall low quality evidence for this stratum reported came from 2 studies. One of these trials had a very small sample size which made judging clinical importance for the outcome responder criteria pain (VAS) exceeding 50% improvement difficult for the GDG. There was also considerable polarity of opinion in the GDG regarding the second trial. One concern was that the study might include sciatica patients as some included patients had nerve compression and also reported 2 diagnostic blocks for

	each group with short follow up of 6, 12 and 24 hours. The GDG felt that this trial was largely irrelevant and did not have much confidence in the outcomes reported.
Other considerations	The GDG noted that many sclerosants were not licensed as injection agents for the treatment of low back pain in the UK but were licensed for other indications, however they did not agree that there was evidence to recommend these injections for low back pain. The GDG were aware of existing NICE interventional procedure guidance for Therapeutic endoscopic division of epidural adhesions (IPG333) recommending special arrangements for clinical governance, consent, audit and research.[124] This procedure was therefore excluded from this review and if its use is considered for people with low back pain, existing guidance should be followed.

23 Radiofrequency denervation for facet joint pain

23.1 Introduction

Some people who are given a diagnosis of low back pain may have pain arising from 1 or more spinal structures where nociceptive/pain innervation has been established, for example, muscles, joints, ligaments and discs. There are no reliable clinical or radiological features to discriminate between these potential sources of low back pain. The evidence to support the idea of back pain arising from discrete structures comes from studies using precisely targeted local anaesthetic blockade.[147]

The lumbar facet joints are pairs of joints that stabilize and guide motion in the spine. These joints are well innervated by the medial branches of the dorsal rami. The prevalence of facet joint pain in heterogeneous populations using local anaesthetic nerve blockade (medial branch block), where 75–100% pain relief is used as a criterion standard, is thought to be 25–40%.[101,102]

In current clinical practice, people with low back pain may be offered local anaesthetic facet joint nerve blockade to determine the presence or absence of a facet joint pain component. Those who experience significant but short term relief may then be offered a neurodestructive procedure called 'radiofrequency denervation' in an attempt to achieve longer term pain relief.

Radiofrequency denervation has evolved as a treatment for spinal pain over the last 40 years and is a minimally invasive and percutaneous procedure performed under local anaesthesia or light intravenous sedation. Radiofrequency energy is delivered along an insulated needle in contact with the target nerves. This focussed electrical energy heats and denatures the nerve. This process may allow axons to regenerate with time requiring the repetition of the radiofrequency procedure.

Radiofrequency denervation is not an appropriate treatment of people who have sciatica without back pain.

23.2 Review question: What is the clinical and cost effectiveness of radiofrequency denervation for facet joint pain in the management of non-specific low back pain?

For full details see review protocol in Appendix C.

Table 19: PICO characteristics of review question

Population	People aged 16 years or above with non-specific low back pain. • Populations with low back pain only and low back pain with/without sciatica will be pooled for analysis. NOTE: low back pain with sciatica is excluded
Interventions	• Radiofrequency denervation of facet joint medial branch NOTE: pulsed radiofrequency is excluded
Comparisons	• Placebo/sham • Usual care/waiting list • Other treatment within guideline scope
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry

	disability index) • Psychological distress (HADS, GHQ, BPI, BDI, STAI) **Important** • Responder criteria (> 30% improvement in pain or function) • Adverse events: ○ morbidity • Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

23.3 Clinical evidence

Eight RCTs were included in the review; these are summarised in **Table 20** below. [3,24,50,87,123,165,172,173] Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below. All the studies compared radiofrequency denervation with a placebo/sham procedure, except for 1 which used medial nerve block as the comparison intervention.[24] All studies (except Civelek et al. 2012) randomised patients who had responded favourably to either an initial diagnostic nerve block,[50,123,165,172] or an intra-articular (IA) joint injection.[87,173] See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Two Cochrane reviews were identified but could not be included. One review included studies in people with neck as well as back pain.[127] The other review included people with low back pain other than facet joint pain.[99] The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol. One study was included but could not be analysed as no relevant outcomes were reported.[3]

Table 20: Summary of studies included in the review

Study	Intervention	Comparison	Population	Outcomes	Comments
Civelek 2012[24]	Radiofrequency denervation 80°C lesion for 120 seconds	Medial branch nerve block Medial branch block with methylprednisolone and bupivacaine	Low back pain without sciatica n=100 Immediate + 1, 6 and 12 months follow-up Turkey	Quality of life (EQ-5D) Pain severity (VNS)	No diagnostic nerve block given prior to randomisation Anaesthetic: lidocaine 1% in injection group only. None given to RF group. Responders (1 week after the procedure) were then placed in a spine rehabilitation programme for 4-6 weeks to maximise the functional gains. Partial or non-responders were offered surgery or physical therapy. Does not specify if this was done for 1 or both arms of the

Study	Intervention	Comparison	Population	Outcomes	Comments
					study.
Gallagher 1994[50]	Radiofrequency denervation 80°C lesion for 90 seconds	Placebo/sham	Low back pain with/without sciatica n=30 Immediate + 1 month and 6 months follow-up UK	Pain severity (VAS and McGill)	True diagnostic nerve block given; responders were randomised Anaesthetic: lignocaine 2% (0.5 ml).
Leclaire 2001[87]	Radiofrequency denervation 80°C lesion for 90 seconds 2 neurotomies performed for each nerve (1 at proximal portion, and 1 at distal of the articular facet nerve).	Placebo/sham	Low back pain with/without sciatica n=70 Immediate + 12 weeks follow-up Canada	Pain severity (VAS) Function (RMDQ and ODI)	Not true diagnostic nerve block given (IA joint injection); responders were randomised Anaesthetic: lidocaine 1% (2 ml).
Nath 2008[123]	Radiofrequency denervation 85°C lesion for 60 seconds Multiple lesions made (6 lesions in total, lateral and medial to the first 2 lesions).	Placebo/sham	Low back pain with/without sciatica n=70 Immediate + 6 months follow-up Sweden	Pain severity (VAS) Healthcare utilisation (analgesic consumption)	True diagnostic nerve block given; responders were randomised Had 2 diagnostic blocks: 1. Screening block (patients with at least 80% relief went to have second block); 2. Second block (patients with at least 80% relief and able to participate in the trial were randomised. Anaesthetic bupivacaine 0.5% (2 ml).
Tekin 2007[165]	Radiofrequency denervation (conventional) 80°C lesion for 90 seconds Lesions made at the levels	Placebo/sham	Low back pain without sciatica n=60 (N=40 in the 2 relevant arms to this review) Immediate + post-operation + 6 months and	Pain severity (VAS) Function (ODI) Healthcare utilisation (analgesic use) Adverse events (complications)	True diagnostic nerve block given; responders were randomised Anaesthetic prilocaine 2% (0.5 ml) or 0.5% bupivacaine (0.5 ml) given to sham

Study	Intervention	Comparison	Population	Outcomes	Comments
	concerned		1 year follow-up Turkey		group. NOTE: the trial has 3 arms. The pulsed RF arm does not meet our review inclusion criteria and so results from this arm have not been included.
Van Kleef 1999[172]	Radiofrequency denervation 80°C lesion for 60 seconds Lesion made on 1 or both sides	Placebo/sham	Low back pain with/without sciatica n=31 Immediate + 8 weeks follow-up Netherlands	Pain severity (VAS) Function (ODI) Healthcare utilisation (analgesic use) Responder criteria (≥50% pain reduction)	True diagnostic nerve block given; responders were randomised Anaesthetic lignocaine 1% (1 ml).
Van Wijk 2005[173]	Radiofrequency denervation 80°C lesion for 60 seconds Lesion made on 1 or both sides	Placebo/sham	Low back pain with/without sciatica n=81 Immediate + 3 months and 1 year follow-up Netherlands	Pain severity (VAS) Quality of life (SF-36) Healthcare utilisation (analgesic use) Responder criteria (back pain reduction >50%) Adverse events	Not true diagnostic nerve block given (IA joint injection); responders were randomised Anaesthetic mepivacaine 2% (0.5 ml)

23.3.1 Radiofrequency denervation versus placebo/sham – data unsuitable for meta-analysis

Table 21: Radiofrequency denervation versus placebo/sham for lower back pain

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Van wijk 2005[173]	Back pain (VAS 0-10), change from baseline at ≤4 months	MD: -2.1	40	MD: -1.6	41	Very high
Van wijk 2005[173]	HC utilisation: mean analgesic intake over past 2 weeks (change from baseline) at ≤4 months	MD: -0.1	40	MD: -0.2	41	Very high
Tekin 2007[165]	HC utilisation: analgesic use, % patients at >4 months	40%	20	95%	20	Very high

23.3.2 Clinical evidence summary

Table 22: Radiofrequency denervation compared with placebo/sham for low back pain

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo/sham	Risk difference with RF denervation (95% CI)
Pain (VAS) 0-10 ≤ 4 months	96 (4 studies)	MODERATE[a] due to risk of bias		*	The mean pain (VAS) 0-10 - <4 months in the intervention groups was 1.46 lower (2.06 to 0.86 lower)
Pain (VAS) 0-10 - >4 months	160 (3 studies)	LOW[a] due to risk of bias		*	The mean pain (VAS) 0-10 - >4 months in the intervention groups was 1.57 lower (2.2 to 0.95 lower)
Pain (McGill) ≤ 4 months	30 (1 study)	LOW[a,b] due to risk of		*	The mean pain (McGill) - <4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo/sham	Risk difference with RF denervation (95% CI)
		bias, imprecision			7 lower (14.11 lower to 0.11 higher)
Pain (McGill) >4 months	30 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean pain (McGill) - >4 months in the intervention groups was 5 lower (20.43 lower to 10.43 higher)
Function ODI 0-100 (change and final values) ≤ 4 months	66 (3 studies)	LOW[a,b] due to risk of bias, imprecision		*	The mean function ODI 0-100 (change and final values) - <4 months in the intervention groups was 4.38 lower (7.31 to 1.45 lower)
Function ODI 0-100 (change and final values) >4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean function ODI 0-100 (change and final values) - >4 months in the intervention groups was 5.6 lower (9.59 to 1.61 lower)
Function RMDQ 0-100 (change and final values≤ 4 months	70 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean function RMDQ 0-100 (change and final values) - <4 months in the intervention groups was 2.6 higher (6.21 lower to 11.41 higher)
Quality of life (SF-36) - General health ≤ 4 months	81 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (sf-36) - general health - <4 months in the control groups was -1.3	The mean quality of life (sf-36) - general health - <4 months in the intervention groups was 3.1 higher (3.72 lower to 9.92 higher)
Quality of life (SF-36) - Mental health ≤ 4 months Scale from: 0 to 100.	81 (1 study)	LOW[a,b] due to risk of bias,		The mean quality of life (sf-36) - mental health - <4 months in the control groups	The mean quality of life (sf-36) - mental health - <4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo/sham	Risk difference with RF denervation (95% CI)
		imprecision		was 0.7	2 higher (9.07 lower to 13.07 higher)
Quality of life (SF-36) - Pain ≤ 4 months Scale from: 0 to 100.	81 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) - pain - <4 months in the control groups was 11.6	The mean quality of life (sf-36) - pain - <4 months in the intervention groups was 0.2 higher (9.29 lower to 9.69 higher)
Quality of life (SF-36) - Physical functioning ≤ 4 months Scale from: 0 to 100.	81 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) - physical functioning - <4 months in the control groups was 7.8	The mean quality of life (sf-36) - physical functioning - <4 months in the intervention groups was 3.1 lower (11.09 lower to 4.89 higher)
Quality of life (SF-36) - Social functioning ≤ 4 months Scale from: 0 to 100.	81 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) - social functioning - <4 months in the control groups was 2.6	The mean quality of life (sf-36) - social functioning - <4 months in the intervention groups was 2.7 higher (11.7 lower to 17.1 higher)
Quality of life (SF-36) - Vitality ≤ 4 months Scale from: 0 to 100.	81 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) - vitality - <4 months in the control groups was -2.4	The mean quality of life (sf-36) - vitality - <4 months in the intervention groups was 7.7 higher (0.64 to 14.76 higher)
AEs: treatment related pain (moderate or severe) - no. of patients ≤ 4 months	78 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.64 (1 to 2.69)	Moderate	
				359 per 1000	230 more per 1000 (from 0 more to 607 more)
AEs: change of sensibility (irritating or evident dysaesthesia or allodynia) - no. of patients ≤ 4 months	79 (1 study)	VERY LOW[a,b] due to risk of bias,	RR 5.13 (0.25 to 103.45)	Moderate	
				†	†

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo/sham	Risk difference with RF denervation (95% CI)
		imprecision			
AEs: loss of motor function (irritating or evident motor loss) - no. of patients ≤ 4 months	79 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.36 (0.02 to 8.55)	Moderate	
				24 per 1000	15 fewer per 1000 (from 24 fewer to 181 more)
HC utilisation: analgesic use (no. of tablets/4 days) ≤ 4 months	31 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean hc utilisation: analgesic use (no. of tablets/4 days) - <4 months in the intervention groups was 3.24 lower (6.6 lower to 0.12 higher)
HC utilisation: analgesic use (global perception of improvement, 0-6) - >4 months	40 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean hc utilisation: analgesic use (global perception of improvement, 0-6) - >4 months in the intervention groups was 0.8 lower (1.56 to 0.04 lower)
Responder criteria (percentage of patients with >50% pain reduction - global perceived effect) ≤ 4 months	31 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	OR 9.53 (1.05 to 86.28)	Moderate	
				†	†
Responder criteria (number of patients with >50% back pain or pain reduction - global perceived effect) ≤ 4 months	111 (2 studies)	MODERATE[b] due to imprecision	RR 1.74 (1.15 to 2.63)	Moderate	
				390 per 1000	289 more per 1000 (from 58 more to 636 more)
Responder criteria (number of patients with >50% back pain or pain reduction - global perceived effect) ≤ 4 months	31 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 3.73 (0.92 to 15.21)	Moderate	
				390 per 1000	341 more per 1000 (from 10 fewer to 1000 more)
Responder criteria (number of patients with >50%	81	LOW[b]	RR 0.95	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with placebo/sham	Risk difference with RF denervation (95% CI)
back pain reduction - VAS) ≤ 4 months	(1 study)	due to imprecision	(0.51 to 1.76)	341 per 1000	17 fewer per 1000 (from 167 fewer to 260 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

* Control rate not reported in study only mean difference given

†Not estimable. No events in control group.

Table 23: Radiofrequency denervation compared with medial branch block for low back pain

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with medial branch block	Risk difference with RF denervation (95% CI)
Pain (VNS) 0-10 - <4 months	100 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean pain (VNS) 0-10 - <4 months in the intervention groups was 1.2 lower (1.79 to 0.61 lower)
Pain (VNS) 0-10 - >4 months	100 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		*	The mean pain (VNS) 0-10 - >4 months in the intervention groups was 2.3 lower (3.42 to 1.18 lower)
Quality of life (EQ-5D) 5-15 scale - <4 months	100 (1 study)	VERY LOW[a,b,c] due to risk of bias, indirectness, imprecision		*	The mean quality of life (eq-5d) 5-15 scale - <4 months in the intervention groups was 0.4 lower (0.97 lower to 0.17 higher)
Quality of life (EQ-5D) 5-15 scale - >4 months	100 (1 study)	VERY LOW[a,b,c] due to risk of bias,		*	The mean quality of life (eq-5d) 5-15 scale - >4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with medial branch block	Risk difference with RF denervation (95% CI)
		indirectness, imprecision			1.3 lower (2.87 lower to 0.27 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

[c] Downgraded by 1 or 2 increments because of Heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

* Control rate not reported in study only mean difference given

23.4 Economic evidence

Published literature

One economic evaluation was identified that included radiofrequency denervation as comparator and has been included in this review. [173] This is summarised in the economic evidence profile below (Table 24) and the economic evidence table in Appendix I.

See also the economic article selection flow chart in Appendix F

Table 24: Economic evidence profile: radiofrequency denervation – placebo/sham comparison only

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Van Wijk 2005[173] (Netherlands)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• With-RCT analysis (same paper) • Cost-consequence analysis (various health outcomes) • Population: Low back pain population (with/without sciatica) (> 6 months with focal tenderness over the facet joints) • Two comparators in full analysis: 1. Sham lesion 2. Radiofrequency lesion Follow-up: 3 months [(c)]	2-1: £186 [(d)]	See clinical review van Wijk 2005 (SF-36, VAS-back, global perceived effect on back pain, analgesic intake).	n/a	No relevant analyses available.

(a) Dutch resource use data (1996-1999) and unit costs (year not reported, assumed to be 2003) may not reflect current NHS context. QALYs were not used as the health outcome measure (SF-36 reported, however QALYs were not calculated).

(b) A longer time horizon may be preferable if effects may persist beyond 3 months. Within-trial analysis and so does not reflect full body of available evidence for this comparison; van Wijk 2005 is 1 of 7 studies included in the clinical review for radiofrequency denervation versus placebo sham. No sensitivity analyses undertaken. Source of unit costs unclear.

(c) 1 year data was supposed to be reported by the study, however at this time-point most patients were unblinded and there was loss-to follow-up.

(d) Cost components incorporated: Intervention costs (including staff time, materials, overheads, administration, accommodation and day care facilities), additional medical consumption over 3 month follow-up (medical, paramedical, and pharmaceutical treatment). Intervention costs were the same for both interventions. Study reported the cost of sham lesion to be equal to radiofrequency denervation. Including the cost of a sham was deemed inappropriate and was excluded here

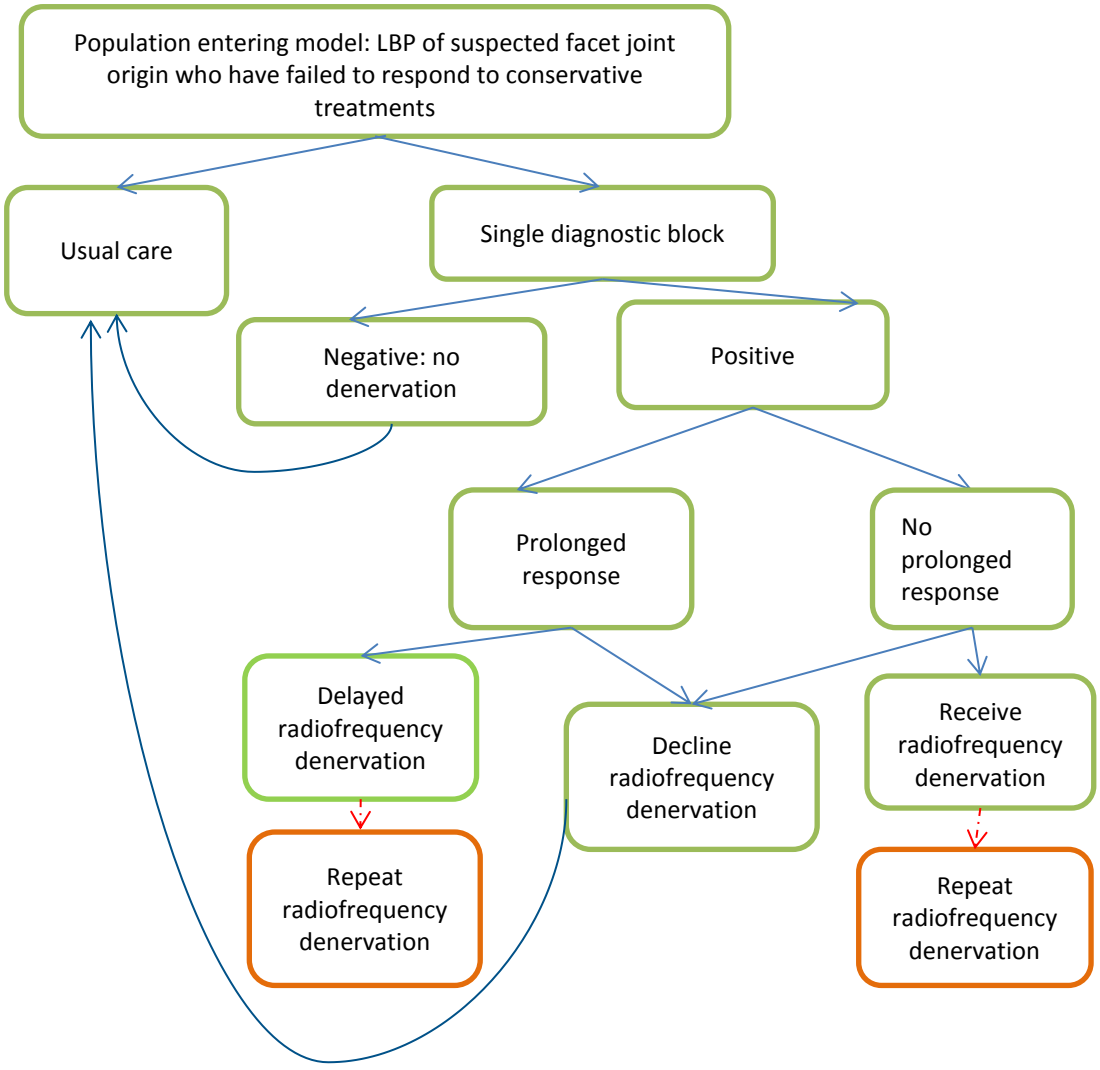
New cost-effectiveness analysis

An original economic analysis was prioritised and conducted for this question. A summary is reported below, while the full description is reported in Appendix N.

Model overview/Methods

The model compares radiofrequency denervation to usual care, defined as active management in primary care. The overall structure of the model is shown in the figure below:

Figure 1: Pathway in the model



The model begins at the point of referral for people with low back pain, suspected to be originating from facet joint pain, where non-invasive management has been unsuccessful. In the radiofrequency denervation arm the person is given an initial diagnostic block to see if they are likely to respond to radiofrequency denervation. Those who have a negative response to this injection do not receive radiofrequency denervation, and directly receive usual care. A positive response can be temporary or

prolonged. Those who do not have a prolonged positive response receive radiofrequency denervation immediately unless they decline the treatment, in which case they receive usual care. If the diagnostic block has a prolonged effect there is a delay in radiofrequency denervation treatment, or again the patient could decline radiofrequency denervation and after this delayed period move to usual care. Sensitivity analysis included repeat radiofrequency denervation procedures.

A time horizon of 28 months was implemented to reflect the duration of the treatment effect for both the diagnostic block and 1 radiofrequency denervation procedure. This is extended to 52 months in the sensitivity analysis to include the possibility of a second radiofrequency denervation procedure. A UK NHS/PSS perspective was taken.

A Markov model with a 1 month cycle was developed to account for natural mortality and additional radiofrequency denervation procedures and was evaluated by cohort simulation. Both costs and outcomes were discounted at 3.5% (and 1.5% for the sensitivity analysis), consistent with the NICE reference case.

The clinical review data for this question provided a cohort population to be analysed that were 35% male, with a mean pain score greater than 4. The entry age into the model was 52 years old.

Key data and assumptions

Probability data:

The probability of a positive response to the diagnostic block was based on a study included in the clinical review.[123] Due to a lack of data, all other probability data in the model were based on GDG opinion. Threshold sensitivity analysis was undertaken to account for this.

Table 25 - Base case probability inputs

Input	Point estimate	Source
Probability of a positive diagnostic block	69%	Nath 2008[123]
Probability of declining radiofrequency denervation after a positive block	10%	GDG opinion
Probability of a prolonged response to diagnostic block	15%	GDG opinion
Proportion of patients repeating radiofrequency denervation after the effect of the first radiofrequency denervation wears off	10%	GDG opinion

Effectiveness data:

Change in pain score measured on the VAS was the intermediate outcome obtained from the systematic review of clinical evidence conducted for the guideline. In this review radiofrequency denervation was compared to sham and the change in pain score was estimated for both at follow up. However in the economic model radiofrequency denervation was compared to usual care, therefore the placebo effect which could be influencing the outcome in the sham arm of the RCTs should be removed from the effectiveness of the usual care arm. To do this, the pain score in the usual care intervention was assumed to be the same as the weighted pain score at baseline in the radiofrequency denervation arm of the RCTs included in the meta-analysis, as patients in the usual care arm do not receive any intervention, while the pain score after patients receive radiofrequency denervation was the same as that observed at follow-up in the radiofrequency denervation arm of the same RCTs (weighted average).

Using the baseline pain score in the usual care intervention would overestimate the effectiveness of radiofrequency denervation as in reality some patients would also have some spontaneous improvement in pain score over time. For this reason, the base case assumption was varied in a

sensitivity analysis where the effectiveness from the sham arm of the RCTs at follow up was used to estimate the effectiveness of usual care and the incremental change with the radiofrequency denervation arm was used to estimate the intervention effectiveness.

There is also the possibility of false positive results from the diagnostic block. However this is taken into account in the mean reduction of pain score in the radiofrequency denervation arm, which would be greater if false positives were minimised.

The model also included an assumption that there is no improvement from the baseline pain score observed in the radiofrequency denervation arm of the included RCTs to account for the fact that the economic model radiofrequency denervation is compared to usual care while in the clinical review the comparator was sham.

Lastly, there was no evidence on the duration of the effectiveness of radiofrequency denervation and was therefore decided by GDG opinion.

Utilities:

No direct data was available to estimate quality of life. Therefore, HRQoL values were determined by using a mapping study by Mueller et al. (2013)[120] to translate the pain scores from the data available from the clinical review conducted for this guideline question into EQ-5D scores using a US tariff. For further detail see Appendix N.

An assumption was made that the pain score and subsequent utility value associated with a prolonged response to diagnostic block is equal to the score/utility of radiofrequency denervation.

Table 26 - Effectiveness data used in the base case model

	Usual care	Prolonged diagnostic block	Radiofrequency denervation
Pain score	5.7	3.6	3.6
Associated EQ-5D	0.5992	0.6846	0.6846
Duration of pain relief (months)	NA	4	24

Cost data:

All costs included in the model were 2013/14 NHS reference costs, as shown in the table below. An assumption was made that patients receiving usual care will not incur additional costs compared to patients who received radiofrequency denervation or prolonged response diagnostic block. This is a very conservative assumption and was therefore varied in sensitivity analysis.

Table 27 - Base case cost inputs

Input	Cost	Source
Initial outpatient appointment	£168	Based on a Consultant-led outpatient appointment, First Non-Admitted Face to Face Attendance, Service: Pain management (NHS reference costs 2013/2014)
Diagnostic block	£521	Based on HRG code: AB05Z Intermediate Pain Procedures (NHS reference costs 2013/2014)
Follow-up appointment (telephone/face-to-face)	£121	Based on non-Consultant-led outpatient appointment, Follow-up Non-Admitted Non-Face to Face Attendance, Service: Pain management / Consultant-led outpatient appointment, Follow-up Non-Admitted Face to Face Attendance, Service: Pain management (NHS reference costs 2013/2014)

Input	Cost	Source
Radiofrequency denervation	£640	Based on HRG code: AB08Z - Pain Radiofrequency Treatments (NHS reference costs 2013/2014)

Sensitivity analysis:

Both probabilistic and deterministic sensitivity analysis were undertaken to account for model uncertainty. For more information on the distribution used for each parameter in the probabilistic sensitivity analysis see Appendix N.

[Deterministic] sensitivity analysis undertaken:

- A repeat denervation after the first wears off
- Pain score using sham data from meta-analysis
- Pain score excluding Leclaire 2001
- A positive diagnostic block assumed to be less effective than radiofrequency denervation
- Using the cost of referral to an interface clinic (around 80% of consultant)
- Threshold analysis on the probability of positive diagnostic block
- Two-way sensitivity analysis where the duration of effects for both radiofrequency denervation and block were decreased to 0 and 4 months respectively.
- Threshold analysis for the proportion of people declining radiofrequency denervation
- Threshold analysis for the proportion of people repeating radiofrequency denervation within SA1
- After the effect of the first radiofrequency denervation wears off patients receive another and the duration of effect of radiofrequency denervation is varied in a threshold analysis.
- Costs and effects discounted at 1.5%.

Results

The model was run 10,000 times using different parameter values chosen from the distribution assigned to each of the parameters to account for the uncertainty in the model. The table below shows that in this base-case analysis radiofrequency denervation is cost effective.

Table 28 - Base case results (probabilistic analysis)

Strategy	Mean cost per patient (£)	Incremental costs (£)	Mean QALYs per patient	Incremental QALYs	ICER (£ per QALY gained)	Probability that strategy is most cost-effective [£20k per QALY]
Usual care	0		2.1402	0	0	30%
radiofrequency denervation	1282	1282	2.2549	0.1147	11,178	70%

Radiofrequency denervation remains cost-effective at a threshold of £20,000 per QALY in all sensitivity analyses, except if the duration of radiofrequency denervation is less than 16 months, if the probability of declining radiofrequency denervation is greater than 50% and if the probability of a positive diagnostic block is less than 40%.

Limitations and interpretation

The model was built around some important assumptions such as the duration of pain relief after a prolonged response to diagnostic block and radiofrequency denervation.

There were also some deviations from the NICE reference case, such as the use of mapping functions to estimate EQ5D values from an intermediate outcome and the use of the USA EQ5D tariffs. The uncertainty around the EQ5D scores could not be captured in the probabilistic model as the software did not allow us to link probabilistic value of the pain score to a distribution around the relevant utility value.

Another important limitation of the model is the quality of the clinical evidence around the effectiveness of radiofrequency denervation; these studies were low to moderate quality and their limitations are explained in section 23.3. As there was no data on radiofrequency denervation versus usual care and there was the assumption that people in the usual care arm would maintain the initial pain score, in reality there could be an improvement over time. This was however addressed in a sensitivity analysis where data from the placebo arm were used instead.

The GDG considered the various limitations of the model together with the main results and concluded that although radiofrequency denervation is a cost effective intervention in the base case analysis and in various sensitivity analyses, there is not enough confidence to make a firm recommendation for this intervention. In addition, as the low back pain population is wide, there are concerns on the potential cost impact of a firm recommendation if many people were eligible for the intervention.

Unit costs

The breakdown of the cost for radiofrequency denervation in a person who responds positively to a diagnostic block and then receives radiofrequency denervation is detailed below and in **Table 29**.

For radiofrequency denervation, the process from referral would usually be:

1. Initial outpatient appointment, usually with a pain medicine consultant.
2. Diagnostic block - based on HRG code: AB05Z Intermediate Pain Procedures.
3. Radiofrequency denervation dependent on diagnostic block – based on HRG code: AB08Z Pain Radiofrequency Treatments.
4. Follow up appointment, usually a telephone consultations with a nurse specialist.

Table 29: Radiofrequency denervation: unit costs

Component	Unit cost	Source/notes
Cost if diagnostic block is positive and radiofrequency denervation undertaken		
Initial outpatient appointment	£168	Based on a Consultant-led outpatient appointment, First Non-Admitted Face to Face Attendance, Service: Pain management (NHS reference costs 2013/2014)[34,35]
Diagnostic block	£521	Based on HRG code: AB05Z Intermediate Pain Procedures (NHS reference costs 2013/2014)[34,35]
Radiofrequency denervation	£640	Based on HRG code: AB08Z Pain Radiofrequency Treatments (NHS reference costs 2013/2014)[34,35]
Follow-up appointment	£121	Based on non-Consultant-led outpatient appointment, Follow-up Non-Admitted Non-Face to Face Attendance, Service: Pain management (NHS reference costs 2013/2014)[34,35]
Total cost per patient	**£1,450**	

23.5 Evidence statements

23.5.1 Clinical

23.5.1.1 Radiofrequency denervation compared with placebo/sham for low back pain

Evidence from 4 studies demonstrated clinical benefit in pain for radiofrequency denervation compared to placebo/sham at both the short and long term follow-ups of less than and greater than 4 months (low to moderate quality, n=160). In contrast there was no difference in function between treatments at any time point. Conflicting evidence from 1 study for quality of life at less than 4 months follow up showed clinical benefit for radiofrequency denervation compared to placebo/sham for the SF-36 domains of general health and vitality. Radiofrequency denervation was inferior to sham for the domains of mental health, pain and social function. There was no difference between treatments for the domain physical function (low quality, n=81). Evidence from a single study reporting adverse events at less than 4 months follow up demonstrated an increase in adverse effects for radiofrequency denervation in terms of the number of patients with moderate or severe treatment related pain(low quality, n=79). There was no difference in other adverse events (change of sensibility and loss of motor function) at short term follow up when radiofrequency denervation was compared to placebo/sham in the same study (very low quality). Additionally when compared with placebo/sham, benefit for radiofrequency denervation in responders to pain reduction measured by global perceived effect was demonstrated by 2 studies at both the less than and greater than 4 months follow up time points although this was not seen for pain reduction measured by VAS at less than 4 months reported by a single study (low quality, n=111).

23.5.1.2 Radiofrequency denervation versus medial branch block

Evidence from a single study demonstrated clinical benefit in terms of pain for radiofrequency denervation compared to medial branch blocks at both the short and long term follow-ups of less than and greater than 4 months (very low quality, n=100).

23.5.2 Economic

One cost-consequence analysis found that radiofrequency denervation was more costly and more effective (£186 more per patient, SF-36 general health and vitality and global perception of reduction in back pain and pain responder criteria) compared to sham for treating low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.

One original economic model found that radiofrequency denervation was cost effective compared to usual care for treating low back pain suggestive of facet joint origin that has not resolved despite non-invasive management (ICER £11,178). This analysis was assessed as partially applicable with potentially serious limitations.

23.6 Recommendations and link to evidence

Recommendations	**33. Consider referral for assessment for radiofrequency denervation for people with chronic low back pain when:** • **non-surgical treatment has not worked for them and** • **the main source of pain is thought to come from structures supplied by the medial branch nerve and**

	• **they have moderate or severe levels of localised back pain (rated as 5 or more on a visual analogue scale, or equivalent) at the time of referral.** **34. Only perform radiofrequency denervation in people with chronic low back pain after a positive response to a diagnostic medial branch block.** **35. Do not offer imaging for people with low back pain with specific facet join pain as a prerequisite for radiofrequency denervation.**
Research recommendations	**5. What is the clinical and cost effectiveness of radiofrequency denervation for chronic low back pain in the long term?**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (>30% for pain and function), adverse events, and healthcare utilisation were also considered as important. Evidence was reported for all of the critical outcomes except for psychological distress, and there was evidence for all of the outcomes that were considered important for this review.
Trade-off between clinical benefits and harms	**Radiofrequency denervation versus placebo/sham** Pain relief (VAS) was seen in studies in both the short term (up to 4 months) and long term (greater than 4 months). However, there was no clinical benefit seen in terms of function (for both ODI and RMDQ). The GDG noted that the baseline ODI scores reported in the study informing this outcome were different between groups and both groups were in the 'minimal disability' range post intervention. The RMDQ scale reported by 1 study was not reported in a standard way and had been converted to a 0-100 scale by the authors, with higher scores indicating benefit, rather than the standard 0-24 scale where higher scores indicate decline in function. Therefore the GDG were not able to place much confidence in these outcomes. For quality of life (SF-36), evidence from a single study showed clinical benefit for the domains of general health and vitality. However, in terms of physical function, the benefit was in favour of the placebo group. It was noted however that there were large baseline differences for physical function between the intervention and sham groups, with the intervention groups being 10 points worse at baseline, and that this data showing benefit to the placebo group was not considered reliable. The GDG therefore agreed that the benefits seen in quality of life outweighed the harm. The GDG also noted that 1 study selectively reported domains of SF-36; for role physical and role emotional scales, the results were reported in terms of 'number of patients who went up or down by 1 or more classes' rather than mean differences, which is not standard reporting of SF-36 data and therefore were not able to be included in this systematic review. The GDG noted there was limited data on adverse events from the included evidence, and they considered it alongside their expert opinion and knowledge to inform decision making. Only 1 study reported adverse event data, and reported no adverse events (in terms of complications) in either the placebo or the radiofrequency arms. However the GDG noted that there was clinically significant harm for the radiofrequency group in terms of treatment-related pain (graded as moderate/severe) at the short term. It was noted that there was some treatment-related harm in the sham group as well, so both groups experienced pain that was considered to be related to the procedure. Data were only reported for less than 4 months but the GDG noted that one would not expect any treatment-related pain to occur beyond 4 months. The study reported 2 adverse events (5%) which were change of sensibility (dysaesthesia or allodynia) in the radiofrequency denervation

	group. The GDG noted that these particular adverse events were important outcomes to the patient, although the event rate in the study was very small, it was higher than expected (based on the GDG's clinical experience). However the size of the study itself was very small (n=79) and only reported this outcome at less than 4 months. The group therefore agreed that although the effect size for these adverse events was considered clinically important, because of the concerns noted, they did not have confidence in extrapolating this data to clinical practice. The GDG also considered that although allodynia may occur, it is likely to only affect a small number of patients. They concluded that as the risk is low and the 5% seen in the evidence is higher than would be expected, the benefits observed in terms of pain and quality of life outweighed this risk of harm. The study additionally reported 'loss of motor function' as an adverse event. The event rate was extremely small (zero events versus 1 event in the radiofrequency group and placebo/sham group respectively). This was considered as clinically important, but again due to the study having a small sample size, short duration of follow up, and low event rate, this risk of harm was also not considered to outweigh the benefits. The GDG considered that although there was limited data from the included studies on adverse events, there are no case reports that the GDG are aware of reporting serious complications (such as paralysis or death) from radiofrequency denervation. Several studies looked at analgesic use following the procedure at less than four months. There was no detail provided regarding number of treatments per day or what the baseline medication intake was. The GDG considered that there was no clinically important difference between groups, but this could not be accurately interpreted from the data reported. Patient perception of their global improvement of analgesic use rated on a 0-6 scale, at greater than 4 months was reported by 1 study. This was noted as a small effect on a scale that was difficult to interpret or determine whether there was benefit or not and did not consider it informative for decision making. The GDG considered the evidence for responder criteria (≥50% reduction in pain) which was reported by several studies. There was clinical benefit at both short and long term follow up for global perception of reduction in back pain and pain; however there was no difference in the short-term in reported peak pain on VAS (median of 4 measurements). It was noted that this was from the same study, but as the study only reported 'peak pain' the global perception of pain reduction may be more informative. The GDG noted that 2 of the studies included in the review did not include a true diagnostic medial branch block and this may have resulted in an unselected patient population. The majority of studies used 1 diagnostic medial branch block. The GDG were mindful that had all studies included a true medial branch block, the effect size may have been larger. **Radiofrequency denervation versus medial branch block** One study compared radiofrequency denervation with medial branch block (with a local anaesthetic and steroid). The GDG noted that the study only looked at 2 outcomes relevant to this review; pain and quality of life assessed by EQ-5D. There were no data reported for adverse events. Pain assessed on a VNS was lower in the group receiving radiofrequency denervation at both short and long-term follow-ups, and this reduction was considered clinically important. The quality of life data (EQ-5D) showed no clinical difference between interventions but the GDG noted that the EQ-5D data was incompletely reported, and had not been analysed in the typical format that is appropriate for EQ-5D (i.e. summarised as a scale of 0-1; it was not weighted or in a linear scale). They were therefore unable to interpret the EQ-5D data and so it was not considered to be useful for decision-making.
Trade-off between	One cost-consequence analysis was identified that compared radiofrequency

net clinical effects and costs	denervation with sham. This study reported higher cost with radiofrequency denervation (£186 when cost of sham is excluded as not real world treatment option). This within-trial analysis was 1 of seven studies included in the clinical review for radiofrequency denervation. It was the only study reporting adverse events and health related quality of life. However, unlike the other studies, it does not report function or pain outcomes (with the exception of responder criteria) and therefore it is difficult to determine whether or not this study reflects the wider body of evidence. A detailed summary of the clinical outcomes are summarised in the 'Trade-off between clinical benefits and harms' section above. This study was judged by the GDG to show benefit for radiofrequency denervation with regards to health related quality of life and the global perception of reduction in back pain and pain responder criteria. The reported change of sensibility (adverse event) for radiofrequency denervation was considered by the GDG, and they felt it did not outweigh the benefits. As QALYs weren't calculated it is not possible to judge if it is cost effective. It was noted that in this study participants did not receive a diagnostic block but rather an intra-articular injection and therefore the selection of eligible patients for radiofrequency denervation may not reflect current practice. Furthermore, the GDG highlighted that the intervention cost outlined in the study (£197) is lower than current practice. Finally, the GDG noted that this procedure would require a follow-up appointment either in person or by telephone. This was not detailed in the study. The unit cost of radiofrequency denervation was estimated to be £1,450 per person who had a positive response to a diagnostic block and went on to receive radiofrequency denervation (NHS reference costs 2013-2014[35]). This cost includes an initial consultant-led outpatient appointment with the pain management service, a diagnostic block (HRG code AB05Z: intermediate pain procedure), radiofrequency denervation (HRG code AB08Z: pain radiofrequency treatments) and a non-consultant-led non-face to face outpatient appointment. Given that radiofrequency denervation reduces pain it is plausible that downstream healthcare utilisation (such as other interventions) might also be reduced however there was very little evidence regarding this. An original economic model was built for this guideline; this was based on pain score reported in the clinical review conducted for this guideline and also on some expert opinion for duration of treatment effects. The population in the model reflects the population included in the RCTs, who were people with a pain score of 5 or more. The model showed that radiofrequency denervation is cost effective in the base case compared to usual care. The pain score at baseline was used for the usual care arm instead of the pain score in the placebo arm of the trials to reflect what would happen in real life. This was varied in a sensitivity analysis which showed that radiofrequency denervation was still cost effective if pain score for usual care was obtained from the placebo arm. The results were sensitive to the duration of the intervention; in the base case it was assumed that the pain relief from radiofrequency denervation would last for 24 months; when this was less than 16 months radiofrequency denervation was not cost effective anymore as the ICER would go above the £20,000 per QALY threshold. No imaging before the procedure was considered in the model as the GDG experts advised this would not be required and therefore would be an inefficient use of NHS resources. The GDG considered the various limitations of the model together with the main results and concluded that although radiofrequency denervation is a cost effective intervention in the base case analysis and in various sensitivity analyses, there was not enough confidence to make a strong ('offer') recommendation for this intervention. In addition, as the low back pain population is potentially very large, the GDG expressed concern about the potential cost impact of a strong

	recommendation. The committee agreed the recommendation should include the criteria that should be met before radiofrequency denervation should be considered. It was noted there were several criteria limiting the likelihood of radiofrequency denervation being carried out and therefore, even in the context of the guideline as a whole, they did not expect this recommendation to generate a significant resource impact.
Quality of evidence	In this review, most of the studies reported evidence for radiofrequency denervation versus placebo/sham and 1 study compared radiofrequency denervation to medial branch block. Seven RCTs relevant to the review protocol were identified. The GDG deemed this sufficient evidence to base a recommendation on and therefore the search was not extended to cohort studies. The GDG noted that the favourable (clinically important) evidence of radiofrequency for improvement of pain, quality of life and responder criteria (in terms of pain) was mostly moderate and low quality. Although a number of the trials were small, the data for pain came from 4 trials. The GDG did not place much confidence in the study comparing radiofrequency denervation with medial branch block. This was because although the study met the inclusion criteria of the review, the methods used did not follow current clinical practice (diagnostic medial branch block was not performed on any of the participants prior to randomisation), but rather, all participants were randomised to radiofrequency denervation or a medial branch block (which would not pre-select those who were most likely to respond to treatment). Additionally, people in both groups were given additional therapy in the form of a rehabilitation programme if they showed a post-intervention response. The GDG highlighted limitations that could be drawn from the study by LeClaire et al. It was noted that a letter to the editors was published by the authors acknowledging some of the methodological limitations. [86] In particular the criteria used to select patients, as the study was carried out prior to medial branch blocks being commonly used for diagnostic purposes. This resulted in the study enrolling 94% of back pain patients from a pain clinic. The GDG estimate and are aware of research showing that the proportion of back pain patients whose pain is related to the facet joint is approximately 40-60% in clinical practice, and therefore this study likely includes a large proportion of patients who would not have facet joint pain and would not be expected to benefit from this treatment. For function (ODI), the GDG noted that post intervention value for the radiofrequency denervation group was very low (and was 10 points lower for physical function than the control group). This meant that the modest improvement seen may be as a consequence of the 'ceiling effect'. The quality of the evidence was therefore downgraded to reflect this. Some quality of life characteristics were only reported as numbers up and numbers down, which further reduced the quality of the data. The same study additionally reported baseline differences between the groups for a few of the quality of life domains, and the evidence for this outcome was therefore downgraded as a result. The GDG recognised that many of the studies of radiofrequency denervation are compared with placebo/sham rather than usual care or waiting list control, which was the most common comparison with other non-invasive interventions reviewed in the guideline. It was also noted that the study reporting analgesic use ended blinding at 3 months and did not provide a definition of whether the analgesic use measured was prescribed or not. The GDG noted that in the study comparing radiofrequency denervation with a medial branch block, responders 1 week after treatment (in both arms) were entered into a rehabilitation programme which may affect subjective outcomes, but as this was for both arms, this was not considered to be a limitation

	to the study. The economic evaluation was assessed as partially applicable with potentially serious limitations.
Other considerations	The GDG highlighted that all of the evidence came from populations with chronic pain (ranging from 2 to 3 years duration or longer) who had failed to respond to conservative treatment. The mean pain scores in the studies reviewed was >5 and the GDG considered that this would reflect the population for which RF might be appropriate. It was agreed that the recommendation should emphasize that this treatment should be considered only for that population (people with chronic pain with a score of 5 or more on a visual analogue scale, or equivalent) and not for all people with low back pain. The GDG noted that current clinical practice is to administer a single initial diagnostic medial branch block to identify the population who might respond to radiofrequency denervation, and that the majority of the studies included in this review conformed to this practice. The GDG also agreed that patients who experienced prolonged pain relief from medial branch blocks (i.e. an analgesic effect outlasting the expected duration of local anaesthesia) should be offered radiofrequency denervation rather than repeated medial branch blocks when seeking further treatment. The GDG agreed that this recommendation would equally apply for pregnant women and this should be considered on a case by case basis. The GDG were concerned about the potential for re-referrals as some nerve regrowth may be expected after the procedure. The GDG were aware of a study finding that of 55 patients, 17 had repeat procedures. It was noted that the subgroup involved would have been patients that had not responded well to any other intervention. The health economic model suggests that radiofrequency denervation is cost effective over usual care provided the duration of pain relief exceeds 16 months. However, the GDG did not review the evidence for repeat radiofrequency denervation. The GDG were aware of the recent development of a National Spinal Radiofrequency Registry and would encourage clinicians performing this intervention to submit patient outcome information to this database. The GDG agreed that clinicians should be cautious about recommending repeat denervation procedures until longer term effectiveness data becomes available. They agreed that a research recommendation was required to inform long terms outcomes from radiofrequency ablation, beyond the timeframe of evidence in this review.' In terms of cost and implementability, the GDG noted that it would be helpful for clinicians to be able to identify patients who may be suitable for this intervention. Although no reliable clinical features or physical signs identify 'facet joint pain' accurately, a recent UK based consensus group have published clinical features suggestive of a facet joint pain component.[117] The GDG agreed that the features identified by the consensus group might be helpful in identifying those patients who may benefit from a radiofrequency denervation. • The features include: Increased pain unilaterally or bilaterally on lumbar para-spinal palpation • Increased back pain on 1 or more of the following: ○ extension (more than flexion) ○ rotation ○ extension/side flexion ○ extension/rotation AND • No radicular symptoms

AND

- No sacroiliac joint pain elicited using a provocation test.

Radiofrequency denervation is a technically demanding procedure and should only be performed by appropriately trained clinicians.

Research recommendation

The lumbar facet joints are pairs of joints that stabilize and guide motion in the spine. These joints and periarticular structures are well innervated by the medial branches of the dorsal rami. The prevalence of pain thought to be arising from the facet joints and periarticular structures in heterogeneous populations using local anaesthetic nerve blockade (medial branch block), where 75–100% pain relief is used as a criterion standard, is thought to be 25–40%. (Manchikanti, 2000[102]).

The current guidance recommends that for people with low back pain who have failed to respond to conservative management, local anaesthetic medial branch nerve blockade to determine the presence or absence of a pain arising from the facet joints and periarticular structures may be offered. Those who experience significant but short term relief may then be offered a neurodestructive procedure called 'radiofrequency denervation' in an attempt to achieve longer term pain relief.

Radiofrequency denervation has evolved as a treatment for spinal pain over the last 40 years and is a minimally invasive and percutaneous procedure performed under local anaesthesia or light intravenous sedation. Radiofrequency energy is delivered along an insulated needle in contact with the target nerves. This focussed electrical energy heats and denatures the nerve. This process may allow axons to regenerate with time requiring the repetition of the radiofrequency procedure.

The duration of pain relief following radiofrequency denervation is uncertain. Data from randomised controlled trials suggests relief is maintained for at least 6-12 months but no study has reported longer term outcomes. Pain relief for more than 2 years would not be an unreasonable clinical expectation.

The de novo economic model undertaken for this guideline for radiofrequency denervation suggested that the treatment is likely to be cost effective provided the duration of effect exceeds 16 months.

If radiofrequency denervation is repeated, we do not know whether the outcomes and duration of these outcomes are similar to the initial treatment. If repeated radiofrequency denervation is to be offered, we need to be more certain that this intervention is both effective and cost effective.

24 Epidural injections for sciatica

24.1 Introduction

The epidural space lies within the spinal canal, outside the dura mater, and contains the spinal nerve roots, fat, connective tissue and blood vessels. An epidural injection is an injection of a therapeutic substance into this canal. Administration may involve a caudal injection at the base of the spine, in the midline between the vertebral laminae (interlaminar epidural) or laterally, through the intervertebral foramen (transforaminal epidural, nerve root injection, dorsal root ganglion injection).

The most commonly used epidural injectate for the management of sciatica is corticosteroid, with or without local anaesthetic. The immunosuppressant and anti-inflammatory effects of corticosteroids provide a theoretical basis and rationale for epidural injection. However, some studies suggest that local anaesthetic epidural injection alone may also be therapeutic. Recent studies have also examined the role of anti-TNF (Tumour Necrosis Factor) agents into the epidural space on the premise of a TNF-α mediated inflammatory mechanism.

Although performed widely since the 1950s, the administration of steroids into the epidural space remains unlicensed. HES data from 2010–2011 estimates that nearly 79,000 epidural and nerve root injections were performed in England.[125]

Currently there are areas of uncertainty beyond the effectiveness of epidural injections to be considered, including the ideal route of administration, the use of imaging to improve accuracy, the timing of injection and the safety profile.

24.2 Review question: What is the clinical and cost effectiveness of epidural injections in the management of people with sciatica?

For full details see review protocol in Appendix C.

Table 30: PICO characteristics of review question

Population	People aged 16 or above with sciatica and:
	• Primarily (≥70%) disc prolapse (likely to be confirmed by imaging), other spinal pathologies may or may not also be present.
	• Primarily (≥70%) not disc prolapse (confirmed by imaging).
	• Mixed population / unclear spinal pathology (no clinical diagnosis);
	  ○ Trial participants required to have pathology confirmed by imaging but could have either disc prolapse or other spinal pathology for inclusion.
	  ○ Pathology not confirmed (may or may not have had imaging).

Interventions	• Steroid (including steroid and saline) • Local anaesthetic • Anti-tumour necrosis factor (TNF) • Combination: local anaesthetic and steroid
Comparisons	• Sham (needle alone) / placebo / saline • Usual care • Each other (including head to head comparisons between strata) • Other treatment (non-invasive and invasive treatments being considered by the guideline for sciatica)
Outcomes	**Critical**

	• Health-related quality of life (for example, SF-12, SF-36 or EQ-5D).
	• Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).
	• Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index).
	• Psychological distress (HADS, GHQ, BDI, STAI)
	Important
	• Responder criteria (>30% improvement in pain or function)
	• Adverse events:
	  ○ morbidity
	  ○ mortality
	• Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit, surgery)

Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

24.3 Clinical evidence

24.3.1 Clinical evidence summary: Image guided epidurals

Twenty RCTs were included in the image-guided epidurals part of the review, of which 3 were reported in 7 studies, giving a total of 24 studies; these are summarised in **Table 31** below.[2,11,25,26,42,43,52,53,56,69,70,82,84,100,103,105,109,112,114,121,126,142,143,164] Karppinen 2001 was also reported in Karppinen 2001A, Manchikanti 2008 was also reported in Manchikanti 2012B and 2012I and Riew 2000 was also reported in Riew 2006. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below. See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

There was no RCT data that could be incorporated in this review for the comparison of steroid versus placebo/sham. The search was therefore widened to look for cohort study data for this comparison; however no relevant cohort studies were identified. A combined search for the epidurals injections for sciatica review and the spinal injections review identified four Cochrane reviews [31,162,163,174]. One of them[163] was not included as it included studies in people with neuropathic pain syndromes and not low back pain. The others reviews[31,162,174] were not included as the stratification of people with low back pain, low back pain with or without sciatica and sciatica was unclear, however any relevant studies included in the reviews were included and re-extracted in this review where appropriate. The studies included in these Cochrane reviews were individually assessed and included if they matched the protocol.

24.3.1.1 Heterogeneity

For the comparison of steroid and anaesthetic versus anaesthetic (>70% prolapse), there was substantial heterogeneity between the studies when they were meta-analysed for pain, responder criteria for pain (>50% reduction in pain) at both short and long term follow-ups, and for responder criteria for function at less than 4 months. Pre-specified subgroup analyses, by route of administration were performed on these outcomes which mostly explained the heterogeneity for pain at longer term follow-up and responder criteria for pain at both time points. Heterogeneity remained for pain and responder criteria for function at less than 4 months however. A random effects meta-analysis was therefore applied to these 2 outcomes, and the evidence was downgraded for inconsistency in GRADE.

For the comparison of steroid and anaesthetic versus anaesthetic (mixed population / unclear spinal pathologies), there was substantial heterogeneity between the studies when they were meta-analysed for pain at and function (ODI) at less than 4 months. Pre-specified subgroup analyses were performed on these outcomes however it did not explain the heterogeneity for pain, and could not be applied to because all of the studies used the same route of administration. A random effects meta-analysis was therefore applied to these 2 outcomes, and the evidence was downgraded for inconsistency in GRADE.

Table 31: Summary of studies included in the review: image- guided

Study	Intervention	Comparison	Population	Outcomes	Comments
Steroid versus placebo/sham/usual care					
Kraemer 1997[84]	Steroid (triamcinolone – 10mg)	Saline	Intractable sciatica (hospitalised patients) All had disc protrusion N=49 Immediate (single injection); unclear follow-up Germany	Major adverse events	Data was not included in this review because the outcomes reported were graphically presented only.
Koc 2009[82]	Steroid(10 mL of solution containing 60 mg of triamcinolone acetonide (1.5 mL), 15 mg of 0.5% bupivacaine hydrochloride (3 mL), and 5.5 mL of physiologic saline (0.9% NaCl)	Usual care (home-based therapeutic exercise program consisting of stretching exercises for the hip flexors, hamstrings and lumbar paraspinal muscles, and strengthening exercises for abdominal and gluteal muscles to be performed twice daily for a period of 6 months, and oral diclofenac sodium 75 mg twice a	Spinal stenosis N=34 Immediate (single injection); 6 month follow up Turkey	Pain (VAS; data reported as medians) Function (physical mobility, data reported as medians)	Image guidance method: fluoroscopic Concomitant treatment: Patients used a home-based therapeutic exercise program consisting of stretching exercises for the hip flexors, hamstrings and lumbar paraspinal muscles, and strengthening exercises for abdominal and gluteal muscles to be performed twice daily for a period of 6 months, and oral diclofenac sodium 75 mg twice a day for 2 weeks.

Study	Intervention	Comparison	Population	Outcomes	Comments
		day for 2 weeks.			
Anaesthetic versus placebo/sham					
Ghahreman 2010[52]	Anaesthetic 0.75ml of 0.5% bupivacaine Transforaminal injection NOTE: This study also had 2 additional arms which did not meet our protocol, and so the data were not extracted for these (IM steroid and IM saline). The additional steroid + anaesthetic arm data has been extracted elsewhere in this review.	Saline	Lumbar radicular pain Hernia N=150 in all 5 arms Immediate (up to 3 injections) + 1 year follow-up Australia	Pain Responder criteria (>50% reduction in pain) Healthcare use: surgery	Image guidance method: fluoroscopic Concomitant treatment: rescue therapy (analgesics, surgery or open-label steroids)
Steroid + anaesthetic versus placebo/sham					
Autio 2004[2]	Steroid + anaesthetic (methylprednisolone 40mg/ml +bupivacaine 5mg/ml) Periradicular infiltration	Saline	Unilateral sciatica Hernia N=160 Immediate (single injection) + 2 year follow-up Europe	No relevant outcomes reported, so this study was included, but no data extracted.	Image guidance method: fluoroscopic Concomitant treatment: none reported
Ghahreman 2010[52]	Steroid + anaesthetic (1.75 ml of triamcinolone 40mg/L + 0.75ml of 0.5% bupivacaine). Transforaminal injection NOTE: This study also had 2 additional arms which did not meet our protocol, and so the data were not extracted for these (IM steroid and IM saline). The	Saline	Lumbar radicular pain Hernia N=150 in all 5 arms Immediate (up to 3 injections) + 1 year follow-up Australia	Pain Responder criteria (>50% reduction in pain) Healthcare use: surgery	Image guidance method: fluoroscopic Concomitant treatment: rescue therapy (analgesics, surgery or open-label steroids)

Study	Intervention	Comparison	Population	Outcomes	Comments
	additional anaesthetic arm data has been extracted elsewhere in this review.				
Karppinen 2001 / 2001A [69,70]	Steroid + anaesthetic (methylprednisolone 40mg/mL + 5mg/mL bupivacaine). Periradicular (transforaminal) infiltration	Saline	Lumbrosacral radicular pain Mostly hernia N=160 Immediate (single injection) + 3 and 6 months and 1 year follow-up Finland	Pain Function: ODI NOTE: pain data reported as the mean difference in the study was found to be incorrect and so the data has been calculated as a change from baseline. No SDs were given for the baseline values and therefore these scores cannot be meta-analysed and so have been reported narratively in this review.	Image guidance method: fluoroscopic Concomitant treatment: both groups received back school instructions; if pain was persistent patients received pain medication and traditional physiotherapy.
Anti-TNF versus placebo					
Cohen 2009[25]	3 arms of different doses: 2mls of etanercept mixed in sterile water – doses of 2mg, 4mg, and 6mg Transforaminal epidural	Saline, 2mls.	Unilateral radiating pain dermatomally from the back to below the knee Hernia N=24 Immediate (1 or 2 injections depending how many levels affected) + 3 and 6 months follow-up USA	Pain (NRS) Function: ODI Healthcare use (% reduction in medication) Adverse events	Image guidance method: fluoroscopic Concomitant treatment: both groups could receive rescue medication (NSAID or tramadol) if they had debilitating pain.
Freeman 2013[42]	3 arms of different doses: Etanercept 0.5mg, 2.5mg, and 12.5mg Transforaminal epidural	Placebo (details not reported)	Lumbrosacral radicular pain Hernia N=160 2 injections,(2 weeks apart)+ 26 weeks	Pain Function: ODI Adverse events	Image guidance method: contrast flow/ fluoroscopic Concomitant treatment: none mentioned

Study	Intervention	Comparison	Population	Outcomes	Comments
			follow-up Europe		
Steroid versus anaesthetic					
Ghahreman 2010[52]	Steroid (1.75 ml of triamcinolone 40mg/L) Transforaminal injection NOTE: This study also had 2 additional arms which did not meet our protocol, and so the data were not extracted for these (IM steroid and IM saline). The additional placebo epidural arm has been compared to each of the interventions in another part of this review	Anaesthetic (0.75ml of 0.5% bupivacaine)	Lumbar radicular pain Hernia N=150 in all 5 arms Immediate (up to 3 injections) + 1 year follow-up Australia	Pain Responder criteria (>50% reduction in pain) Healthcare use: surgery	Image guidance method: fluoroscopic Concomitant treatment: rescue therapy (analgesics, surgery or open-label steroids)
Anti-TNF + anaesthetic versus anaesthetic					
Cohen 2012[26]	Anti-TNF + anaesthetic (4mg etanercept + 0.5% bupivacaine) NOTE: The additional steroid + anaesthetic epidural arm has been compared to each of the interventions in another part of this review.	Anaesthetic(0.5% bupivacaine) + saline	Lumbosacral radiculopathy Hernia or annular tear (% not given) N=84 Immediate (1 or 2 injections); 1, 3 and 6 months follow-up. USA	Pain (NRS) Function: ODI Responder criteria (>50% improvement in pain) Adverse events	Image guidance method: fluoroscopic Concomitant treatment: both groups could receive rescue medication (opioid increase, or NSAID or tramadol) if they had debilitating pain.
Steroid + anaesthetic versus anaesthetic					
Cohen 2012[26]	Steroid + anaesthetic (60 mg methylprednisolone + 0.5% bupivacaine) Transforaminal injection NOTE: The	Anaesthetic(0.5% bupivacaine) + saline	Lumbosacral radiculopathy Hernia or annular tear (% not given) N=84 Immediate (1 or 2 injections); 1, 3 and 6	Pain (NRS) Function: ODI Responder criteria (>50% improvement in pain) Adverse events	Image guidance method: fluoroscopic Concomitant treatment: both groups could receive rescue medication (opioid increase,

Study	Intervention	Comparison	Population	Outcomes	Comments
	additional anti-TNF + anaesthetic epidural arm have been compared to each of the interventions in another part of this review.		months follow-up. USA		or NSAID or tramadol) if they had debilitating pain.
Friedly 2014[43]	Steroid + anaesthetic (1-3ml /60-120mg triamcinolone or 6-12mg betamethasone or 8-10mg dexamethasone or 60-120mg methylprednisolone + 1-3ml /0.25% - 1% lidocaine) Lumbar transforaminal epidural	Anaesthetic (1-3ml /0.25% - 1% lidocaine)	Central lumbar spinal stenosis N=400 Immediate (single injection) + 6 weeks follow-up USA	Quality of life (EQ-5D) Pain Function: RMDQ Responder criteria (>30% improvement in pain and in RMDQ) Serious AEs	Image guidance method: fluoroscopic Concomitant treatment: none reported
Ghahreman 2010[52]	Steroid + anaesthetic (1.75 ml of triamcinolone 40mg/L + 0.75ml of 0.5% bupivacaine). Transforaminal injection NOTE: This study also had 2 additional arms which did not meet our protocol, and so the data were not extracted for these (IM steroid and IM saline). The additional placebo arm data has been extracted elsewhere in this review.	Anaesthetic (0.75ml of 0.5% bupivacaine)	Lumbar radicular pain Hernia N=150 in all 5 arms Immediate (up to 3 injections) + 1 year follow-up Australia	Pain Responder criteria (>50% reduction in pain) Healthcare use: surgery	Image guidance method: fluoroscopic Concomitant treatment: rescue therapy (analgesics, surgery or open-label steroids)
Ghai 2015[53]	Steroid + anaesthetic (80 mg, 2 mL of methylprednisolone /6 mL of 0.5% lidocaine) parasagittal interlaminar (PIL)	Anaesthetic (8ml of 0.5% lidocaine)	Sciatica on MRI Hernia N=69 Immediate (1 or >1 injection) + 1 year follow-up	Pain (NRS) Function (ODQ) Responder criteria (>50% pain relief) Adverse events (complications) Healthcare use	Image guidance method: fluoroscopic (C-arm) Concomitant treatment: conservative

Study	Intervention	Comparison	Population	Outcomes	Comments
	approach		India	(additional injections)	management including analgesics and/or exercise program. Job attendance continued. Patients were encouraged to engage in physical activities. No additional occupation/physical therapy or any other interventions were offered beyond the protocol.
Hagihara 2009[56]	Steroid + anaesthetic (betamethasone 1ml /4mg +lidocaine 2ml) Unclear rout of administration of the epidural	Anaesthetic (3ml lidocaine)	Sciatica on MRI Underlying pathology not stated N=69 Immediate (1 or >1 injection) + 1 week follow-up Japan	Pain (VAS and PPI) Surgery	Image guidance method: fluoroscopic Concomitant treatment: none reported
Manchikanti 2008/2012B/2012I [100,105,109]	Steroid + anaesthetic (1ml nonparticulate betamethasone, 6mg + 9ml lidocaine 0.5%) Caudal epidural	Anaesthetic (lidocaine 0.5%)	Spinal stenosis with radicular pain N=100 Immediate (at least 1 injection) + 2 year follow-up USA	Pain Function: ODI Responder criteria (>50% improvement in pain and ODI) Healthcare use: opioid dose Major AEs	Image guidance method: fluoroscopic Concomitant treatment: both groups continued with previous exercise programs, drug therapy, and work.
Manchikanti 2012H[114]	Steroid + anaesthetic (6mg betamethasone or 40mg methylprednisolone +lidocaine 0.5%) Caudal epidural	Anaesthetic (lidocaine 0.5%)	Lumbar disc herniation and radiculitis Hernia N=88 Immediate (single injection) + 2 year follow-up USA	Pain Function: ODI Responder criteria (>50% improvement in pain) Healthcare use: morphine dose	Image guidance method: fluoroscopic 20 patients in the combination arm each received 1 of 3 steroids : betamethasone (brand name or non-particulate) or

Study	Intervention	Comparison	Population	Outcomes	Comments
					methylprednisolone Concomitant treatment: both groups continued with previous exercise programs, drug therapy, and work.
Manchikanti 2014B[112]	Steroid + anaesthetic (3mg or 0.5ml betamethasone + lidocaine 1%) Lumbar transforaminal epidural	Anaesthetic (lidocaine 1%, 1.5ml)	Lumbar disc herniation and unilateral radiculitis Hernia N=120 Immediate (single injection at each nerve root level) + 2 year follow-up USA	Pain Function: ODI Responder criteria (>50% improvement in pain and in ODI) Healthcare use: opioid dose	Image guidance method: fluoroscopic Concomitant treatment: both groups were given structured exercise programs. Employed people continued working. Drug therapy was decreased or stopped if required; if increase in opioid therapy then the patient was withdrawn.
Manchikanti 2015C[103]	Steroid + anaesthetic (1ml or 6mg betamethasone + 0.5% lidocaine 5mls) Lumbar interlaminar epidural	Anaesthetic (lidocaine 0.5%, 6 mL)	Central spinal stenosis with radicular pain N=120 Immediate (single injection at each nerve root level) + 2 year follow-up USA	Pain Function: ODI	Image guidance method: fluoroscopic Concomitant treatment: both groups were given structured therapeutic exercise program along with medical therapy, and continued employment. Majority of patients were taking opioids, non-opioid analgesics and adjuvant analgesics. Repeat

Study	Intervention	Comparison	Population	Outcomes	Comments
					procedures were performed in patients with deterioration of pain relief and/or functional status below 50%.
Ng 2005[126]	Steroid + anaesthetic (methylprednisolone 40mg/ml +bupivacaine 0.25%) Periradicular infiltration (transforaminal)	Anaesthetic (bupivacaine 0.25%)	Unilateral leg pain (chronic radicular pain) Hernia and spinal stenosis (49% hernia) N=88 Immediate (single injection) + 12 weeks follow-up UK	Pain Function: ODI	Image guidance method: fluoroscopic Concomitant treatment: none reported
Riew 2000 and -Riew 2006[142,143]	Steroid + anaesthetic (betamethasone, 1ml of 6mg/ml +bupivacaine 1ml of 0.25%) Periradicular infiltration (transforaminal)	Anaesthetic (1 ml bupivacaine 0.25%)	Lumbar radicular pain Hernia and spinal stenosis (75% hernia) N=55 Immediate (1 or >1 injection) + mean 13 months, range 13-28 months follow-up USA	Surgery	Image guidance method: fluoroscopic Concomitant treatment: none reported
Tafazal 2009[164]	Steroid + anaesthetic (2ml methylprednisolone 40mg/ bupivacaine 0.25%)) Periradicular infiltration epidural (transforaminal)	Anaesthetic (2ml bupivacaine 0.25%)	Sciatica/nerve root compression on MRI Hernia and spinal stenosis (51% hernia) N=150 Immediate (1 injection) + 12 weeks and 1 year follow-up UK	Pain (VAS) Function: ODI Surgery	Image guidance method: fluoroscopic Concomitant treatment: not to alter their oral analgesic medication during the follow-up period and did not have any additional treatments such as physiotherapy.
Steroid + anaesthetic versus combination of non-invasive interventions					
Murakibhavi 2011[121]	Epidural injections 20mls normal	Combination of non-	Low back pain + unilateral or	Quality of life (Numerical pain	Concomitant treatment not

Study	Intervention	Comparison	Population	Outcomes	Comments
	saline, 2 ml of 2 % xylocaine, 2 ml triamcinolone acetate Repeated every 2-3 weeks for 3 months as required.	invasive interventions (defined as a combination of pharmacological + manual therapy + electrotherapy + biomechanical exercise: Tizanidine (6-12 mg/24 hours), Diclofenac 50-100mg/24 hours, Amitriptyline 10-50mg ON, Bilateral skin traction, Physiotherapy, TENS, Short wave diathermy and Back extension exercises)	bilateral sciatica >3 months not responding to rest +analgesics MRI evidence of disc herniation/degernation N=102 1 year follow-up India	intensity, NPI) Pain (VAS) Pain (NRS) Function (ODI) Psychological distress (Beck depression scale) Responder criteria (complete relief of pain)	reported
Steroid + anaesthetic versus anti-TNF + anaesthetic					
Cohen 2012[26]	Steroid + anaesthetic (60 mg methylprednisolone + 0.5% bupivacaine) NOTE: The additional anaesthetic epidural arm has been compared to each of the interventions in another part of this review.	Anti-TNF + anaesthetic(4mg etanercept + 0.5% bupivacaine)	Lumbosacral radiculopathy Hernia or annular tear (% not given) N=84 Immediate (1 or 2 injections); 1, 3 and 6 months follow-up. USA	Pain (NRS) Function: ODI Responder criteria (>50% improvement in pain) AEs	Image guidance method: fluoroscopic Concomitant treatment: both groups could receive rescue medication (opioid increase, or NSAID or tramadol) if they had debilitating pain.
Steroid versus other treatments					

Study	Intervention	Comparison	Population	Outcomes	Comments
Bronfort 2004[12]	Steroid (details of dose and regimen not reported)	Self-management (self-care education) Manual therapy - mixed modality (manipulation/mobilisation + massage + heat/cold)	Unilateral or bilateral radiating pain of lumbar origin Underlying pathology not reported. N=32 Up to 3 injections,(over 12 weeks) + 52 weeks follow-up USA	Data was not included in this review because it was not reported for each group separately, only for all patients as a whole.	Image guidance method: fluoroscopic Concomitant treatment: both groups were allowed prescription strength rescue medication during the 12-week treatment period if they experienced severe pain.

24.3.2 Clinical evidence summary: Non image guided epidurals

Fifteen RCTs were included in the review; these are summarised in **Table 32** below.[1,16,21,29,30,37,81,85,141,146,161,170] Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below. All the studies compared non image guided epidurals of either steroid, anaesthetic agents, or a combination of both.

No studies comparing the use of anti TNF were identified.

See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

Table 32: Summary of studies included in the review: non image- guided

Study	Intervention	Comparison	Population	Outcomes	Comments
Steroid versus placebo/sham/usual care					
Carette 1997[21]	Epidural injections of 80mg methyl prednisolone mixed with 8 mls of normal saline Repeated at 3 and 6 weeks if required	Epidural injection of 1 ml of normal saline Repeated at 3 and 6 weeks if required	First or recurrent of unilateral or bilateral sciatica, with CT evidence of disc herniation Duration 1-12 months N= 158 Canada	Function (ODI) Pain (VAS) Pain (McGill score: present pain intensity) Pain (McGill score : pain rating index) AE- morbidity (minor complications)	Concomitant treatment: acetaminophen tablets (325mg)
Klenerman 1984[81]	20 mls Bupivacaine 0.25% (made up in normal saline)	20 mls Normal saline	Unilateral sciatica +/- objective neurological signs.	N/A	Data was not included in this review because there were no relevant outcome

Study	Intervention	Comparison	Population	Outcomes	Comments
		Needling into the intraspinous ligament but no injection	Less than 6 months duration. Never had hospital treatment No diagnostic imaging N=74 UK		data reported.
Spijkerhuiges 2014 and 2015[160,161]	Segmental epidural steroid injection of 80mg triamcinolone in 10mls normal saline + usual care	Usual care provided by the GP	Lumbosacral radicular syndrome Between2-4 weeks duration N=73 Netherlands No diagnostic imaging Netherlands	Function (RMDQ) Pain (NRS back pain) Pain (NRS leg pain) Pain (NRS pain during day) Pain (NRS pain during night) Pain (NRS total pain) Quality of Life (SF-36)	Concomitant treatment was usual care provided by the GP
Snoek 1977[157]	Lumbar extradural injection of 80mg methyl prednisolone acetate at level of the disc lesion	Lumbar extradural injection of 2 mls of normal saline at level of the disc lesion	Sciatic or femoral nerve pain +neurological deficit correlating with compression of 4/5th or lumbar, or 1st sacral nerve root, and myelographic findings No diagnostic imaging. N=51 Norway	Healthcare use: Discontinuance of analgesic consumption	Concomitant treatment included bed rest for first 7 days of hospitalisation standardised physiotherapy programme and in patient admission for 14 +/-4 days. Patients not improved referred for neurosurgical opinion.
Valat 2003 [170]	3 x epidural injections (2 day intervals) of 50mg prednisolone	3 x epidural injections (2 day intervals) of 2 mls normal saline	Inpatients referred for sciatica lasting between 15-180 days All patients with causes other than herniated disc were excluded.	Function (RMDQ) Pain (VAS) AE- morbidity (minor complications)	Concomitant treatment: NSAIDs >20 days from first injection. Non opioid analgesics, bed rest, mild lumbar tractions and lumbar belts authorised.

Study	Intervention	Comparison	Population	Outcomes	Comments
			N=42 France		
Anaesthetic versus placebo/sham/usual care					
Coomes 1961[29]	Outpatient epidural into the sacral region: 50mls 0.5% Procaine. Advised to take any oral analgesia, no advice on bed rest given	Bed rest at home on a fracture board +/- inpatient admission for analgesia	Sciatica not controlled by simple analgesia, and only comfortable in bed rest UK	N/A	Data was not included in this review because there were no relevant outcome data reported.
Klenerman 1984[81]	20 mls Bupivacaine 0.25% (made up in normal saline)	20 mls Normal saline Needling into the intraspinous ligament but no injection	Unilateral sciatica +/- objective neurological signs. Less than 6 months duration. Never had hospital treatment No diagnostic imaging N=74 UK	Healthcare utilisation (number of patients that had back surgery at follow-up)	Concomitant treatment: after epidurals if the pain was still severe (not defined) then patients were offered physiotherapy
Steroid + anaesthetic versus placebo/sham					
Arden 2005[1]	3 x lumbar epidurals of 10mls of 0.25% bupivacaine and 80mg triamcinolone acetonide at weeks 0, 3 and 6.	3 x epidurals of 2 mls normal saline into the intraspinous ligament at weeks 0, 3 and 6.	Unilateral sciatica 1-18 months duration N=228 UK No diagnostic imaging UK	Function (ODI) Pain (VAS leg pain) Pain (VAS back pain) Responder criteria: improvement on leg pain, and back pain (Likert scale) Healthcare use: Analgesic use Surgery Further physiotherapy Pain management referrals Other injection techniques AE morbidity (minor)	Concomitant treatment: All patients received a standardised physiotherapy package before the study focusing mainly on education and exercise regimens. They had access to analgesics and anti-inflammatory medicines as required.
Cuckler	Epidural	Epidural	Radicular pain,	Responder	Concomitant

Study	Intervention	Comparison	Population	Outcomes	Comments
1985 [30]	injections into 3rd and 4th vertebral space, of 2 mls sterile water, 80mg of methyl prednisolone, and 5 mls of 1 % procaine	injections into 3rd and 4th vertebral space of 2 mls of saline, 5mls of 1% procaine	either disc herniation, or spinal stenosis who had failed >2 weeks of conservative treatment. Results presented separately for disc herniation N=73 USA	criteria: Improvement of symptoms	treatment of mild analgesics only.
Steroid + Anaesthetic versus pharmacological therapy					
Dincer 2007[37]	Caudal injection: 40mg methyl prednisolone, 7mls 2% prilocaine HCL, 10ml NaCL	Pharmacological interventions- NSAIDS: diclofenac sodium 75mg, sustained release, oral, twice daily for 14 days	Sub-acute or chronic (1-12 months) low back pain + radicular pain with MRI imaging confirming lumbar disc herniation Turkey	Pain (VAS) Function (ODI) Healthcare use (use of paracetamol)	Concomitant treatment: lumbopelvic mobilisation and lumbar stabilisation exercises daily. After 15 days both groups allowed paracetamol only if needed.
Laiq 2009[85]	• Epidural injection of 80mg methyl prednisolone and 3 mls of 2% xylocaine diluted to 8mls with normal saline Ibuprofen 400mg if needed	Combined pharmacological therapy: Pharmacological interventions (NSAIDS, Opioids+ Muscle relaxant)+ Self-management • Ibuprofen 400mg TDS during 1st month • Tramadol SR 100mg OD during 1st 2 months • Tinizidine 2 mg BD for 1st 3 months • Famotadine 40mg throughout treatment Bed rest for 1st	Lumbar radicular pain >2 weeks duration MRI evidence of disc herniation N=52 Pakistan	Pain (VAS) AE- morbidity (minor complications)	Concomitant treatment: analgesics when needed after 3 months

Study	Intervention	Comparison	Population	Outcomes	Comments
		month			
Steroid + Anaesthetic versus combination of non-invasive interventions					
Buchner 2000[16]	3 x Epidural injections of 100mg methylprednisolone in 10 mls 0.25% bupivacaine within 14 days of admission • + Combination of interventions (same as the interventions in the comparison arm)	• Combination of non-invasive interventions (defined as combination of self-management + pharmacological + mixed modality exercises + electrotherapy + manual therapy + postural therapy: Bed rest, administration of analgesic (worst pain treated with tramadol) and non-steroidal anti-inflammatory drugs for the initial pain period. After initial improvement the patients received a standard program of graded rehabilitation including hydrotherapy, electroanlagesia, postural exercise classes (back school) and later spinal	Inpatients with radicular pain MRI evidence of disc herniation N= 36 Germany	Pain (VAS)	Concomitant treatment, usual care / combination of interventions (defined as bed rest, administration of analgesics (NSAIDS and tramadol for worst pain). After initial improvement both groups had standard program of graded rehabilitation including hydrotherapy, electroanalgesia, postural exercise classes (back school) and later spinal mobilising physiotherapy)

Study	Intervention	Comparison	Population	Outcomes	Comments
		mobilising physiotherapy (soft tissue and joint mobilisation, muscle stabilisation program, strengthening by dynamic and static exercises)			
Steroid + anaesthetic versus. anaesthetic					
Beliveau 1971[4]	Epidural of 40mls of procaine 0.5% in normal saline, with 2 mls of methylprednisolone	Epidural of 42 mls of procaine 0.5% in normal saline	Moderate to severe unilateral sciatica +/- neurological signs N=48 UK	No relevant outcomes reported.	Data was not included in this review because there were no relevant outcome data reported.
Breivik 1976[10]	Epidurals of 20mls bupivacaine 0.25% with 80mg depot methyl prednisolone	Epidurals of 20mls bupivacaine 0.25% followed by 100mls saline	Chronic low back pain + sciatica unresponsive to conservative treatment >several months duration N=35 Norway	N/A	11 patients had already undergone surgery for prolapsed intervertebral discs Data was not included in this review because there were no relevant outcome data reported. Concomitant treatment of medical and physical therapy
Datta 2011[32]	Caudal epidural of 10-15mls of 0.125% bupivacaine and 80mg methyl prednisolone Caudal epidural of 10-15mls of 0.125% bupivacaine and 80mg triamcinolone	Caudal epidural of 10-15mls of 0.125% bupivacaine	Recurrent episodes of sciatica >4 weeks and less than 1 year CT evidence of herniated disc corresponding to symptoms N=207	Pain (VAS) Healthcare use Use of NSAIDS Use of physiotherapy	Concomitant treatment of NSAIDS

Study	Intervention	Comparison	Population	Outcomes	Comments
	Caudal epidural of 10-15mls of 0.125% bupivacaine and 15mg dexamethasone		India		
El Zahaar 1991[181]	Epidural injection of 2mls of 4% carbocaine and 5mls of hydrocortisone (concentration not given) made up to 30mls	Epidural injection of 2mls of 4% carbocaine made up to 30mls	Patients with both disc herniation and spinal stenosis + clinical diagnosis of sciatica were included but presented separately CT/Myelographic confirmation of diagnosis N=63 Egypt	Responder outcome (pre-injection symptoms)- this has been grouped as responder criteria for radicular pain from inference in the study Healthcare use: spinal surgery	Concomitant treatment: Not listed
Rogers 1992[146]	Epidural injection of 14 mls of lignocaine 2%, 80mg methyl prednisolone and 2 mls normal saline	Epidural injection of 14mls of lignocaine 2%, with normal saline 6mls	Diagnosis of sciatica + positive straight leg test No diagnostic imaging N= 30 UK	Healthcare use (analgesic use) Healthcare use (surgery)	6 patients had already had epidural steroid injections for episodes of sciatica Concomitant treatment not reported
Steroid versus anaesthetic					
Klenerman 1984[81]	80 mg of Depro-medrone in normal saline made up to 20 ml	20 mls Bupivacaine 0.25% (made up in normal saline)	Unilateral sciatica +/- objective neurological signs. Less than 6 months duration. Never had hospital treatment No diagnostic imaging N=74 UK	Healthcare use (surgery)	Concomitant treatment: after epidurals if the pain was still severe (not defined) then patients were offered physiotherapy

24.3.3 Data unsuitable for meta-analysis

Table 33: Image-guided steroid + anaesthetic versus usual care lumbar spinal stenosis

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Koc 2009[82]	Pain (VAS, 0-10), change from baseline at ≤4 months (3 months)	Image-guided steroids + anaesthesia Median= 2.05; Usual care median = 2.77 Results reported as percentages (medians). Patients analysed: image-guided steroids + anaesthetics =10; usual care =9.				VERY HIGH
	Pain (VAS, 0-10), change from baseline at >4 months (6 months)	Image-guided steroids + anaesthesia Median= 2.30; Usual care median = 2.01 Results reported as percentages (medians) and are change scores. Patients analysed: image-guided steroids + anaesthetics -=10; usual care=9.				VERY HIGH
Koc 2009[82]	Function (RMDQ,0-24), change from baseline at ≤4 months (3 months)	Image-guided steroids + anaesthetics Median= 31.2; usual care Median=31.0 Results reported as percentages (medians) and are change scores. Patients analysed: image-guided steroids + anaesthetics -=10; usual care = 9.				VERY HIGH
	Function (RMDQ,0-24), change from baseline at >4 months (6 months)	Image-guided steroids + anaesthetics Median= 31.2; usual care Median=31.0 Results reported as percentages (medians) and are change scores. Patients analysed: image-guided steroids + anaesthetics -=10; usual care = 9.				VERY HIGH

Table 34: Image-guided steroid + anaesthetic versus placebo/sham for sciatica primarily caused by (≥70%) disc prolapse

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
KARPPINEN 2001[69]	Pain (NRS 0-10), change from baseline at >4 months	Mean difference: 0.12 (favouring sham/placebo)*				VERY HIGH
	Pain (NRS 0-10), change from baseline at >4 months	Mean difference: 0.39 (favouring sham/placebo)*				VERY HIGH

*Data calculated from that provided in the study. Study did not report SD at baseline and therefore only the MD without SD could be calculated. The MDs reported in the paper itself at follow-up were found to be incorrect.

Table 35: Image-guided steroid + anaesthetic versus anaesthetic for sciatica primarily caused by (≥70%) disc prolapse

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
GHAI 2015[53]	Pain (NRS 0-10) at ≤4 months	Statistically significant difference between groups (favours steroid + anaesthetic); p=0.002				VERY HIGH
	Leg Pain (NRS 0-10) at >4 months	Statistically significant difference between groups (favours steroid + anaesthetic); p=0.001				VERY HIGH
	Function (ODQ 0-100) at ≤4 months	Statistically significant difference between groups (favours steroid + anaesthetic); p=0.02				VERY HIGH
	Function (ODQ 0-100) at >4 months	Statistically significant difference between groups (favours steroid + anaesthetic); p=0.007				VERY HIGH

Note: Results of the table to be reviewed during consultation as data has been mislabelled in the study (confirmed by authors) and effect should favour anaesthetic treatment. Erratum to be published soon and data can be changed to reflect this before publication.

Table 36: Image-guided anti-TNF versus placebo/sham for sciatica primarily caused by (≥70%) disc prolapse

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
COHEN 2009[25]	Leg Pain (NRS 0-10) at ≤4 months	Final score: 0.78 (SD 1.16)	6	3.0 No SD or 95% CI given; data from 1 patient only	1	VERY HIGH
	Leg Pain (NRS 0-10) at >4 months	Final score: 0.96 (SD 1.4)	6	4.0 No SD or 95% CI given; data from 1 patient only	1	VERY HIGH
FREEMAN 2013[42]	Function (ODI 0-100) at ≤4 months	The anti-TNF 0.5 mg group showed a statistically significant reduction in mean and % change in ODI from baseline to week 4. At 3 months, consistently maintained a ≥10 point change from baseline and a ≥30% reduction above the placebo group.				VERY HIGH
COHEN 2009[25]	Function (ODI 0-100) at ≤4 months	Final score: 14.3	6	22.0	1	VERY HIGH

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
		(SD 12.4)		No SD or 95% CI given; data from 1 patient only		
	Function (ODI 0-100) at >4 months	Final score: 15.0 (SD 9.7)	6	42.0 No SD or 95% CI given; data from 1 patient only	1	VERY HIGH
FREEMAN 2013[42]	Surgery at >4 months	5/49 patients (across all groups) underwent surgery. Percentage of patients undergoing surgery was similar in all the groups (exact numbers not reported).				VERY HIGH
COHEN 2009[25]	HC use: reduction in medication (mean % change) at ≤4 months	72% (range 10-100)	17	17% (range 0-50)	5	VERY HIGH
	HC use: reduction in medication (mean % change) at >4 months	72% (range 10-100)	17	17% (range 0-50)	5	VERY HIGH

Table 37: Non image guided: Steroid + anaesthetic versus combinations of non-invasive interventions for Sciatica caused by (≥70%) disc prolapse

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Buchner 2000[16]	Pain >4 months (VAS) At 6 months	Final score: 3.29 (range 0-8.5)	17	Final score: 3.92 (range 0-10) No SD or 95% CI given;	19	VERY HIGH

24.3.4 Clinical evidence summary: Image-guided epidurals

Table 38: Image guided: Anaesthetic versus sham/placebo for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anaesthetic versus sham/placebo (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anaesthetic versus sham/placebo (95% CI)
Leg pain (0-10, final value) ≤4 months	64 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean leg pain (0-10, final value) ≤4 months in the control groups was 5.5	The mean leg pain (0-10, final value) ≤4 months in the intervention groups was 1.2 higher (0.15 lower to 2.55 higher)
Responder criteria: >50% reduction in pain ≤4 months	64 (1 study)	LOW[b] due to imprecision	RR 0.39 (0.09 to 1.74)	Moderate	
				189 per 1000	115 fewer per 1000 (from 172 fewer to 140 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

Table 39: Image guided: Anti-TNF (mean of 3 doses) versus sham/placebo for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anti-TNF (mean of 3 doses) versus sham/placebo (95% CI)
Mean daily worst leg pain (0-10, change score) ≤4 months	37 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean daily worst leg pain (0-10, change score) ≤4 months in the control groups was 5.42	The mean daily worst leg pain (0-10, change score) ≤4 months in the intervention groups was 1.32 lower (3.3 lower to 0.66 higher)
Adverse events ≤4 months	24 (1 study)	LOW[a,b] due to risk of bias	Not estimable	*	
Adverse events >4 months	24 (1 study)	LOW[a,b] due to risk of bias	Not estimable	*	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anti-TNF (mean of 3 doses) versus sham/placebo (95% CI)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

* Zero events in both arms

Table 40: Image guided: Steroid + and anaesthetic versus Sham/placebo for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus Sham/placebo (95% CI)
Intensity of leg pain - Intensity of leg pain ≤4 months	65 (1 study)	MODERATE[b] due to imprecision		*	The mean intensity of leg pain - intensity of leg pain ≤4 months in the intervention groups was 1.40 lower (2.79 to 0.01 lower)
Function - ODI ≤4 months	160 (1 study)	LOW[a,b] due to risk of bias, imprecision		*	The mean function - ODI ≤4 months in the intervention groups was 1.3 lower (8.6 lower to 6 higher)
Function - ODI >4 months	160 (1 study)	MODERATE[a] due to risk of bias		*	The mean function - ODI >4 months – 1 year in the intervention groups was 0.4 lower (7 lower to 6.2 higher)
Responder criteria: >50% reduction in pain ≤4 months	65 (1 study)	HIGH	RR 2.83 (1.34 to 6.0)	Moderate	
				189 per 1000	346 more per 1000 (from 64 to 945 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus Sham/placebo (95% CI)
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's. *No control rate reported in study, only mean difference					

Table 41: Image guided: Steroid and anaesthetic versus anaesthetic for sciatica primarily caused by >70% disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid+ anaesthetic versus anaesthetic (>70% prolapse) (95% CI)
Pain (0-10, change/final scores) ≤4 months transforaminal epidural	233 (3 studies) ≤4 months	MODERATE[a] due to risk of bias		The mean pain (0-10, change/final scores) ≤4 months transforaminal epidural in the control groups was 3.78	The mean pain (0-10, change/final scores) <4 months transforaminal epidural in the intervention groups was 0.52 lower (1.04 lower to 0 higher)
Pain (0-10, change/final scores) ≤4 months caudal epidural	353 (1 study) ≤4 months	LOW[a,b] due to risk of bias, imprecision		The mean pain (0-10, change/final scores) ≤4 months caudal epidural in the control groups was 4.1	The mean pain (0-10, change/final scores) <4 months caudal epidural in the intervention groups was 0.70 lower (1.33 to 0.07 lower)
Pain (0-10, change/final scores) >4 months - transforaminal approach	120 (1 study)	HIGH		The mean pain (0-10, change/final scores) >4 months - transforaminal approach in the control groups was 4.0	The mean pain (0-10, change/final scores) >4 months - transforaminal approach in the intervention groups was 0.2 higher (0.37 lower to 0.77 higher)
Pain (0-10, change/final scores) >4 months - caudal epidural	120 (1 study)	LOW[a,b] due to risk of bias,		The mean pain (0-10, change/final scores) >4 months - caudal epidural in the control groups was	The mean pain (0-10, change/final scores) >4 months - caudal epidural in the intervention groups was 0.6 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid+ anaesthetic versus anaesthetic (>70% prolapse) (95% CI)
		imprecision		4.2	(1.24 lower to 0.04 higher)
Function ODI (0-100, change/final score) ≤4 months	240 (3 studies)	LOW[a,b] due to risk of bias, imprecision		The mean ODI score (0-100, change/final score) <4 months in the control groups was 16.5	The mean ODI score (0-100, change/final score) ≤4 months in the intervention groups was 2.46 lower (4.16 to 0.75 lower)
Function (ODI) (0-100, final score) >4 months	240 (2 studies)	MODERATE[a] due to risk of bias		The mean ODI score (0-100, final score) >4 months in the control groups was 15.25	The mean ODI score (0-100, final score) >4 months in the intervention groups was 1.4 lower (3.16 lower to 0.36 higher)
Responder criteria: >50% reduction in pain ≤4 months - transforaminal approach	233 (3 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision	RR 1.29 (1.06 to 1.57)	Moderate	
				767 per 1000	222 more per 1000 (from 46 more to 437 more)
Responder criteria: >50% reduction in pain ≤4 months - caudal epidural	120 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 1.04 (0.86 to 1.26)	Moderate	
				767 per 1000	31 more per 1000 (from 107 fewer to 199 more)
Responder criteria: >50% reduction in pain ≤4 months - interlaminar (parasagittal approach)	69 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.71 (1.19 to 2.46)	Moderate	
				650 per 1000	462 more per 1000 (from 124 more to 949 more)
Responder criteria: >50% reduction in pain >4 months - transforaminal approach	178 (2 studies)	MODERATE[b] due to imprecision	RR 0.84 (0.64 to 1.10)	Moderate	
				650 per 1000	92 fewer per 1000 (from 208 fewer to 58 more)
Responder criteria: >50% reduction in pain	120	LOW[a,b]	RR 1.08	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid+ anaesthetic versus anaesthetic (>70% prolapse) (95% CI)
>4 months - caudal epidural	(1 study)	due to risk of bias, imprecision	(0.83 to 1.40)	650 per 1000	52 more per 1000 (from 111 fewer to 260 more)
Responder criteria: >50% reduction in pain >4 months - interlaminal (parasagittal) approach	69 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.51 (1.11 to 2.04)	Moderate	
				650 per 1000	331 more per 1000 (from 72 more to 676 more)
Responder criteria: >50% reduction in ODI ≤4 months - transforaminal approach	120 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.91 (0.73 to 1.14)	Moderate	
				750 per 1000	67 fewer per 1000 (from 202 fewer to 105 more)
Responder criteria: >50% reduction in ODI ≤4 months - caudal epidural	120 (1 study)	MODERATE[b] due to imprecision	RR 1.19 (0.93 to 1.53)	Moderate	
				617 per 1000	117 more per 1000 (from 43 fewer to 327 more)
Responder criteria: >50% reduction in ODI >4 months	240 (2 studies)	MODERATE[a] due to risk of bias	RR 1.03 (0.86 to 1.23)	Moderate	
				658 per 1000	20 more per 1000 (from 92 fewer to 151 more)
HC use: Surgery >4 months	55 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.43 (0.23 to 0.82)	Moderate	
				667 per 1000	380 fewer per 1000 (from 120 fewer to 514 fewer)
HC use: opioid intake, mg dose in last 12 months ≤4 months	240 (2 studies)	MODERATE[a] due to risk of bias		The mean hc use: opioid intake, mg dose in last 12 months <4 months in the control groups was 40.7	The mean hc use: opioid intake, mg dose in last 12 months ≤4 months in the intervention groups was 4.73 lower (13.53 lower to 4.08 higher)
HC use: opioid intake, mg dose in last 12 months >4 months	240 (2 studies)	MODERATE[a] due to risk		The mean hc use: opioid intake, mg dose in last 12	The mean hc use: opioid intake, mg dose in last 12 months >4 months in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid+ anaesthetic versus anaesthetic (>70% prolapse) (95% CI)
		of bias		months >4 months in the control groups was 37.85	groups was 3.98 lower (12.8 lower to 4.84 higher)
HC use: number of patients having additional injections>4 months	69 (1 study) >4 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.84 (0.58 to 1.22)	Moderate	
				667 per 1000	107 fewer per 1000 (from 280 fewer to 147 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

[c] Downgraded by 1 increment for inconsistency if I^2 between 50% and <75%. Downgraded by 2 increments if I^2 >75%.

Table 42: Image guided: Steroid + anaesthetic versus anaesthetic for sciatica primarily caused by non-disc lesion

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Anaesthetic	Risk difference with Steroid+ anaesthetic (95% CI)
Quality of life (EQ-5D) ≤4 months	386 (1 study)	LOW[a] due to risk of bias		The mean quality of life (eq-5d) <4 months in the control groups was 0.68	The mean quality of life (eq-5d) ≤4 months in the intervention groups was 0.02 higher (0.02 lower to 0.06 higher)
Pain (0-10, change/final scores) ≤4 months	606 (3 studies)	LOW[a] due to risk of bias		The mean pain (0-10, change/final scores) <4 months in the control groups was 3.7	The mean pain (0-10, change/final scores) ≤4 months in the intervention groups was 0.06 lower (0.40 lower to 0.28 higher)
Pain (0-10, change/final scores) >4 months	220 (2 studies)	MODERATE[a] due to risk of bias		The mean pain (0-10, change/final scores) >4 months in the control groups was	The mean pain (0-10, change/final scores) >4 months in the intervention groups was 0.08 lower

				4.0	(0.57 lower to 0.41 higher)
RMDQ score (0-24, change score) ≤4 months	386 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean RMDQ score (0-24, change score) <4 months in the control groups was -3.1	The mean RMDQ score (0-24, change score) ≤4 months in the intervention groups was 1.1 lower (2.21 lower to 0.01 higher)
ODI score (0-100, change/final score) ≤4 months	100 (1 study)	MODERATE[a] due to risk of bias		The mean ODI score (0-100, change/final score) <4 months in the control groups was 25	The mean ODI score (0-100, change/final score) ≤4 months in the intervention groups was 0.18 lower (2.12 lower to 1.76 higher)
ODI score (0-100, final score) >4 months	100 (1 study)	MODERATE[a] due to risk of bias		The mean ODI score (0-100, final score) >4 months in the control groups was 25	The mean ODI score (0-100, final score) >4 months in the intervention groups was 1.34 lower (8.59 lower to 0.91 higher)
Responder criteria: >30% reduction in pain ≤4 months	386 (1 study)	LOW[a] due to risk of bias	RR 1.01 (0.83 to 1.24)	Moderate	
				492 per 1000	5 more per 1000 (from 84 fewer to 118 more)
Responder criteria: >50% reduction in pain ≤4 months	100 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.94 (0.7 to 1.26)	Moderate	
				660 per 1000	40 fewer per 1000 (from 198 fewer to 172 more)
Responder criteria: >50% reduction in pain >4 months	100 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.05 (0.67 to 1.65)	Moderate	
				420 per 1000	21 more per 1000 (from 139 fewer to 273 more)
Responder criteria: >30% reduction in RMDQ ≤4 months	386 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.85 (0.64 to 1.12)	Moderate	
				373 per 1000	56 fewer per 1000 (from 134 fewer to 45 more)
Responder criteria: >50% reduction in ODI ≤4 months	100 (1 study)	LOW[a,b] due to risk of bias, imprecision	RR 0.86 (0.6 to 1.24)	Moderate	
				580 per 1000	81 fewer per 1000 (from 232 fewer to 139 more)

Responder criteria: >50% reduction in ODI >4 months	100 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.1 (0.7 to 1.71)	Moderate	
				420 per 1000	42 more per 1000 (from 126 fewer to 298 more)
HC use: opioid intake, mg dose in last 12 months ≤4 months	100 (1 study)	MODERATE[a] due to risk of bias		The mean hc use: opioid intake, mg dose in last 12 months <4 months in the control groups was 33.3	The mean hc use: opioid intake, mg dose in last 12 months ≤4 months in the intervention groups was 0.2 lower (12.69 lower to 12.29 higher)
HC use: opioid intake, mg dose in last 12 months >4 months	100 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean hc use: opioid intake, mg dose in last 12 months >4 months in the control groups was 35.7	The mean hc use: opioid intake, mg dose in last 12 months >4 months in the intervention groups was 3.2 lower (18.6 lower to 12.2 higher)
SAEs ≤4 months	500 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.8 (0.22 to 2.94)	Moderate	
				13 per 1000	3 fewer per 1000 (from 10 fewer to 25 more)
SAEs >4 months	100 (1 study)	MODERATE[a] due to risk of bias	Not estimable	*	

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

*Zero events in both arms

Table 43: Image guided: Steroid + anaesthetic versus anaesthetic for sciatica primarily caused by mixed population/ unclear spinal pathologies

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Anaesthetic	Risk difference with Steroid+ anaesthetic (95% CI)
Pain (0-10, change/final scores) ≤4 months	332	VERY		The mean pain <4 months-	The mean pain (0-10, change/final

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Anaesthetic	Risk difference with Steroid+ anaesthetic (95% CI)
	(4 studies)	LOW[a,b,c] due to risk of bias, inconsistency, imprecision		transforaminal epidural in the control groups was -0.03	scores) ≤4 months in the intervention groups was 0.06 lower (0.30 lower to 0.19 higher)
Pain, PPI (0-5, change score) ≤4 months	69 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain <4 months-approach not specified in the control groups was 4.17	The mean pain, ppi (0-5, change score) ≤4 months in the intervention groups was 0.04 higher (0.35 lower to 0.43 higher)
ODI score (0-100, change/final score) ≤4 months	263 (3 studies)	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean function score ≤4 months in the control group was 12.3	The mean ODQ score (0-100, change/final score) ≤4 months in the intervention groups was 0.01 lower (2.83 lower to 2.85 higher)
HC use: Surgery ≤4 months	127 (2 studies)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.79 (0.36 to 1.74)	Moderate	
				183 per 1000	38 fewer per 1000 (from 117 fewer to 135 more)
HC use: Surgery >4 months	129 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.65 (0.3 to 1.4)	Moderate	
				215 per 1000	75 fewer per 1000 (from 150 fewer to 86 more)
HC use: medication reduction (>20% opioid use or cessation non-opioids) ≤4 months	58 (1 study)	MODERATE[b] due to imprecision	RR 1.3 (0.8 to 2.11)	Moderate	
				467 per 1000	140 more per 1000 (from 93 fewer to 518 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Anaesthetic	Risk difference with Steroid+ anaesthetic (95% CI)
HC use: medication reduction (>20% opioid use or cessation non-opioids) >4 months	24 (1 study)	MODERATE[b] due to imprecision	RR 1.22 (0.85 to 1.77)	Moderate	
				750 per 1000	165 more per 1000 (from 112 fewer to 577 more)
Adverse events: complications >4 months	129 (1 study)	LOW[a] due to risk of bias	Not estimable	*	
Adverse events: complications ≤4 months	124 (1 study)	LOW[a] due to risk of bias	Not estimable	*	

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

[c] Downgraded by 1 increment for inconsistency if I^2 between 50% and <75%. Downgraded by 2 increments if I^2 >75%.

* Zero events in both arms

Table 44: Image guided: steroid and anaesthetic epidural versus combinations of non-invasive interventions for Sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus combination of non-invasive interventions (95% CI)
Quality of life(HRQoL -Numerical pain intensity, NPI)>4 months	100 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean hrqol in the control groups was 5.58	The mean hrqol in the intervention groups was 2.24 lower (2.76 to 1.72 lower)
Pain (VAS,0-10) >4 months	100 (1 study)	MODERATE[a] due to risk of		The mean pain in the control groups was	The mean pain in the intervention groups was 3.39 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus combination of non-invasive interventions (95% CI)
	> 4 months	bias		6.08	(3.65 to 3.13 lower)
ODI score (0-100) >4 months	100 (1 study) > 4 months	MODERATE[a] due to risk of bias		The mean function in the control groups was 24.87	The mean function in the intervention groups was 12.59 lower (13.42 to 11.76 lower)
Psychological distress BDI >4 months	100 (1 study) >4 months	MODERATE[a] due to risk of bias		The mean psychological distress in the control groups was 13.26	The mean psychological distress in the intervention groups was 4.67 lower (5.44 to 3.9 lower)
Responder criteria (complete relief of pain) >4 months	102 (1 study) >4 months	HIGH	RR 3.45 (2.07 to 5.73)	Study population	
				240 per 1000	588 more per 1000 (from 257 more to 1000 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 45: Image guided: Anti-TNF + anaesthetic versus anaesthetic for sciatica primarily caused by >70% disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anti-TNF + anaesthetic versus anaesthetic (95% CI)
Pain (0-10, change/final scores) ≤4 months	56 (1 study)	LOW[a] due to imprecision		The mean pain (0-10, change/final scores) <4 months in the control groups was 3.78	The mean pain (0-10, change/final scores) ≤4 months in the intervention groups was 0.22 lower (1.76 lower to 1.32 higher)
ODI score (0-100, final score) ≤4 months	56 (1 study)	MODERATE[a] due to imprecision		The mean ODI score (0-100, final score) <4 months in the control	The mean ODI score (0-100, final score) ≤4 months in the intervention groups was 10.26 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Anti-TNF + anaesthetic versus anaesthetic (95% CI)
				groups was 30	(0.69 to 19.83 higher)
HC use: Surgery ≤4 months	56 (1 study)	LOW[a] due to imprecision	RR 1.38 (0.48 to 4.01)	Moderate	
				167 per 1000	63 more per 1000 (from 87 fewer to 503 more)
Responder criteria: >50% reduction in pain ≤4 months	56 (1 study)	LOW[a] due to imprecision	RR 0.98 (0.53 to 1.79)	Moderate	
				433 per 1000	9 fewer per 1000 (from 204 fewer to 342 more)
Responder criteria: >50% reduction in pain >4 months	56 (1 study)	LOW[a] due to imprecision	RR 0.96 (0.5 to 1.85)	Moderate	
				400 per 1000	16 fewer per 1000 (from 200 fewer to 340 more)
HC use: medication reduction (>20% opioid use or cessation non-opioids) ≤4 months	56 (1 study)	LOW[a] due to imprecision	RR 0.74 (0.39 to 1.42)	Moderate	
				467 per 1000	121 fewer per 1000 (from 285 fewer to 196 more)
HC use: medication reduction (>20% opioid use or cessation non-opioids) >4 months	23 (1 study)	LOW[a] due to imprecision	RR 0.85 (0.49 to 1.48)	Moderate	
				750 per 1000	112 fewer per 1000 (from 382 fewer to 360 more)

[a] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 46: Image guided: Steroid + anaesthetic versus Anti-TNF + anaesthetic for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus Anti-TNF + anaesthetic (95% CI)
Pain (0-10) ≤4 months	54 (1 study)	MODERATE[a] due to		The mean pain (0-10) <4 months in the control	The mean pain (0-10) ≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus Anti-TNF + anaesthetic (95% CI)
		imprecision		groups was 3.56	1.02 lower (2.63 lower to 0.59 higher)
ODI score (0-100, final score) ≤4 months	54 (1 study)	MODERATE[a] due to imprecision		The mean ODI score (0-100, final score) <4 months in the control groups was 40.26	The mean ODI score (0-100, final score) ≤4 months in the intervention groups was 16.16 lower (26.15 to 6.17 lower)
Responder criteria: >50% reduction in pain ≤4 months	54 (1 study)	LOW[a] due to imprecision	RR 1.18 (0.66 to 2.11)	Moderate	
				423 per 1000	76 more per 1000 (from 144 fewer to 470 more)
Responder criteria: >50% reduction in pain >4 months	54 (1 study)	LOW[a] due to imprecision	RR 0.74 (0.35 to 1.59)	Moderate	
				385 per 1000	100 fewer per 1000 (from 250 fewer to 227 more)
HC use: Surgery ≤4 months	54 (1 study)	LOW[a] due to imprecision	RR 0.93 (0.34 to 2.52)	Moderate	
				231 per 1000	16 fewer per 1000 (from 152 fewer to 351 more)
HC use: medication reduction (>20% opioid use or cessation non-opioids) ≤4 months	54 (1 study)	MODERATE[a] due to imprecision	RR 1.75 (0.96 to 3.22)	Moderate	
				346 per 1000	259 more per 1000 (from 14 fewer to 768 more)
HC use: medication reduction (>20% opioid use or cessation non-opioids) >4 months – 1 year	23 (1 study)	MODERATE[a] due to imprecision	RR 1.44 (0.89 to 2.32)	Moderate	
				636 per 1000	280 more per 1000 (from 70 fewer to 840 more)

[a] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

24.3.5 Clinical evidence summary: non-image-guided epidurals

Table 47: Non image guided: steroid epidural versus placebo for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus placebo/sham (95% CI)
Pain (VAS) VAS	174 (2 studies) 3-4 months	MODERATE[a] due to risk of bias		The mean pain (VAS) in the control groups was 3.58	The mean pain (VAS) in the intervention groups was 0.19 lower (1.09 lower to 0.71 higher)
Pain McGill: present pain intensity McGill scale	156 (1 study) 3 months	HIGH		The mean pain McGill: present pain intensity in the control groups was 1.9	The mean pain McGill: present pain intensity in the intervention groups was 0 higher (0.49 lower to 0.49 higher)
Pain (McGill score: pain rating index) McGill score	156 (1 study) 3 months	HIGH		The mean pain (McGill score: pain rating index) in the control groups was 1.9	The mean pain (McGill score: pain rating index) in the intervention groups was 0 higher (5.93 lower to 5.93 higher)
Function ODI/RMDQ	221 (2 studies) 3-12 months	LOW[a,b] due to risk of bias, imprecision		The mean function in the control groups was 36.25	The mean function in the intervention groups was 0.1 standard deviations lower (0.37 lower to 0.16 higher)
Adverse events-morbidity no of minor adverse events	232 (2 studies) 3-12 months	LOW[a,b] due to risk of bias, imprecision	RR 1.36 (0.81 to 2.3)	132 per 1000	48 more per 1000 (from 25 fewer to 172 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 48: Non image guided: steroid epidural versus placebo for sciatica in a population with unclear spinal pathology

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
Healthcare use – discontinuation of analgesics	51 (1 study) 8-20 months	VERY LOW[a,b] due to risk of bias, imprecision	2.44 (0.9 to 6.67)	167 per 1000	240 more per 1000 (from 17 fewer to 945 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 49: Non image guided: steroid epidural versus usual care with sciatica in a population with unclear spinal pathology

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
Quality of life (SF-36) 0-100 ≤4 months - Mental composite	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - mental composite in the control groups was 61.2	The mean quality of life (sf-36) 0-100 ≤4 months - mental composite in the intervention groups was 3.8 higher (2.65 lower to 10.25 higher)
Quality of life (SF-36) 0-100 ≤4 months - Physical composite	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - physical composite in the control groups was 59.4	The mean quality of life (sf-36) 0-100 ≤4 months - physical composite in the intervention groups was 9.5 higher (2.32 to 16.68 higher)
Quality of life (SF-36) 0-100 ≤4 months - Physical functioning	50 (1 study)	LOW[a,b] due to risk of bias,		The mean quality of life (sf-36) 0-100 ≤4 months - physical functioning in the control groups was	The mean quality of life (sf-36) 0-100 ≤4 months - physical functioning in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
		imprecision		79	8.7 higher (1.03 to 16.37 higher)
Quality of life (SF-36) 0-100 ≤4 months - Physical role limitations	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - physical role limitations in the control groups was 45.7	The mean quality of life (sf-36) 0-100 ≤4 months - physical role limitations in the intervention groups was 14 higher (5.68 lower to 33.68 higher)
Quality of life (SF-36) 0-100 ≤4 months - Social functioning	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - social functioning in the control groups was 44.5	The mean quality of life (sf-36) 0-100 ≤4 months - social functioning in the intervention groups was 4.4 higher (3.32 lower to 12.12 higher)
Quality of life (SF-36) 0-100 ≤4 months - Emotional role limitations	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - emotional role limitations in the control groups was 74	The mean quality of life (sf-36) 0-100 ≤4 months - emotional role limitations in the intervention groups was 13.5 higher (2.69 lower to 29.69 higher)
Quality of life (SF-36) 0-100 ≤4 months - Emotional well-being	50 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (sf-36) 0-100 ≤4 months - emotional well-being in the control groups was 71	The mean quality of life (sf-36) 0-100 ≤4 months - emotional well-being in the intervention groups was 1.2 lower (9.33 lower to 6.93 higher)
Quality of life (SF-36) 0-100 ≤4 months - Energy/fatigue	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - energy/fatigue in the control groups was 56.7	The mean quality of life (sf-36) 0-100 ≤4 months - energy/fatigue in the intervention groups was 2.4 lower (11.24 lower to 6.44 higher)
Quality of life (SF-36) 0-100 ≤4 months - Pain	50 (1 study)	MODERATE[a] due to risk of		The mean quality of life (sf-36) 0-100 ≤4 months - pain in the control	The mean quality of life (sf-36) 0-100 ≤4 months - pain in the intervention groups

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
		bias		groups was 48.4	was 3.1 higher (2.14 lower to 8.34 higher)
Quality of life (SF-36) 0-100 ≤4 months - General health perceptions	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - general health perceptions in the control groups was 66.7	The mean quality of life (sf-36) 0-100 ≤4 months - general health perceptions in the intervention groups was 6.8 higher (0.72 lower to 14.32 higher)
Quality of life (SF-36) 0-100 ≤4 months - Change in perceived help	50 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 ≤4 months - change in perceived help in the control groups was 55.3	The mean quality of life (sf-36) 0-100 ≤4 months - change in perceived help in the intervention groups was 2.6 higher (10.99 lower to 16.19 higher)
Quality of life (SF-36) 0-100 >4 months - Mental composite	50 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (sf-36) 0-100 >4 months - mental composite in the control groups was 65.2	The mean quality of life (sf-36) 0-100 >4 months - mental composite in the intervention groups was 1.8 higher (4.92 lower to 8.52 higher)
Quality of life (SF-36) 0-100 >4 months - Physical composite	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - physical composite in the control groups was 67.6	The mean quality of life (sf-36) 0-100 >4 months - physical composite in the intervention groups was 11.9 higher (4.64 to 19.16 higher)
Quality of life (SF-36) 0-100 >4 months - Physical functioning	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - physical functioning in the control groups was 87	The mean quality of life (sf-36) 0-100 >4 months - physical functioning in the intervention groups was 7.5 higher (0.36 lower to 15.36 higher)
Quality of life (SF-36) 0-100 >4 months -	50	LOW[a]		The mean quality of life (sf-36) 0-100	The mean quality of life (sf-36) 0-100 >4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
Physical role limitations	(1 study)	due to risk of bias, imprecision		>4 months – 1 year - physical role limitations in the control groups was 63.2	months - physical role limitations in the intervention groups was 29.1 higher (8.55 to 49.65 higher)
Quality of life (SF-36) 0-100 >4 months - Social functioning	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - social functioning in the control groups was 47.1	The mean quality of life (sf-36) 0-100 >4 months - social functioning in the intervention groups was 4.6 higher (3.26 lower to 12.46 higher)
Quality of life (SF-36) 0-100 >4 months - Emotional role limitations	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - emotional role limitations in the control groups was 85.2	The mean quality of life (sf-36) 0-100 >4 months - emotional role limitations in the intervention groups was 9.1 higher (7.57 lower to 25.77 higher)
Quality of life (SF-36) 0-100 >4 months - Emotional well-being	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - emotional well-being in the control groups was 72.2	The mean quality of life (sf-36) 0-100 >4 months - emotional well-being in the intervention groups was 4.8 lower (13.13 lower to 3.53 higher)
Quality of life (SF-36) 0-100 >4 months - Energy/fatigue	50 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (sf-36) 0-100 >4 months - energy/fatigue in the control groups was 57	The mean quality of life (sf-36) 0-100 >4 months - energy/fatigue in the intervention groups was 1.4 lower (10.2 lower to 7.4 higher)
Quality of life (SF-36) 0-100 >4 months - Pain	50 (1 study)	MODERATE[a] due to risk of bias		The mean quality of life (sf-36) 0-100 >4 months - pain in the control groups was 51.2	The mean quality of life (sf-36) 0-100 >4 months - pain in the intervention groups was 1.5 lower (6.81 lower to 3.81 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
Quality of life (SF-36) 0-100 >4 months - General health perceptions	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - general health perceptions in the control groups was 73.5	The mean quality of life (sf-36) 0-100 >4 months - general health perceptions in the intervention groups was 4.7 higher (3.16 lower to 12.56 higher)
Quality of life (SF-36) 0-100 >4 months - Change in perceived help	50 (1 study)	LOW[a,b] due to risk of bias, imprecision		The mean quality of life (sf-36) 0-100 >4 months - change in perceived help in the control groups was 73.3	The mean quality of life (sf-36) 0-100 >4 months - change in perceived help in the intervention groups was 14.5 higher (0.53 to 28.47 higher)
Pain score ≤4 months - NRS leg pain	63 (1 study) 13 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score ≤4 months - NRS leg pain in the control groups was 2.7	The mean pain score ≤4 months - NRS leg pain in the intervention groups was 1.1 lower (2.42 lower to 0.22 higher)
Pain score ≤4 months - NRS back pain	63 (1 study) 13 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score ≤4 months - NRS back pain in the control groups was 3	The mean pain score ≤4 months - NRS back pain in the intervention groups was 0.9 lower (2.27 lower to 0.47 higher)
Pain score ≤4 months - NRS total pain	63 (1 study) 13 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score ≤4 months - NRS total pain in the control groups was 3.2	The mean pain score ≤4 months - NRS total pain in the intervention groups was 0.7 lower (2.02 lower to 0.62 higher)
Pain score ≤4 months - NRS pain during night	63 (1 study) 13 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score ≤4 months - NRS pain during night in the control groups was 2.6	The mean pain score ≤4 months - NRS pain during night in the intervention groups was 0.9 lower (2.27 lower to 0.47 higher)
Pain score ≤4 months - NRS pain during day	63 (1 study)	LOW[a,b] due to risk of		The mean pain score ≤4 months - NRS pain during day in the control groups	The mean pain score ≤4 months - NRS pain during day in the intervention

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
	13 weeks	bias, imprecision		was 3.1	groups was 0.7 lower (2.09 lower to 0.69 higher)
Pain score >4 months - NRS leg pain	63 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score >4 months - NRS leg pain in the control groups was 1.4	The mean pain score >4 months - NRS leg pain in the intervention groups was 0.4 lower (1.44 lower to 0.64 higher)
Pain score >4months - NRS back pain VAS	63 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score >4months - NRS back pain in the control groups was 2	The mean pain score >4months - NRS back pain in the intervention groups was 0.7 lower (1.92 lower to 0.52 higher)
Pain score >4 months - NRS pain during day	63 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score >4 months - NRS pain during day in the control groups was 2.2	The mean pain score >4 months - NRS pain during day in the intervention groups was 1 lower (2.27 lower to 0.27 higher)
Pain score >4 months - NRS pain during night	63 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score >4 months - NRS pain during night in the control groups was 1.8	The mean pain score >4 months - NRS pain during night in the intervention groups was 1 lower (2.19 lower to 0.19 higher)
Pain score >4 months - NRS total pain	63 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain score >4 months - NRS total pain in the control groups was 2.1	The mean pain score >4 months - NRS total pain in the intervention groups was 0.8 lower (2.07 lower to 0.47 higher)
Function ≤ 4 months ODI	63 (1 study) 13 weeks	LOW[a,b] due to risk of bias, imprecision		The mean function score - disability ≤ 4 months in the control groups was 7.6	The mean function score - ≤ 4 months in the intervention groups was 2.3 lower (5.32 lower to 0.72 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid versus usual care (95% CI)
Function >4 months ODI	63 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean function score >4 months in the control groups was 4.1	The mean function score - >4 months in the intervention groups was 1.8 lower (4.35 lower to 0.75 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 50: Non image guided: steroid and anaesthetic epidural versus placebo for sciatica in a population with unclear spinal pathology

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus placebo (95% CI)
Pain≤ 4 months - VAS leg pain VAS	228 (1 study) 52 weeks	MODERATE[a] due to risk of bias		The mean pain> 4 months - VAS leg pain in the control groups was 2	The mean pain> 4 months - VAS leg pain in the intervention groups was 0.3 lower (1.21 lower to 0.61 higher)
Pain≤ 4 months - VAS back pain VAS	228 (1 study) 52 weeks	MODERATE[a] due to risk of bias		The mean pain> 4 months - VAS back pain in the control groups was 0.9	The mean pain> 4 months - VAS back pain in the intervention groups was 0.1 lower (0.93 lower to 0.73 higher)
Pain >4 months - VAS leg pain VAS	228 (1 study) 12 weeks	MODERATE[a] due to risk of bias		The mean pain ≤4 months - VAS leg pain in the control groups was 1.8	The mean pain ≤4 months - VAS leg pain in the intervention groups was 0.5 lower (1.36 lower to 0.36 higher)
Pain >4 months - VAS back pain VAS	228 (1 study) 12 weeks	MODERATE[a] due to risk of bias		The mean pain ≤4 months - VAS back pain in the control groups was 0.7	The mean pain ≤4 months - VAS back pain in the intervention groups was 0.3 lower (1.08 lower to 0.48 higher)
Function (ODI)≤4 months ODI	228 (1 study)	MODERATE[a,b] due to risk of		The mean function score - (ODI)≤4 months in the control groups was	The mean function score - (ODI)≤4 months in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus placebo (95% CI)
	12 weeks	bias		-12	0 higher (5.22 lower to 5.22 higher)
Function - (ODI) >4 months ODI	228 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision		The mean function score - (ODI) >4 months in the control groups was -14	The mean function score - (ODI) >4 months in the intervention groups was 2 lower (8.12 lower to 4.12 higher)
Psychological distress ≤ 4months - HAD anxiety HAD	228 (1 study) 12 weeks	LOW[a,b] due to risk of bias, imprecision		The mean psychological distress ≤ 4months - had anxiety in the control groups was -3	The mean psychological distress ≤ 4months - had anxiety in the intervention groups was 1 higher (0.04 lower to 2.04 higher)
Psychological distress ≤ 4months - HAD depression HAD	228 (1 study) 12 weeks	MODERATE[a] due to risk of bias		The mean psychological distress ≤ 4months - had depression in the control groups was -2	The mean psychological distress ≤ 4months - had depression in the intervention groups was 0 higher (1.04 lower to 1.04 higher)
Psychological distress >4 months - HAD depression HAD	214 (1 study) 52 weeks	MODERATE[a] due to risk of bias		The mean psychological distress >4 months - had depression in the control groups was -3	The mean psychological distress >4 months - had depression in the intervention groups was 0 higher (1.21 lower to 1.21 higher)
Psychological distress >4 months - HAD anxiety HAD	203 (1 study) 52 weeks	MODERATE[a] due to risk of bias		The mean psychological distress >4 months - had anxiety in the control groups was -2	The mean psychological distress >4 months - had anxiety in the intervention groups was 0 higher (1.38 lower to 1.38 higher)
Responder criteria - Improvement on leg pain 75% improvement on leg pain likert	228 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision	RR 1.18 (0.92 to 1.53)	472 per 1000	86 more per 1000 (from 43 fewer to 208 more)
Responder criteria - Improvement on back pain	228 (1 study)	LOW[a,b] due to risk of bias,	RR 1.11 (0.84 to	435 per 1000	47 more per 1000 (from 78 fewer to 177 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus placebo (95% CI)
75% improvement on back pain likert	52 weeks	imprecision	1.47)		
Healthcare utilisation (further physiotherapy) No. undertaking further physiotherapy >4 months	228 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision	RR 1.23 (0.88 to 1.81)	250 per 1000	59 more per 1000 (from 50 fewer to 194 more)
Healthcare utilisation (referral to pain management services) No. referred to pain management >4 months	228 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision	Peto odds ratio 0.12 (0.01 to 1.94)	19 per 1000	17 fewer per 1000 (from 19 fewer to 17 more)
Healthcare utilisation (further epidurals) No. referred for further epidurals >4 months	228 (1 study) 52 weeks	LOW[a,b] due to risk of bias, imprecision	RR 1.32 (0.68 to 2.53)	120 per 1000	37 more per 1000 (from 40 fewer to 166 more)
Healthcare utilisation (analgesics) - ≤4 months Mean analgesic use/week	228 (1 study) 12 weeks	MODERATE[a] due to risk of bias		The mean healthcare utilisation (analgesics) - ≤4 months in the control groups was 16	The mean healthcare utilisation (analgesics) - ≤4 months in the intervention groups was 7 lower (16.26 lower to 2.26 higher)
Healthcare utilisation (analgesics) - >4 months – 1 year Mean analgesic use/week	228 (1 study) 52 weeks	MODERATE[a] due to risk of bias		The mean healthcare utilisation (analgesics) - >4 months – 1 year in the control groups was 16	The mean healthcare utilisation (analgesics) - >4 months – 1 year in the intervention groups was 2 lower (12.35 lower to 8.35 higher)
Healthcare utilisation (surgery) 75% improvement on back pain likert	228 (1 study) 52 weeks	MODERATE[a] due to risk of bias	RR 1.08 (0.57 to 2.04)	139 per 1000	11 more per 1000 (from 62 fewer to 131 more)
Adverse events- morbidity minor adverse events	228 (1 study)	LOW[a,b] due to risk of bias,	RR 0.9 (0.41 to	102 per 1000	10 fewer per 1000 (from 60 fewer to 101 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus placebo (95% CI)
	52 weeks	imprecision	1.99)		

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 51: Steroid +anaesthetic epidural versus combination of non-invasive interventions for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus pharmacological treatment (NSAIDS) (95% CI)
Pain ≤4 months VAS	139 (1 study) 2 weeks	MODERATE[a] due to risk of bias		The mean pain ≤4 months in the control groups was 4.39	The mean pain ≤4 months in the intervention groups was 0.97 lower (11.95 lower to 10.01 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 52: Non image guided: steroid and anaesthetic epidural versus pharmacological treatment (NSAIDS) for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus pharmacological treatment (NSAIDS) (95% CI)
Pain ≤4 months VAS	64 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision		The mean pain ≤4 months in the control groups was 4.1	The mean pain ≤4 months in the intervention groups was 0.8 lower (1.49 to 0.11 lower)
Function ≤4 months ODI	64 (1 study)	LOW[a,b] due to risk of bias,		The mean function ≤4 months in the control groups was	The mean function ≤4 months in the intervention groups was 4.1 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus pharmacological treatment (NSAIDS) (95% CI)
	3 months	imprecision		20.3	(8.9 lower to 0.7 higher)
Healthcare utilisation (analgesics) No. using paracetamol	64 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision	RR 0.55 (0.20 to 1.50)	267 per 1000	121 fewer per 1000 (from 218 fewer to 108 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 53: Non image guided: steroid and anaesthetic epidural versus pharmacological treatment (combination) for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus pharmacological treatment (combination) (95% CI)
Pain - ≤ 4 months VAS	50 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain - ≤ 4 months in the control groups was 5	The mean pain - ≤ 4 months in the intervention groups was 0.5 lower (1.23 lower to 0.23 higher)
Pain -> 4 months VAS	50 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean pain -> 4 months in the control groups was 6.5	The mean pain -> 4 months in the intervention groups was 0.5 lower (1.26 lower to 0.26 higher)
Adverse events - morbidity	50 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision	RR 1.25 (0.38 to 4.12)	160 per 1000	40 more per 1000 (from 99 fewer to 499 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 54: Non image guided: steroid and anaesthetic epidural versus anaesthetic epidural for sciatica primarily caused by (≥70%) disc prolapse

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus anaesthetic (95% CI)
Pain ≤ 4 months - Methyl prednisolone versus bupivacaine VAS	105 (1 study) 3 months	MODERATE[a,b] due to risk of bias		The mean pain ≤ 4 months - methyl prednisolone versus bupivacaine in the control groups was 6.18	The mean pain ≤ 4 months - methyl prednisolone versus bupivacaine in the intervention groups was 1.28 lower (1.69 to 0.87 lower)
Pain ≤4 months - Triamcinolone + Bupivicaine versus anaesthetic VAS	107 (1 study) 3 months	MODERATE[a] due to risk of bias		The mean pain ≤4 months - triamcinolone + bupivicaine versus anaesthetic in the control groups was 6.8	The mean pain ≤4 months - triamcinolone + bupivicaine versus anaesthetic in the intervention groups was 1.38 lower (1.71 to 1.05 lower)
Pain≤4 months - Dexamethasone + Bupivicaine versus anaesthetic VAS	105 (1 study) 3 months	MODERATE[a] due to risk of bias		The mean pain≤4 months - dexamethasone + bupivicaine versus anaesthetic in the control groups was 6.8	The mean pain≤4 months - dexamethasone + bupivicaine versus anaesthetic in the intervention groups was 0.98 lower (1.47 to 0.49 lower)
Responder criteria (>75% improvement in pain subjectively) ≤4 months:	33 (1 study) 1 days	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.03 (0.67 to 1.58)	714 per 1000	21 more per 1000 (from 236 fewer to 414 more)
Responder criteria(>75% improvement in pain subjectively) >4 months:	33 (1 study) 20.8 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.9 (0.52 to 1.56)	643 per 1000	64 fewer per 1000 (from 309 fewer to 360 more)
Healthcare utilisation- surgery: N= had surgery at follow up	33 (1 study) 20.8 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.23 (0.35 to 4.02)	214 per 1000	49 more per 1000 (from 139 fewer to 647 more)
Healthcare utilisation- physiotherapy - Methyl	81	LOW[a,b]	RR 0.51	452 per 1000	223 fewer per 1000

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus anaesthetic (95% CI)
Prednisolone + Bupivicaine versus anaesthetic No. referred for further physiotherapy	(1 study) 3 months	due to risk of bias, imprecision	(0.26 to 0.99)		(from 13 fewer to 348 fewer)
Healthcare utilisation- physiotherapy - Tiamcinoline + Bupivicaine versus anaesthetic No. referred for further physiotherapy	84 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision	RR 0.37 (0.17 to 0.78)	452 per 1000	287 fewer per 1000 (from 96 fewer to 383 fewer)
Healthcare utilisation- physiotherapy - Dexamethasone + Bupivicaine versus anaesthetic No. referred for further physiotherapy	82 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision	RR 0.66 (0.37 to 1.18)	452 per 1000	152 fewer per 1000 (from 304 fewer to 64 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 55: Non image guided: Steroid and anaesthetic epidural versus anaesthetic for sciatica primarily caused by (≥70%) spinal stenosis

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus anaesthetic (95% CI)
Responder criteria (>75% improvement in pain subjectively) ≤4 months: spinal stenosis	30 (1 study) 1 days	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.11 (0.55 to 2.24)	500 per 1000	55 more per 1000 (from 225 fewer to 620 more)
Responder criteria (>75% improvement in pain subjectively) >4 months – 1 year: spinal stenosis	30 (1 study) 20.8 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.17 (0.43 to 3.13)	333 per 1000	57 more per 1000 (from 190 fewer to 710 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus anaesthetic (95% CI)
Healthcare utilisation- surgery: spinal stenosis N= had surgery at follow up	30 (1 study) 20.8 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.76 (0.38 to 1.54)	583 per 1000	140 fewer per 1000 (from 362 fewer to 315 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs

Table 56: Non image guided: steroid and anaesthetic epidural versus anaesthetic epidural for sciatica in a population with unclear spinal pathology

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Steroid + anaesthetic versus anaesthetic (95% CI)
Healthcare utilisation - analgesics - Reduced drug intake No. reduced analgesia at follow-up	29 (1 study) 1 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.24 (0.58 to 2.68)	429 per 1000	359 fewer per 1000 (from 168 fewer to 672 more)
Healthcare utilisation - surgery No. referred for surgery Follow-up: mean 1 months	30 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1 (0.31 to 3.28)	267 per 1000	267 more per 1000 (from 83 fewer to 876 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 57: Non image guided: steroid epidural versus anaesthetic epidural for sciatica in a population with unclear spinal pathology

Outcomes	No of	Quality of the evidence	Relative effect	Anticipated absolute effects

	Participants (studies) Follow up	(GRADE)	(95% CI)	Risk with Control	Risk difference with Anaesthetic versus steroid (95% CI)
Healthcare utilisation (surgery) no. referred for surgery	35 (1 study) 1 months	VERY LOW[a,b] due to risk of bias, imprecision	peto odds ratio 0.11 (0.01 to 1.77)	0 per 1000	*

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

*Not estimable as zero events in 1 treatment arm

24.4 Economic evidence

Published literature

Two economic evaluations were identified that included epidural injections for sciatica as a comparator and have been included in this review.[141,159] These are summarised in the economic evidence profiles below (**Table 58**, **Table 59**) and the economic evidence table in Appendix I.

Five economic evaluations were selectively excluded due to a combination of applicability and methodological limitations.[40,93,137,160,169] These studies are listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 58: Economic evidence profile: Steroid plus local anaesthetic (non-image guided) versus placebo

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Price 2005[141] (UK)	Partially applicable (a)	Potentially serious limitations (b)	• With-RCT analysis (associated clinical paper Arden 2005) • Cost-utility analysis (QALYs) • Population: Adults with low back pain and sciatica (unclear spinal pathology). • Two comparators in full analysis: (c) 1.Placebo (injection of 2ml of normal saline into the interspinous ligament) 2. Steroid plus local anaesthetic epidural, non-image guided (lumbar epidural injection of 80mg triamcinolone acetonide and 10ml of 0.125% bupivacaine) • Follow-up: 1 year	2−1: £265 (d)	2−1: 0.0059350 QALYs (e)	2 vs 1: £44,701 per QALY gained	No bootstrapping undertaken. A sensitivity analysis was conducted where the costs were adjusted assuming only 1 epidural injection was administered and the impact on QALYs is assumed to be unchanged. ICER = £25,746. Additional sensitivity analyses were undertaken, where the maximum healthcare professional resource use reported in the trial were used to estimate intervention costs and where the patient is assumed to require an overnight stay. In both cases this increased the total cost of intervention 2 and therefore the ICER.

(a) UK resource use data (1999-2002) and unit costs (2002/3) may not reflect current NHS context. Non-NICE reference case utility measure used to estimate QALYs (SF-6D), unclear if UK population valuations were used.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Arden 2005 is 1 of 3 studies included in the clinical review for steroid epidurals + local anaesthetic versus placebo (non-image guided). Limited sensitivity analyses undertaken.

(c) All participants received a standard physiotherapy package prior (education and exercise) and analgesia as required. Injections were repeated at 3 and 6 weeks in relation to response. The indication for repeat injection was less than a 75% improvement in Oswestry Disability Questionnaire from the baseline visit.

(d) 2002-2003 UK pounds. Cost components incorporated: For those receiving intervention 2 only: assessment and review by clinician, medical and nursing time incurred during procedure, nursing time on recovery post-procedure, drug and equipment use associated with procedure and pathology and radiology use.

(e) QALYs were calculated using patient-level SF-36 data, converted to SF-6D utility, collected at baseline, 3, 6, 12, 26 and 52 weeks. At 12 weeks the average scores converged for intervention 1 and 2. The area under the curve approach was used to calculate incremental QALYs

Table 59: Economic evidence profile: Steroid (non-image guided) epidural versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Spijker-Huiges 2014[159] (Netherlands)	Partially applicable (a)	Potentially serious limitations (b)	• With-RCT analysis (associated clinical paper Spijker-Huiges 2014A) • Cost-effectiveness analysis (health outcome: 1point improvement in NRS back pain score) • Population: Adults with sciatica (unclear spinal pathology). • Two comparators in full analysis: 1. Usual care provided by GP (pain treatment with analgesics, advice to maintain normal activities and referral if necessary) 2. Steroid epidural, non-image guided (segmental epidural injection of 80mg of triamcinolone in normal saline) • Follow-up: 1 year	2−1: £58 (c)	2−1: 0.97 mean change in NRS back pain score (d)	£60 per 1 point improvement in NRS back pain	Bootstrapping undertaken but only from a societal perspective which is not presented here. No other sensitivity analyses were conducted.

(a) Dutch resource use data (2005-2007) and unit costs (date unclear) may not reflect current NHS context. QALYs were not used as the health outcome measure.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Spijker-Huiges 2014A is 1 of many studies included in the clinical review for steroid epidurals versus usual care (non-image guided). No sensitivity analyses undertaken.

(c) Year unclear, assumed to be 2007 Euros converted using 2007 purchasing power parities[131].Cost components incorporated: Intervention cost (for intervention 2 only), GP care, hospital care, additional examinations, medication, physiotherapy, alternative therapies and home help visits.

(d) Mean change in NRS back pain score calculated from point estimate for the ICER reported in the study

The study by Spijker-Huiges 2015[160] was not combined with the previous one as the costs were reported only from a societal perspective and the QALYs calculated did not match with the results of the previous study and the individual SF36 scores reported for each intervention, ie while the individual SF36 scores show an improvement in the group receiving epidural, the QALY estimates were in favour of the control group.

24.5 Evidence statements

24.5.1 Clinical

24.5.1.1 Image guided epidurals versus sham/placebo (primarily caused by >70% disc prolapse)

In people with sciatica there was clinical benefit of an anti-TNF epidural compared with placebo for leg pain demonstrated in evidence from 1 study at up to 4 months (very low quality, n=37). When the epidural was a steroid combined with an anaesthetic, there was clinical benefit favouring the intervention arm for leg pain and number of responders with greater than or equal to 50% reduction in pain, but no difference for function (n=65, moderate quality).When anaesthetic only was administered, no difference between anaesthetic or sham was observed for pain or number of responders. No evidence was available for the other critical outcomes or for steroid mono-therapy.

24.5.1.2 Image guided epidurals versus active control

In people with sciatica primarily caused by >70% prolapse, non-disc lesion, or unclear spinal pathologies, there was no clinical benefit of a steroid plus anaesthetic epidural compared with anaesthetic alone for pain and function at either short or longer term follow up (only data for up to 4 months was available for the unclear spinal pathologies evidence). The evidence ranged from very low to high quality, and from 1 to 4 studies, n=69 to 606. When anti-TNF was combined with anaesthetic (in sciatica primarily caused by >70% prolapse), there was no benefit compared to anaesthetic alone observed for pain or function at ≤4 months (1 study, low and moderate quality, n=56). No evidence was available for the other critical outcomes or for other interventions.

In people with sciatica primarily caused by >70% prolapse, there was clinical benefit of a steroid combined with anaesthetic epidural compared with combinations of non-invasive interventions or compared with anti-TNF with anaesthetic for leg pain or function at less than or equal to 4 months (1 study, moderate quality, n=100 and n=54 for the different comparisons respectively). There was also clinical benefit for quality of life for the comparison with non-invasive combinations. No evidence was available for the other critical outcomes or interventions.

24.5.1.3 Non image guided epidurals versus sham/placebo

In people with sciatica primarily caused by >70% prolapse, there was no clinical benefit of a steroid compared with placebo for function at greater than 4 months follow-up (low quality, 2 studies, n=221), and pain at up to 4 months (moderate quality, 2 studies, n=174). There was no evidence for this comparison for any of the critical outcomes in the population with an unclear pathology. When steroid was combined with anaesthetic (in sciatica with an unclear pathology) there was no clinical benefit for pain or function demonstrated by 1 study at both short and long term follow-ups (moderate and low quality, n=228).

24.5.1.4 Non image guided epidurals versus active control

In people with sciatica with an unclear pathology, there was a clinical benefit of steroid compared to usual care for leg pain and function demonstrated in evidence from 1 study at up to 4 months but

not at greater than 4 months and most of the quality of life domains at both short and long term follow up (low quality, n=63).

In people with sciatica primarily caused by >70% prolapse, there was no clinical benefit of steroid combined with anaesthetic compared with pharmacological treatment (NSAIDs) for pain and function demonstrated in evidence from 1 study at up to 4 months (low quality, n=64), or for pain when compared with a combination of pharmacological interventions at both short and long term follow up (1 study, low and very low quality, n=50).

In people with sciatica primarily caused by >70% prolapse, there was clinical benefit of steroid combined with anaesthetic compared with anaesthetic demonstrated in evidence from 1 study for pain at up to 4 months when using a combination of methylprednisolone or triamcinolone in combination with bupivacaine (moderate quality, n=105). However there was no benefit when dexamethasone and bupivacaine were used (moderate quality, n=105). There was no evidence for any of the critical outcomes for this comparison in the sciatica caused by spinal stenosis or unclear pathology populations.

24.5.2 Economic

- One cost-utility analysis found that non-image guided epidural injections of steroid plus anaesthetic was not cost effective compared to placebo for adults with low back pain and sciatica (ICER: £44,701 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost-effectiveness analysis found that non-image guided steroid epidural was more costly and more effective than placebo for adults with sciatica (ICER: £60 per 1 point improvement in NRS back pain score). This analysis was assessed as partially applicable with potentially serious limitations.

24.6 Recommendations and link to evidence

Recommendations	**36. Consider epidural injections of local anaesthetic and steroid in people with acute and severe sciatica.** **37. Do not use epidural injections for neurogenic claudication in people who have central spinal canal stenosis.**
Research recommendations	**6. What is the clinical and cost effectiveness of image guided compared to non-image guided epidural injections for people with acute sciatica?**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Adverse events (mortality and morbidity), and healthcare utilisation were also considered as important. For image-guided epidurals, evidence was reported for all of the critical outcomes, but there were limited data for quality of life. For non-image-guided epidurals there was no evidence for quality of life.
Trade-off between clinical benefits and harms	The GDG agreed that there was sufficient RCT evidence for all comparisons except for image-guided epidurals versus placebo/sham. However, there was no relevant cohort data found to address this. The GDG agreed that the evidence for the effectiveness of epidurals was conflicting. They noted that sciatic symptoms usually improve over the course of a few months in the majority of people without treatment. The placebo-controlled trials did show some evidence of an effect for epidurals, particularly for the combination of steroid plus anaesthetic. The evidence suggested the important component was the steroid,

	but there was no evidence of benefit of steroid alone or anaesthetic alone when compared to placebo/sham for any critical outcome. As a responder analysis suggested a 35% increase in the probability that people obtain substantial pain relief following epidural injections (steroid plus anaesthetic) compared to placebo, it was agreed that epidural injection of local anaesthetic and steroid should be considered as a treatment option. Most of the RCT evidence in the review came from people with acute and moderately severe sciatica, and the GDG considered that this would be the population most likely to benefit from epidural injection. The group discussed the evidence for anti-TNF. There was no evidence found for non-image guided anti-TNF, but there was evidence for image-guided anti-TNF epidurals. Despite the evidence showing a positive effect of image-guided anti-TNF epidurals on pain and function, the GDG noted that the evidence was limited as it came from three studies which could not be pooled together because different comparisons were used. The group discussed the risks associated with the different routes of administration of an epidural. The opinion of the group was that serious complications are very rare. The most common adverse event was a temporary increase in pain which the GDG considered could be outweighed by the potential benefits. The group discussed that there is some guidance in the UK suggesting epidurals should be given under image-guidance based on safety grounds, although there was limited evidence for a difference in effectiveness of image guided compared to non-image guided epidural injections from this review. It was therefore agreed that a recommendation for future research should be drafted to ascertain the evidence base for safety and effectiveness for image guided and non- image guided epidural injections. **Summary** Overall, the GDG considered that epidural injection, whether administered under image guidance or without, is a relatively safe and routinely used procedure, and had some evidence demonstrated by placebo-controlled trials for effectiveness in pain relief for epidurals of local anaesthetic and steroid. There was insufficient/ lack of evidence for effectiveness to support epidural injections using anti-TNF. The studies were conducted in small populations who had at least moderately severe sciatica and did not have further treatment options available to them (other than surgery). The evidence reviewed by the GDG suggests that epidural injection of local anaesthetic and steroid may reduce the number of people who would require surgical intervention. This evidence was reinforced by evidence from 2 trials that were included in the spinal decompression review (See Chapter 28) that compared decompression to epidurals showing that 50% of people who had an epidural did not go on to have surgery. The group therefore agreed that in acute, severe sciatica where patients would otherwise be offered surgery, an epidural injection of local anaesthetic and steroid should be considered. The group discussed the evidence that had been conducted in sciatica patients with central spinal canal stenosis. The populations studied comprised people with neurogenic claudication primarily. There was insufficient evidence that epidural injections of local anaesthetic and steroid were effective in this group of people and it was noted that current opinion also reflects this. The group therefore agreed to make a recommendation against using epidurals in people with claudicant leg symptoms caused by central spinal canal stenosis. The GDG discussed that the purpose of this review had been to determine efficacy of different injectates, rather than comparing image guided to non-image guided injections. However, the stratification of the review by those delivered under image guided to those that weren't did not demonstrate a clear indication of improved efficacy of image guided epidurals over non-image guided. They therefore agreed that a research recommendation was warranted in this area.
Trade-off between	Two economic evaluations were included comparing non-image guided epidural with

net clinical effects and costs	either usual care or placebo in a population of adults with sciatica.[141, 159] In particular the study by Price *et al.* (2005)[141] was a cost-utility analysis comparing the intervention with placebo which concluded that epidural increased costs and improved health (increased QALYs), with an incremental cost-effectiveness ratio of £44,701 per QALY gained. In sensitivity analysis where the costs were adjusted assuming only 1 epidural injection was administered and the impact on QALYs was assumed to be unchanged, the ICER went down to £25,746. The group noted that as the recommendation for epidurals was for the acute sciatica population (most likely to be defined as having symptoms for <3 months), then multiple injections would not usually be performed within this short period of time. The GDG discussed the likely higher effectiveness observed with placebo as opposed to no treatment and concluded that if epidural was compared to no treatment or usual care it would probably be associated with a higher QALY gain, and therefore it would be more cost effective. In the same study no cost was attached to the placebo arm while in reality patients could incur the cost of other treatments such as medications and the cost of their side effects. The GDG noted that the studies from which the cost effectiveness data was derived did not have a diagnosis of sciatica confirmed by imaging. The GDG felt that clinical diagnosis alone may overestimate the numbers of patients with true sciatica and lower their confidence in the results. There was evidence suggesting that epidural injection may reduce the number of people with severe sciatica requiring surgical intervention; this would generate some cost savings. For these reasons, the GDG decided not to make a strong recommendation on epidural injections but they concluded that they may be cost effective for some patients and therefore it should be considered.
Quality of evidence	The quality of the evidence for both image guided and non-image guided epidurals was mostly low or moderate (due to risk of bias usually caused by selection or performance bias, small sample sizes and imprecision) across all of the outcomes and comparisons in the review. There was evidence to show an effect of anti-TNF (image-guided), however this was only from single studies, which mostly had small sample sizes. Some of the studies had incomplete reporting of outcome data (for example, no standard deviations were reported for some outcomes and 1 study only had data for 1 participant in the comparison arm). This also meant that the evidence was rated as being at high risk of bias and so overall the group did not have confidence in the findings. The GDG had more confidence in the evidence for epidurals in sciatica patients with spinal stenosis (steroid was given as an adjunct) because the main study contributing to the meta-analysis was conducted in 400 participants. The group were less confident in the results of the other contributing study, since it was smaller and although it was also conducted in spinal stenosis patients, it differed considerably to the other studies in the review. The population consisted of chronic sciatica patients with over 100 months of pain, and patients could be given as many epidural injections as they needed (the average given was 4). The GDG felt that this did not reflect clinical practice.
Other considerations	The group discussed the effectiveness of giving multiple / subsequent epidural injections. The group noted that as the recommendation for epidurals was for the acute sciatica population (most likely to be defined as having symptoms for <3 months), then multiple injections would not usually be performed within this short period of time. The GDG agreed that this recommendation would equally apply for pregnant women and should be considered alongside BNF guidance. The GDG were aware of existing NICE interventional procedure guidance for Therapeutic endoscopic division of epidural adhesions (IPG333) recommending

	special arrangements for clinical governance, consent, audit and research.[124] This procedure was therefore excluded from this review and if it's use is considered for people with sciatica, existing guidance should be followed. **Research recommendation** **Why this is important:** Epidural injection of therapeutic substances that include corticosteroids is commonly offered to people with sciatica. Epidural injection might improve symptoms, reduce disability and speed up return to normal activities. Several different procedures have been developed for epidural delivery of corticosteroids. Some practitioners inject substances through the caudal opening to the spinal canal in the sacrum (caudal epidural), whereas others direct the injection through the foraminal space at the presumed level of nerve root irritation (transforaminal epidural). There is a rationale that transforaminal epidurals might be most effective, by ensuring delivery of corticosteroids directly to the region in which the nerve root might be compromised. However, transforaminal epidural injection requires imaging, usually within a specialist setting, potentially limiting treatment access and increasing costs. Caudal epidural injection might be undertaken without imaging, or with ultrasound guidance in a non-specialist setting, but, it has been argued, the drug might not reach the affected nerve root and therefore this approach might not be as effective as would be transforaminal injection. Empirical evidence that 1 approach is clearly superior to the other is currently lacking. Access to the two procedures varies between healthcare providers, and people who do not respond to caudal corticosteroid injection might subsequently receive image guided epidural injection. People with sciatica might therefore currently experience unnecessary symptoms at unnecessary cost to the NHS than would be the case if the most cost effective modes of delivering epidural corticosteroid injections were used.

25 Surgery and prognostic factors

25.1 Introduction

Surgery for low back pain and sciatica is most commonly carried out when more conservative treatments have failed. As with most major invasive procedures, surgery to manage back pain and sciatica carries with it an inherent risk of serious harm.

For surgery in people with low back pain, a number of prognostic factors are thought to be linked to better or worse response to surgery. These include a history of previous spinal fusion surgery, smoking status, BMI and psychological distress. The likelihood of successful surgery may be important therefore to help inform the clinical decision to refer a person for surgery. In people with suspected sciatica however, the prognostic factors for response to surgery are thought to be distinct and may be more affected by the presence of radicular symptoms and presence of pathology on imaging.

This review intends to ascertain the evidence for whether these prognostic factors are indicative of response to surgical intervention in people with low back pain or sciatica.

25.2 Review question: Does history of previous fusion surgery, smoking status, BMI or psychological distress predict response to surgery in people with non-specific low back pain?

For full details see review protocol in Appendix C.

Table 60: Characteristics of review question (low back pain)

Population	People aged 16 or above with non-specific low back pain (with/without sciatica) or low back pain without sciatica who have failed to respond to appropriate conservative therapy.
Prognostic variable/s under consideration	• History of previous fusion surgery • Smoking • BMI >30 • Psychological distress
Confounding factors	Duration of symptoms

Outcomes	**Critical**
	• Health-related quality of life (for example, SF-12, SF-36 or EQ-5D).
	• Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).
	• Function (for example the Roland-Morris disability questionnaire or the Oswestry disability index).
	• Psychological distress (HADS, GHQ, BPI, BDI, STAI)
	• Adverse events
	  ○ Mortality
	  ○ Morbidity
	  ○ Re-operation rate
	Important
	• Surgery conversion rate

Study design	• Prospective and retrospective cohorts (with multivariate analysis adjusted for key

	confounders (if none are identified those with multivariate analysis adjusted for other confounders will be included) • Randomised trials (if appropriate) with multivariate analysis adjusted for key confounders (if none are identified those with multivariate analysis adjusted for other confounders will be included) • Systematic reviews of the above

25.3 Review question: Does image concordant pathology or presence of radicular symptoms predict response to surgery in people with suspected sciatica?

Table 61: Characteristics of review question (Sciatica)

Population	People aged 16 or above with sciatica who have failed to respond to appropriate conservative therapy.
Prognostic variable/s under consideration	• Image concordant pathology (diagnosis supported by imaging - i.e. MRI or CT. To see if compression is present or not) • Radicular symptoms (pain that extends to leg vs. pain in back/buttock only)
Confounding factors	• Duration of symptoms
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI) • Adverse events ○ Mortality ○ Morbidity ○ Re-operation rate **Important** • Surgery conversion rate
Study design	• Prospective and retrospective cohorts (with multivariate analysis adjusted for key confounders (if none are identified those with multivariate analysis adjusted for other confounders will be included) • Randomised trials (if appropriate) with multivariate analysis adjusted for key confounders (if none are identified those with multivariate analysis adjusted for other confounders will be included) • Systematic reviews of the above

25.4 Clinical evidence

A.1.1 Low back pain

Four studies were included in the review.[89,132,135,148,152,168] Evidence from these are summarised in the clinical evidence profile below (table 63) See also the study selection flow chart in Appendix E, forest plots in Appendix K, Grade tables in Appendix J, study evidence tables in Appendix H and exclusion list in Appendix L.

We searched for studies with multivariable analysis for all the prognostic factors included in the review protocol. Although the four included studies carried out multivariable analyses, they all adjusted for different confounding variables (defined in table 63).

Table 62: Summary of studies included in the review

Study	Population	Prognostic variable(s)	Confounders	Outcomes	Limitations
Ostelo 2005[132] (Prospective study conducted within the framework of RCT)	Single cohort of people with low back pain with/without sciatica recruited from multicentre in the Netherlands N=105 Type of surgery= no details provided	BMI, Psychological distress-negative affectivity (Negative Emotionality sub-scale of the Multi-dimensional Personality Questionnaire)NEM >1-≤4 vs NEM ≤1 (reference)and NEM >4 vs NEM ≤1(reference) (High is worse outcome) Radicular symptoms (pain that extends to leg vs. pain in back/buttock only)-Preoperative-LP (VAS >43)	Duration of complaints before surgery, age, gender, BMI, whether or not pain medication was taken at baseline because the residual complaints, number of days in hospital following the surgery, severity of pain in back and leg (both on VAS), pain catastrophising (Pain Catastrophising Scale, PCS), fear of movement (Tampa scale for Kinesiophobia, TSK)	Recovered Function (RMDQ≤4) Recovered Back Pain (VAS ≤10 mm), Recovered Leg Pain (VAS ≤10 mm) Follow-up= 12 months	High risk of bias. Cross- sectional study design. Key confounder defined in the protocol adjusted for in the multivariate analysis. Variables showing a promising relationship in the univariate analysis were included in the multivariate analysis.
Pearson 2012[135] (combined prospective RCT and observational cohort)	Single cohort with spinal stenosis (with/without sciatica) recruited from multicentre in the United States N=634 Type of surgery= standard open decompressive laminectomy compared to the non-operative treatment of usual care.	BMI, Smoking status	Duration of symptoms, age, gender, centre, baseline ODI score income, treatment preference, compensation status, baseline Stenosis Bothersomeness Index, joint problems, stomach problems and bowel problems	Treatment Effect = change in Function ODI (surgery)-change in Function ODI (non-operative) Follow-up= 4 years	Very high risk of bias. Combination of RCT and cross-sectional study design; high rate of protocol non-adherence and the consistency of findings in RCT and key confounder defined in the protocol adjusted for in the multivariate analysis.

Study	Population	Prognostic variable(s)	Confounders	Outcomes	Limitations
Silverplats 2010[152] (Prospective cohort)	Single cohort, consecutive patients with low back pain with/without sciatica recruited in Sweden N=171 Type of surgery=midline approach to dissect the paravertebral muscles down to the laminae and the interlaminar was resected. Partial laminotomy performed when required	Radicular Symptoms (VAS Leg Pain), Smoking, Psychological distress (Zung Depression Scale, ZDS)	Duration of pain, age gender, level of disc hernia, use of analgesics, time on sick leave, baseline leg and back pain, ZDS and ODI	Pain (VAS) Follow-up=2 years	Very high risk of bias. Cross-sectional study design. Key confounder defined in the protocol adjusted for in the multivariate analysis. All predictors that showed a potential influence in the initial bivariate analyses were included. Results were only reported narratively with no statistics (apart from p-values given)
Trief 2000[168] (Prospective cohort) study in patients with low back pain	Single cohort of patients with low back pain recruited in the USA N=159 Type of surgery=Lumbar spine surgery. Majority (67.7% underwent fusion)	Psychological Distress (Dallas Pain Questionnaire)	Duration of pain, age gender	Function (Dallas Pain Questionnaire)	Very high risk of bias. The study reported other data/outcomes which did not meet the criteria set in the protocol. The statistic reported for the data that met the inclusion criteria is not interpretable and does not answer the question posed in this review.

A.1.2 Sciatica

Two studies were included in the review.[28,89] Evidence from these are summarised in the clinical evidence profile below (table 63) See also the study selection flow chart in Appendix E, forest plots in Appendix K, Grade tables in Appendix J, study evidence tables in Appendix H and exclusion list in Appendix L.

We searched for studies with multivariable analysis for all the prognostic factors included in the review protocol. Although the 2 included studies carried out multivariable analyses, they all adjusted for different confounding variables (defined in table 63). There was no evidence found for image concordant pathology as a prognostic factor in people with sciatica.

Table 63: Summary of studies included in the review

Study	Population	Prognostic variable(s)	Confounders	Outcomes	Limitations
Cook 2015 [28](Retrospective cohort study)	Single cohort recruited from multicentre spine outcomes registry in the USA N=1108 Type of surgery=discectomy	Radicular symptoms (pain that extends to leg vs. pain in back/buttock only)-Preoperative-LP VAS, Leg pain greater than back pain	Age, BMI, gender, previous back surgery history, baseline ODI, baseline back pain VAS, baseline SF-12 PCS and MCS scores, presence/absence of complications, levels of surgery and diagnosis.	Function (ODI>10) Follow-up=23.5 months (range 12-49 months)	Very high risk of bias. Key confounder defined in the protocol not adjusted for in the multivariate analysis. Results found significant with p values 0.10 in the univariate analysis were included in four distinct MVA models
Lee 2010 [89](Retrospective cohort study)	Single cohort recruited in South Korea N=40 Type of surgery=discectomy	Radicular symptoms (pain that extends to leg vs. pain in back/buttock only)-Preoperative-LP VAS	Duration of pain, age, gender, BMI, smoking, surgical levels and whether the surgery was a revision operation or the primary operation.	Percentage change in pain (VAS) Percentage change in function (ODI) Follow-up= 1 year	Very high risk of bias. Cross-sectional study design. Key confounder defined in the protocol adjusted for in the multivariate analysis. Results found significant in the univariate analysis were included in the MVA although there was poor reporting of the rationale for inclusion of the prognostic factors.

25.4.1 Low back pain

Table 64: Clinical evidence summary: Smoking (surgery: open decompressive laminectomy)

Risk factors/outcomes/population	Number of studies	Mean difference and SE in single study	Imprecision	GRADE
Smoking versus non-smoking for predicting the treatment effect(TE=change in ODI(surgery) – Change in ODI(non-operative) at 4 years on patients with spinal stenosis (low back pain and/or Sciatica population)	1	Adjusted Mean Difference[Standard Error]: 10.1 (3.055)[a, b]	No serious imprecision	LOW

[a] Methods multivariable analysis, including key covariates used in analysis to assess if smoking versus non-smoking is an independent risk factor. Key covariates included: Duration of symptoms, Age, Gender, Centre, Baseline ODI score income, treatment preference, compensation status, baseline Stenosis Bothersomeness Index, joint problems, stomach problems and bowel problems
[b] ANCOVA results

Table 65: Clinical evidence summary: BMI >30 (surgery not defined)

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
BMI>30 versus BMI< 25 for predicting the effect on recovered Function (RDQ≤4) at 3 months (patients with back or leg pain)	1	Adjusted OR : 0.79 [0.21, 2.94]	Serious[b]	VERY LOW

[a] 95% CI around the median crosses null line.
Note: Methods multivariable analysis, including key covariates used in analysis to assess if BMI>30 versus BMI< 25 is an independent risk factor. Duration of complaints before surgery, age, gender, BMI, whether or not pain medication was taken at baseline because the residual complaints, number of days in hospital following the surgery, severity of pain in back and leg (both on VAS), pain catastrophising (Pain Catastrophising Scale, PCS), fear of movement (Tampa scale for Kinesiophobia, TSK)

Table 66: Clinical evidence summary: Psychological Distress (surgery not defined)

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
Psychological Distress (Negative Affectivity (NEM>1-≤4 versus NEM ≤1) on Back Pain (VAS≤10mm) at 3 months (patients with back or leg pain) NEM scale:1-5, high is poor outcome	1	Adjusted OR : 0.55 [0.19, 1.61]	No serious imprecision	LOW
Psychological Distress (Negative Affectivity (NEM>4 versus NEM ≤1) on Back Pain (VAS≤10mm) at 3 months (patients with back or leg pain) NEM scale:1-5, high is poor outcome	1	Adjusted OR : 0.21 [0.06, 0.78]	Serious[b]	VERY LOW

[a] *95% CI around the median crosses null line.*

Note: Methods multivariable analysis, including key covariates used in analysis to assess Negative Affectivity (NEM>1-≤4/NEM >4 versus NEM ≤1 is an independent risk factor. Duration of complaints before surgery, age, gender, BMI, whether or not pain medication was taken at baseline because the residual complaints, number of days in hospital following the surgery, severity of pain in back and leg (both on VAS), pain catastrophising (Pain Catastrophising Scale, PCS), fear of movement (Tampa scale for Kinesiophobia, TSK)

25.4.2 Sciatica

Table 67: Clinical evidence summary: Radicular symptoms (continuous outcome) (surgery: open decompressive laminectomy)

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
Pre-op predominant Leg Pain (Bothersomeness Scale,0-6 point Likert-type scale) versus pre-op predominant Back Pain (Bothersomeness Scale,0-6 point Likert-type scale predicting the treatment effect (TE=change in ODI(surgery) – Change in ODI(non-operative)) at 4 years on patients with spinal stenosis (low back pain and/or	1	Adjusted Mean Difference(Standard Error): -4.2 (1.088)	No serious imprecision	VERY LOW

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
Sciatica population.				

Note: Methods multivariable analysis, including key covariates used in analysis to assess if Pre-op radicular pain to leg is an independent risk factor. Key covariates included: Duration of symptoms, Age, Gender, Centre, Baseline ODI score income, treatment preference, compensation status, baseline Stenosis Bothersomeness Index, joint problems, stomach problems and bowel problems.

Table 68: Clinical evidence summary: Radicular symptoms (surgery not defined)

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
Pre-operative leg pain (VAS >43) versus Leg Pain (VAS ≤43)on leg pain VAS≤10 mm) at 3 months (patients with back or leg pain)	1	Adjusted OR : 0.24 [0.10, 0.58]	No serious imprecision	VERY LOW
Pre-operative leg pain (VAS >43) versus leg pain (VAS ≤43) on leg pain (VAS≤10 mm) at 12 months (patients with back or leg pain)	1	Adjusted OR : 0.38 [0.16, 0.75]	No serious imprecision	VERY LOW

Note: Methods multivariable analysis, including key covariates used in analysis to assess if Pre-operative Leg Pain (VAS >43) versus Leg Pain (VAS ≤43 is an independent risk factor. Duration of complaints before surgery, age, gender, BMI, whether or not pain medication was taken at baseline because the residual complaints, number of days in hospital following the surgery, severity of pain in back and leg (both on VAS), pain catastrophising (Pain Catastrophising Scale, PCS), fear of movement (Tampa scale for Kinesiophobia, TSK)

Table 69: Clinical evidence summary: Radicular symptoms (categorical outcome) (surgery: dissection of the paravertebral muscles down to the laminae and resection of the interlaminar)

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
Effects of Pre-op leg pain (VAS) on Function (ODI>10) at 1 year (patients with Sciatica	1	Adjusted OR : 0.523 [0.135, 2.028]	Serious[b]	VERY LOW

[a] 95% CI around the median crosses null line.

Note: Methods multivariable analysis, including key covariates used in analysis to assess if pre-op Leg Pain (VAS) is an independent risk factor. Key covariates included: Duration of pain, age, gender, BMI, smoking, surgical levels and whether the surgery was a revision operation or the primary operation.

Table 70: Clinical evidence summary: Radicular symptoms (surgery: discectomy)

Risk factors/outcomes/population	Number of studies	OR Effect and CI in single study	Imprecision	GRADE
Leg pain greater than back pain on 50% improvement in pain in 1 year	1	Adjusted OR : 1.02 [0.70, 1.48]	No serious imprecision	LOW
Leg pain greater than back pain on 30% improvement in function assessed by ODI in 1 year	1	Adjusted OR : 1.71 [1.18, 2.47]	No serious imprecision	LOW
Leg pain greater than back pain on 50% improvement in function assessed by ODI in 1 year	1	Adjusted OR : 1.93 [1.35, 2.77]	No serious imprecision	LOW

Methods multivariable analysis, including key covariates used in analysis to assess if leg pain greater than back pain is an independent risk factor. Key covariates included: Age, BMI, gender, previous back surgery, history, baseline ODI, baseline back pain VAS, baseline SF-12 PCS and MCS scores, presence/absence of complications, levels of surgery and diagnosis

25.5 Economic evidence

Published literature

No relevant economic evaluations were identified.

See also the economic article selection flow chart in Appendix F.

25.6 Evidence statements

25.6.1 Clinical

25.6.1.1 Low back pain

Smoking

Low quality evidence from a single cohort study with a multivariable analysis, showed smoking status was a prognostic factor after adjusting for duration of symptoms in predicting improvement in function after surgery, favouring not smoking, in people with low back pain (n=634).

BMI >30

Very low quality evidence from a single cohort study with multivariable analysis gave some indication that a BMI greater than 30 may be a prognostic factor in predicting poorer response to surgery in terms of improving function in people with low back pain (n=105) after adjusting for duration of complaints before surgery. This was highly imprecise with an adjusted odds ratio of 0.79 [0.21, 2.94].

Psychological Distress

Low-very low quality evidence from a single cohort study with multivariable analysis, suggested that psychological distress was a prognostic factor in predicting response to surgery in terms of improving back pain after adjusting for duration of complaints before surgery, with lower levels of distress predicting better outcome, in people with low back pain or sciatica (n=105).

History of previous fusion surgery

No relevant evidence was identified.

25.6.1.2 Sciatica

Radicular symptoms

Very low quality evidence from a single cohort study with multivariable analysis suggested presence of radicular symptoms was a prognostic factor for predicting the response to surgery at less than or equal to 4 months after adjusting for duration of symptoms (n=105). Low- very low quality evidence from 4 cohort studies with multivariable analyse is, suggested presence of

radicular symptoms was a prognostic factor in predicting response to surgery at greater than 4 months in people with sciatica (n=1782) after adjusting for duration of symptoms, duration of complaints before surgery and duration of pain. This evidence indicated that greater radicular symptoms / higher leg pain scores indicated better response to surgery.

Image-concordant pathology

No relevant evidence was identified

25.6.2 Economic

No relevant economic evaluations were identified.

25.7 Recommendations and link to evidence

Recommendations	38.Do not allow a person's BMI, smoking status or psychological distress to influence the decision to refer them for a surgical opinion for sciatica.
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity; function, psychological distress and adverse events (mortality, morbidity and re-operation rate) were the outcomes that were critical for decision making. Surgery conversion rate was also considered as important. Evidence was reported for all prognostic factors that were pre-specified in the protocol except for history of fusion surgery for people with low back pain and image concordant pathology in the sciatica population. **Low back pain** Evidence for the prognostic factors smoking, BMI >30 and psychological distress was available for the outcomes of pain and function only. There was no evidence for any of the other outcomes. **Sciatica** Evidence for the prognostic factor radicular symptoms (pain that extends to leg versus pain in back/buttock only) was available for the outcome of pain and function only, and no evidence was found for any of the other outcomes.
Trade- off between clinical benefits and harms	Overall, there was a paucity of evidence to effectively explore the effect of prognostic factors on the outcomes of people with low back pain or sciatica following surgery. It was acknowledged by the GDG that in the low quality, evidence identified in this review, there was a trend towards worse outcomes in the groups of people who had prognostic factors identified-for example; smoking and high BMI. **Low back pain** There was evidence that non-smokers had a greater improvement in function following surgery compared to smokers. Other evidence reported negative effects on pain and function outcomes following surgery in people with a higher BMI or with psychological distress. The strength of this evidence was weak however and the GDG agreed that this carried significant uncertainty. There was scant evidence supporting better surgical outcome in people who did not have a prognostic factor identified (for example, there were no trials investigating the surgical outcomes of patients post smoking cessation). **Sciatica** The evidence suggested better outcomes for patients for patients with predominant leg pain following surgery for sciatica. The GDG noted that the evidence for leg pain prior to surgery was in a population undergoing surgery for sciatica and therefore would be expected to have a more favourable outcome from surgery. The GDG considered that the influence of predominant leg pain on the treatment effect seen at 4 years could be as a result of the long follow up time adopted in this study given that sciatica has a generally favourable prognosis over the long term. **Summary** The type of surgery carried out was different in each study and not defined in the case of 2 trials. Therefore, differences in surgical outcome could possibly be due to the surgical technique adopted rather than the prognostic factor, despite the adjustments for confounders in the multivariate analyses. Unfortunately, it was not possible to statistically explore this difference due to lack of data. The GDG agreed that there was insufficient evidence to suggest that smoking and obesity reliably impacted the prognosis for patients undergoing surgical treatment. It was however acknowledged that weight loss and smoking cessation have public health benefits and therefore should be encouraged. (See the NICE guideline for obesity and smoking cessation for more information). It was noted that these

	prognostic factors may increase the risk of surgery, but do not appear to affect the outcome, and the benefits of surgery in some may outweigh the risks. It was agreed that the prognostic factors identified should not preclude a surgical opinion where the benefits of surgery might outweigh the potential risks.
Trade-off between net clinical effects and costs	No economic evaluations were identified from the published literature. The GDG considered whether making a recommendation to not base decision for referral for a surgical opinion on these prognostic factors may lead to additional referrals for surgery if CCGs are currently refusing referrals for surgery on the basis of these factors, which in turn could result in an increase in the number of people having surgery. The GDG noted however that this recommendation was unlikely to impact sciatica surgery referrals as people are not currently being denied referral for surgical opinion on the basis of their BMI, smoking status or psychological distress, however the recommendation has been made specific to sciatica because the evidence reviewed elsewhere in this guideline has led to surgery only being recommended for sciatica rather than low back pain.
Quality of evidence	The evidence was from 5 prospective cohort and 1 retrospective cohort studies and ranged from low to very low quality mainly due to high risk of bias due to selection and attrition bias. For the prognostic factors of BMI, psychological distress and radicular symptoms, data came from a single, relatively small (N=105) trial, and the evidence was graded as very low quality with serious imprecision. Evidence was only available at short follow up time of 3 months for the majority of outcomes. The GDG noted that it may have been beneficial if the categories of obesity had been stratified further in the study rather than just the 2 cut-offs that were considered (i.e. <25 and >30) as this might reveal further differences in prognosis. A referent of BMI <25 was used in the study and data for the BMI=25-30 group reported separately compared to this referent (in addition the BMI>30 group of interest). The evidence for the prognostic factors of smoking and radicular symptoms was of overall very low quality due to selection bias demonstrated by unclear confounding of all the key confounders that could influence outcomes in the MVA and an >10% group differential attrition bias related to outcomes with no appropriate imputation in the studies.
Other considerations	The GDG discussed the ethical issues around shared decision making regarding spinal surgery and using information based on limited prognostic factors to decide treatment for patients. They agreed that using the limited evidence to deny treatment to certain people would be unethical. The GDG noted that the recommendation was based upon the prognostic factors identified in the protocol and there may be other factors, for example, age and the presence of co-morbidities.

26 Disc replacement

26.1 Introduction

Disc replacement, or spine arthroplasty, is an operation carried out to treat spinal pain. The indications and rationale are similar to those of spinal fusion. The procedure involves replacing intervertebral units with artificial discs that can act as a functional prosthetic replacement. The pain relief stems from removal of the painful disc. Single discs can be replaced, or alternatively, several levels can be replaced during the same surgery. Some clinicians consider that the advantage of disc arthroplasty over spinal fusion is that it preserves movement, which may have some benefits. Other clinicians have the view that the movement confers no significant clinical advantage.

The specific selection procedures mean that only a small number of people are suitable for surgery, and the surgical approach inevitably carries with it risks of serious harm. Since it was first introduced, the frequency of use of this procedure appears to have fallen.

26.2 Review question: What is the clinical and cost-effectiveness of disc replacement surgery in people with non-specific low back pain?

For full details see review protocol in Appendix C

Table 71: PICO characteristics of review question

Population	People aged 16 or above with non-specific low back pain. • Populations with low back pain only and low back pain with/without sciatica will be pooled for analysis
Intervention	Disc replacement surgery
Comparisons	• Usual care • Other treatment (interventions listed in our guideline review protocols)

Outcomes	**Critical**
	• Health-related quality of life (for example, SF-12, SF-36 or EQ-5D).
	• Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).
	• Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index).
	• Psychological distress (HADS, GHQ, BPI, BDI, STAI)
	Important
	• Responder criteria (> 30% improvement in pain or function)
	• Adverse events:
	  ○ morbidity
	  ○ mortality
	• Revision rate
	• Failure rate
	• Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
	Outcomes to be recorded at:
	• Short term (≤ 4 months) (8 weeks to 4 months)
	• Long-term:
	  ○ >4 months - 1 year (4 months to 1 year) for all outcomes
	  ○ 0-2 years for critical outcomes

	○ 0-10 years for failure rates and revision rates.
Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

26.3 Clinical evidence

A search was undertaken for randomised trials comparing the clinical and cost effectiveness of performing disc replacement surgery in people with low back pain. Five randomised controlled trials were included in the review; 2 of the studies were published as multiple papers: Berg 2009A,[6-8,44,154] Gornet 2011,[55] Hellum 2011,[59-61,65,66] Li 2013,[94,95] Sasso 2008.[149,150]

All studies included people with low back pain with or without sciatica, and compared disc replacement to other treatment. Four studies compared disc replacement to spinal fusion,[7,55,95,150] while 1 compared disc replacement to a 3-element MBR programme.[61]

The search was extended to cohort studies due to insufficient evidence and 2 further studies were included .[92,122,144]

Berg2009A,[6-8,44,154] Gornet2011[55] and Lee2015 [91,92] are also included in the Spinal fusion chapter (See Chapter 27).

One Cochrane review[63,64] was identified but was not included as the stratification of the people with low back pain, low back pain with/without sciatica and sciatica was unclear. The studies included in the Cochrane review were individually assessed and included if they matched the protocol.

The included studies are summarised in **Table 72** below. Evidence from these studies is summarised in the clinical evidence summary below (**Table 74**, **Table 74** and **Table 75**). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

26.3.1 Summary of included studies

Table 72: Summary of studies included in the review

Study	Intervention and comparison	Population	Outcomes	Comments
Berg 2009A[6-8,44,154]	Total disc replacement (Charite, ProDisc, Maverick) Spinal fusion (posterolateral fusion or posterior lumbar interbody fusion)	Low back pain with or without sciatica N=152 5 years follow up Sweden	Health-related quality of life (EQ-5D) Pain severity (Back pain VAS, leg pain VAS) Function (ODI) Reoperations (number of patients; device-related, number of events)	All smokers were encouraged to give up smoking before treatment Postoperatively, patients in both groups increased their activities as quickly as they could tolerate and were instructed to be as mobile as possible without restriction (though sport and heavy lifting were to be avoided for 6 weeks and 3 months, respectively). Walking, together with a small programme to activate back and trunk muscles, were

Study	Intervention and comparison	Population	Outcomes	Comments
				recommended Postoperatively, all patients were referred to outpatient physiotherapy Postoperatively, a soft lumbar orthosis was used for 6 weeks in the total disc replacement group, as recommended by some suppliers Part of the evidence was reported in a format that could not be analysed in this report, and has been presented in Table 73
Gornet 2011[55]	Total disc replacement (Maverick) Spinal fusion (stand-alone anterior lumbar interbody fusion)	Low back pain with or without sciatica N=577 2 years follow up United States of America	Health-related quality of life (SF-36) Pain severity (Back pain NRS, leg pain NRS) Function (ODI) Reoperations (number of patients) Adverse events (number of patients: any reported; possibly device-related)	No details given of any concomitant treatment or post-operative instructions/advice One patient was randomised to the investigational group but received control treatment and was analysed in the control group Adverse events were reported at the unclear 'operative' time point and were therefore extracted as ≤ 4 months outcome Adverse events were reported for the intervention group only; this format that could not be analysed in this report and has been presented in Table 73
Hellum 2011[59-61,65,66]	Total disc replacement (ProDisc II) 3-elements MBR (multidisciplinary biopsychosocial rehabilitation programme: cognitive, physical and education components)	Low back pain without sciatica N=173 2 years follow up Norway	Health-related quality of life (EQ-5D, SF-36) Pain (VAS) Function (ODI) Adverse events (morbidity)	Intervention group: no major postoperative restrictions; patients were not referred for post-operative physiotherapy, but at 6 weeks follow up they could be referred if required. Control group: no details given of any concomitant treatment or post-operative

Study	Intervention and comparison	Population	Outcomes	Comments
				instructions/advice
Lee 2015 [91,92]	Total disc replacement (ProDisc-L) Spinal fusion (TLIF)	Low back pain without sciatica N=74 5 years follow up Singapore	No relevant outcomes reported (time-point of revision surgery was unclear therefore this outcome was not extracted)	No details given of any concomitant treatment or post-operative instructions/advice
Li 2013[94,95]	Total disc replacement (Aesculap Activ-L) Spinal fusion (arthrodesis spinal fusion of facet joints with autograft bones)	Low back pain with or without sciatica N=68 3 years follow up China	No relevant outcomes reported (responder outcome was not defined as pain or function but only as generic symptomatic improvement mainly including low back pain, therefore it was not extracted)	Review condition defined as 'Lower lumbar pain during activities with or without radicular leg pain' Early rehabilitation was implemented in both groups.
Nabhan 2007[122]	Disc replacement (Aesculap AG) Spinal fusion (Xia II Spinal System with TLIF-PEEK Cage)	Low back pain N=24 1 year follow up Germany	No relevant outcomes reported	Intervention group: if foraminal stenosis was identifies on preoperative MRI, this was removed. In case where posterior longitudinal ligament was ossified, this was released Control group: no details given of any concomitant treatment or post-operative instructions/advice
Sasso 2008[150]	Total disc replacement (FlexiCore) Spinal fusion (circumferential fusion with posterior pedicle screw instrumentation; 1 patient received anterior fusion with LT cages)	Low back pain with or without sciatica N=76 2 years follow up United States of America	Pain severity (VAS) Function (ODI)	No details given of any concomitant treatment or post-operative instructions/advice Evidence was reported in a format that could not be analysed in this report, and has been presented in Table 73

Table 73: Disc replacement versus spinal fusion: data unsuitable for meta-analysis

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Sasso 2008[150]	Pain severity (NRS, 0-10) ≤ 4 months	Mean: 3.9	39	Mean: 3.3	19	Very high
	Pain severity (NRS, 0-10) >4 months (1 year)	Mean: 1.8	35	Mean: 2.6	17	Very high
	Pain severity (NRS, 0-10) > 4 months (2 years)	Mean: 1.6	11	Mean: 2.0	8	Very high
	Function (ODI, 0-100) ≤ 4 months	Mean: 30	39	Mean: 32	19	Very high
	Function (ODI, 0-100) >4 months (1 year)	Mean: 24	35	Mean: 32	18	Very high
	Function (ODI, 0-100) > 4 months (2 years)	Mean: 6	11	Mean: 12	7	Very high
Hellum 2011[59-61,65,66]	Adverse events (morbidity) > 4 months (2 years): total number of complications in the disc replacement group at 2 years follow-up: 26/77 (34%). Complications included: 1 intimal lesion in left common iliac artery; 1 arterial thrombosis of dorsalis pedis artery; 4 blood loss > 1500 ml; 1 retrograde ejaculation; 1 abdominal hernia; 1 superficial hematoma; 1 ileus; 2 temporary warm left foot; 1 temporary nausea at 1 year follow-up; 2 sensory loss; 2 radicular pain. '1 patient had a serious complication: at 3 month follow-up, the polyethylene inlay was found to be dislodged. During revision surgery, injury to the left common iliac artery led to compartment syndrome resulting in a lower leg amputation'.					Very high

Table 74: Clinical evidence summary: Disc replacement versus spinal fusion in low back pain (low back pain with/without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Spinal fusion	Risk difference with Disc replacement (95% CI)
Quality of life (SF-36 - mental component summary score (MCS), 0-100) ≤ 4 months	559 (1 study) 3 months	LOW[a] due to risk of bias		The mean health related quality of life (sf-36) ≤ 4 months - mental component summary score (mcs) in the control groups was 48.5	The mean health related quality of life (sf-36) ≤ 4 months - mental component summary score (mcs) in the intervention groups was 2.8 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Spinal fusion	Risk difference with Disc replacement (95% CI)
					(0.65 to 4.95 higher)
Quality of life (SF-36 - physical component summary score (PCS), 0-100) ≤ 4 months	559 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean health related quality of life (sf-36) ≤ 4 months - physical component summary score (pcs) in the control groups was 36.9	The mean health related quality of life (sf-36) ≤ 4 months - physical component summary score (pcs) in the intervention groups was 4.5 higher (2.75 to 6.25 higher)
Quality of life (SF-36 - mental component summary score (MCS), 0-100) >4 months (1 year)	556 (1 study) 1 years	LOW[a] due to risk of bias		The mean health related quality of life (sf-36) >4 months (1 year) - mental component summary score (mcs) in the control groups was 49.3	The mean health related quality of life (sf-36) >4 months (1 year) - mental component summary score (mcs) in the intervention groups was 2 higher (0.09 lower to 4.09 higher)
Quality of life (SF-36 - physical component summary score (PCS), 0-100) >4 months (1 year)	556 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health related quality of life (sf-36) >4 months (1 year) - physical component summary score (pcs) in the control groups was 41.6	The mean health related quality of life (sf-36) >4 months (1 year) - physical component summary score (pcs) in the intervention groups was 3.1 higher (0.96 to 5.24 higher)
Quality of life (SF-36 - mental component summary score (MCS), 0-100) > 4 months (2 years) SF-36 mental component summary score. Scale from: 0 to 100.	524 (1 study) 2 years	LOW[a] due to risk of bias		The mean health related quality of life (sf-36) > 4 months (2 years) - mental component summary score (mcs) in the control groups was 50	The mean health related quality of life (sf-36) > 4 months (2 years) - mental component summary score (mcs) in the intervention groups was 1.4 higher (0.71 lower to 3.51 higher)
Quality of life (SF-36 - physical component summary score (PCS), 0-100) > 4 months (2 years)	524 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health related quality of life (sf-36) > 4 months (2 years) - physical component summary score (pcs) in the control groups was	The mean health related quality of life (sf-36) > 4 months (2 years) - physical component summary score (pcs) in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Spinal fusion	Risk difference with Disc replacement (95% CI)
				42.1	3 higher (0.68 to 5.32 higher)
Quality of life (EQ-5D, 0-1) >4 months (1 year)	152 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health related quality of life (eq-5d) > 4 months in the control groups was 0.63	The mean health related quality of life (eq-5d) > 4 months in the intervention groups was 0.08 higher (0.01 lower to 0.17 higher)
Quality of life (EQ-5D, 0-1) > 4 months (2 years)	152 (1 study) 2 years	LOW[a] due to risk of bias		The mean health related quality of life (eq-5d) > 4 months - 2 years in the control groups was 0.69	The mean health related quality of life (eq-5d) > 4 months - 2 years in the intervention groups was 0.02 lower (0.11 lower to 0.07 higher)
Function (ODI, 0-100) ≤ 4 months	559 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) ≤ 4 months in the control groups was 32	The mean function (ODI) ≤ 4 months in the intervention groups was 8.6 lower (11.76 to 5.44 lower)
Function (ODI, 0-100) >4 months (1 year)	708 (2 studies) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) >4 months (1 year) in the control groups was 25.1	The mean function (ODI) >4 months (1 year) in the intervention groups was 5.9 lower (8.87 to 2.92 lower)
Function (ODI, 0-100) > 4 months (2 years)	676 (2 studies) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) > 4 months (2 years) in the control groups was 23.9	The mean function (ODI) > 4 months (2 years) in the intervention groups was 4.69 lower (7.86 to 1.52 lower)
Pain severity (Back pain NRS, 0-10) ≤ 4 months	559 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (back pain NRS) ≤ 4 months in the control groups was 2.7	The mean pain severity (back pain NRS) ≤ 4 months in the intervention groups was 0.92 lower (1.35 to 0.49 lower)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Spinal fusion	Risk difference with Disc replacement (95% CI)
Pain severity (Back pain VAS/NRS, 0-10) >4 months (1 year)	708 (2 studies) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (back pain VAS/NRS) >4 months (1 year) in the control groups was 2.9	The mean pain severity (back pain VAS/NRS) >4 months (1 year) in the intervention groups was 0.73 lower (1.15 to 0.31 lower)
Pain severity (Back pain VAS/NRS, 0-10) > 4 months (2 years)	676 (2 studies) 2 years	LOW[a] due to risk of bias		The mean pain severity (back pain VAS/NRS) > 4 months (2 years) in the control groups was 5.28	The mean pain severity (back pain VAS/NRS) > 4 months (2 years) in the intervention groups was 0.51 lower (0.96 to 0.06 lower)
Pain severity (Leg pain NRS, 0-10) ≤ 4 months	559 (1 study) 3 months	LOW[a] due to risk of bias		The mean pain severity (leg pain NRS) ≤ 4 months in the control groups was 1.74	The mean pain severity (leg pain NRS) ≤ 4 months in the intervention groups was 0.06 higher (0.37 lower to 0.49 higher)
Pain severity (Leg pain VAS/NRS, 0-10) >4 months (1 year)	708 (2 studies) 1 years	LOW[a] due to risk of bias		The mean pain severity (leg pain VAS/NRS) >4 months (1 year) in the control groups was 2.02	The mean pain severity (leg pain VAS/NRS) >4 months (1 year) in the intervention groups was 0.57 lower (0.97 to 0.18 lower)
Pain severity (Leg pain VAS/NRS, 0-10) > 4 months (2 years)	676 (2 studies) 2 years	LOW[a] due to risk of bias		The mean pain severity (leg pain VAS/NRS) > 4 months (2 years) in the control groups was 4.02	The mean pain severity (leg pain VAS/NRS) > 4 months (2 years) in the intervention groups was 0.38 lower (0.82 lower to 0.05 higher)
Adverse events (number of patients) ≤ 4 months (operative)	577 (1 study)	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.67 (0.98 to 2.86)	Moderate	
				87 per 1000	58 more per 1000 (from 2 fewer to 162 more)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Spinal fusion	Risk difference with Disc replacement (95% CI)
Adverse events (possibly device-related; number of patients) ≤ 4 months (operative)	577 (1 study)	VERY LOW[a,c] due to risk of bias, imprecision	RR 2.13 (0.10 to 44.15)	Moderate 0 per 1000	0 fewer per 1000
Reoperations (number of patients) > 4 months (2 years)	676 (2 studies) 2 years	VERY LOW[a,c] due to risk of bias, imprecision	RR 0.97 (0.59 to 1.57)	Moderate 100 per 1000	3 fewer per 1000 (from 41 fewer to 57 more)
Reoperations (number of patients) > 4 months (5 years)	152 (1 study) 5 years	VERY LOW[a,c] due to risk of bias, imprecision	RR 0.75 (0.24 to 2.35)	Moderate 83 per 1000	21 fewer per 1000 (from 63 fewer to 112 more)
Device-related reoperations (number of events) > 4 months (5 years)	152 (1 study) 5 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.41 (0.2 to 0.83)	Moderate 278 per 1000	164 fewer per 1000 (from 47 fewer to 222 fewer)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1 MID
(c) Downgraded by 2 increments if the confidence interval crossed both MIDs

Table 75: Clinical evidence summary: Disc replacement versus 3-elements MBR in low back pain (low back pain without sciatica)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with 3-elements MBR	Risk difference with Disc replacement (95% CI)

Quality of life (EQ-5D, 0-1) >4 months (1 year).	172 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (eq-5d) > 4 months in the control groups was 0.55	The mean health-related quality of life (eq-5d) > 4 months in the intervention groups was 0.13 higher (0.03 to 0.23 higher)
Quality of life (EQ-5D, 0-1) > 4 months (2 years)	172 (1 study) 2 years	LOW[a] due to risk of bias		The mean health-related quality of life (eq-5d) > 4 months - 2 years in the control groups was 0.63	The mean health-related quality of life (eq-5d) > 4 months - 2 years in the intervention groups was 0.06 higher (0.03 lower to 0.15 higher)
Quality of life (SF-36 - mental component summary score (MCS, 0-100) >4 months (1 year)	172 (1 study) 1 years	LOW[a] due to risk of bias		The mean health-related quality of life (sf-36) >4 months (1 year) - mental component summary score (mcs) in the control groups was 49.2	The mean health-related quality of life (sf-36) >4 months (1 year) - mental component summary score (mcs) in the intervention groups was 1 higher (2.77 lower to 4.77 higher)
Quality of life (SF-36 - physical component summary score (PCS), 0-100) >4 months (1 year)	172 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (sf-36) >4 months (1 year) - physical component summary score (pcs) in the control groups was 37.3	The mean health-related quality of life (sf-36) >4 months (1 year) - physical component summary score (pcs) in the intervention groups was 5.5 higher (2.03 to 8.97 higher)
Quality of life (SF-36, mental component summary score (MCS), 0-100) > 4 months (2 years)	172 (1 study) 2 years	LOW[a] due to risk of bias		The mean health-related quality of life (sf-36) > 4 months (2 years) - mental component summary score (mcs) in the control groups was 48.6	The mean health-related quality of life (sf-36) > 4 months (2 years) - mental component summary score (mcs) in the intervention groups was 2.1 higher (1.55 lower to 5.75 higher)
Quality of life (SF-36, physical component summary score, 0-100 > 4 months (2 years)	172 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean health-related quality of life (sf-36) > 4 months (2 years) - physical component summary score (pcs) in the control groups was 37.7	The mean health-related quality of life (sf-36) > 4 months (2 years) - physical component summary score (pcs) in the intervention groups was 5.6 higher (2.33 to 8.87 higher)

Pain severity (Back pain VAS, 0-10) >4 months (1 year)	172 (1 study) 1 year	LOW[a] due to risk of bias		The mean pain severity (VAS) >4 months (1 year) in the control groups was 5.32	The mean pain severity (VAS) >4 months (1 year) in the intervention groups was 1.76 lower (2.61 to 0.91 lower)
Pain severity (Back pain VAS, 0-10) > 4 months (2 years)	172 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS) > 4 months (2 years) in the control groups was 4.97	The mean pain severity (VAS) > 4 months (2 years) in the intervention groups was 1.43 lower (2.29 to 0.57 lower)
Function (ODI, 0-100) ≤ 4 months	172 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) ≤ 4 months in the control groups was 30.6	The mean function (ODI) ≤ 4 months in the intervention groups was 9.1 lower (13.17 to 5.03 lower)
Function (ODI, 0-100) >4 months (1 year)	172 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) > 4 months in the control groups was 29.2	The mean function (ODI) > 4 months in the intervention groups was 8.9 lower (13.88 to 3.92 lower)
Function (ODI, 0-100) > 4 months (2 years)	172 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI) > 4 months - 2 years in the control groups was 26.7	The mean function (ODI) > 4 months - 2 years in the intervention groups was 6.9 lower (11.57 to 2.23 lower)

(a) Downgraded by 2 increments if the majority of the evidence was at very high risk of bias
(b) Downgraded by 1 increment if the confidence interval crossed 1MID

26.4 Economic evidence

Published literature

Two economic evaluations were identified with the relevant comparison and have been included in this review.[44,66] These are summarised in the economic evidence profile below (**Table 76**) and the economic evidence tables in Appendix I.

One economic evaluation relating to this review question was identified but was excluded[5,8] as it was based on the same data reported in the included study by Fritzell et al (2011).[44,45] This is listed in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 76: Economic evidence profile: Total disc replacement versus fusion

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Fritzell 2011[44,45] (Sweden)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-trial (RCT, associated clinical paper Berg 2011) • Cost-utility analysis (QALYs) • Population: Adults with low back pain with/without sciatica. • Two comparators in full analysis: 1. Total disc replacement surgery 2.Fusion(either ALIF or PLIF according to surgeon preference) • Follow-up: 2 years	Saves £1,587 [(c)]	0.01 [(d)]	Intervention 1 dominates intervention 2 (lower costs and higher QALYs)	Bootstrapping of ICER conducted but only from a societal perspective not a health care provider perspective. Therefore this is not reported here. Two additional sensitivity analyses were conducted. - The costs were discounted at 3%; this did not impact the total cost difference between the 2 comparators. - Reoperation costs were excluded from total healthcare costs. The total costs (mean per patient) were: Intervention 1: £9,710 Intervention 2: £10,235 Incremental (2−1): £525 (95% CI: -£827 to £1,710; p=NR)

Abbreviations: ICER: incremental cost-effectiveness ratio; QALY: quality-adjusted life years; RCT: randomised controlled trial

(a) Swedish resource use data (2002-2005) and unit costs (2006) may not reflect current NHS context. No discounting applied in base case analysis, discounting of costs at 3% applied in sensitivity analysis, however this is not in line with NICE reference case.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Berg 2009 is 1 of the studies included in the clinical review for disc replacement surgery. Bootstrapping of ICER not undertaken from a healthcare payer perspective. Potential conflict of interest, study funded by manufacturers of surgical devices.

(c) 2006 Swedish Krona converted using 2006 purchasing power parities[131]. Cost components include: Intervention cost (index procedure for surgery), post-surgery hospital cost (including re-operation costs), primary care costs (including private care) and back-related drug costs.

(d) EQ-5D collected pre-operatively, 1 year and 2 years follow-up. QALYs were calculated using the area under the curve approach adjusted for baseline utility.

Table 77: Economic evidence profile: Total disc replacement versus multidisciplinary rehabilitation

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects (QALYs)	Cost effectiveness	Uncertainty
Johnsen 2014[66,67] (Norway)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-trial (RCT, associated clinical paper Hellum 2011) • Cost-utility analysis (QALYs) • Population: Adults with chronic low back pain for more than 1 year and degenerative changes in lumbosacral intervertebral discs • Two comparators in full analysis: 1. Total disc replacement surgery 2. 3-elements MBR (multidisciplinary biopsychosocial rehabilitation programme: cognitive, physical and education components) • Follow-up: 2 years	£3,245 [(c)]	0.34 [(d)]	£9544 per QALY gained	Bootstrapping analysis was conducted using a societal perspective and therefore the 95% CI around the ICER is not reported. Using the intention to treat analysis total disc replacement was more costly but also more effective, however the costs included the societal perspective therefore results are not reported. Where missing data were not inputted but dropped, the effectiveness of total disc replacement was lower, however the costs included the societal perspective therefore results are reported. When SF-6D instead of EQ5D was used, the incremental QALY gain was 0.11, and the ICER was £29,500.

Abbreviations: ICER: incremental cost-effectiveness ratio; QALY: quality-adjusted life years; RCT: randomised controlled trial

(a) Norwegian resource use data (2004-2007) and unit costs may not reflect current NHS context. No discounting conducted.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison. Bootstrapping of ICER not undertaken.

(c) 2012 euros converted using 2012 purchasing power parities[131]. Cost components include: Intervention cost, hospital follow up (reoperations, admissions, visits), GP consultations, physical therapist consultations, visits to complementary practitioners, medications.

(d) EQ-5D collected at baseline, 6 weeks, and 3, 6, 12, 24 months follow-up. QALYs constructed through area under the curve method

The 2 included studies compared total disc replacement with another type of surgery[44,45] or with a non-invasive intervention[66,67] and they both concluded that total disc replacement is cost effective in the base case. However the real extent of uncertainty around this conclusion could not be assessed as the probabilistic sensitivity analyses were conducted using societal costs.

In addition, the comparator in Fritzell 2011[44,45 44,4545,4644,45] is not recommended in this guideline as it is not considered cost effective. Therefore in this study disc replacement has been compared to a cost-ineffective intervention, which could explain why it is cost effective.

26.5 Evidence statements

26.5.1 Clinical

26.5.1.1 Disc replacement versus spinal fusion (Low back pain with/without sciatica)

Evidence from 1 study comparing disc replacement to anterior lumbar interbody fusion suggested clinical benefit of disc replacement for quality of life (SF-36 mental component) both at short and long term, but this was not demonstrated for the SF-36 physical component summary score (low to very low quality; n=577). Clinical benefit of disc replacement compared to posterior lumbar interbody fusion for quality of life (EQ-5D) at 1 year was also observed ; however, this was not demonstrated at 2 years (1 study, low to very low quality; n=152). Evidence from the 2 studies also demonstrated no clinical difference between disc replacement and spinal fusion for pain (back and leg pain VAS) or function (ODI) at both short and long term (low to very low quality; n=577, n=152). Further evidence informing these outcomes, could not be analysed as the results were inadequately reported for analysis.

In terms of adverse events, evidence from a single study showed greater numbers of adverse events for disc replacement compared to spinal fusion below 4 months (low to very low quality; n=577).

There was no clinical difference between the 2 procedures for the reoperation outcome at 2 years (2 studies; low to very low quality; n=577, n=152) and at 5 years (1 study; low to very low quality; n=152), while there was evidence of clinical benefit favouring disc replacement for device-related reoperations at 5 years (1 RCT; low to very low quality; n=152).

26.5.1.2 Disc replacement versus 3-MBR (low back pain without sciatica)

Evidence from 1 study demonstrated a clinically important benefit of disc replacement when compared to 3-element MBR for quality of life (EQ-5D and SF-36 physical component) in the long-term but this was not demonstrated for the SF-36 mental component. A benefit of disc replacement was also shown for back pain severity in the long-term. There was no clinical difference for function in the short or longer term (low to very low quality; n=173).

26.5.2 Economic

- One cost-utility analysis found that total disc replacement was dominant (less costly and more effective) compared to spinal fusion in people with low back pain with or without sciatica. This study was partially applicable with potentially serious limitations.
- One cost-utility analysis found that total disc replacement was cost-effective compared to 3-element MBR (ICER: £9,544 per QALY gained). This study was partially applicable with potentially serious limitations.

26.6 Recommendations and link to evidence

Recommendations	39.Do not offer disc replacement in people with low back pain.
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria (for pain and function), adverse events, revision rate, failure rate and healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit) were also considered as important outcomes. In this review, there was no evidence for the psychological distress for any of the

	comparisons. There was also no evidence identified for responder criteria, failure rate or healthcare utilisation for disc replacement versus spinal fusion.
Trade-off between clinical benefits and harms	**Disc replacement versus spinal fusion for low back pain with/without sciatica** The GDG noted that evidence for the comparison was limited, with outcomes analysed from 2 RCTs only. Although the majority of outcomes demonstrated no clinical difference between disc replacement and spinal fusion, some clinical benefit for disc replacement was observed in terms of quality of life. The GDG were concerned that the benefits observed came mainly from a study comparing disc replacement to anterior lumbar interbody fusion (BAK cages technique). The GDG was aware that anterior procedures in the lumbar spine for back pain are not commonly performed in the UK setting, and that the BAK cages technique shows a low fusion rate and would not be considered appropriate for a stand-alone anterior fusion in clinical practice. The GDG had serious concerns about the high number of severe adverse events associated with disc replacement in comparison to spinal fusion. When compared to posterior lumbar interbody fusion, disc replacement demonstrated a clinical benefit in the number of device related reoperations. However, the GDG emphasised the complexity of revision disc replacement procedures in patients, resulting in surgeons applying a much higher threshold for carrying out reoperations. For 1 of the intervention trials, insufficient data were reported for pain and function to be meta-analysed and therefore conclusions could not be drawn with any degree of certainty although the GDG noted that the magnitude of the between group differences appeared small. **Disc replacement versus 3 element -MBR for low back pain without sciatica** The GDG observed that the comparison between disc replacement and 3-element MBR could be inappropriate, as people with low back pain would often take part in a MBR programme before undergoing surgery. The GDG noted that evidence for this comparison came from a single RCT. Although there was some benefit observed in the outcomes reported, the GDG expressed concerns over the serious adverse events related with disc replacement, in particular 1 lower leg amputation and four cases of considerable blood loss (greater than 1500 ml) out of 80 participants. It was noted that this is a high occurrence of adverse events in studies not powered to detect harm. GDG opinion was that this rate was reflective of the risk observed in practice. **Summary** The GDG noted that there were some signs of benefit from disc replacement compared to other interventions, but this evidence was very limited and not consistent across outcomes. Furthermore the GDG felt the risk of harms associated with disc replacement outweighed the potential benefits. The GDG were aware of the lack of long term follow-up data for disc replacement surgery. The GDG expressed their concerns about this, particularly as disc replacement is often performed in younger age-groups in consideration of its claimed motion preservation benefits. However, it was highlighted that there is currently limited evidence of disc replacement benefits regarding motion and adjacent level degeneration compared to other surgical procedures, and the reported risks of disc replacement would often prevail over the benefits. As a result, the GDG agreed that the limited evidence of effectiveness alongside the above concerns meant it was appropriate to recommend against the use of disc replacement in people with low back pain with/without sciatica.
Trade-off between net clinical effects and costs	Two cost–utility analyses were identified for disc replacement. The first analysis, Fritzell 2011, was a within-trial analysis (associated RCT: Berg 2009) which found that total disc replacement was dominant (less costly and more effective) compared to spinal fusion in people with low back pain with or without sciatica. This study was partially applicable with potentially serious limitations. It was noted that all cost elements were higher for the spinal fusion group and that 1 of the key cost drivers was the higher rate of re-operations in the spinal fusion surgery group.

	The second analysis, Johnsen 2014, was a within-trial analysis (associated RCT: Hellum 2011) which found that total disc replacement was cost-effective compared to 3-element MBR (ICER: £9,544 per QALY gained). This study was partially applicable with potentially serious limitations. The unit cost for spinal fusion surgery was estimated to be £7,337 per patient. This cost is based on the weighted average for complications and co-morbidities of the following HRG codes: Extradural Spine Major 2 with CC Score 5+ (HC01A); Extradural Spine Major 2 with CC Score 2-4 (HC01B); Extradural Spine Major 2 with CC Score 0-1 (HC01C); Extradural Spine Major 1 with CC Score 5+ (HC02D); Extradural Spine Major 1 with CC Score 2-4 (HC02E); Extradural Spine Major 1 with CC Score 0-1 (HC02F). The cost of total disc replacement surgery was also discussed by the GDG. This surgical procedure is included in the same HRG codes as spinal fusion and therefore the 2 surgeries do not differ in unit cost. The GDG noted that the comparator in the first study may have affected the overall conclusions as spinal fusion was found not to be a cost effective interventions itself. Therefore, disc replacement could have been shown to be cost effective in the studies only because it was compared to a cost ineffective intervention. In the 2 economic studies a probabilistic sensitivity analysis was reported only using the societal perspective, which is excluded in our guideline, therefore no evidence on uncertainty around the mean ICER was available from them. One way sensitivity analysis was undertaken in the study comparing disc replacement with 3-element MBR, where SF6D was used as a quality of life measure instead of EQ5D.The ICER was around £29,000 and the intervention was not cost effective anymore. Overall, the GDG were concerned about the lack of evidence of effect and the safety of the procedure. Taking into account the overall body of clinical effectiveness evidence, the uncertainty around the cost effectiveness studies, and the concerns around safety, the GDG decided to recommend against this procedure.
Quality of evidence	The evidence included in the review ranged from a GRADE quality rating of low to very low. This was due to the high risk of bias within the studies included as a result of incomplete blinding, high drop-out rates and baseline differences between the groups for several characteristics including baseline values of outcomes considered as critical for decision making in this review (leg pain, low back pain scores and SF-36 mental health sub score). The GDG expressed particular concern over the high number of patients that dropped out of the disc replacement group during the trial comparing 3-element MBR versus disc replacement (30% versus 17%). As the trial featured ITT analysis with last value carried forward (assuming patients had no improvement after dropout), this raised a concern about data interpretation. The imprecise nature of the outcomes included in this review further contributed to decreasing the GRADE quality rating. As stated above, the GDG raised concerns about the comparators in the included studies as they were either procedures without proven efficacy, or in the case of MBR, would be expected to be offered earlier in the pathway as an option prior to surgery. The economic evidence was assessed as partially applicable with potentially serious limitations.
Other considerations	The GDG agreed there may be specific causes of low back pain for which disc replacement might be an appropriate treatment which are beyond the scope of this guideline. The GDG were aware of NICE Interventional procedures guidance for Prosthetic intervertebral disc replacement in the lumbar spine, IP306 which recommend normal arrangements for clinical governance, consent and audit for this procedure. However, evidence reviewed by this GDG suggests that there was very limited evidence available of effectiveness of these procedures and this did not outweigh

	the risks and therefore the GDG agreed that it is appropriate to recommend against the use of disc replacement techniques for this population.

27 Spinal fusion

27.1 Introduction

Spinal fusion is an operation performed to achieve solid bone union between spinal vertebrae to prevent movement. This involves using the patient's own bone or artificial bone substitutes. The procedure of spinal fusion is commonly carried out as a component part of many types of spinal operation, such as operations to correct deformity, remove tumours and treat spinal fractures. Sometimes a fusion is done as part of an operation to decompress the spinal neurological structures; this is known as a decompression.

In clinical practice, spinal fusion is sometimes used to treat severe and constant low back pain that has not resolved despite the use of other more conservative treatments. Screws, rods or other implants may be used as an internal splint to stabilise the spine while the fusion is occurring.

There are different surgical approaches to the spine: from the back, the front or the side. The outcomes from the different approaches are similar. However, the risks of harm vary according to the approach and specific methods used. The risk of harm should be considered in terms of the probability of benefit and the alternative treatments that are known to have a treatment effect.

27.2 Review question: What is the clinical and cost effectiveness of spinal fusion/arthrodesis in people with non-specific low back pain?

For full details see review protocol in Appendix C.

Table 78: PICO characteristics of review question

Population	People aged 16 or above with non-specific low back pain.
Intervention	Spinal fusion/arthrodesis
Comparisons	• Usual care; waiting list • No surgery • Different type of surgery (e.g. anterior approach fusion versus disc replacement) • Other treatment (interventions listed in our guideline review protocols)

Outcomes	**Critical**
	• Health-related quality of life (for example, SF-12, SF-36 or EQ-5D).
	• Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]).
	• Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index).
	• Psychological distress (HADS, GHQ, BPI, BDI, STAI)
	Important
	• Adverse events:
	  ○ post-operative complications (e.g. infection)
	  ○ increased risk of requiring surgery at adjacent segments
	  ○ Mortality.
	• Revision rate
	• Failure rate
	• Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)

Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a

recommendation is found, non-randomised studies will be included.

27.3 Clinical evidence

Nine studies were included in the review (found in 18 papers).[6,7,13-15,39,44,46-48,55,72,73,88,129,145,154,156] As there was only 1 RCT for the comparison of spinal fusion versus usual care, the search was extended to cohort studies for this comparison as well as spinal fusion versus no surgery for which there were no randomised trials. One cohort study was identified that met the inclusion criteria for fusion versus usual care and was included in the review. One Cochrane review[63,64] was identified but was not included as the stratification of the people with low back pain, low back pain with/without sciatica and sciatica was unclear, however the study included were individually assessed and included in this review if they matched the review protocol.

One non-randomised study was identified comparing spinal fusion with spinal decompression; [77] data for which is reported in chapter 28. Evidence for spinal fusion versus disc replacement can also be found in Chapter 26.The included studies have been summarised in **Table 79** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (action flow chart in Appendix B, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

27.3.1 Summary of included studies

Table 79: Summary of studies included in the review

Study	Intervention and comparison	Population	Outcomes	Comments
Berg 2009[5,7,44,154]	Fusion (either PLF[d] or PLIF[ca] according to surgeon preference) Total Disc Replacement (TDR)	Low back pain with or without sciatica n=152 1 + 2 year follow-up (5 year follow up for complications and reoperations) Sweden	Pain (VAS) Function (ODI) Quality of Life (SF-36 and EQ-5D) Averse events-complications Reoperations	Single centre trial Pain was assessed for back and leg separately; only back pain was reported in this review No details reported of concurrent treatment
Brix 2003[13,15,47,48,72,73]	Posterolateral fusion with transpedicular screws 3 element MBR program: duration of supervised treatment period was 1 week at first, followed by 2 weeks at home and another supervised period of 2 weeks. Average duration of the rehabilitation program was about 25 hours per week. Patients stayed at a patient hotel and treatments were conducted in the outpatient clinic	Low back pain without sciatica n=64 1 year follow-up (4 year follow up data reported for combined results of Brix 2003 and Brix 2006 trials) Norway	Pain (VAS) Function (ODI, General Function Score (GFS)) Reoperations(4 year)	Multi-centre trial Concurrent treatment: consumption of analgesics, anxiololytics, hypnotics, sedatives, antidepressants, anti-inflammatory agents and muscle relaxants were recorded 1 week before follow up and daily till 1 year follow up. Consumption of each drug was calculated and daily doses defined.

Study	Intervention and comparison	Population	Outcomes	Comments
	during the day. Three daily workouts were performed; aerobics or outdoor activities, water gymnastics, and individual exercises. Endurance and co-ordination exercises were also recommended. Additionally, individual consultations, group lessons and discussions were given. During the first week, a specialist in physical medicine gave a lecture to the patients to describe pain receptors in the discs, facet joints and muscles; the reflexive interplay between various structures and the ability to suppress and reinforce various peripheral stimuli. Fear avoidance techniques were used to reinforce that patients could not harm the discs by engaging in normal activities; patients were constantly challenged in their thoughts about participation in physical activities previously labelled as not recommended.			
Brix 2006[14]	Posterolateral fusion with transpedicular screws 3 element MBR program: same as Brix 2003	Low back pain without sciatica N=57 Patients with previous surgery for disc herniation 1 year follow-up Norway	Pain (VAS) Function (ODI, and General Function Score, GFS)	Multi-centre trial No details reported of concurrent treatment - implies same as Brix 2003
Fairbank	Fusion (technique	Low back pain	Function (ODI)	Multi-centre trial

Study	Intervention and comparison	Population	Outcomes	Comments
2005[39,145]	based on surgeon preference) 3 element MBR program: Intensive rehabilitation programme modelled on a daily outpatient programme of education and exercise running 5 days per week for 3 weeks continuously. Most centres offered 75 hours of intervention (range 60-110 hours) with 1 day of follow-up sessions at 1.2,6 or 12 months after treatment. Program was led by physiotherapists and clinical psychologists as well as medical support. Daily exercise included stretching of the major muscle groups, spinal flexibility exercises, general muscle strengthening, spine stabilisation exercise, and cardiovascular endurance exercise using any mode of aerobic exercise. Hydrotherapy was also used in all but 1 centre. Lastly, principles of cognitive behaviour therapy was used to identify and overcome fears/unhelpful beliefs that many patients develop when in pain	without Sciatica N=349 2 year follow up UK	Quality of Life (SF-36) Quality of Life (EQ-5D-data presented in graphical format and therefore has was not able to be used in this review) Healthcare Utilisation(hospitalisation, health professional visit, prescriptions)	The patient population included a proportion of patients with Spondylolisthesis (<15% in each treatment group) A high number of patients randomised to rehabilitation underwent surgical stabilisation of the spine-10 instead if rehabilitation, 38 in addition to rehabilitation contributing to a >40% cross-over rate of patients who had both treatments No details reported of concurrent treatment
Fritzell 2001[45,46]	Fusion (either ALIF[a], PLF[d] or PLIF[c]) Usual Care: non-surgical treatment	Low back pain with or without sciatica N=294	Pain (VAS) Function (ODI, GFS, and Million Visual Analogue Scale,	Multi-centre trial Less than 4 months data was reported graphically (shows

Study	Intervention and comparison	Population	Outcomes	Comments
	program. Main component was physical therapy which could be supplemented with other forms of treatment such as information and education, treatment aimed at pain relief (TENS, acupuncture, injections), cognitive and functional training and coping strategies	2 year follow up Sweden	MVAS) Adverse events-Complications Reoperations	benefit for fusion). However, this data was therefore not extractable. No details reported of concurrent treatment
Gornet 2011[55]	Fusion Lumbar Disc Arthroplasty	Low back pain with or without sciatica N=577 3 month, 1 year and 2 year follow-up USA	Pain (VAS) Function (ODI) Quality of Life (SF-36) Adverse events-Mortality Adverse events-Complications	RCT Groups were comparable for baseline values for ODI, VAS and SF36. The proportion of men and medication use was significantly higher in the Disc Arthroplasty group No concurrent details reported
Lee 2013[88,91]	Fusion only Decompression (laminectomy with flavectomy without fusion)	Low back pain with or without sciatica N=50 6 month and 2 year follow up USA	Pain (VAS)-reported as change with no corresponding statistics for meta-analysis Function (ODI)-reported as change with no corresponding statistics for meta-analysis	Retrospective cohort review Groups were matched for age, gender, race, surgery date, surgery level and the status of spinal stenosis at the surgery segment No concurrent details reported
Ohtori 2011[129]	Fusion (ALF[b] or PLF[b]) Mixed modality exercise treatment: aerobic+ biomechanical. Daily walking (30 minutes x2 per day) and muscle stretching (body and leg)(15 minutes x 2 per day). Instruction for daily walking was made by 1 physician and was performed independently by the	Low back pain only N=41 1 and 2 year follow-up Japan	Pain (VAS, and Japanese Orthopaedic Association Score, JOAS) Function (ODI)	Multi-centre trial All patients underwent discography and discoblock for a degenerated disc at single level for strict diagnosis of discogenic low back pain Concurrent treatment: only non-steroidal anti-inflammatory drugs were used in both groups. Opioids were not permitted

Study	Intervention and comparison	Population	Outcomes	Comments
	patient at home. Muscle stretching was performed at 1 hospital by a physiotherapist. These treatments were performed over 2 years and a physician checked monthly that both treatments were performed precisely as instructed. If the patients did not perform the walking and stretching as instructed, the patients were excluded from study			
Smith 2014[155,156]	Fusion (instrumented lumbar fusion) Usual care: non-operative treatment modalities including physical therapy, epidural injections, and medications	Low back pain N=96 58-63 month average follow-up USA	Quality of life (SF-12) Pain (NRS) Function (ODI)	Retrospective review All patients had a positive, concordant lumbar discogram No details reported of concurrent treatment

(a) ALIF-Anterior Lumbar Interbody Fusion
(b) ALF- Anterior Lumbar Fusion
(c) PLIF- Posterior Lumbar Interbody Fusion
(d) PLF-Posterior Lumbar Fusion

27.3.2 Data unsuitable for meta-analysis

Table 80: Fusion versus decompression for spinal stenosis

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Lee 2013[88,91]	Back pain (VAS) at 6 months follow up	The decrease in back pain score after treatment was greater in the Fusion group compared to the Decompression group. Back pain VAS score improved from 7.4 to 2.7 over the first 6 months in the Fusion Group (change= 4.7) and improved from 5.6 to 2.1 (change=3.5) in the Decompression Group				Very high
	Back pain (VAS) at 24 months follow up	The decrease in back pain score after treatment was greater in the Fusion group compared to the Decompression group. Back pain VAS score improved from 7.4 to 2.8 over 24 months in the Fusion Group (change =4.6) and from 5.6 to 3.4 (change=2.2) in the Decompression Group				Very high
	Leg pain (VAS) at 6 months follow up	The decrease in leg pain score after treatment was greater in the Fusion group compared to the Decompression group. Leg pain VAS score improved from 7.9 to 2.0 over the first 6 months in the Fusion Group (change= 5.9) and improved from 6.6 to 1.7 (change=4.9) in the Decompression Group				Very high
	Leg pain (VAS) at 24 months follow up	The decrease in leg pain score after treatment was greater in the Fusion group compared to the Decompression group. Leg pain VAS score improved from 7.9 to 2.0 over the first 6 months in the Fusion Group (change= 5.9) and improved from 6.6 to 2.4 (change=4.2) in the Decompression Group				Very high
	Function (ODI) at 6 months follow up	The decrease in ODI score after treatment was greater in the Decompression group compared to the Fusion group. ODI score improved from 20.0 to 6.5 over the first 6 months in the Fusion Group (change= 13.5) and improved from 25.4 to 11.0 (change=14.4) in the Decompression Group				Very high
	Function (ODI) at 24 months follow up	The decrease in ODI score after treatment was greater in the Decompression group compared to the Fusion group. ODI score improved from 20.0 to 11 over the first 6 months in the Fusion Group (change= 9) and improved from 25.4 to 15.1 (change=10.4) in the Decompression Group				Very high

Table 81: Clinical evidence profile: Fusion versus Usual Care

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Spinal Fusion (95% CI)
Pain Severity (VAS,0-10) >4 months	264 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS,0-10) >4 months in the control groups was 5.83	The mean pain severity (VAS,0-10) >4 months in the intervention groups was 1.51 lower (2.09 to 0.93 lower)
Function (ODI,0-100) >4 months	264 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI,0-100) >4 months in the control groups was 45.6	The mean function (ODI,0-100) >4 months in the intervention groups was 9.9 lower (14.59 to 5.21 lower)
Function (General Function Score, GFS,0-100) >4 months	264 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (general function score,gfs,0-100) >4 months in the control groups was 45.5	The mean function (general function score,gfs,0-100) >4 months in the intervention groups was 11.4 lower (17.29 to 5.51 lower)
Function (Million Visual Analogue Score,MVAS,0-100) >4 months	264 (1 study) 2 years	LOW[a] due to risk of bias		The mean function (million visual analogue score,mvas,0-100) >4 months in the control groups was 60.4	The mean function (million visual analogue score,mvas,0-100) >4 months in the intervention groups was 14.8 lower (20.11 to 9.49 lower)
Adverse events-Complications (2 years)	283 (1 study)	LOW [a] due to risk of bias	OR 5 (2.45 to 10.19)	Study population	
				0 per 1000	*
Reoperations (2 years)	283 (1)	LOW[a] due to risk of bias	OR 4.12 (1.3 to 13.1)	Study population	
				0 per 1000	*

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1MID or by 2 increments if the confidence interval crossed both MID's.

*Peto odds ratio reported as there is zero events in 1 treatment arm

Table 82: Clinical evidence profile: Fusion versus Usual Care (cohort)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Spinal Fusion versus Usual Care (95% CI)
Pain Severity (NRS,0-10) >4 months - 1 year	96 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (NRS,0-10) >4 months - 1 year in the control groups was 4.4	The mean pain severity (NRS,0-10) >4 months - 1 year in the intervention groups was 0.8 lower (1.94 lower to 0.34 higher)
Function (ODI,0-100)>4 months - 1 year	96 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI,0-100)>4 months - 1 year in the control groups was 34.2	The mean function (ODI,0-100)>4 months - 1 year in the intervention groups was 1.1 higher (7.87 lower to 10.07 higher)
Quality of life, SF-36 (PCS, 0-100) >4 month	96 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36 (pcs, 0-100) >4 month in the control groups was 43.8	The mean quality of life, sf-36 (pcs, 0-100) >4 month in the intervention groups was 1.9 higher (1.12 lower to 4.92 higher)
Quality of life, SF-36(MCS, 0-100) >4 month	96 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36(mcs, 0-100) >4 month in the control groups was 48.7	The mean quality of life, sf-36(mcs, 0-100) >4 month in the intervention groups was 2.6 lower (6.96 lower to 1.76 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MID's.

Table 83: Clinical evidence summary: Fusion versus Other treatment

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other Treatment	Risk difference with Spinal Fusion (95% CI)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other Treatment	Risk difference with Spinal Fusion (95% CI)
Pain Severity (VAS,0-10) >4 months - 1 year (3 element MBR)	118 (2 studies) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS,0-10) >4 months - 1 year (3 element MBR) in the control groups was 4.91	The mean pain severity (VAS,0-10) >4 months - 1 year (3 element MBR) in the intervention groups was 0.4 lower (1.29 lower to 0.48 higher)
Pain Severity (VAS,0-10) >4 months - 1 year (Mixed Modality: Aerobic+ biomechanical exercise)	41 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS,0-10) >4 months - 1 year (mixed modality: aerobic+ biomechanical exercise) in the control groups was 5.6	The mean pain severity (VAS,0-10) >4 months - 1 year (mixed modality: aerobic+ biomechanical exercise) in the intervention groups was 2.83 lower (5.68 lower to 0.02 higher)
Pain Severity (VAS,0-10) >4 months - 2 year(Mixed Modality: Aerobic+ biomechanical exercise)	41 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS,0-10) >4 months - 2 year(mixed modality: aerobic+ biomechanical exercise) in the control groups was 4.7	The mean pain severity (VAS,0-10) >4 months - 2 year(mixed modality: aerobic+ biomechanical exercise) in the intervention groups was 3.06 lower (6.08 to 0.04 lower)
Function (ODI,0-100) >4 months - 3 element MBR (1 year)	118 (2 studies) 1 years	LOW[a] due to risk of bias		The mean function (ODI,0-100) >4 months - 3 element MBR (1 year) in the control groups was 19.4	The mean function (ODI,0-100) >4 months - 3 element MBR (1 year) in the intervention groups was 0.83 higher (6.03 lower to 7.7 higher)
Function (ODI,0-100) >4 months - Mixed Modality (aerobic+ biomechanical exercise) (1 year)	41 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI,0-100) >4 months - mixed modality (aerobic+ biomechanical exercise) (1 year) in the control groups was 53.2	The mean function (ODI,0-100) >4 months - mixed modality (aerobic biomechanical exercise) (1 year) in the intervention groups was 26.06 lower (47.47 to 4.65 lower)
Function (ODI,0-100) >4 months - 3 element	349	LOW[a]		The mean function(ODI,0-100) >4	The mean function(ODI,0-100) >4

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other Treatment	Risk difference with Spinal Fusion (95% CI)
MBR (2 year)	(1 study) 2 years	due to risk of bias		months - 3 element MBR (2 year) in the control groups was 36.1	months - 3 element MBR (2 year) in the intervention groups was 2.1 lower (6.47 lower to 2.27 higher)
Function (ODI,0-100) >4 months - Mixed Modality (aerobic+ biomechanical exercise) (2 year)	41 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI,0-100) >4 months - mixed modality (aerobic+ biomechanical exercise) (2 year) in the control groups was 40	The mean function (ODI,0-100) >4 months - mixed modality (aerobic+ biomechanical exercise) (2 year) in the intervention groups was 26.59 lower (44.82 to 8.36 lower)
Function (GFS,0-100) >4 months (1 year)	118 (2 studies) 1 years	VERY LOW[a,b,c] due to risk of bias, inconsistency, imprecision		The mean function (gfs,0-100) >4 months (1 year) in the control groups was 19.95	The mean function (gfs,0-100) >4 months (1 year) in the intervention groups was 0.93 higher (10.12 lower to 11.97 higher)
Function (Japanese Orthopaedic Association Score, JOAS,0-3) >4 months - 1 year (Mixed Modality: Aerobic+ biomechanical exercise)	41 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Japanese orthopaedic association score, joas,0-3) >4 months - 1 year (mixed modality: aerobic+ biomechanical exercise) in the control groups was 0.9	The mean function (Japanese orthopaedic association score, joas,0-3) >4 months - 1 year (mixed modality: aerobic+ biomechanical exercise) in the intervention groups was 0.96 higher (0.36 to 1.56 higher)
Function (Japanese Orthopaedic Association Score, JOAS,0-3) >4 months - 2 year(Mixed Modality: Aerobic+ biomechanical exercise)	41 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (Japanese orthopaedic association score,joas,0-3) >4 months - 2 year(mixed modality: aerobic+ biomechanical exercise) in the control groups was 1.2	The mean function (association score,joas,0-3) >4 months - 1 year (mixed modality: aerobic+ biomechanical exercise) in the intervention groups was 1.16 higher

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other Treatment	Risk difference with Spinal Fusion (95% CI)
					(0.4 to 1.92 higher)
Quality of life, SF-36, 0-100 (2 years) - Physical component score, PCS	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - physical component score, pcs in the control groups was 27.6	The mean quality of life, sf-36, 0-100 (2 years) - physical component score, pcs in the intervention groups was 1.2 higher (2.5 lower to 4.9 higher)
Quality of life, SF-36, 0-100 (2 years) - Mental component score, MSC	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - mental component score, msc in the control groups was 48.1	The mean quality of life, sf-36, 0-100 (2 years) - mental component score, msc in the intervention groups was 0.7 lower (3.79 lower to 2.39 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-General health perception	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-general health perception in the control groups was 53.8	The mean quality of life, sf-36, 0-100 (2 years) - domain-general health perception in the intervention groups was 3.9 higher (2.12 lower to 9.92 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Physical functioning	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-physical functioning in the control groups was 49.8	The mean quality of life, sf-36, 0-100 (2 years) - domain-physical functioning in the intervention groups was 0.2 higher (6.92 lower to 7.32 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Role limitation(physical)	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-role limitation(physical) in the control groups was 38.6	The mean quality of life, sf-36, 0-100 (2 years) - domain-role limitation(physical) in the intervention groups was 1 higher (9.61 lower to 11.61 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Role limitation (emotional)	246 (1 study)	LOW[a] due to risk		The mean quality of life, sf-36, 0-100 (2 years) - domain-role	The mean quality of life, sf-36, 0-100 (2 years) - domain-role

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other Treatment	Risk difference with Spinal Fusion (95% CI)
	2 years	of bias		limitation(emotional) in the control groups was 65.4	limitation(emotional) in the intervention groups was 0.2 lower (10.98 lower to 10.58 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Pain	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-pain in the control groups was 44.9	The mean quality of life, sf-36, 0-100 (2 years) - domain-pain in the intervention groups was 3.2 higher (3.26 lower to 9.66 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Social functioning	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-social functioning in the control groups was 55.6	The mean quality of life, sf-36, 0-100 (2 years) - domain-social functioning in the intervention groups was 2 lower (8.56 lower to 4.56 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Mental Health	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-mental health in the control groups was 68.4	The mean quality of life, sf-36, 0-100 (2 years) - domain-mental health in the intervention groups was 1.9 lower (7.48 lower to 3.68 higher)
Quality of life, SF-36, 0-100 (2 years) - Domain-Energy and vitality	246 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 (2 years) - domain-energy and vitality in the control groups was 46.4	The mean quality of life, sf-36, 0-100 (2 years) - domain-energy and vitality in the intervention groups was 0.3 higher (5.66 lower to 6.26 higher)
Healthcare Utilisation (unplanned hospital admissions for spinal surgery)	349 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation(unplanned hospital admissions for spinal surgery) in the control groups was 0.31	The mean healthcare utilisation(unplanned hospital admissions for spinal surgery) in the intervention groups was 0.24 lower (0.32 to 0.16 lower)
Healthcare Utilisation (GP consultations) (2 year)	349 (1 study)	LOW[a] due to risk		The mean healthcare utilisation(gp consultations) (2 year) in the control	The mean healthcare utilisation (gp consultations) (2 year) in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other Treatment	Risk difference with Spinal Fusion (95% CI)
	2 years	of bias		groups was 6.81	intervention groups was 0.57 higher (1.29 lower to 2.43 higher)
Healthcare Utilisation (Practice Nurse consultations) (2 year)	349 (1 study)	LOW[a] due to risk of bias		The mean healthcare utilisation(practice nurse consultations) (2 year) in the control groups was 0.62	The mean healthcare utilisation (practice nurse consultations) (2 year) in the intervention groups was 0.24 higher (0.17 lower to 0.65 higher)
Healthcare Utilisation (GP home visits) (2 year)	349 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (gp home visits) (2 year) in the control groups was 0.31	The mean healthcare utilisation (gp home visits) (2 year) in the intervention groups was 0.38 higher (0.07 to 0.69 higher)
Healthcare Utilisation (Practise nurse home visits) (2 year)	349 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean healthcare utilisation (practise nurse home visits) (2 year) in the control groups was 0.24	The mean healthcare utilisation (practise nurse home visits) (2 year) in the intervention groups was 0.37 higher (0.02 to 0.72 higher)
Healthcare Utilisation (Prescriptions) (2 year)	349 (1 study) 2 years	LOW[a] due to risk of bias		The mean healthcare utilisation (prescriptions) (2 year) in the control groups was 13.43	The mean healthcare utilisation (prescriptions) (2 year) in the intervention groups was 0.8 higher (4.21 lower to 5.81 higher)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

[c] Downgraded by 1 or 2 increments because of Heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

Table 84: Clinical evidence summary: Fusion versus Different type of surgery

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Different types of surgery	Risk difference with Spinal Fusion (95% CI)
Pain Severity (VAS/NRS,0-10) <4 months (3 months)	577 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (VAS/NRS,0-10) <4 months (3 months) in the control groups was 1.78	The mean pain severity (VAS/NRS,0-10) <4 months (3 months) in the intervention groups was 0.92 higher (0.5 to 1.34 higher)
Pain Severity (VAS/NRS,0-10) >4 months (1 year)	729 (2 studies) 1 years	LOW[a] due to risk of bias		The mean pain severity (VAS/NRS,0-10) >4 months (1 year) in the control groups was 2.155	The mean pain severity (VAS/NRS,0-10) >4 months (1 year) in the intervention groups was 0.73 higher (0.32 to 1.14 higher)
Pain Severity (VAS/NRS,0-10) >4 months (2 years)	729 (2 studies) 2 months	VERY LOW[a,b] due to risk of bias, inconsistency		The mean pain severity (VAS/NRS,0-10) >4 months (2 years) in the control groups was 3.94	The mean pain severity (VAS/NRS,0-10) >4 months (2 years) in the intervention groups was 0.1 lower (0.89 lower to 0.69 higher)
Function (ODI,0-100) <4 months (3 months)	577 (1 study) 3 months	LOW[a] due to risk of bias		The mean function(ODI,0-100) <4 months (3 months) in the control groups was 23.4	The mean function(ODI,0-100) <4 months (3 months) in the intervention groups was 8.6 higher (4.6 to 12.6 higher)
Function (ODI,0-100) >4 months (1 year)	729 (2 studies) 1 years	LOW[a] due to risk of bias		The mean function (ODI,0-100) >4 months (1 year) in the control groups was 19.35	The mean function (ODI,0-100) >4 months (1 year) in the intervention groups was 5.9 higher (2.98 to 8.83 higher)
Function(ODI,0-100) >4 months (2 years)	729 (2 studies) 2 years	LOW[a] due to risk of bias		The mean function (ODI,0-100) >4 months (2 years) in the control groups was 19.7	The mean function (ODI,0-100) >4 months (2 years) in the intervention groups was 4.75 higher (1.74 to 7.77 higher)
Quality of life,SF-36 (Physical Component Score,PCS,0-100) < 4 months	577 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life,sf-36(physical component score,pcs,0-100)< 4 months in the control groups was 41.4	The mean quality of life,sf-36 (physical component score,pcs,0-100)< 4 months in the intervention groups was 4.5 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Different types of surgery	Risk difference with Spinal Fusion (95% CI)
					(6.22 to 2.78 lower)
Quality of life,SF-36 (Physical Component Score,PCS,0-100) > 4 months - 1 year	577 (1 study) 1 years	LOW[a] due to risk of bias		The mean quality of life,sf-36 (physical component score,pcs,0-100)> 4 months - 1 year in the control groups was 44.7	The mean quality of life,sf-36 (physical component score,pcs,0-100) > 4 months - 1 year in the intervention groups was 3.1 lower (5.19 to 1.01 lower)
Quality of life,SF-36 (Physical Component Score,PCS,0-100) > 4 months - 2 year	577 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life,sf-36 (physical component score,pcs,0-100) > 4 months - 2 year in the control groups was 45.1	The mean quality of life,sf-36 (physical component score,pcs,0-100) > 4 months - 2 year in the intervention groups was 3 lower (5.16 to 0.84 lower)
Quality of life, SF-36(Mental Component Score,MCS,0-100)< 4 months	577 (1 study) 3 months	LOW[a] due to risk of bias		The mean quality of life, sf-36(mental component score,mcs,0-100)< 4 months in the control groups was 51.3	The mean quality of life, sf-36(mental component score,mcs,0-100)< 4 months in the intervention groups was 2.8 lower (4.91 to 0.69 lower)
Quality of life,SF36(Mental Component Score,MCS,0-100)> 4 months - 1 year	577 (1 study) 1 years	LOW[a] due to risk of bias		The mean quality of life,sf36(mental component score,mcs,0-100)> 4 months - 1 year in the control groups was 51.3	The mean quality of life,sf36(mental component score,mcs,0-100)> 4 months - 1 year in the intervention groups was 2 lower (4.05 lower to 0.05 higher)
Quality of life,SF36(Mental Component Score,MCS,0-100)> 4 months - 2 year	577 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life,sf36(mental component score,mcs,0-100)> 4 months - 2 year in the control groups was 51.4	The mean quality of life,sf36(mental component score,mcs,0-100)> 4 months - 2 year in the intervention groups was 1.4 lower (3.36 lower to 0.56 higher)
Quality of life,EQ-5D,0-1 >4 months - 1 year	152 (1 study) 1 years	VERY LOW[a,b] due to risk of bias,		The mean quality of life,eq-5d,0-1 >4 months - 1 year in the control groups was	The mean quality of life,eq-5d,0-1 >4 months - 1 year in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Different types of surgery	Risk difference with Spinal Fusion (95% CI)
		imprecision		0.71	0.08 lower (0.17 lower to 0.01 higher)
Quality of life,EQ-5D,0-1 >4 months - 2 year	152 (1 study) 2 years	LOW[a] due to risk of bias		The mean quality of life,eq-5d,0-1 >4 months - 2 year in the control groups was 0.67	The mean quality of life,eq-5d,0-1 >4 months - 2 year in the intervention groups was 0.02 higher (0.07 lower to 0.11 higher)
Adverse events-Mortality	577 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.27 (0.13 to 12.16)	Moderate	
				6 per 1000	2 more per 1000 (from 5 fewer to 67 more)
Adverse events-Complications - 2 year	729 (2 studies) 2 years	LOW[a] due to risk of bias	RR 0.97 (0.9 to 1.05)	Moderate	
				532 per 1000	16 fewer per 1000 (from 53 fewer to 27 more)
Adverse events-Complications - 5 year	152 (1 study) 5 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.77 (0.35 to 1.69)	Moderate	
				163 per 1000	37 fewer per 1000 (from 106 fewer to 112 more)
Adverse events-surgery at adjacent level at 2 years	152 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 6.67 (0.82 to 54.06)	Moderate	
				13 per 1000	74 more per 1000 (from 2 fewer to 690 more)
Reoperations - 2 year	152 (1 study) 2 years	VERY LOW[a,b] due to risk of bias,	RR 0.97 (0.37	Moderate	
				100 per 1000	3 fewer per 1000

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Different types of surgery	Risk difference with Spinal Fusion (95% CI)
		imprecision	to 2.55)		(from 63 fewer to 155 more)
Reoperations - 5 year	152 (1 study) 5 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.86 (0.34 to 2.2)	Moderate	
				113 per 1000	16 fewer per 1000 (from 75 fewer to 136 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

[c] Downgraded by 1 or 2 increments because of Heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

27.4 Economic evidence

Published literature

Two economic evaluations were identified that included spinal fusion as a comparator and have been included in this review. [44,145] These are summarised in the economic evidence profile below (**Table 85** and **Table 86**) and the economic evidence table in Appendix I.

See also the economic article selection flow chart in Appendix F.

Table 85: Economic evidence profile: Spinal fusion versus other surgery (total disc replacement)

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Fritzell 2011[44,45] (Sweden)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-trial (RCT, associated clinical paper Berg 2011) • Cost-utility analysis (QALYs) • Population: Adults with low back pain with/without sciatica. • Two comparators in full analysis: 1. Total disc replacement surgery 2. Fusion(either ALIF or PLIF according to surgeon preference) • Follow-up: 2 years	2−1: £1,587 [(c)]	2−1: -0.01 QALYs [(d)]	Intervention 1 dominates intervention 2 (lower costs and higher QALYs)	Bootstrapping of ICER conducted but only from a societal perspective not a health care provider perspective. Therefore this is not reported here. Two additional sensitivity analyses were conducted. - The costs were discounted at 3%, this did not impact the total cost difference between the 2 comparators. - Reoperation costs were excluded from total healthcare costs. The total costs (mean per patient) were: Intervention 1: £9,710 Intervention 2: £10,235 Incremental (2−1): £525 (95% CI: -£827 to £1,710; p=NR)

(a) Swedish resource use data (2002-2005) and unit costs (2006) may not reflect current NHS context. No discounting applied in base case analysis, discounting of costs at 3% applied in sensitivity analysis, however this is not in line with NICE reference case.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Berg 2009 is 1 of 2 studies included in the clinical review for spinal fusion versus other surgery. Bootstrapping of ICER not undertaken from a healthcare payer perspective. Potential conflict of interest, study funded by manufacturers of surgical devices.

(c) 2006 Swedish Krona converted using 2006 purchasing power parities[131]. Cost components include: Intervention cost (index procedure for surgery), post-surgery hospital cost (including re-operation costs), primary care costs (including private care) and back-related drug costs.

(d) EQ-5D collected pre-operatively, 1 year and 2 years follow-up. QALYs were calculated using the area under the curve approach adjusted for baseline utility.

Table 86: Economic evidence profile: Spinal fusion versus other treatment (Intensive rehabilitation programme-3 element MBR programme)

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
Rivero-Arias 2005[145] (UK)	Partially applicable [(a)]	Potentially serious limitations [(b)]	• Within-trial (RCT, associated clinical paper Fairbank 2005) • Cost-utility analysis (QALYs) • Population: Adults with chronic low back pain • Two comparators in full analysis: 1. Intensive rehabilitation programme-3 element MBR programme (paced exercise and education programme based on cognitive behavioural approaches). 2. Fusion(technique based on surgeon preference) • Follow-up: 2 years	2−1: £3,299 [(c)]	2−1: 0.068 QALYs [(d)]	£48,515 per QALY gained	Bootstrapping of ICER conducted but only using a total costs including patient-related costs (broader perspective) not a NHS perspective. Probability Intervention 2 cost-effective (£20K): ~5% (reading from graph) Sensitivity analyses were conducted assuming different surgical technique costs: - posterolateral technique (least expensive procedure): ICER 2 versus 1 = £35,338 per QALY - 360 degree fusion (most expensive procedure): ICER 2 versus 1 = £60,765 per QALY Further sensitivity analysis by varying the time horizon to 4 years (assuming treatment differences for utilities were maintained): ICER = £25,398 per QALY. Finally, they examined impact of patients receiving other interventions subsequent to allocated intervention (at 2 years 45 patients had received both interventions) by assuming that people in each arm continued to receive both treatments in years 3,4 and 5 at rates observed in year 1 and 2: ICER =£16,824 per QALY. The same sensitivity analysis was

Study	Applicability	Limitations	Other comments	Incremental cost	Incremental effects	Cost effectiveness	Uncertainty
							done but assuming half the rate observed at year 1 and 2 applied: ICER = £31,838 per QALY. Note, these were all conducted using the broader perspective (including patient-related costs).

(a) UK NHS resource use data (1996-2002) and unit cost (2002-2003) may not reflect current NHS context.

(b) Within-trial analysis and so does not reflect full body of available evidence for this comparison; Fairbank 2005 is 1 of 4 studies included in the clinical review for spinal fusion versus other treatments. Sensitivity analyses were conducted using a broader perspective which included patient-related costs.

(c) 2002/3 UK pounds. Cost components include: Intervention costs (including staff time and other resource use such as surgical implants and equipment) and other back pain related NHS contacts up to 24 months (including surgical follow-up appointments, physiotherapy outpatient appointments, unplanned or other back-related hospital admission, HCP contacts, prescriptions).

(d) EQ-5D collected baseline, 6, 12 and 24 months follow-up. QALYs were calculated using the area under the curve approach adjusted for baseline utility

27.4.1 Unit costs

These HRG codes include the following spinal fusion procedures (OPCS codes):

HRG code HC01:

- V333: ALIF (>1 level)
- V336 + V551: ALIF + PLF (1 level)
- V385 + V551: PLIF (1 level)
- V386 + V551/2/3: TLIF

HRG code HC02:

- V402, V403, V404: Posterior instrumented fusion
- V333 + V551: ALIF (1 level)

Table 87: Spinal fusion surgery unit costs

Reference cost HRG	Activity	National average unit cost
Extradural Spine Major 2 with CC Score 5+ (HC01A); as recorded for Total HRG	273	£14,686
Extradural Spine Major 2 with CC Score 2-4 (HC01B); as recorded for Total HRG	1060	£8,968
Extradural Spine Major 2 with CC Score 0-1 (HC01C); as recorded for Total HRG	2428	£7,464
Extradural Spine Major 1 with CC Score 5+ (HC02D); as recorded for Total HRG	311	£13,028
Extradural Spine Major 1 with CC Score 2-4 (HC02E); as recorded for Total HRG	1300	£6,999
Extradural Spine Major 1 with CC Score 0-1 (HC02F); as recorded for Total HRG	2956	£5,518
Weighted for complications and co morbidities	**8328**	**£7,337**

Source: NHS reference costs 2013/2014[34,35]

27.5 Evidence statements

27.5.1 Clinical

27.5.1.1 Fusion versus usual care

Evidence from 1 randomised study demonstrated clinical benefit of spinal fusion compared to usual care for pain at greater than 4 months (very low quality, n=264) and for function measured by the General Function Score (GFS) and Million VAS (MVAS) and in the long term (very low and low quality, n=264). However, function measured by the ODI at greater than 4 months follow-up demonstrated no clinical difference between fusion and usual care(very low quality, n=264). Evidence from a non-randomised study for the same comparison suggested no clinical difference between fusion and usual care for any of the reported outcomes for quality of life, pain and function (very low quality, n=96).

27.5.1.2 Fusion versus other treatment

Evidence from 3 studies showed there to be no clinical difference between spinal fusion and 3 element MBR in pain and function (low-very low quality, n=467). Overall, there was no clinical difference between the 2 interventions for the majority of the quality of life domains of the SF-36 as well as the composite mental and physical scores, however a clinical benefit favouring spinal fusion was demonstrated in the domains of general health perception (low quality, n=246) and the domain pain (low quality, n=246). In addition there was no difference between spinal fusion and 3 element MBR in any reported healthcare utilisation measure (1 study, very low quality, n=349).

Evidence from a single study comparing spinal fusion with mixed modality exercise demonstrated clinical benefit for fusion in both pain and function (measured by ODI and JOAS) at both the 4 months to 1 year follow up and at 1 and 2 years (low to very low quality, n=41).

27.5.1.3 Fusion versus different type of surgery

Evidence from 2 studies comparing spinal fusion with disc replacement demonstrated spinal fusion to be less effective than disc replacement in terms of improving quality of life measures such as EQ-5D at greater than 4 months (1 study, very low quality, n=152) and the physical component score of the SF-36 at the all follow-up points reported (1 study, low-very low quality, n=577). There was no difference between the 2 surgical treatments for the mental component score of the SF-36 at any follow-up period as well for EQ-5D at the 2 years follow up. Similarly, no clinical difference between spinal fusion and disc replacement was reported for pain and function in either the short or long term either (2 studies, low-very low quality, n=729).

There was slightly conflicting evidence for adverse events reported from 2 studies with the majority of evidence demonstrating no clinical difference between spinal fusion and disc replacement for mortality, complications and reoperation rates at 2 years and 5 year follow up for re-operation rate). However, clinical benefit for fusion in comparison to disc replacement was reported for complications at 5 years in evidence from a single study (low quality, n=152). In contrast, fusion was demonstrated to result in more occurrences of surgery at adjacent level at 2 years compared to disc replacement (1 study, very low quality, n=152).

27.5.2 Economic

- One cost–utility analysis found that spinal fusion was dominated (more costly and less effective) compared to total disc replacement surgery for treating low back pain (with or without sciatica). This analysis was assessed as partially applicable with potentially serious limitations.
- One cost–utility analysis found that spinal fusion was not cost-effective compared to a 3-element MBR programme for treating low back pain with or without sciatica (ICER: £48,515 per QALY gained). This analysis was assessed as partially applicable with potentially serious limitations.
- No economic analyses were identified comparing spinal fusion to no surgery or usual care.

27.6 Recommendations and link to evidence

Recommendations	**40. Do not offer spinal fusion for people with low back pain unless as part of a randomised controlled trial.**
Research recommendations	**7. Should individuals with low back pain be offered spinal fusion as a surgical option?**
Relative values of	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making.

different outcomes	Adverse events, revision rate, failure rate and healthcare utilisation were also considered as important. Evidence was reported for all of the critical outcomes except for psychological distress. Failure rate was the only important outcome for which there was no evidence from studies included in this review. The GDG felt there was sufficient evidence for all of the outcomes that were considered important for this review.
Trade-off between clinical benefits and harms	**Spinal fusion versus usual care** Low and very low quality randomised evidence from a single large trial suggested a clinical benefit in favour of spinal fusion in terms of pain (VAS) in the longer term follow up (4 months - 1 year) however there was uncertainty in this effect. The GDG discussed that the difference in pain scores at the end of 2 years between the surgical and non-surgical group was not very pronounced. However, this study reported a marked decrease in pain severity in the first 6 months after surgery in graphical form. The GDG considered this useful data although it could not be included in this meta-analysis. The GDG discussed that the short term relief in pain could be as a result of the application of a rigid plastic brace restricting the individuals' movement after surgery. A long term benefit in function (measured on three different scales) was also shown to favour fusion. The GDG also noted the 17% complication rate and 8% reoperation rate for spinal fusion and that there was significant potential harm to patients. **Spinal fusion versus other treatment** Clinical benefit in pain (assessed by VAS and Japanese Orthopaedic Association Score (JOAS)) and function (assessed by ODI and General Function Score) favouring spinal fusion was observed in the longer term follow up with serious uncertainty. This long term benefit in pain severity and function was observed in evidence from 1 small study comparing minimally treated patients as the control group to surgery. It was considered unlikely that improvements would be seen in the group receiving minimal treatment. The 3 larger studies in this comparison incorporated more rigorous MBR programmes as their comparator treatment; no clinically important difference in either pain or function was observed with this comparator. The GDG noted that 1 study had a very intensive MBR programme that involved 75 hours of intervention per week compared to 25 hours per week in the other 2 studies. However, evidence was consistent across all 3 studies, suggesting that the outcomes for people receiving MBR programmes were no different those receiving surgery. No clinically important difference in quality of life (assessed by SF-36) or healthcare utilisation (with some uncertainty) was seen between treatments in the long term follow-up for this comparison. The data for these 2 outcomes was taken from 1 study in which a high number of patients randomised to rehabilitation underwent surgical stabilisation of the spine; 10 subjects opted for this instead of rehabilitation, and 38 subjects in addition to rehabilitation, contributing to a >40% cross-over rate for patients who had both treatments. Overall it appeared that MBR programmes perform as well as spinal fusion in terms of improving pain, function and quality of life, but are associated with a low risk of harm. **Spinal fusion versus different types of surgery** Evidence from 2 large trials demonstrated no clinically important difference in either pain (VAS) or function (ODI) between spinal fusion and disc replacement either in the short or the long term follow-up. A clinical benefit favouring disc replacement was demonstrated when assessed by the physical component of the SF-36 in both the and long term. However, no clinically important difference in the mental component of the SF-36 was observed at any time point. Very low quality evidence suggested a clinical benefit favouring disc replacement in terms of quality of life assessed by EQ-5D at the long term time

	point of 1 year which was not maintained at the 2 year follow-up. No clinically important difference between spinal fusion and disc replacement was seen in terms of adverse events (mortality and complications). The GDG noted that there was a high rate of serious complications associated with both treatments, for example 1 study reported that 345 out of 405 people experienced adverse events at 2 years following fusion surgery. However, it was noted that intraoperative rates of serious complications differed at 14.6% for disc replacement compared to 8.7% for spinal fusion; the higher rate in disc replacement possibly attributed to its more invasive nature. The GDG understood there to be a roughly 10–20% rate of complications across trials, with approximately 4-5% serious complications. As a result, they did not feel that the clinical benefit favouring disc replacement assessed by the physical component of the SF-36 in both the short term and long term was significant enough to outweigh the potential harms associated with the procedure despite the effect being maintained at 1 and 2 year follow-up. Very low quality evidence demonstrated a clinical benefit favouring disc replacement for further surgery required at an adjacent level at 2 years. However, the study did not report treatment effect at different levels, so the GDG did not feel that this information was useful for decision making. Furthermore, data from the same study suggested no clinically important difference between spinal fusion and disc replacement for revision rate (reoperations) at the long term time points of 2 and 5 years. **Summary** Overall the GDG considered that there was no consistent benefit of spinal fusion over comparator treatments and evidence of potential harm. Given this and the limited number of studies from which data could be evaluated, the GDG agreed that there was a lack of evidence of clinical effectiveness to recommend spinal fusion for people with low back pain other than in the context of a randomised controlled trial.
Trade-off between net clinical effects and costs	Two cost–utility analyses were identified for spinal fusion. The first analysis, Fritzell 2011, was a within-trial analysis (associated RCT: Berg 2009) which found that spinal fusion was dominated (more costly and less effective) compared to total disc replacement in people with low back pain with or without sciatica. This study was partially applicable with potentially serious limitations. It was noted that all cost elements were higher for the spinal fusion group and that 1 of the key cost drivers was the higher rate of re-operations in the spinal fusion surgery group. The second analysis, Rivero-Arias 2005, was a within-trial analysis (associated RCT: Fairbank 2005) which found that spinal fusion was not cost-effective compared to a 3-element MBR programme (ICER: £48,515 per QALY gained). This study was partially applicable with potentially serious limitations. The GDG discussed the high cross-over between treatment arms reported in the trial, resulting in a large proportion of the trial participants receiving both interventions by the end of the 2 year follow-up. The unit cost for spinal fusion surgery was estimated to be £7,337 per patient. This cost is based on the weighted average for complications and co-morbidities of the following HRG codes: Extradural Spine Major 2 with CC Score 5+ (HC01A); Extradural Spine Major 2 with CC Score 2-4 (HC01B); Extradural Spine Major 2 with CC Score 0-1 (HC01C); Extradural Spine Major 1 with CC Score 5+ (HC02D); Extradural Spine Major 1 with CC Score 2-4 (HC02E); Extradural Spine Major 1 with CC Score 0-1 (HC02F). The cost of total disc replacement surgery was also discussed by the GDG. This surgical procedure is included in the same HRG codes as spinal fusion and therefore the 2 surgeries do not differ in unit cost. Taking into account the overall body of clinical effectiveness evidence for spinal fusion, the GDG concluded there was no consistent benefit of spinal fusion over comparator treatments and there was considerable evidence of harm. When combined with the cost-effectiveness evidence which indicated that spinal fusion

	was not a cost-effective intervention for the treatment of low back pain, the GDG agreed that spinal fusion should not be routinely recommended for people with low back pain.
Quality of evidence	**Spinal fusion versus usual care** Evidence for this comparison was from 1 large study which reported pain, function, adverse events and revision rate. The evidence was rated as low-very low quality due to the risk of bias and uncertainty of the effect size. The population was recruited by invitation to specialist spine centres and subsequent randomisation to more of the same treatment (physiotherapy and advice), or surgery. The GDG discussed that the control group appeared to be a severely disadvantaged group that had not been offered a new treatment and had been selected on the grounds of strict inclusion criteria of mandatory sick leave or equivalent disability for a year, as well as previous failure of non-surgical treatments. The GDG felt that this could result in a risk of bias due to a 'negative contextual effect' and also raised concerns that the study only reported outcomes at 2 years. The surgical group in this study was also much larger than the usual care group; 211 patients underwent surgery whereas 72 patients usual care treatment. It was also noted that Million Visual Analogue Scale (MVAS) used to measure function in the study reported a final score of 0-100 whereas commonly the MVAS comprises of 15 questions with a scale of 0-150. **Spinal fusion versus other treatment** There were 4 studies included in this comparison and the majority of evidence was of very low quality due to risk of bias and imprecision. "Other treatment" was defined as an MBR programme of varying intensity in 3 studies and aerobic and biomechanical exercise in 1 study. One study in particular was noted by the GDG to be a very small trial and used a less intensive comparator than the other trials. The GDG were not convinced by the small benefit in pain and function favouring spinal fusion reported in this study, which was not observed in the larger studies with more intensive comparator interventions. **Spinal fusion versus different types of surgery** Evidence for this comparison was from 2 large randomised studies which both compared disc replacement to spinal fusion. Evidence was low-very low quality due to very high risk of bias attributed to selection bias, lack of blinding and incomplete data at follow-up. There was also imprecision on many of the results reported. The larger of the 2 studies was an industry funded investigational device exemption trial for an artificial lumbar disc and had an incomplete outcome data rate of 15.1% in the control arm compared to 5.7% in the disc replacement group which cast doubt on the results reported.
Other considerations	The GDG agreed there were causes of low back pain for which spinal fusion might be an appropriate treatment which were beyond the scope of this guideline. The GDG noted that if spinal fusion was being undertaken, patient outcome information should be submitted to a national registry. The GDG were aware of NICE Interventional procedures guidance for Non rigid stabilisation techniques for the treatment of low back pain, IP366 which recommend normal arrangements for clinical governance, consent and audit for this procedure. The GDG were also aware of existing NICE interventional procedure guidance for Transaxial interbody lumbosacral fusion (IPG 387) and Lateral (including extreme, extra and direct lateral) interbody fusion in the lumbar spine (IPG321) which both recommend special arrangement for clinical governance, consent, audit and research. These procedures were excluded from the review and if considered for people with low back pain, the existing guidance should be followed. **Research recommendation** **Why this is important:** Low back pain affects a large number of individuals in UK. The condition has a huge cost to the individual, society and the country's economy. Over the past 2 decades, increasing number of procedures have been proposed for

	the surgical management of LBP. These include but are not limited to surgical fixation with internal metal-work applied from the back, front, side or any combination of the three routes. The costs of these operations have escalated, andas well as the monetary cost, there are complications associated with the surgical approaches with some studies reporting around 20% complication rate in the short to medium term. There have been several studies looking at the clinical effectiveness of spinal fusion versus usual care, no surgery, different surgeries, and other treatments. The studies collectively fail to show clear advantage of fusion but do show some modest benefit in some elements of pain, function and quality of life as well a reduction in healthcare utilisation. It is not known what treatments should have been tried prior to the consideration of surgery. Some patients who respond positively to surgery demonstrate a large treatment effect and the ability to predict responders would improve options available to patients. The studies generally suffer from low number of patients, large cross over and in case selection bias. We therefore propose a large, multi- centre randomized trial with sufficient power to answer these important questions.

28 Spinal decompression for sciatica

28.1 Introduction

Spinal decompression refers to removal of pressure from the nervous structures within the spinal column. This circumferential structure consists of vertebral body, disc and ligaments at the front, facet joints and foramen at the sides, and the lamina and ligaments at the back. Compression may be due to an abnormality of any of these structures and their removal results in spinal decompression.

An example of spinal decompression, laminectomy, is the removal of the lamina either unilaterally (hemi-laminectomy) or bilaterally, which is usually accompanied by the removal of the attached yellow ligament (*ligamentum flavum*). This can also include enlarging the foramen (foraminotomy) or undercutting facetectomy (trimming of the overgrown facets) and/or discectomy. The ultimate aim is to make more room for the neural elements.

The most common cause of the narrowing of the spinal canal is degenerative lumbar disease otherwise known as spondylosis. The symptoms associated with degenerative lumbar disease are leg symptoms (often pain, but also numbness and weakness) usually made worse by prolonged standing and walking. This is known as neurogenic claudication. At a very late stage of the condition people can develop bladder and bowel incontinence. In contrast to this, disc prolapse usually causes leg pain and sciatica. These 2 conditions often coexist in people suffering from back pain.

There have been several advances in the techniques of laminectomy and discectomy. With the improvements in optics and illumination, surgical loops, microscopes and endoscopes, the procedures are thought to be less invasive. There has also been the introduction of different methods of removing disc material including laser, thermo-coagulation radiofrequency and many others. Despite controversy surrounding the best method for discectomy, we have not reviewed the comparative effectiveness of these methods and suggest that this be determined by the individual surgeon and by clinical appropriateness.

28.2 Review question: What is the clinical and cost effectiveness of spinal decompression in people with sciatica?

For full details see review protocol in Appendix C.

Table 88: PICO characteristics of review question

Population	People aged 16 or above with sciatica • Populations with neurogenic claudication causing leg pain will be included
Intervention	Spinal decompression • Laminectomy • Discectomy
Comparisons	• Usual care • Other treatment (interventions listed in our guideline review protocols)
Outcomes	**Critical** • Health-related quality of life (for example, SF-12, SF-36 or EQ-5D). • Pain severity (for example, visual analogue scale [VAS] or numeric rating scale [NRS]). • Function (for example, the Roland-Morris disability questionnaire or the Oswestry disability index). • Psychological distress (HADS, GHQ, BPI, BDI, STAI)

	Important
	• Responder criteria (>30% improvement in pain or function)
	• Adverse events:
	  ○ Morbidity
	  ○ Mortality
	• Revision rate
	• Failure rate
	• Healthcare utilisation (prescribing, investigations, hospitalisation or health professional visit)
	• Outcomes to be recorded at:
	  ○ Short term (≤4 months) (8 weeks to 4 months)
	  ○ Long-term:
	  - > 4 months (4 months to 1 year) for all outcomes
	  - 1-2 years for critical outcomes
	  - 0-10 years for failure rates and revision rates (recurrence / repeat surgery at adjacent segments or at the same segment, will be reported narratively only, for GDG

Study design	RCTs and SRs will be included in the first instance. If insufficient RCT evidence to form a recommendation is found, non-randomised studies will be included.

28.3 Clinical evidence

Nine RCT's (published in 14 papers) were included in the review.[17,18,38,51,119,133,138-140,166,167,171,175-178]

The search was extended to cohort studies for comparisons where there was insufficient evidence (specific forms of decompression versus a valid comparator) and 4 further studies were included (published in 6 papers).[19,74,75,77,97,136,176]

Two Cochrane reviews were identified by searches but could not be included for the following reasons:

- the review included studies on surgery techniques in disc prolapse and not just spinal decompression [54];
- the review compared different types of spinal decompression techniques and was therefore not relevant to the review protocol [134].

The studies included in these Cochrane reviews were individually assessed and included if they matched the review protocol.

The included studies have been summarised in **Table 89** below. Evidence from these studies is summarised in the GRADE clinical evidence profile/clinical evidence summary below (**Table 94** to **Table 101**). See also the study selection flow chart in Appendix E, study evidence tables in Appendix H, forest plots in Appendix K, GRADE tables in Appendix J and excluded studies list in Appendix L.

For the comparison of discectomy versus usual care, there was substantial heterogeneity between studies when they were meta-analysed for the outcome leg pain severity at up to 4 months. Pre-specified subgroup analyses to compare people who had discectomy as a procedure to those who had laminectomy could not be applied as the only decompression procedure being investigated was discectomy. A random effects meta-analysis was therefore applied to this outcome, and the evidence was downgraded for inconsistency in GRADE.

28.3.1 Summary of included studies

Table 89: Summary of RCTs included in the review

Study	Intervention and comparison	Population	Outcomes	Comments
Cao 2014[19] Retrospective cohort study	Discectomy (inter-laminar fenestration and prolapse removed) Fusion	Low back pain with sciatica Lumbar disc herniation N=91 18 months follow-up China	Adverse events - complications	No details reported of concurrent treatment
Erginousakis 2011[38]	Spinal decompression (PDD) Usual care: 6 weeks planned of supervised conservative therapy - actual mean duration was 22 days (analgesics, anti-inflammatory drugs, muscle relaxants, and physiotherapy; included counselling and education. Personal communication once/ week).	Sciatica (with or without low back pain) Invertebral disc herniation n=62 1 year and 2 years follow up Greece	Pain (VAS) Adverse events-Complications	No details reported of concurrent treatment
Gerszten 2010[51]	Spinal decompression (using the Coblation DLR or DLG Spine Wand surgical device) Epidural steroid injection (at the site of disc protrusion. Steroid used in most patients was methylprednisolone).	Sciatica Lumbar disc protrusion N=90 6 months follow-up USA	Pain (VAS) Function (ODI) Adverse events (procedure-related)	Concurrent treatment: both groups allowed to receive additional conservative therapies including bed rest, physical therapy, narcotic analgesics or NSAIDs at the discretion of the treating investigator
Kim 2015[77] Prospective cohort study	Spinal decompression (microsurgical extraforaminal decompression / discectomy) Fusion (posterior lumbar interbody fusion) following the decompression procedures, including laminectomy and	Sciatica lumbar foraminal stenosis n=55 12 months follow-up Korea	Pain (VAS) Function (ODI) Quality of life (SF-36) Revision rate	No details reported of concurrent treatment

Study	Intervention and comparison	Population	Outcomes	Comments
	facetectomy			
Mcmorland 2010[119]	Microdiscectomy (both sequestrectomy and intrannular discectomy were performed to ensure adequate nerve root decompression) Combination non-invasive interventions: manual therapy+ biomechanical exercise + self-management. Manual therapy (spinal manipulation) plus Cryotherapy or thermotherapy was used on as needed basis during treatment sessions to increase patient ability to tolerate treatment. Patients were moved from passive care to active and then finally self-directed care. This involved providing patient with an education/information pack and introducing them to rehabilitative exercise. Patients also participated in a supervised rehabilitative (core stability) exercise regimen. Treatments typically required 2-3 treatments per week for the first 4 weeks reducing to 1-2 visits per week for the next 3-4 weeks. At the 8 week mark, follow up visits were scheduled based on patients symptoms and initial treatment holiday was given for 2	Sciatica Lumbar disc herniation N=40 1 year follow-up Canada	Pain (McGill) Function (RMDQ) Quality of life (SF-36)	No details reported of concurrent treatment

Study	Intervention and comparison	Population	Outcomes	Comments
	weeks, Upon follow up if the patients symptoms had not deteriorated, no treatment was given at the follow up and the next treatment holiday time doubled with another follow-up visit scheduled a month later. If the patient's symptoms had worsened at follow-up, treatment was administered and another 2 week holiday was scheduled. This process of treatment withdrawal and follow-up visits was continued until the patient's symptoms were deemed stable			
Osterman 2006[133]	Microdiscectomy Usual care (physiotherapeutic instructions initially and continued with isometric exercises after randomisation)	Sciatica Herniated invertebral disc n=56 2 year follow-up Finland	Pain (VAS) Function (ODI) Quality of Life (SF-36) Healthcare utilisation (additional physiotherapy) Revision rate (reoperations)	39% of patients in the control group crossed over to surgery eventually Concurrent treatment: analgesia was prescribed according to individual requirements
Peul 2007[140] (Peul 2007[138], Peul 2008[139])Van denhout 2008[171]	Microdiscectomy (herniation removed by minimal unilateral transflaval approach. Annular fenestration, curettage, and removal of loose degenerated disc material from the disc space, using a rongeur, without attempting to perform a subtotal discectomy) Usual care (Prolonged conservative treatment (surgery offered at 6 months	Sciatica Herniated disc N=283 1 year and 2 year follow-up The Netherlands	Pain (VAS) Function (RMDQ) Quality of Life (SF-36 and EQ-5D) Responder criteria (Recovery: complete or nearly complete disappearance of symptoms)	No details reported of concurrent treatment NOTE: if sciatica persisted for 6 months after the patient underwent randomisation, discectomy was offered. Surgery was offered earlier than 6 months after randomisation if patients had increasing leg pain not responsive to medication, or progressive neurologic deficits.

Study	Intervention and comparison	Population	Outcomes	Comments
	if needed): intended 6 months of conservative treatment. provided by GPs. informed about their favourable prognosis and invited to visit the trial website (provided info about the natural course of their illness and the expectation of successful recovery, irrespective of initial intensity of pain). Treatment aimed mainly at enabling patients to resume daily activities. If needed, prescription of pain medication was adjusted according to clinical guidelines. Patients fearful of moving were referred to a physiotherapist.)			
SPORT trial: Weinstein 2006A[178]	Discectomy (standard, open) Usual care (at least physical therapy, education and counselling with home exercise instruction and non-steroidal anti-inflammatory drugs if tolerated. Physicians were instructed to individualise non-operative treatment and explore a wide range of non-operative options)	Sciatica Intervertebral disc herniation N=1191 (3 studies) 1 year follow-up USA	Pain (Sciatica bothersomeness) Function (ODI) Quality of Life (SF-36 and EQ-5D)-EQ-5D data reported graphically and as QALY's therefore not usable for reviewing purposes Adverse events (inadvertent durotomy, wound infection)	Back pain data from analyses adjusted for most key confounders High rate of cross-over from the control group arm into the discectomy group No details reported of concurrent treatment
SPORT trial: Weinstein 2006[176]Pearson 2008[136] (Kerr 2015[74], Lurie 2014[97] Tosteson 2008	As above for SPORT trial	As above for SPORT trial	Pain (Back pain bothersomeness Adverse events (inadvertent durotomy, wound infection) Healthcare utilisation(number	Data from the observational cohort trial reported separately as well as combined with the RCT data. High rate of cross-over from the control group

Study	Intervention and comparison	Population	Outcomes	Comments
[167]Tosteson 2008A[166] Prospective cohort study			of physical therapy visits and medication use)	arm into the discectomy group No details reported of concurrent treatment
SPORT trial: Weinstein 2008[177]	Laminectomy(posterior decompressive laminectomy) Usual Care (recommended to include at least active physical therapy, education or counselling with home exercise instruction, and the administration of non-steroidal anti-inflammatory drugs if tolerated.	Sciatica Lumbar spinal stenosis at 1 or more levels N=654 2 year follow-up USA	Pain (Sciatica bothersomeness and low back pain bothersomeness) Function (ODI) Quality of Life (SF-36)	High rate of crossover in the study in both treatment arms No details reported of concurrent treatment
Weber 1983[175]	Decompression surgery (type not specified) Usual Care (conservative treatment)	N=567 N=1191 (3 studies) 1 year follow-up USA	No outcomes of interest reported in the study	No details reported of concurrent treatment

28.3.2 Data unsuitable for meta-analysis

Table 90: Discectomy versus usual care

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Weinstein 2006A[178]	Adverse events(intraoperative complications) at 2 year follow-up	The most common intraoperative complication was dural tear which occurred in 4% of patients. There were 10 events of dural tear/spinal fluid leak, 1 event of vascular injury and 2 events of other complications. There were no complications reported in 230 patients (95%)				Very high
Weinstein 2006A[178]	Adverse events(postoperative complications) at 2 year follow-up	There were 4 events of wound infection and 9 events of other postoperative complications. No complications were reported in 226 (95%) of patients.				Very high
Weinstein 2006A[178]Osterman 2006[133]	Reoperations at 1 year follow up	Weinstein 2006A reported 9 cases of additional surgery (4%) within 1 year of initial surgery. These included 5 reoperations due to recurrent herniation (2%) and 4 reoperations due to complication or other reasons (2%) Osterman 2006 reported 2 reoperations because of recurring symptoms on the same side and level. The reoperations took place at 6 weeks and 19 months after initial surgery				Very high
Weinstein 2006A[178]	Reoperations at 2 year follow up	There were 13 cases of additional surgery (5%) patients within 2 year of initial surgery. These included 8 reoperations due to recurrent herniation (3%) and 4 reoperations due to complication or other reasons (2%)				Very high
Weinstein 2006[176]	Adverse events(complications) at 2 year follow-up	The most common surgical complication was dural tear in 2% of cases				Very high
Weinstein 2006[176]	Reoperations at 1 and 2 year follow-up	Reoperation occurred in 7% of cases by 1 year and in 9% of cases at 2 years; more than half were recurrent herniation at the same level				Very high
Pearson 2008[136]	Adverse events (complications) at 2 year follow-up	Inadvertent durotomy and wound infection were the most common complications, occurring in 23 (3%) of patients and 18 (2%) of patients respectively				Very high
Pearson 2008[136]	Reoperations at 1 year and 2 year follow- up	36 patients underwent reoperation within 1 year including 26 for reherniation. By 2 years, 48 patients had undergone reoperation, 38 of				Very high

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
		whom had suffered reherniation.				
Pearson 2008[136]	Reoperations at 8 year follow- up	The rates of reoperation were bot significantly different between the randomised and observational cohorts.87 of the 119 re-operations noted the type of re-operation; approximately 85% of these (74/87) were listed as recurrent herniation at the same level				Very high

Table 91: Laminectomy versus usual care

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Weinstein 2008[177]	Adverse events	The most common surgical complication was dural tear in 9% of cases				Very high
Weinstein 2008[177]	Reoperations	At 2 years, reoperation had occurred in 8% of patients; fewer than half of these operations were for recurrent stenosis				Very high

Table 92: Percutaneous decompression versus usual care

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Erginousakis 2011[38]	Adverse events	There were no adverse events in either the treatment groups				Very high

Table 93: Discectomy versus fusion for sciatica

Study	Outcome	Intervention results	Intervention group (n)	Comparison results	Comparison group (n)	Risk of bias
Kim 2015[77]	Leg pain (VAS 0-10), at >4 months - 1 year	No significant difference between the 2 groups (p=0.909).				Very high
Kim 2015[77]	Back pain (VAS 0-10), at >4 months - 1 year	No significant difference between the 2 groups (p=0.626).				Very high
Kim 2015[77]	Quality of life (SF-36 physical component) at >4 months - 1 year	No significant difference between groups (p=0.643).				Very high
Kim 2015[77]	Quality of life (SF-36 mental component) at >4 months - 1 year	No significant difference between groups (p=0.818).				Very high

28.3.3 Clinical Evidence Summary

Table 94: Discectomy versus Usual Care

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Bodily pain	690 (2 studies) ≤4 month	VERY LOW[a,c] due to risk of bias, inconsistency		The mean quality of life, sf-36, 0-100 ≤4 months - domain-bodily pain in the control groups was 41	The mean quality of life, sf-36, 0-100 ≤4 months - domain-bodily pain in the intervention groups was 8.35 higher (7.87 to 8.83 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Physical functioning	690 (2 studies) ≤4 months	VERY LOW[a,c] due to risk of bias, inconsistency		The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical functioning in the control groups was 43.4	The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical functioning in the intervention groups was 9.26 higher (8.84 to 9.68 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Social functioning	281 (1 study) ≤4 months	LOW[a,b] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-social functioning in the control groups was 67.6	The mean quality of life, sf-36, 0-100 ≤4 months - domain-social functioning in the intervention groups was 2.3 higher (1.76 to 2.84 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Physical role	281 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical role in the control groups was 29.3	The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical role in the intervention groups was 0.2 higher (0.54 lower to 0.94 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Emotional role	281 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-emotional role in the control groups was 66.2	The mean quality of life, sf-36, 0-100 ≤4 months - domain-emotional role in the intervention groups was 3.1 higher (2.26 to 3.94 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Mental health index	281 (1 study) ≤4	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-mental health index in the control groups was	The mean quality of life, sf-36, 0-100 ≤4 months - domain-mental health index in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
	months			73.0	9.1 higher (8.75 to 9.45 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Vitality	281 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-vitality in the control groups was 57.1	The mean quality of life, sf-36, 0-100 ≤4 months - domain-vitality in the intervention groups was 10.4 higher (10 to 10.8 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-General health perception	281 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-general health perception in the control groups was 65.2	The mean quality of life, sf-36, 0-100 ≤4 months - domain-general health perception in the intervention groups was 10.5 higher (10.14 to 10.86 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Bodily pain	696 (2 studies) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-bodily pain in the control groups was 54.85	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-bodily pain in the intervention groups was 3.3 higher (2.94 to 3.66 higher
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Physical functioning	696 (2 studies) >4 months - 1 year	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-physical functioning in the control groups was 56.4	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-physical functioning in the intervention groups was 1.5 higher (1.08 to 1.92 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Social functioning	281 (1 study) >4 months - 1 year	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-social functioning in the control groups was 82.4	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-social functioning in the intervention groups was 4.5 higher (4.07 to 4.93 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Physical role	281 (1 study)	LOW[a] due to risk of		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-physical	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-physical

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
	>4 months - 1 year	bias		role in the control groups was 61.9	role in the intervention groups was 7.2 higher (6.37 to 8.03 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Emotional role	281 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-emotional role in the control groups was 81	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-emotional role in the intervention groups was 3.9 higher (3.23 to 4.57 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Mental health index	281 (1 study) 4 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-mental health index in the control groups was 80.5	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-mental health index in the intervention groups was 2.7 higher (2.37 to 3.03 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-Vitality	281 (1 study) >4 months - 1 year	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-vitality in the control groups was 68.5	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-vitality in the intervention groups was 3.2 higher (2.84 to 3.56 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year - Domain-General health perception	281 (1 study) >4 months - 1 year	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-general health perception in the control groups was 71.6	The mean quality of life, sf-36, 0-100 >4 months - 1 year - domain-general health perception in the intervention groups was 2.5 higher (2.11 to 2.89 higher)
Quality of life, SF-36, 0-100 >4 months (2 year) - Domain-Bodily pain	373 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months(2 year) - domain-bodily pain in the control groups was 37.1	The mean quality of life, sf-36, 0-100 >4 months(2 year) - domain-bodily pain in the intervention groups was 3.2 higher (2.07 lower to 8.47 higher)
Quality of life, SF-36, 0-100 >4 months (2 year) - Domain-Physical functioning	373 (1 study)	VERY LOW[a,b] due to risk of		The mean quality of life, sf-36, 0-100 >4 months(2 year) - domain-physical	The mean quality of life, sf-36, 0-100 >4 months(2 year) - domain-physical

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
	2 years	bias, imprecision		functioning in the control groups was 35.9	functioning in the intervention groups was 0 higher (5.41 lower to 5.41 higher)
Quality of life, EQ-5D, 0-1 ≤4 months (3 months)	283 (1 study) 3 months	LOW[a] due to risk of bias		The mean quality of life, eq-5d, 0-1 ≤4 months(3 months) in the control groups was 0.57	The mean quality of life, eq-5d, 0-1 ≤4 months(3 months) in the intervention groups was 0.06 higher (0.01 to 0.11 higher)
Quality of life, EQ-5D, 0-1 >4 months - 1 year (1 year)	283 (1 study) 1 years	LOW[a] due to risk of bias		The mean quality of life, eq-5d, 0-1 >4 months - 1 year(1 year) in the control groups was 0.82	The mean quality of life, eq-5d, 0-1 >4 months - 1 year(1 year) in the intervention groups was 0.02 higher (0.02 lower to 0.06 higher)
Leg Pain Severity (VAS,0-10) ≤4 months	333 (2 studies) ≤4 months	VERY LOW [a,b,c] due to risk of bias, inconsistency, imprecision		The mean leg pain severity(VAS,0-10) ≤4 months in the control groups was 2.195	The mean leg pain severity(VAS,0-10) ≤4 months in the intervention groups was 1.39 lower (2.39 to 0.39 lower)
Leg Pain Severity (VAS,0-10) >4 months - 1 year	333 (2 studies) >4 months - 1 year	LOW[a] due to risk of bias		The mean leg pain severity(VAS,0-10) >4 months - 1 year in the control groups was 1.175	The mean leg pain severity(VAS,0-10) >4 months - 1 year in the intervention groups was 0.57 lower (0.87 to 0.28 lower)
Leg Pain Severity (VAS,0-10) >4 months (2 years)	50 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean leg pain severity(VAS,0-10) >4 months(2 year) in the control groups was 1.5	The mean leg pain severity(VAS,0-10) >4 months(2 year) in the intervention groups was 0.9 lower (1.95 lower to 0.15 higher)
Back Pain Severity (VAS,0-10) ≤4 months	333	LOW[a]		The mean back pain severity(VAS,0-	The mean back pain severity(VAS,0-

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
	(2 studies) ≤4 months	due to risk of bias		10) ≤4 months in the control groups was 2.385	10) ≤4 months in the intervention groups was 1.13 lower (1.18 to 1.08 lower)
Back Pain Severity (VAS,0-10) >4 months - 1 year	332 (2 studies) >4 months - 1 year	LOW[a] due to risk of bias		The mean back pain severity(VAS,0-10) >4 months - 1 year in the control groups was 1.74	The mean back pain severity(VAS,0-10) >4 months - 1 year in the intervention groups was 0.23 lower (0.28 to 0.18 lower)
Back Pain Severity (VAS,0-10) >4 months (2 year)	50 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean back pain severity(VAS,0-10) >4 months (2 year) in the control groups was 2.1	The mean back pain severity(VAS,0-10) >4 months (2 year) in the intervention groups was 1 lower (2.28 lower to 0.28 higher)
Pain Severity (Sciatica bothersomeness, change score,0-6) ≤4 months	409 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(back pain bothersomeness, change score,0-6) ≤4 months in the control groups was -6.8	The mean pain severity(back pain bothersomeness, change score,0-6) ≤4 months in the intervention groups was 2.2 lower (3.46 to 0.94 lower)
Pain Severity (Sciatica bothersomeness, change score,0-6) >4 months - 1 year (1 year)	413 (1 study) 1 years	LOW [a,b] due to risk of bias		The mean pain severity(back pain bothersomeness,change score,0-6) >4 months - 1 year (1 year) in the control groups was -8.7	The mean pain severity(back pain bothersomeness, change score,0-6) >4 months - 1 year (1 year) in the intervention groups was 1.6 lower (2.86 to 0.34 lower)
Pain Severity (Sciatica bothersomeness, change score,0-6) >4 months (2 years)	373 (1 study) 2 years	LOW[a] due to risk of bias		The mean pain severity(back pain bothersomeness, change score,0-6) >4 months (2 year) in the control groups was	The mean pain severity(back pain bothersomeness, change score,0-6) >4 months (2 year) in the intervention groups was 1.6 lower

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
				-8.5	(2.92 to 0.28 lower)
Function (RMDQ, final score) ≤4 months	281 (1 study) ≤4 months	LOW[a] due to risk of bias		The mean function(RMDQ, final score) ≤4 months in the control groups was 9.2	The mean function(RMDQ, final score) ≤4 months in the intervention groups was 3.1 lower (3.22 to 2.98 lower)
Function (RMDQ final score) >4 months - 1 year	281 (1 study) >4 months - 1 year	LOW[a] due to risk of bias		The mean function(RMDQ final score) >4 months - 1 year in the control groups was 4.8	The mean function(RMDQ final score) >4 months - 1 year in the intervention groups was 0.8 lower (0.92 to 0.68 lower)
Function (ODI change score) ≤4 months	461 (2 studies) ≤4 months	LOW[a] due to risk of bias		The mean function(,ODI change score) ≤4 months in the control groups was -17.65	The mean function(,ODI change score) ≤4 months in the intervention groups was 5.1 lower (8.91 to 1.3 lower)
Function (ODI change score) >4 months - 1 year	467 (2 studies) >4 months - 1 year	LOW[a] due to risk of bias		The mean function(ODI change score) >4 months - 1 year in the control groups was -19.2	The mean function(,ODI change score) >4 months - 1 year in the intervention groups was 2.58 lower (6.47 lower to 1.3 higher)
Function (ODI change score) >4 months (2 years)	423 (2 studies) 2 years	LOW[a] due to risk of bias		The mean function(ODI change score) >4 months (2 year) in the control groups was -19.85	The mean function(,ODI change score) >4 months (2 year) in the intervention groups was 3.38 lower (7.33 lower to 0.58 higher)
Responder criteria (complete or nearly complete disappearance of symptoms) ≤ 4 months (8 weeks)	281 (1 study) 8 weeks	LOW[a] due to risk of bias	RR 1.97 (1.49	Moderate	
				312 per 1000	303 more per 1000

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc- Discectomy (95% CI)
			to 2.6)		(from 153 more to 499 more)
Responder criteria (complete or nearly complete disappearance of symptoms) > 4 months (26 weeks)	281 (1 study) 26 weeks	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.38 (1.21 to 1.57)	Moderate	
				660 per 1000	251 more per 1000 (from 139 more to 376 more)
Healthcare Utilisation (Number of patients with additional physical therapy visits) > 4 months (2 years)	50 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.49 (0.26 to 0.95)	Moderate	
				625 per 1000	319 fewer per 1000 (from 31 fewer to 463 fewer)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 or 2 increments because of Heterogeneity, I^2=50%, p=0.04, unexplained by subgroup analysis.

[c] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 95: Discectomy versus usual care (cohort and RCT+ cohort)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Sciatica due to herniated disc- Discectomy (95% CI)
Quality of life, SF-36, 0-100 ≤4 months (3 month) - Domain-Bodily pain	656 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months(3 month) - domain-bodily pain in the control groups was 25.3	The mean quality of life, sf-36, 0-100 ≤4 months (3 month) - domain-bodily pain in the intervention groups was 14.9 higher (10.77 to 19.03 higher)
Quality of life, SF-36, 0-100 ≤4 months (3 month) - Domain-Physical functioning	656 (1 study)	VERY LOW[a,b] due to risk		The mean quality of life, sf-36, 0-100 ≤4 months(3 month) - domain-	The mean quality of life, sf-36, 0-100 ≤4 months (3 month) - domain-

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Sciatica due to herniated disc- Discectomy (95% CI)
	3 months	of bias, imprecision		physical functioning in the control groups was 26	physical functioning in the intervention groups was 15.4 higher (11.53 to 19.27 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year (1 year) - Domain-Bodily pain	631 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months - 1 year(1 year) - domain-bodily pain in the control groups was 29.2	The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-bodily pain in the intervention groups was 10.8 higher (6.5 to 15.1 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year (1 year) - Domain-Physical functioning	631 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months - 1 year(1 year) - domain-physical functioning in the control groups was 32	The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-physical functioning in the intervention groups was 15.1 higher (10.9 to 19.3 higher)
Quality of life, SF-36, 0-100 >4 months (2 years) - Domain-Bodily pain	621 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months(2 year) - domain-bodily pain in the control groups was 31.9	The mean quality of life, sf-36, 0-100 >4 months (2 years) - domain-bodily pain in the intervention groups was 10.2 higher (5.9 to 14.5 higher)
Quality of life, SF-36, 0-100 >4 months (2 year) - Domain-Physical functioning	621 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months(2 year) - domain-physical functioning in the control groups was 32.4	The mean quality of life, sf-36, 0-100 >4 months (2 years) - domain-physical functioning in the intervention groups was 12 higher (7.8 to 16.2 higher)
Pain Severity (Sciatica bothersomeness index, change score,0-24) ≤4 months (3 months)	656 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(sciatica bothersomeness index, change score,0-24) ≤4 months (3 months) in the control groups was	The mean pain severity (sciatica bothersomeness index, change score,0-24) ≤4 months (3 months) in the intervention groups was

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Sciatica due to herniated disc- Discectomy (95% CI)
				-7.5	3.9 lower (4.93 to 2.87 lower)
Pain Severity (Sciatica bothersomeness index, change score,0-24) >4 months - 1 year (1 year)	631 (1 study) 1 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (sciatica bothersomeness index, change score,0-24) >4 months - 1 year (1 year) in the control groups was -8.6	The mean pain severity (sciatica bothersomeness index, change score,0-24) >4 months - 1 year (1 year) in the intervention groups was 2.6 lower (3.67 to 1.53 lower)
Pain Severity (Sciatica bothersomeness index, change score, 0-24) >4 months (2 year)	621 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (sciatica bothersomeness index, change score,0-24) >4 months (2 year) in the control groups was -8.7	The mean pain severity (sciatica bothersomeness index, change score,0-24) >4 months (2 year) in the intervention groups was 2.1 lower (3.17 to 1.03 lower)
Function (ODI change score) ≤4 months	656 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean function (ODI change score) ≤4 months in the control groups was -20.9	The mean function (ODI change score) ≤4 months in the intervention groups was 15.2 lower (18.6 to 11.8 lower)
Function (ODI change score) 4 months (1 year)	631 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean function(ODI change score) 4 months (1 year) in the control groups was -22.4	The mean function (ODI change score) 4 months (1 year) in the intervention groups was 15.3 lower (19.03 to 11.57 lower)
Function (ODI change score) ≤4 months (2 years)	621 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI change score) ≤4 months (2 years) in the control groups was -24.2	The mean function (ODI change score) ≤4 months (2 years) in the intervention groups was 13.4 lower (17.13 to 9.67 lower)
Pain Severity (Back Pain bothersomeness, 0-6) ≤4 months	1191 (1 study)	VERY LOW[a] due to risk		The mean pain severity (back pain bothersomeness, 0-6) ≤4 months in	The mean pain severity (back pain bothersomeness, 0-6) ≤4 months in

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Sciatica due to herniated disc- Discectomy (95% CI)
		of bias		the control groups was -1.3	the intervention groups was 0.9 lower (0.91 to 0.89 lower)
Pain Severity (Back Pain bothersomeness, 0-6) >4 months - 1 year (1 year)	1191 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean pain severity (back pain bothersomeness, 0-6) >4 months - 1 year (1 year) in the control groups was -1.4	The mean pain severity (back pain bothersomeness, 0-6) >4 months - 1 year (1 year) in the intervention groups was 0.7 lower (0.71 to 0.69 lower)
Pain Severity (Back Pain bothersomeness, 0-6) >4 months (2 year)	1191 (1 study) 2 years	VERY LOW[a] due to risk of bias		The mean pain severity (back pain bothersomeness, 0-6) >4 months (2 year) in the control groups was -1.5	The mean pain severity (back pain bothersomeness, 0-6) >4 months (2 year) in the intervention groups was 0.5 lower (0.51 to 0.49 lower)
Healthcare Utilisation (Number of patients with more reported diagnostic test use) > 4 months (2 years)	1191 (1 study) 2 years	LOW[a] due to risk of bias	RR 1.56 (1.34 to 1.81)	Moderate	
				339 per 1000	190 more per 1000 (from 115 more to 275 more)
Healthcare Utilisation (Number of patients with additional physical therapy visits) > 4 months (2 years)	1191 (1 study) 2 years	VERY LOW[a] due to risk of bias	RR 1.12 (0.99 to 1.28)	Moderate	
				440 per 1000	53 more per 1000 (from 4 fewer to 123 more)
Healthcare Utilisation (Number of patients with reported healthcare visits) > 4 months (2 years)	1191 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision	RR 1.02 (0.98 to 1.07)	Moderate	
				880 per 1000	18 more per 1000 (from 18 fewer to 62 more)
Healthcare Utilisation (Medication use) > 4	1191	VERY LOW[a]	RR	Moderate	

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual care	Risk difference with Sciatica due to herniated disc- Discectomy (95% CI)
months (2 years)	(1 study) 2 years	due to risk of bias	1.08 (1.04 to 1.12)	889 per 1000	71 more per 1000 (from 36 more to 107 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 96: Discectomy versus combination treatment (manual therapy+ biomechanical exercise + self-management)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Manual therapy+ biomechanical exercise + self-management	Risk difference with Sciatica due to herniated intervertebral disc- Discectomy (95% CI)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Bodily pain	40 (1 study) 12 weeks	LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-bodily pain in the control groups was 47.1	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-bodily pain in the intervention groups was 10.3 higher (2.37 lower to 22.97 higher)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Physical role	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-physical role in the control groups was 32.5	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-physical role in the intervention groups was 3.7 lower (27.1 lower to 19.7 higher)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Emotional role	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-emotional role in the control groups was 74.5	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-emotional role in the intervention groups was 9.5 lower (34.49 lower to 15.49 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Manual therapy+ biomechanical exercise + self-management	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Vitality	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-vitality in the control groups was 59.0	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-vitality in the intervention groups was 8.20 higher (3.37 lower to 19.77 higher)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Physical function	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-physical function in the control groups was 73.6	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-physical function in the intervention groups was 6.80 higher (9.64 lower to 23.24 higher)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Social function	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-social function in the control groups was 73.6	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-social function in the intervention groups was 6.30 lower (23.79 lower to 11.19 higher)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-Mental health	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-mental health in the control groups was 82.8	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-mental health in the intervention groups was 0.40 higher (5.61 lower to 6.41 higher)
Quality of life, SF-36, 0-100 ≤4 months (12 weeks) - Domain-General health	40 (1 study) 12 weeks	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-mental health in the control groups was 77.8	The mean quality of life, sf-36, 0-100 ≤4 months (12 weeks) - domain-mental health in the intervention groups was 5.40 higher (-3.40 lower to 14.20 higher)
Pain Severity(McGill, 0-78) ≤ 4 months (12 weeks)	40 (1 study) 12 weeks	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (McGill, 0-78) ≤ 4 months (12 weeks) in the control groups was 19.4	The mean pain severity (McGill, 0-78) ≤ 4 months (12 weeks) in the intervention groups was 6.4 lower (15.9 lower to 3.1 higher)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Manual therapy+ biomechanical exercise + self-management	Risk difference with Sciatica due to herniated intervertebral disc-Discectomy (95% CI)
Function (RMDQ,0-24) ≤4 months	40 (1 study) 12 weeks	LOW[a,b] due to risk of bias, imprecision		The mean function (RMDQ,0-24) ≤4 months in the control groups was 9.0	The mean function (RMDQ,0-24) ≤4 months in the intervention groups was 1.8 lower (5.87 lower to 2.27 higher)

[a]Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias
[b]Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 97: Percutaneous disc decompression versus Usual Care

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc-Percutaneous disc decompression (95% CI)
Pain Severity (Leg Pain NVS,0-10) ≤4 months (3 months)	62 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity (leg pain nvs,0-10) ≤4 months (3 months) in the control groups was 6	The mean pain severity (leg pain nvs,0-10) ≤4 months (3 months) in the intervention groups was 1.6 lower (2.95 to 0.25 lower)
Pain Severity (Leg Pain NVS,0-10) >4 months - 1 year (1 year)	62 (1 study) 1 years	LOW[a] due to risk of bias		The mean pain severity (leg pain nvs,0-10) >4 months - 1 year (1 year) in the control groups was -2.9	The mean pain severity (leg pain nvs,0-10) >4 months - 1 year (1 year) in the intervention groups was 2.8 lower (4.02 to 1.58 lower)
Pain Severity (Leg Pain NVS,0-10) >4 months (2 years)	62 (1 study) 2 years	LOW[a] due to risk of bias		The mean pain severity (leg pain nvs,0-10) >4 months (2 years) in the control groups was -2.8	The mean pain severity (leg pain nvs,0-10) >4 months (2 years) in the intervention groups was 3.10 lower (4.45 to 1.75 lower)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Usual Care	Risk difference with Sciatica due to herniated intervertebral disc- Percutaneous disc decompression (95% CI)

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 98: Plasma disc decompression versus other treatment (epidural steroid injection)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other treatment (Transforaminal epidural steroid injections)	Risk difference with Sciatica due to herniated intervertebral disc- Plasma disc decompression (95% CI)
Pain Severity (Leg Pain VAS,0-10) ≤4 months (3 months)	85 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (leg pain VAS, 0-10) ≤4 months (3 months) in the control groups was -1.8	The mean pain severity(leg pain VAS,0-10) ≤4 months (3 months) in the intervention groups was 1.8 lower (3.05 to 0.55 lower)
Pain Severity (Leg Pain VAS,0-10) >4 months - 1 year (6 months)	85 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (leg pain VAS,0-10) >4 months - 1 year(6 months) in the control groups was -1.6	The mean pain severity (leg pain VAS,0-10) >4 months - 1 year (6 months) in the intervention groups was 1.8 lower (3.05 to 0.55 lower)
Pain Severity (Back Pain VAS,0-10) ≤4 months (3 months)	85 (1 study) 3 months	MODERATE[a] due to risk of bias		The mean pain severity (back pain VAS,0-10) ≤4 months (3 months) in the control groups was 0.7	The mean pain severity (back pain VAS,0-10) ≤4 months (3 months) in the intervention groups was 2.2 lower (3.18 to 1.22 lower)
Pain Severity (Back Pain VAS,0-10) >4 months - 1 year (6 months)	85 (1 study) 6 months	LOW[a,b] due to risk of bias, imprecision		The mean pain severity (back pain VAS,0-10) >4 months - 1 year (6 months) in the control groups was 0.02	The mean pain severity (back pain VAS,0-10) >4 months - 1 year (6 months) in the intervention groups was 1.62 lower (2.73 to 0.51 lower)
Function ODI, 0-100 ≤4 months (3 months)	85 (1 study) 3 months	LOW[a,b] due to risk of bias, imprecision		The mean function ODI, 0-100 ≤4 months (3 months) in the control groups was 0.2	The mean function ODI, 0-100 ≤4 months (3 months) in the intervention groups was 1.2 lower (1.91 to 0.49 lower)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Other treatment (Transforaminal epidural steroid injections)	Risk difference with Sciatica due to herniated intervertebral disc- Plasma disc decompression (95% CI)
Function (ODI,0-100) >4 months - 1 year (6 months)	85 (1 study) 6 months	MODERATE[a] due to risk of bias		The mean function (ODI,0-100) >4 months - 1 year (6 months) in the control groups was 0.4	The mean function (ODI, 0-100) >4 months - 1 year (6 months) in the intervention groups was 1.6 lower (2.31 to 0.89 lower)
Procedure related adverse events> 4 months – 1 year (6 months)	85 (1 study) 6 months	VERY LOW[a,b] due to risk of bias, imprecision	RR 0.63 (0.22 to 1.84)	Moderate	
				175 per 1000	65 fewer per 1000 (from 137 fewer to 147 more)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 99: Discectomy versus fusion (cohort)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Fusion	Risk difference with Sciatica due to herniated disc- Discectomy (95% CI)
Function (ODI 0-100) >4 months - 1 year	55 (1 study) >4 months - 1 year	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI 0-100) >4 months - 1 year in the control groups was 27.2	The mean function (ODI 0-100) >4 months - 1 year in the intervention groups was 1.52 lower (8.76 lower to 5.72 higher)
Revision surgery >4 months - 1 year	55 (1 study) >4 months - 1 year	VERY LOW[a] due to risk of bias	OR 9.82 (0.97 to 99.53)	Moderate	
				0 per 1000	-

[a] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

[b] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

Table 100: Laminectomy versus usual care

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Sciatica due to stenosis (foraminal and/or canal)- Laminectomy versus Usual Care (95% CI)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Bodily pain	251 (1 study) 3 months	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-bodily pain in the control groups was 11.1	The mean quality of life, sf-36, 0-100 ≤4 months - domain-bodily pain in the intervention groups was 2.5 higher (4.16 lower to 9.16 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Physical functioning	251 (1 study) 3 months	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical functioning in the control groups was 11.6	The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical functioning in the intervention groups was 4.2 lower (10.86 lower to 2.46 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year (1 year) - Domain-Bodily pain	246 (1 study) 1 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-bodily pain in the control groups was 17.5	The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-bodily pain in the intervention groups was 5.5 higher (0.74 lower to 11.74 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year (1 year) - Domain-Physical functioning	246 (1 study) 1 years	LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-physical functioning in the control groups was 16.4	The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-physical functioning in the intervention groups was 1.6 higher (4.64 lower to 7.84 higher)
Quality of life, SF-36, 0-100 >4 months (2 year) - Domain-Bodily pain	221 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-bodily pain in the control groups was 15.6	The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-bodily pain in the intervention groups was 7.8 higher (1.56 to 14.04 higher)
Quality of life, SF-36, 0-100 >4 months (	221 (1 study)	LOW[a] due to risk		The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-	The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-physical

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Sciatica due to stenosis (foraminal and/or canal)- Laminectomy versus Usual Care (95% CI)
2 year) - Domain-Physical functioning	2 years	of bias		physical functioning in the control groups was 17.1	functioning in the intervention groups was 0 higher (6.52 lower to 6.52 higher)
Pain Severity (Low Back Pain bothersomeness, change score,0-24) ≤4 months	251 (1 study) 3 months	LOW[a] due to risk of bias		The mean pain severity (low back pain bothersomeness, change score,0-24) ≤4 months in the control groups was -1	The mean pain severity (low back pain bothersomeness, change score,0-24) ≤4 months in the intervention groups was 0.4 higher (0.15 lower to 0.95 higher)
Pain Severity (Low Back Pain bothersomeness, change score,0-24) >4 months - 1 year	246 (1 study) 1 years	LOW[a] due to risk of bias		The mean pain severity (low back pain bothersomeness, change score,0-24) >4 months - 1 year in the control groups was -1.3	The mean pain severity (low back pain bothersomeness, change score,0-24) >4 months - 1 year in the intervention groups was 0 higher (0.55 lower to 0.55 higher)
Pain Severity (Low Back Pain bothersomeness, change score,0-24) >4 months (2 year)	221 (1 study) 2 years	LOW[a] due to risk of bias		The mean pain severity (low back pain bothersomeness, change score,0-24) >4 months (2 year) in the control groups was -1.6	The mean pain severity (low back pain bothersomeness, change score,0-24) >4 months (2 year) in the intervention groups was 0.3 higher (0.26 lower to 0.86 higher)
Pain Severity (Sciatica Pain bothersomeness, change score,0-24) ≤4 months	251 (1 study) 3 months	LOW[a] due to risk of bias		The mean pain severity (sciatica pain bothersomeness, change score,0-24) ≤4 months in the control groups was -1.2	The mean pain severity (sciatica pain bothersomeness, change score,0-24) ≤4 months in the intervention groups was 0.3 lower (1.01 lower to 0.41 higher)
Pain Severity (Sciatica Pain bothersomeness, change score,0-24) >4 months - 1 year (1 year)	246 (1 study) 1 years	VERY LOW[a,b] due to risk		The mean pain severity (sciatica pain bothersomeness, change score,0-24) >4 months - 1 year (1	The mean pain severity (sciatica pain bothersomeness, change score,0-24) >4 months - 1 year (1 year) in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Sciatica due to stenosis (foraminal and/or canal)-Laminectomy versus Usual Care (95% CI)
		of bias, imprecision		year) in the control groups was -1.7	intervention groups was 0.6 lower (1.15 to 0.05 lower)
Pain Severity (Sciatica Pain bothersomeness, change score,0-24) >4 months (2 year)	221 (1 study) 2 years	LOW[a] due to risk of bias		The mean pain severity (sciatica pain bothersomeness, change score,0-24) >4 months (2 year) in the control groups was -1.8	The mean pain severity (sciatica pain bothersomeness, change score,0-24) >4 months (2 year) in the intervention groups was 0.4 lower (0.96 lower to 0.16 higher)
Function (ODI change score) ≤4 months	251 (1 study) 3 months	LOW[a] due to risk of bias		The mean function (ODI change score) ≤4 months in the control groups was -8.1	The mean function (ODI change score) ≤4 months in the intervention groups was 0.5 higher (5.05 lower to 6.05 higher)
Function (ODI change score) >4 months - 1 year	246 (1 study) 1 years	LOW[a] due to risk of bias		The mean function (ODI change score) >4 months - 1 year in the control groups was -12.7	The mean function (ODI change score) >4 months - 1 year in the intervention groups was 2.2 lower (7.33 lower to 2.93 higher)
Function (ODI change score) >4 months (2 year)	221 (1 study) 2 years	LOW[a] due to risk of bias		The mean function (ODI change score) >4 months (2 year) in the control groups was -12.9	The mean function (ODI change score) >4 months (2 year) in the intervention groups was 3.5 lower (8.63 lower to 1.63 higher)

[a]Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and downgraded by 2 increments if the majority of the evidence was at very high risk of bias

[b]Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

Table 101: Laminectomy versus usual care (cohort and RCT+ cohort)

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Sciatica due to stenosis (foraminal and/or canal)- Laminectomy versus Usual Care (95% CI)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Bodily pain	691 (1 study) 3 months	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 ≤4 months - domain-bodily pain in the control groups was 11.8	The mean quality of life, sf-36, 0-100 ≤4 months - domain-bodily pain in the intervention groups was 16.1 higher (12.91 to 19.29 higher)
Quality of life, SF-36, 0-100 ≤4 months - Domain-Physical functioning	691 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical functioning in the control groups was 10	The mean quality of life, sf-36, 0-100 ≤4 months - domain-physical functioning in the intervention groups was 14.8 higher (11.48 to 18.12 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year (1 year) - Domain-Bodily pain	532 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-bodily pain in the control groups was 13.5	The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-bodily pain in the intervention groups was 14.5 higher (10.89 to 18.11 higher)
Quality of life, SF-36, 0-100 >4 months - 1 year (1 year) - Domain-Physical functioning	532 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-physical functioning in the control groups was 10.5	The mean quality of life, sf-36, 0-100 >4 months - 1 year (1 year) - domain-physical functioning in the intervention groups was 16 higher (12.39 to 19.61 higher)
Quality of life, SF-36, 0-100 >4 months (2 year) - Domain-Bodily pain	533 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-bodily pain in the control groups was 13.3	The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-bodily pain in the intervention groups was 13.6 higher (9.99 to 17.21 higher)
Quality of life, SF-36, 0-100 >4 months (	448 (1 study)	VERY LOW[a,b]		The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-	The mean quality of life, sf-36, 0-100 >4 months (2 year) - domain-physical

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Sciatica due to stenosis (foraminal and/or canal)- Laminectomy versus Usual Care (95% CI)
2 year) - Domain-Physical functioning	2 years	due to risk of bias, imprecision		physical functioning in the control groups was 11.8	functioning in the intervention groups was 11.2 higher (6.76 to 15.64 higher)
Pain Severity(Low Back Pain bothersomeness, change score,0-24) ≤4 months	691 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean pain severity(low back pain bothersomeness, change score,0-24) ≤4 months in the control groups was -0.8	The mean pain severity(low back pain bothersomeness, change score,0-24) ≤4 months in the intervention groups was 1.2 lower (1.48 to 0.92 lower)
Pain Severity(Low Back Pain bothersomeness, change score,0-24) >4 months - 1 year	532 (1 study) 1 years	LOW[a] due to risk of bias		The mean pain severity(low back pain bothersomeness, change score,0-24) >4 months - 1 year in the control groups was 1	The mean pain severity(low back pain bothersomeness, change score,0-24) >4 months - 1 year in the intervention groups was 3.0 lower (3.28 to 2.72 lower)
Pain Severity(Low Back Pain bothersomeness, change score,0-24) >4 months (2 year)	533 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(low back pain bothersomeness, change score,0-24) >4 months (2 year) in the control groups was -1.1	The mean pain severity(low back pain bothersomeness change score,0-24) >4 months (2 year) in the intervention groups was 0.9 lower (1.18 to 0.62 lower)
Pain Severity(Sciatica Pain bothersomeness, change score,0-24) ≤4 months	691 (1 study) 3 months	VERY LOW[a] due to risk of bias		The mean pain severity(sciatica pain bothersomeness, change score,0-24) ≤4 months in the control groups was -0.9	The mean pain severity(sciatica pain bothersomeness, change score,0-24) ≤4 months in the intervention groups was 1.8 lower (2.08 to 1.52 lower)
Pain Severity(Sciatica Pain bothersomeness, change score,0-24) >4 months - 1 year (1 year)	532 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean pain severity(sciatica pain bothersomeness, change score,0-24) >4 months - 1 year (1 year) in	The mean pain severity(sciatica pain bothersomeness, change score,0-24) >4 months - 1 year (1 year) in the

Outcomes	No of Participants (studies) Follow up	Quality of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects	
				Risk with Control	Risk difference with Sciatica due to stenosis (foraminal and/or canal)-Laminectomy versus Usual Care (95% CI)
				the control groups was -1.4	intervention groups was 1.2 lower (1.48 to 0.92 lower)
Pain Severity(Sciatica Pain bothersomeness, change score,0-24) >4 months (2 year)	533 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean pain severity(sciatica pain bothersomeness, change score,0-24) >4 months (2 year) in the control groups was -1.4	The mean pain severity(sciatica pain bothersomeness, change score,0-24) >4 months (2 year) in the intervention groups was 1.1 lower (1.38 to 0.82 lower)
Function (ODI change score) ≤4 months	691 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean function (ODI change score) ≤4 months in the control groups was -7.6	The mean function (ODI change score) ≤4 months in the intervention groups was 13.8 lower (16.44 to 11.16 lower)
Function (ODI change score) >4 months - 1 year	532 (1 study) 1 years	VERY LOW[a] due to risk of bias		The mean function (ODI change score) >4 months - 1 year in the control groups was -8.9	The mean function (ODI change score) >4 months - 1 year in the intervention groups was 12.5 lower (15.41 to 9.59 lower)
Function (ODI change score) >4 months (2 years)	533 (1 study) 2 years	VERY LOW[a,b] due to risk of bias, imprecision		The mean function (ODI change score) >4 months (2 years) in the control groups was -9.3	The mean function (ODI change score) >4 months (2 years) in the intervention groups was 11.2 lower (14.26 to 8.14 lower)

[a] Downgraded by 1 increment if the majority of the evidence was at high risk of bias, and 2 increments if the majority of the evidence was at very high risk of bias

[b] Downgraded by 1 increment if the confidence interval crossed 1 MID or by 2 increments if the confidence interval crossed both MIDs.

28.4 Economic evidence

Published literature

Three economic evaluations were identified with the relevant comparison and have been included in this review.[166,167,171] These are summarised in the economic evidence profile below and the economic evidence tables in Appendix I.

Three economic evaluations relating to this review question were identified but selectively excluded.[57,58],[169],[179] This is reported in Appendix M, with reasons for exclusion given.

See also the economic article selection flow chart in Appendix F.

Table 102: Economic evidence profile: surgery versus usual care

Study	Applicability	Limitations	Other comments	Incremental cost (£)	Incremental effects (QALYs)	Cost effectiveness (ICER)	Uncertainty
Tosteson 2008[167] (USA)	Partially applicable[(a)]	Potentially serious limitations	• Based on both randomised and observational cohorts of the SPORT trial combined and analysed according to treatment received using regression models. • Population: Adults with a diagnosis of intervertebral disc herniation. • Two comparators in full analysis: 1. Standard open laminotomy/laminectomy with removal of the herniation and examination of the involved nerve root. Surgeons only performed other procedures when it was deemed necessary. 2. Usual care as decided by the physician • Follow-up was 2 years.	9,133	0.21	£43,490 per QALY gained	Probabilistic analysis only reported for total costs which include indirect costs. No other sensitivity analyses conducted.
Tosteson 2008A [166,167] (USA)	Partially applicable[(a)]	Potentially serious limitations	• Based on both randomised and observational cohorts of the SPORT trial combined and analysed according to treatment received using regression models. • Population: Adults with symptoms for at least 12 weeks and image-confirmed diagnosis of spinal stenosis without degenerative	6,661	0.17	£44,865 per QALY gained	95% CI: 31,617 – 66,191 Indirect costs were included in all the sensitivity analyses conducted: observational and randomised cohorts were analysed separately and no major difference between the 2 ICERs was observed; adjusting for observed mortality decreased the ICER only

Study	Applicability	Limitations	Other comments	Incremental cost (£)	Incremental effects (QALYs)	Cost effectiveness (ICER)	Uncertainty
			spondylolisthesis. • Two comparators in full analysis: 1. Standard posterior laminectomy. 2. Usual care as chosen by the patient and physician • Follow-up was 2 years.				slightly; the ICER increased when QALYs were estimated with SF-6D and when higher surgery cost was used.
Van den Hout 2008[171] (Netherlands)	Partially applicable[(f)]	Potentially serious limitations	• Within-trial analysis (associated clinical paper Peul 2008[139,140]) • Population: patients aged 18 to 65 with a radiologically confirmed disc herniation and lumbosacral radicular syndrome that had lasted for 6 to 12 weeks. • Two comparators in full analysis: 1. Early surgery to remove disc herniation. 2. Usual care - prolonged conservative care provided by the GP; if sciatica persisted at 6 months, microdiscectomy was offered. • Increasing leg pain not responsive to drugs and progressive neurological deficit were reasons for performing surgery earlier than 6 months. • Follow-up was 1 year.	1,405	0.044	£31,932 per QALY gained	95% CI: 10,817 – 332,249 When SF-6D was used as an alternative utility measure the QALY difference was 0.024, resulting in an ICER of £58,541.

Abbreviations: ICER: incremental cost-effectiveness ratio; QALY: quality-adjusted life years; RCT: randomised controlled trial
(a) Study conducted in the USA; discount rate is 3%

(b) Outcomes were based also on observational data, not on RCT only, it was not clear how many individuals were form the RCTs and how many from the observational study; costs from US Medicare payments which may not reflect actual costs; resource use was based on patient-reported data which may not be accurate; unclear what parameters at baseline were used to adjust EQ5D data; no sensitivity analyses were conducted and the 95% CI of the ICER was reported only for the total costs (direct and indirect too).

(c) 2004 US dollars converted to UK pounds.[131] Cost components incorporated: surgery, health care visits, diagnostic test, medications, and other health care services. Indirect costs were included but analysed separately and not reported here.

(d) QALYs estimated using the EQ5D US tariff.

(e) Outcomes were based also on observational data, not on RCT; costs from US Medicare payments which may not reflect actual costs; resource use was based on patient-reported data which may not be accurate; sensitivity analyses were conducted using both direct and indirect costs.

(f) Study conducted in the Netherlands. Intervention not described in detail in this paper. Patients in the usual care group could have surgery after the initial 6 months and outcomes were collected up to 1 year.

(g) Short time horizon; resource use was based on patient-reported data which may not be accurate; hospital prices were used.[131] Cost components incorporated: surgery with admissions to hospital, physical therapy, visits, homecare, drugs and aids.

(h) Indirect and societal costs were included but analysed separately and not reported here.

(i) QALYs estimated using the EQ5D UK tariff

The studies from the USA reported a higher incremental cost for surgery compared to the study conducted in the Netherlands. The unit cost of surgery used in the USA study was $12,754 for surgery with no complications, which is equal to £8,071 using the purchasing power parities.[131] This figure is very high compared to the cost reported in the NHS Reference Cost (£3,582) for the HRG code HC04F – Extradural Spine Intermediate 1, which includes spinal decompression surgery.

If a lower cost estimate for surgery was used in the analysis, the estimated ICER would be lower too.

28.5 Evidence statements

28.5.1 Clinical

28.5.1.1 Discectomy versus usual care

In people with sciatica due to herniated disc, there was clinical benefit for discectomy compared with usual care for quality of life demonstrated in evidence from 2 studies at less than or equal to 4 months for the SF-36 domains of bodily pain and physical functioning (very low quality, n=696) as well as in mental health, vitality and general health from 1 study (low quality, n=281). Evidence for greater than 4 months' time point of 1 year from 2 studies demonstrated a clinical benefit for discectomy compared to usual care in quality of life for the majority of domains of the SF-36 apart from physical functioning and mental health for which there was no clinical difference between treatments. Evidence of quality of life measured by the SF-36 at the 2 year follow-up demonstrated a clinical benefit for discectomy compared to usual care for the SF-36 domain bodily pain but not for physical function(very low quality, n=373). Evidence for quality of life measured by the EQ-5D demonstrated clinical benefit for discectomy compared to usual care at the less than 4 months' and no difference between treatments at 1 year (1 study, low quality, n=283).

Conflicting evidence demonstrated a clinical benefit of discectomy compared with usual care for both leg and back pain measured by VAS in the short term but no difference between treatments at 1 and 2 years (2 studies, very low-low quality, n=333). Further evidence demonstrated no benefit in pain measured by sciatica bothersomeness index at any time point (low quality, n=413). Benefit in function measured by the RMDQ was seen for discectomy compared to usual care at less than four months' but not when assessed by the ODI. There was no difference in treatments in function assessed by either scale in the long term.

Clinical benefit for discectomy compared to usual care was also demonstrated in evidence from 1 study for responders to complete disappearance of symptoms at both the less than and greater than four month follow up.

Non-randomised evidence demonstrated clinical benefit for discectomy compared with usual care for all quality of life domains measured by the SF-36 at both short and long term follow-up (1 study, very low quality, n=631). Evidence from 2 non-randomised studies suggested clinical benefit in leg pain measured by the sciatica bothersomeness index and back pain assessed with back pain bothersomeness index for discectomy compared to usual care in the short term and long term follow-up of 1 year but not at 2 years (very low quality, n=656 and n=1191). Additionally when compared with usual care, benefit for discectomy for function on the ODI was demonstrated at both short and long term follow up in 1 study (n=656, very low quality). There was non-randomised evidence of a poorer outcome with discectomy when compared to usual care for healthcare utilisation assessed by number of patients with more reported diagnostic test use but no clinical difference between treatments for any other healthcare utilisation measure (1 study, low quality, n=1191).

28.5.1.2 Discectomy versus combination treatment (manual therapy + biomechanical exercise + self-management)

Conflicting evidence from 1 study for quality of life at less than 4 months follow up showed clinical benefit for discectomy compared to combination treatment for the SF-36 domains of bodily pain, vitality and physical function but clinical harm for discectomy for the domains of physical role, emotional role and social function. There was no difference between treatments for the domain of mental health (very low quality, n=40). Evidence from the same study demonstrated no difference in pain and function between discectomy and the combination treatment at the short term follow up of less than 4 months (low quality, n=40).

28.5.1.3 Percutaneous disc decompression versus usual care

Evidence from 1 study demonstrated clinical benefit in pain for percutaneous disc decompression when compared to usual care at both the short term and long term follow up (low to very low quality, n=62).

28.5.1.4 Plasma disc decompression versus epidural steroid injection

Evidence from a single study demonstrated clinical benefit in both leg and back pain for plasma disc decompression when compared to epidural steroid injections at both short term and long term follow up (moderate to low quality, n=85). However, there was no clinical difference between treatments for function (low to moderate quality, n=85) at any time point or procedure related adverse events at the greater than 4 months follow up (very low quality, n=85).

28.5.1.5 Discectomy versus fusion (cohort)

Evidence from a single study showed no clinical benefit in function for discectomy when compared with spinal fusion at the greater than 4 months follow up (very low quality, n=55).

28.5.1.6 Laminectomy versus usual care

Conflicting evidence from 1 study for quality of life at less than 4 months follow up showed laminectomy to be less effective than usual care for the SF-36 domain of physical functioning but clinical benefit with laminectomy compared to usual care was seen for the domain of bodily pain at the long term follow up of 1 and 2 years (low quality, n=246). The same study demonstrated no clinical difference in pain (both back pain and sciatica) and function when laminectomy was compared to usual care at both the less than and greater than 4 months follow-ups low to very low quality, n=251).

Non-randomised evidence from a single study demonstrated a clinical benefit of laminectomy compared to usual care for quality of life assessed by the SF-36 in the domains of bodily pain and physical functioning at both the short term and long term follow ups (very low quality, n=533). A clinical benefit of laminectomy compared to usual care for back pain was seen at the greater than 4 month time point of 1 year but not at any other follow up period (low quality, n=691). There was no difference between treatments in leg pain assessed by the sciatica bothersomeness index reported in the same study. Additionally, when compared with usual care, a clinical benefit with laminectomy was seen for function at both the less than and greater than 4 months follow up periods (1 study, very low quality, n=532).

28.5.2 Economic

- Three cost–utility analyses found that spinal decompression was not cost-effective compared to usual care treating patients with disc herniation or spinal stenosis. These analyses were assessed as partially applicable with potentially serious limitations.

28.6 Recommendations and link to evidence

Recommendations	**41. Consider spinal decompression for people with sciatica when non-surgical treatment has not improved pain or function and their radiological findings are consistent with sciatic symptoms.**
Relative values of different outcomes	The GDG agreed that health related quality of life, pain severity, function and psychological distress were the outcomes that were critical for decision making. Responder criteria for pain and function, adverse events, revision rate, failure rate and healthcare utilisation were also considered as important. Evidence was reported for all of the critical outcomes except for psychological distress. Failure rate was the only important outcome for which there was no evidence from studies included in this review. The GDG felt there was sufficient evidence for all of the other outcomes that were considered important for this review.
Trade-off between clinical benefits and harms	**Discectomy versus usual care** Overall, the evidence suggested a clinical benefit in favour of discectomy when performed in people with sciatica due to a herniated intervertebral disc for quality of life assessed by the SF-36 in the domains of bodily pain, physical functioning, mental health index, vitality and general health perception in the short term. This benefit was also supported by EQ-5D data at the short term follow-up. Some benefit for discectomy was also seen at the long term follow up of 1 year in the SF-36 domains of bodily pain, social functioning, physical/emotional role and vitality as well. As with quality of life data, clinical benefit favouring discectomy was observed for both back and leg pain in the short term. The GDG noted that although the benefits were maintained in the long term, the between group difference was not. The GDG noted that sciatic symptoms usually improve over the course of the first 3 months in the majority of people without treatment but this evidence suggested people undergoing discectomy improve quicker. The GDG agreed that in some individuals the pain severity may warrant an earlier intervention. In terms of function, the randomised evidence showed no difference between treatments, although the non-randomised data suggested a clinically important difference favouring discectomy in both the short and long term. In terms of healthcare utilisation, there was no evidence for a difference other than a suggestion that more diagnostic tests were required in those undergoing discectomy; however the GDG agreed that this did not outweigh the possible short term benefits observed. The group noted that discectomy was a relatively safe procedure, and that the most common surgical complication in the discectomy group was a dural tear. The GDG thought this could possibly increase hospital length of stay, and that a tear may result in CNS infection. Reoperation rates were low with discectomy, and mainly due to recurrent disc herniation. The GDG noted that re-operations may not be considered as adverse events following surgery, but may be a natural history of the condition, since about 5% of patients will suffer from a recurrence of disc prolapse. The GDG noted that there was a high rate of cross-over from the control group arm into the discectomy group in the included trials, and those that crossed over had high pain scores post usual care treatment. Results were usually reported as intention to treat analysis and therefore the effects seen in the usual care group may have been over-estimated. This was noted as an inevitable consequence of surgical trials that do not utilise a placebo control. If cross-over isn't offered as an option in a

trial, a high drop-out rate from the usual care arm would also be expected. It was also considered that had the people who crossed over to receive discectomy been removed from the analysis, the effect size in favour of discectomy would likely have been larger than observed, though the GDG recognised that this introduces a risk of bias. There was also concern raised about the uncertainty surrounding the amount of physiotherapy sessions received by the treatment groups in 1 study. It was unclear if this treatment was offered at baseline or as additional sessions. Equally, It was not possible to establish whether the proportion of patients referred for additional physiotherapy was the same in the discectomy and the control groups. The GDG felt this could have affected the outcomes of pain and function reported and therefore did not have much confidence in the effects reported.

The GDG agreed that although there was concern about the reliability of the evidence due to a high cross-over rate, the cross-over of patients was more predominant in 1 arm of the trial (from the usual care group to surgery), and occurred mostly after the short term outcome data was collected. This gave the GDG some confidence in the results reported as the benefit seen in the discectomy group would have been even larger had the usual care cross-over patients not been considered in this arm. However as this very low quality evidence was from a single trial with a small sample size, it did not contribute significantly to informing the recommendation.

Discectomy versus combination treatment (manual therapy + biomechanical exercise + self-management)

Contrasting results were seen amongst the individual domains of quality of life (assessed by the SF-36) in the short term. There were no obvious baseline differences between the arms for these domains that may have explained this.

Evidence for pain (assessed by McGill) and function (assessed by RMDQ) showed no clinically important difference between the 2 groups. The GDG noted that the study reported baseline pain scores and the "present pain intensity" values separately with 2 values for each group varying significantly from each other. The present pain intensity scores were reported to be ~2.5 for both the discectomy and combination treatment groups (baseline McGill scores were reported as ~30). The GDG considered this to be an anomaly and therefore interpreted the results with caution.

Percutaneous disc decompression versus usual care

The evidence showed a clinically important difference favouring percutaneous disc decompression for the outcome of pain in both the short term (≤ 4 months) and long term (> 4 months; at both 1 year and 2 year follow up). However as this finding came from a single, low quality study with a small sample size, the GDG could not be confident enough to make a recommendation based on this limited evidence.

Plasma disc decompression versus epidural steroid injection

A clinical benefit in pain (assessed by VAS) favouring decompression was reported for both leg and back pain in the short term and long term. However, no clinically important difference between treatments was seen in function (assessed by ODI) at either time-point. The GDG noted that 1 of the criteria for inclusion in the trial was that the participants had to have failed a previous epidural injection for the same symptoms between 3 weeks to 6 months previously. They considered this to be a serious flaw of the trial, which lowered their confidence in the evidence reported.

When weighing up the balance between benefits and harms, the GDG considered the adverse events associated with plasma decompression. The evidence showed that there was no clinically important difference in adverse events reported between the 2 treatment groups. The group felt that the majority of adverse events reported were not a cause for concern, except possibly increased weakness seen in the decompression group. However, as this was a single event and there was no additional information provided; the GDG could not derive conclusive evidence of harm from the study.

Discectomy versus fusion

The GDG discussed that the majority of the evidence was in favour of discectomy in

	terms of quality of life and pain in the short term, however these effects were not always maintained at long term followed up. The evidence also showed no clinically important difference between the 2 surgical treatments for function (assessed by ODI) in the long term. **Summary** The GDG considered that discectomy for people suffering from sciatica offered a good prognosis and was successful in providing long-term pain relief. However, they also noted that sciatic symptoms tend to improve naturally with time without treatment. Despite the good long term prognosis with or without treatment, the GDG felt that earlier symptom resolution with surgical intervention should be an option for people. It was agreed that there was sufficient evidence to suggest that discectomy should be considered for a subgroup of people with sciatica who had failed to respond to conservative management of their symptoms.
Trade-off between net clinical effects and costs	Three economic studies were included which compared spinal decompression with usual care.[166,167,171] The first 2were USA studies based on both randomised and observational cohorts of the SPORT trial; [166,167] in the first study the population was adults with a diagnosis of intervertebral disc herniation, while in the second the population was adults with spinal stenosis without degenerative spondylolisthesis (the study presented results separately for people with and without degenerative spondylolisthesis but we only focused on the latter). In both studies surgery was more effective but more costly than usual care with a resulting ICER of more than £40,000 per QALY. In the second study, a probabilistic sensitivity analysis resulted in 95% confidence interval around the ICER of £31,617 to £66,191 per QALY gained. The third study was a within-trial analysis (associated clinical paper Peul 2008[139]) conducted in the Netherlands on a population with disc herniation and lumbosacral radicular syndrome where early micro-discectomy was compared to prolonged conservative care provided by the GP followed by surgery if sciatica persisted at 6 months.[171] However, people in the conservative care group could also receive surgery earlier than 6 months if they had increasing leg pain that was not responsive to drugs and progressive neurological deficit. Again, in this study surgery was more effective but more costly than usual care, with an ICER of £31,932 per QALY gained. The 95% confidence interval around the ICER was £10,817 to £332,249 per QALY gained. It was noted that in the first 2 studies conducted in the USA the cost of surgery was significantly higher compared to the cost reported in the study from the Netherlands. The unit cost of surgery in the USA studies (£8,071) was also compared to the NHS Reference cost of spinal decompression surgery in the UK (£3,582). Conducting a simple threshold analysis using the intervention cost of £3,582 reported in the NHS Reference Cost; spinal decompression surgery would need to generate at least an additional 0.179 QALYs compared to no surgery for it to be considered cost effective at the £20,000 per QALY threshold. The observed QALY gain in the USA studies was 0.21 and 0.17. However, in the European study, the effectiveness was much lower compared to the USA studies (0.044 QALYs). The GDG discussed this evidence and concluded that this could be due to a high cross-over between arms in this study: during the first year surgery was performed in 89% of patients in the early surgery group and 40% of the prolonged conservative care group. If the effectiveness was similar to that reported in the USA studies then spinal decompression is likely to be cost-effective. The GDG concluded that there was a high uncertainty around the conclusions of the economic studies as the cost of surgery is overestimated in the USA studies and the effectiveness is likely to be underestimated in the European study. Therefore overall the GDG concluded that decompression surgery is likely to be cost effective in patients with sciatica when other treatments have failed.
Quality of evidence	The evidence for all comparisons and all outcomes was rated as low or very low quality, mainly due to risk of bias (and sometimes due to additional imprecision). The evidence from randomised studies was considered to be at high risk of bias

	mainly due to lack of appropriate blinding to the key confounders that could influence the outcome. However, the group noted that a limitation of surgery trials that do not utilise a placebo control is that it is often not possible to carry out adequate blinding, but that lack of blinding still would mean there is a risk of bias in interpreting the results. The majority of low quality evidence for the discectomy versus usual care comparison was derived from 2 trials with large sample sizes. Both trials had a high rate of cross-over in both arms, which the GDG agreed would affect their confidence in interpreting the data that was reported. The evidence for all other comparisons in the review was of low quality and came from single studies with relatively small sample sizes. The non-randomised evidence was rated as very low quality, due to inherent selection bias in non-randomised studies as well as a lack of appropriate blinding. This meant it was considered to be at serious risk of bias and therefore the group placed low confidence in the effects reported.
Other considerations	The issue regarding optimal time to offer spinal decompression was discussed. Whilst the GDG agreed that in the majority of cases, sciatic symptoms would improve naturally with time, they recognised that the option for earlier pain relief should be available for a subset of patients that suffer from severe, acute sciatic pain. The group agreed that surgical intervention following a period of conservative management for around 6 weeks would be reasonable. However, it was noted that there was little evidence to support this time-point and that the 6 week conservative treatment interval was largely historical and consensus based. The GDG agreed that as non-surgical management should be pursued prior to surgery, this would negate the need to specify a specific time point in the recommendation as it is likely that it would be at least 3-6 months before surgery was offered. The GDG discussed the need of imaging prior to spinal decompression. The GDG observed that prior imaging was an inclusion criteria for all the studies included in the review. The GDG was also aware that operating without concordant imaging would carry a significant risk of harm, because such patients would be exposed to the risks of surgery and general anaesthetics with little chance of any benefit. The GDG decided it was therefore appropriate to restrict the use of spinal decompression in people in whom radiological findings are concordant with sciatic symptoms. The GDG noted that if spinal decompression was being performed, patient outcome information should be submitted to a national registry. The GDG agreed that this recommendation would equally apply for pregnant women and this should be considered on a case by case basis. The GDG were aware of the NICE clinical guideline for pharmacological management of neuropathic pain (CG173) which covers the pharmacological management of sciatica and therefore was outside of the remit for this guideline to do a systematic review of the evidence for this. Conservative management for sciatica should therefore be guided by the recommendations set in CG173 before discectomy is considered as an option. It was also noted that in the non-randomised study included in the review, patients had to pay for their own treatment which the group agreed was a serious limitation of the trial, since the costs of spinal fusion far outweigh those of discectomy. This could potentially skew the results in favour of the cheaper surgical option. The GDG were aware of existing NICE interventional procedure guidance for Interspinous distraction procedures for lumbar spinal stenosis causing neurogenic claudication (IPG365) and Percutaneous intradiscal laser ablation in the lumbar spine (IPG 357) which recommend normal arrangements for clinical governance, consent and audit. This specific procedure was excluded from this review and therefore this existing guidance should be followed for people with sciatica.

	Interventional procedure guidance also exists for Percutaneous intradiscal laser ablation in the lumbar spine (IPG357) which recommends normal arrangements for clinical governance, consent and audit, Automated percutaneous mechanical lumbar discectomy (IPG141), Endoscopic laser foraminoplasty (IPG31) Insertion of an annular disc implant lumbar discectomy (IPG506) and Percutaneous endoscopic laser lumbar discectomy (IPG300) which all recommend special arrangements for clinical governance, consent, audit and research. These procedures were excluded from the review due to being inappropriate to pool with decompression techniques in general, and therefore if being considered for people with sciatica, existing guidance should be followed. The GDG were also aware of IPG guidance for Percutaneous coblation of the intervertebral disc for low back pain and sciatica (IPG543) which recommends normal arrangements, however it was noted that this review considered different evidence and followed different methodology to that included within this review. At the time of consultation IPG300 was being updated. Information on the update is available here: http://www.nice.org.uk/guidance/indevelopment/gid-ip2806.

29 Reference list

1 Arden NK, Price C, Reading I, Stubbing J, Hazelgrove J, Dunne C et al. A multicentre randomized controlled trial of epidural corticosteroid injections for sciatica: the WEST study. Rheumatology. 2005; 44(11):1399-1406

2 Autio RA, Karppinen J, Kurunlahti M, Haapea M, Vanharanta H, Tervonen O. Effect of periradicular methylprednisolone on spontaneous resorption of intervertebral disc herniations. Spine. 2004; 29(15):1601-1607

3 Barendse GAM, Spaans F, Stomp-van den Berg SGM, Weber WEJ, Kessels A, Van KM. Local denervation of lumbar paraspinal muscles may not be used as a criterion for the effectivity of radiofrequency lesions of the zygapophyseal joints. Pain Clinic. 2001; 13(2):125-131

4 Beliveau P. A comparison between epidural anaesthesia with and without corticosteroid in the treatment of sciatica. Rheumatology and Physical Medicine. 1971; 11(1):40-43

5 Berg S. On total disc replacement. Acta Orthopaedica. Sweden 2011; 82(Suppl.343):1-34

6 Berg S, Tropp HT, Leivseth G. Disc height and motion patterns in the lumbar spine in patients operated with total disc replacement or fusion for discogenic back pain. Results from a randomized controlled trial. Spine Journal. 2011; 11(11):991-998

7 Berg S, Tullberg T, Branth B, Olerud C, Tropp H. Total disc replacement compared to lumbar fusion: A randomised controlled trial with 2-year follow-up. European Spine Journal. 2009; 18(10):1512-1519

8 Berg S, Fritzell P, Tropp H. Sex life and sexual function in men and women before and after total disc replacement compared with posterior lumbar fusion. Spine Journal. 2009; 9(12):987-994

9 Bourne IH. Treatment of chronic back pain. Comparing corticosteroid-lignocaine injections with lignocaine alone. Practitioner. 1984; 228(1389):333-338

10 Breivik H, Hesla PE, Molnar I, Lind B. Treatment of chronic low back pain and sciatica: comparison of caudal epidural injections of bupivacaine and methylprednisolone with bupivacaine followed by saline. Advances in Pain Research and Therapy. 1976; 1:927-932

11 Bronfort G, Evans RL, Maiers M, Anderson AV. Spinal manipulation, epidural injections, and self-care for sciatica: a pilot study for a randomized clinical trial. Journal of Manipulative and Physiological Therapeutics. 2004; 27(8):503-508

12 Bronfort G, Haas M, Evans RL, Bouter LM. Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis. Spine. 2004; 4(3):335-356

13 Brox JI, Nygaard OP, Holm I, Keller A, Ingebrigtsen T, Reikeras O. Four-year follow-up of surgical versus non-surgical therapy for chronic low back pain. Annals of the Rheumatic Diseases. 2010; 69(9):1643-1648

14 Brox JI, Reikeras O, Nygaard O, Sorensen R, Indahl A, Holm I et al. Lumbar instrumented fusion compared with cognitive intervention and exercises in patients with chronic back pain after

previous surgery for disc herniation: a prospective randomized controlled study. Spine. 2006; 122(1-2):145-155

15 Brox JI, Sorensen R, Friis A, Nygaard O, Indahl A, Keller A et al. Randomized clinical trial of lumbar instrumented fusion and cognitive intervention and exercises in patients with chronic low back pain and disc degeneration. Spine. 2003; 28(17):1913-1921

16 Buchner M, Zeifang F, Brocai DR, Schiltenwolf M. Epidural corticosteroid injection in the conservative management of sciatica. Clinical Orthopaedics and Related Research. 2000;(375):149-156

17 Buttermann GR. The effect of spinal steroid injections for degenerative disc disease. Spine Journal. 2004; 4(5):495-505

18 Buttermann GR. Treatment of lumbar disc herniation: epidural steroid injection compared with discectomy. Journal of Bone and Joint Surgery - American Volume. 2004; 86(4):670-679

19 Cao P, Chen Z, Zheng Y, Wang Y, Jiang L, Yang Y et al. Comparison of simple discectomy and instrumented posterior lumbar interbody fusion for treatment of lumbar disc herniation combined with Modic endplate changes. Chinese Medical Journal. 2014; 127(15):2789-2794

20 Cao P, Jiang L, Zhuang C, Yang Y, Zhang Z, Chen W et al. Intradiscal injection therapy for degenerative chronic discogenic low back pain with end plate Modic changes. Spine Journal. 2011; 11(2):100-106

21 Carette S, Leclaire R, Marcoux S, Morin F, Blaise GA, St-Pierre A et al. Epidural corticosteroid injections for sciatica due to herniated nucleus pulposus. New England Journal of Medicine. 1997; 336(23):1634-1640

22 Carette S, Marcoux S, Truchon R, Grondin C, Gagnon J, Allard Y et al. A controlled trial of corticosteroid injections into facet joints for chronic low back pain. New England Journal of Medicine. 1991; 325(14):1002-1007

23 Carrasco AT, Wescoat L, Roman A. A retrospective review of Botulinum toxin type A compared with standard therapy in the treatment of lumbar myofascial back pain patients. Pain Clinic. 2003; 15(3):205-211

24 Civelek E, Cansever T, Kabatas S, Kircelli A, Yilmaz C, Musluman M et al. Comparison of effectiveness of facet joint injection and radiofrequency denervation in chronic low back pain. Turkish Neurosurgery. 2012; 22(2):200-206

25 Cohen SP, Bogduk N, Dragovich A, Buckenmaier CC, Griffith S, Kurihara C et al. Randomized, double-blind, placebo-controlled, dose-response, and preclinical safety study of transforaminal epidural etanercept for the treatment of sciatica. Anesthesiology. 2009; 110(5):1116-1126

26 Cohen SP, White RL, Kurihara C, Larkin TM, Chang A, Griffith SR et al. Epidural steroids, etanercept, or saline in subacute sciatica: a multicenter, randomized trial. Annals of Internal Medicine. 2012; 156(8):551-559

27 Colhado OC, Moura-Siqueira HBO, Pedrosa DF, Saltareli S, da Silva TdCR, Hortense P et al. Evaluation of low back pain: comparative study between psychophysical methods. Pain Medicine. 2013; 14(9):1307-1315

28 Cook CE, Arnold PM, Passias PG, Frempong-Boadu AK, Radcliff K, Isaacs R et al. Predictors of pain and disability outcomes in one thousand, one hundred and eight patients who underwent lumbar discectomy surgery. International Orthopaedics. 2015; 39(11):2143-2151

29 Coomes NE. A comparison between epidural anaesthesia and bed rest in sciatica. BMJ. 1961; 1(5218):20-24

30 Cuckler JM, Bernini PA, Wiesel SW, Booth REJ, Rothman RH, Pickens GT. The use of epidural steroids in the treatment of lumbar radicular pain. A prospective, randomized, double-blind study. Journal of Bone and Joint Surgery - American Volume. 1985; 67(1):63-66

31 Dagenais S, Yelland MJ, Del MC, Schoene ML. Prolotherapy injections for chronic low-back pain. Cochrane Database of Systematic Reviews. 2007; Issue 2:CD004059. DOI:10.1002/14651858.CD004059.pub3

32 Datta R, Upadhyay KK. A randomized clinical trial of three different steroid agents for treatment of low backache through the caudal route. Medical Journal Armed Forces India. 2011; 67(1):25-33

33 Dechow E, Davies RK, Carr AJ, Thompson PW. A randomized, double-blind, placebo-controlled trial of sclerosing injections in patients with chronic low back pain. Rheumatology. 1999; 38(12):1255-1259

34 Department of Health. Our health, our care, our say: a new direction for community services. London. The Stationery Office, 2006

35 Department of Health. NHS reference costs 2012-13. 2013. Available from: https://www.gov.uk/government/publications/nhs-reference-costs-2012-to-2013 [Last accessed: 2 May 2014]

36 Department of Health. Reference costs 2012-2013, 2013. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/261154/nhs_reference_costs_2012-13_acc.pdf

37 Dincer U, Kiralp MZ, Cakar E, Yasar E, Dursan H. Caudal epidural injection versus non-steroidal anti-inflammatory drugs in the treatment of low back pain accompanied with radicular pain. Joint, Bone, Spine. 2007; 74(5):467-471

38 Erginousakis D, Filippiadis DK, Malagari A, Kostakos A, Brountzos E, Kelekis NL et al. Comparative prospective randomized study comparing conservative treatment and percutaneous disk decompression for treatment of intervertebral disk herniation. Radiology. 2011; 260(2):487-493

39 Fairbank J, Frost H, Wilson-MacDonald J, Yu LM, Barker K, Collins R. Randomised controlled trial to compare surgical stabilisation of the lumbar spine with an intensive rehabilitation programme for patients with chronic low back pain: the MRC spine stabilisation trial. BMJ. 2005; 330(7502):1233

40 Fitzsimmons D, Phillips CJ, Bennett H, Jones M, Williams N, Lewis R et al. Cost-effectiveness of different strategies to manage patients with sciatica. Pain. 2014; 155(7):1318-1327

41 Foster L, Clapp L, Erickson M, Jabbari B. Botulinum toxin A and chronic low back pain: a randomized, double-blind study. Neurology. 2001; 56(10):1290-1293

42 Freeman BJC, Ludbrook GL, Hall S, Cousins M, Mitchell B, Jaros M et al. Randomized, double-blind, placebo-controlled, trial of transforaminal epidural etanercept for the treatment of symptomatic lumbar disc herniation. Spine. 2013; 38(23):1986-1994

43 Friedly JL, Comstock BA, Turner JA, Heagerty PJ, Deyo RA, Sullivan SD et al. A randomized trial of epidural glucocorticoid injections for spinal stenosis. New England Journal of Medicine. 2014; 371(1):11-21

44 Fritzell P, Berg S, Borgstrom F, Tullberg T, Tropp H. Cost effectiveness of disc prosthesis versus lumbar fusion in patients with chronic low back pain: randomized controlled trial with 2-year follow-up. European Spine Journal. 2011; 20(7):1001-1011

45 Fritzell P, Hagg O, Wessberg P, Nordwall A. The Swedish Spine Study: Lumbar fusion for chronic low back pain. A multicentre RCT comparing surgery with physiotherapy. 2000 Annual Meeting of the Spine Society of Europe In: Eur Spine J. 2000; 9

46 Fritzell P, Hagg O, Wessberg P, Nordwall A. 2001 Volvo Award Winner in Clinical Studies: Lumbar fusion versus nonsurgical treatment for chronic low back pain: a multicenter randomized controlled trial from the Swedish Lumbar Spine Study Group. Spine. 2001; 26(23):2521-2532

47 Froholdt A, Holm I, Keller A, Gunderson RB, Reikeraas O, Brox JI. No difference in long-term trunk muscle strength, cross-sectional area, and density in patients with chronic low back pain 7 to 11 years after lumbar fusion versus cognitive intervention and exercises. Spine Journal. 2011; 11(8):718-725

48 Froholdt A, Reikeraas O, Holm I, Keller A, Brox JI. No difference in 9-year outcome in CLBP patients randomized to lumbar fusion versus cognitive intervention and exercises. European Spine Journal. 2012; 21(12):2531-2538

49 Fuchs S, Erbe T, Fischer HL, Tibesku CO. Intraarticular hyaluronic acid versus glucocorticoid injections for nonradicular pain in the lumbar spine. Journal of Vascular and Interventional Radiology. 2005; 16(11):1493-1498

50 Gallagher J, Petriccione Di Vadi PL, Wedley JR, Hamann W, Ryan P, Chikanza I et al. Radiofrequency facet joint denervation in the treatment of low back pain: A prospective controlled double-blind study to assess its efficacy. Pain Clinic. 1994; 7(3):193-198

51 Gerszten PC, Smuck M, Rathmell JP, Simopoulos TT, Bhagia SM, Mocek CK et al. Plasma disc decompression compared with fluoroscopy-guided transforaminal epidural steroid injections for symptomatic contained lumbar disc herniation: a prospective, randomized, controlled trial. Journal of Neurosurgery: Spine. 2010; 12(4):357-371

52 Ghahreman A, Ferch R, Bogduk N. The efficacy of transforaminal injection of steroids for the treatment of lumbar radicular pain. Pain Medicine. 2010; 11(8):1149-1168

53 Ghai B, Kumar K, Bansal D, Dhatt SS, Kanukula R, Batra YK. Effectiveness of Parasagittal Interlaminar Epidural Local Anesthetic with or without Steroid in Chronic Lumbosacral Pain: A Randomized, Double-Blind Clinical Trial. Pain Physician. 2015; 18(3):237-248

54 Gibson JNA, Waddell G. Surgical interventions for lumbar disc prolapse. Cochrane Database of Systematic Reviews. 2007; Issue 2:CD001350. DOI:10.1002/14651858.CD001350.pub3

55 Gornet MF, Burkus JK, Dryer RF, Peloza JH. Lumbar disc arthroplasty with MAVERICK disc versus stand-alone interbody fusion: A prospective, randomized, controlled, multicenter investigational device exemption trial. Spine. 2011; 36(25):E1600-E1611

56 Hagihara Y, Ogata S, Hirayama H, Koyama T, Watanabe E. Why use steroids in lumbar selective nerve root block? - A randomized control study. Chiba Medical Journal. 2009; 85(2):71-76

57 Hansson E, Hansson T. The cost-utility of lumbar disc herniation surgery. European Spine Journal. 2007; 16(3):329-337

58 Hansson E, Hansson T, Jonsson R. Predictors for work ability and disability in men and women with low-back or neck problems. European Spine Journal. 2006; 15(6):780-793

59 Hellum C, Berg L, Gjertsen O, Johnsen LG, Neckelmann G, Storheim K et al. Adjacent level degeneration and facet arthropathy after disc prosthesis surgery or rehabilitation in patients with chronic low back pain and degenerative disc: second report of a randomized study. Spine. 2012; 37(25):2063-2073

60 Hellum C, Johnsen LG, Gjertsen O, Berg L, Neckelmann G, Grundnes O et al. Predictors of outcome after surgery with disc prosthesis and rehabilitation in patients with chronic low back pain and degenerative disc: 2-year follow-up. European Spine Journal. 2012; 21(4):681-690

61 Hellum C, Johnsen LG, Storheim K, Nygaard OP, Brox JI, Rossvoll I et al. Surgery with disc prosthesis versus rehabilitation in patients with low back pain and degenerative disc: two year follow-up of randomised study. BMJ. 2011; 342:d2786

62 Jackson RP. The facet syndrome. Myth or reality? Clinical Orthopaedics and Related Research. 1992;(279):110-121

63 Jacobs JH, Grayson MF. Trial of an anti-inflammatory agent (indomethacin) in low back pain with and without radicular involvement. BMJ. 1968; 3(5611):158-160

64 Jacobs W, Van der Gaag NA, Tuschel A, de KM, Peul W, Verbout AJ et al. Total disc replacement for chronic back pain in the presence of disc degeneration. Cochrane Database of Systematic Reviews. 2012; Issue 9:CD008326. DOI:10.1002/14651858.CD008326.pub2

65 Johnsen LG, Brinckmann P, Hellum C, Rossvoll I, Leivseth G. Segmental mobility, disc height and patient-reported outcomes after surgery for degenerative disc disease: a prospective randomised trial comparing disc replacement and multidisciplinary rehabilitation. Bone and Joint Journal. 2013; 95-B(1):81-89

66 Johnsen LG, Hellum C, Storheim K, Nygaard OP, Brox JI, Rossvoll I et al. Cost-effectiveness of total disc replacement versus multidisciplinary rehabilitation in patients with chronic low back pain: A norwegian multicenter RCT. Spine. 2014; 39(1):23-32

67 Johnsen LG, Hellum C, Nygaard OP, Storheim K, Brox JI, Rossvoll I et al. Comparison of the SF6D, the EQ5D, and the oswestry disability index in patients with chronic low back pain and degenerative disc disease. BMC Musculoskeletal Disorders. 2013; 14:148

68 Kader D, Radha S, Smith F, Wardlaw D, Scott N, Rege A et al. Evaluation of perifacet injections and paraspinal muscle rehabilitation in treatment of low back pain. A randomised controlled trial. Ortopedia, Traumatologia, Rehabilitacja. 2012; 14(3):251-259

69 Karppinen J, Malmivaara A, Kurunlahti M, Kyllonen E, Pienimaki T, Nieminen P et al. Periradicular infiltration for sciatica - a randomized controlled trial. Spine. 2001; 26(9):1059-1067

70 Karppinen J, Ohinmaa A, Malmivaara A, Kurunlahti M, Kyllonen E, Pienimaki T et al. Cost effectiveness of periradicular infiltration for sciatica: subgroup analysis of a randomized controlled trial. Spine. 2001; 26(23):2587-2595

71 Kawu AA, Olawepo A, Salami AOO. Facet joints infiltration: a viable alternative treatment to physiotherapy in patients with low back pain due to facet joint arthropathy. Nigerian Journal of Clinical Practice. 2011; 14(2):219-222

72 Keller A, Brox JI, Gunderson R, Holm I, Friis A, Reikeras O. Trunk Muscle Strength, Cross-sectional Area, and Density in Patients with Chronic Low Back Pain Randomized to Lumbar Fusion or Cognitive Intervention and Exercises. Spine. 2004; 29(1):3-8

73 Keller A, Brox JI, Reikeras O. Predictors of change in trunk muscle strength for patients with chronic low back pain randomized to lumbar fusion or cognitive intervention and exercises. Pain Medicine. 2008; 9(6):680-687

74 Kerr D, Zhao W, Lurie JD. What Are Long-term Predictors of Outcomes for Lumbar Disc Herniation? A Randomized and Observational Study. Clinical Orthopaedics and Related Research. 2015; 473(6):1920-1930

75 Kerr DP, Walsh DM, Baxter D. Acupuncture in the management of chronic low back pain: a blinded randomized controlled trial. Clinical Journal of Pain. 2003; 19(6):364-370

76 Khot A, Bowditch M, Powell J, Sharp D. The use of intradiscal steroid therapy for lumbar spinal discogenic pain: a randomized controlled trial. Spine. 2004; 29(8):833-837

77 Kim H-J, Jeong J-H, Cho H-G, Chang B-S, Lee C-K, Yeom JS. Comparative observational study of surgical outcomes of lumbar foraminal stenosis using minimally invasive microsurgical extraforaminal decompression alone versus posterior lumbar interbody fusion: a prospective cohort study. European Spine Journal. 2015; 24(2):388-395

78 Kim WM, Lee HG, Jeong CW, Kim CM, Yoon MH. A randomized controlled trial of intra-articular prolotherapy versus steroid injection for sacroiliac joint pain. Journal of Alternative and Complementary Medicine. 2010; 16(12):1285-1290

79 Klein RG, Eek BC. Low-energy laser treatment and exercise for chronic low back pain: double-blind controlled trial. Archives of Physical Medicine and Rehabilitation. 1990; 71(1):34-37

80 Klein RG, Eek BC, DeLong WB, Mooney V. A randomized double-blind trial of dextrose-glycerine-phenol injections for chronic, low back pain. Journal of Spinal Disorders. 1993; 6(1):23-33

81 Klenerman L, Greenwood R, Davenport HT, White DC, Peskett S. Lumbar epidural injections in the treatment of sciatica. British Journal of Rheumatology. 1984; 23(1):35-38

82 Koc Z, Ozcakir S, Sivrioglu K, Gurbet A, Kucukoglu S. Effectiveness of physical therapy and epidural steroid injections in lumbar spinal stenosis. Spine. 2009; 34(10):985-989

83 Kotilainen E, Muittari P, Kirvela O. Intradiscal glycerol or bupivacaine in the treatment of low back pain. Acta Neurochirurgica. 1997; 139(6):541-545

84 Kraemer J, Ludwig J, Bickert U, Owczarek V, Traupe M. Lumbar epidural perineural injection: a new technique. European Spine Journal. 1997; 6(5):357-361

85 Laiq N, Khan MN, Iqbal MJ, Khan S. Comparison of Epidural Steroid Injections with conservative management in patients with lumbar radiculopathy. Journal of the College of Physicians and Surgeons--Pakistan. 2009; 19(9):539-543

86 Leclaire R, Fortin L, Bergeron Y, Lambert R, Rossignol M. In response to: radiofrequency neurotomy for chronic lumbar facet pain—interpreting the evidence. Pain Practice. 2010; 10(3):261-262

87 Leclaire R, Fortin L, Lambert R, Bergeron YM, Rossignol M. Radiofrequency facet joint denervation in the treatment of low back pain: a placebo-controlled clinical trial to assess efficacy. Spine. 2001; 26(13):1411-1417

88 Lee CH, Hyun SJ, Kim KJ, Jahng TA, Kim HJ. Decompression only versus fusion surgery for lumbar stenosis in elderly patients over 75 years old: which is reasonable? Neurologia Medico-Chirurgica. 2013; 53(12):870-874

89 Lee JC, Kim MS, Shin BJ. An analysis of the prognostic factors affecing the clinical outcomes of conventional lumbar open discectomy : clinical and radiological prognostic factors. Asian Spine Journal. 2010; 4(1):23-31

90 Lee JH, Lee SH, Song SH. Clinical effectiveness of botulinum toxin A compared to a mixture of steroid and local anesthetics as a treatment for sacroiliac joint pain. Pain Medicine. 2010; 11(5):692-700

91 Lee S-H, Lee S-J, Park K-H, Lee I-M, Sung K-H, Kim J-S et al. Comparison of percutaneous manual and endoscopic laser discectomy with chemonucleolysis and automated nucleotomy. Der Orthopade. 1996; 25(1):49-55

92 Lee WT, Liu G, Thambiah J, Wong HK. Clinical outcomes of single-level lumbar artificial disc replacement compared with transforaminal lumbar interbody fusion in an Asian population. Singapore Medical Journal. 2015; 56(4):208-211

93 Lewis R, Williams N, Matar HE, Din N, Fitzsimmons D, Phillips C et al. The clinical effectiveness and cost-effectiveness of management strategies for sciatica: systematic review and economic model. Health Technology Assessment. 2011; 15(39)

94 Li YW, Li ZL. The clinical observation of scalp acupuncture accoated with body acupuncture in the treatment of sciatica in 296 cases. Journal of Clinical Acupuncture and Moxibustion. 1996; 12(1):22

95 Li ZY, Han X, Ma S, Tian W. Effect of total lumbar disc replacement on the treatment of discogenic low lumbar pain: preliminary outcomes. Chinese Medical Journal. 2013; 126(8):1504-1508

96 Lilius G, Laasonen EM, Myllynen P, Harilainen A, Gronlund G. Lumbar facet joint syndrome. A randomised clinical trial. Journal of Neurosurgery: Spine. 1989; 71(4):681-684

97 Lurie JD, Tosteson TD, Tosteson ANA, Zhao W, Morgan TS, Abdu WA et al. Surgical versus nonoperative treatment for lumbar disc herniation: eight-year results for the spine patient outcomes research trial. Spine. 2014; 39(1):3-16

98 Luukkainen RK, Wennerstrand PV, Kautiainen HH, Sanila MT, Asikainen EL. Efficacy of periarticular corticosteroid treatment of the sacroiliac joint in non-spondylarthropathic patients with chronic low back pain in the region of the sacroiliac joint. Clinical and Experimental Rheumatology. 2002; 20(1):52-54

99 Maas ET, Ostelo Raymond WJG, Niemisto L, Jousimaa J, Hurri H, Malmivaara A et al. Radiofrequency denervation for chronic low back pain. Cochrane Database of Systematic Reviews. 2015; Issue 10:CD008572. DOI:10.1002/14651858.CD008572.pub2

100 Manchikanti L, Cash KA, McManus CD, Pampati V, Fellows B. Results of 2-year follow-up of a randomized, double-blind, controlled trial of fluoroscopic caudal epidural injections in central spinal stenosis. Pain Physician. 2012; 15(5):371-384

101 Manchikanti L, Pampati V, Bakhit CE, Pakanati RR. Non-endoscopic and endoscopic adhesiolysis in post lumbar laminectomy syndrome: a one-year outcome study and cost effectiveness analysis. Pain Physician. 1999; 2(3):52-58

102 Manchikanti L, Pampati V, Fellows B, Bakhit CE. The diagnostic validity and therapeutic value of lumbar facet joint nerve blocks with or without adjuvant agents. Current Review of Pain. 2000; 4(5):337-344

103 Manchikanti L, Cash KA, McManus CD, Damron KS, Pampati V, Falco FJE. A randomized, double-blind controlled trial of lumbar interlaminar epidural injections in central spinal stenosis: 2-year follow-up. Pain Physician. 2015; 18(1):79-92

104 Manchikanti L, Cash KA, McManus CD, Pampati V. Fluoroscopic caudal epidural injections in managing chronic axial low back pain without disc herniation, radiculitis, or facet joint pain. Journal of Pain Research. 2012; 5:381-390

105 Manchikanti L, Cash KA, McManus CD, Pampati V, Abdi S. Preliminary results of a randomized, equivalence trial of fluoroscopic caudal epidural injections in managing chronic low back pain: Part 4--Spinal stenosis. Pain Physician. 2008; 11(6):833-848

106 Manchikanti L, Cash KA, McManus CD, Pampati V, Benyamin R. Fluoroscopic lumbar interlaminar epidural injections in managing chronic lumbar axial or discogenic pain. Journal of Pain Research. 2012; 5:301-311

107 Manchikanti L, Cash KA, McManus CD, Pampati V, Benyamin RM. Preliminary results of a randomized, double-blind, controlled trial of fluoroscopic lumbar interlaminar epidural injections in managing chronic lumbar discogenic pain without disc herniation or radiculitis. Pain Physician. 2010; 13(4):E279-E292

108 Manchikanti L, Cash KA, McManus CD, Pampati V, Benyamin RM. A randomized, double-blind, active-controlled trial of fluoroscopic lumbar interlaminar epidural injections in chronic axial or discogenic low back pain: results of 2-year follow-up. Pain Physician. 2013; 16(5):E491-E504

109 Manchikanti L, Cash KA, McManus CD, Pampati V, Fellows B. Fluoroscopic caudal epidural injections with or without steroids in managing pain of lumbar spinal stenosis: one-year results of randomized, double-blind, active-controlled trial. Journal of Spinal Disorders and Techniques. 2012; 25(4):226-234

110 Manchikanti L, Cash KA, McManus CD, Pampati V, Smith HS. Preliminary results of a randomized, equivalence trial of fluoroscopic caudal epidural injections in managing chronic low back pain: Part 1--Discogenic pain without disc herniation or radiculitis. Pain Physician. 2008; 11(6):785-800

111 Manchikanti L, Cash KA, McManus CD, Pampati V, Smith HS. One-year results of a randomized, double-blind, active controlled trial of fluoroscopic caudal epidural injections with or without steroids in managing chronic discogenic low back pain without disc herniation or radiculitis. Pain Physician. 2011; 14(1):25-36

112 Manchikanti L, Cash KA, Pampati V, Falco FJE. Transforaminal epidural injections in chronic lumbar disc herniation: a randomized, double-blind, active-control trial. Pain Physician. 2014; 17(4):E489-E501

113 Manchikanti L, Manchikanti KN, Manchukonda R, Cash KA, Damron KS, Pampati V et al. Evaluation of lumbar facet joint nerve blocks in the management of chronic low back pain: preliminary report of a randomized, double-blind controlled trial: clinical trial NCT00355914. Pain Physician. 2007; 10(3):425-440

114 Manchikanti L, Singh V, Cash KA, Pampati V, Damron KS, Boswell MV. Effect of fluoroscopically guided caudal epidural steroid or local anesthetic injections in the treatment of lumbar disc herniation and radiculitis: a randomized, controlled, double blind trial with a two-year follow-up. Pain Physician. 2012; 15(4):273-286

115 Manchikanti L, Singh V, Falco FJE, Cash KA, Pampati V. Lumbar facet joint nerve blocks in managing chronic facet joint pain: one-year follow-up of a randomized, double-blind controlled trial: Clinical Trial NCT00355914. Pain Physician. 2008; 11(2):121-132

116 Manchikanti L, Singh V, Falco FJE, Cash KA, Pampati V. Evaluation of lumbar facet joint nerve blocks in managing chronic low back pain: a randomized, double-blind, controlled trial with a 2-year follow-up. International Journal of Medical Sciences. 2010; 7(3):124-135

117 Mars T, Ellard DR, Antrobus JH, Cairns M, Underwood M, Haywood K et al. Intraarticular facet injections for low back pain: design considerations, consensus methodology to develop the protocol for a randomized controlled trial. Pain Physician. 2015; 18(5):473-493

118 Mayer TG, Gatchel RJ, Keeley J, McGeary D, Dersh J, Anagnostis C. A randomized clinical trial of treatment for lumbar segmental rigidity. Spine. 2004; 29(20):2199-2206

119 McMorland G, Suter E, Casha S, du Plessis SJ, Hurlbert RJ. Manipulation or microdiskectomy for sciatica? A prospective randomized clinical study. Journal of Manipulative and Physiological Therapeutics. 2010; 33(8):576-584

120 Mueller B, Carreon LY, Glassman SD. Comparison of the EuroQOL-5D with the Oswestry Disability Index, back and leg pain scores in patients with degenerative lumbar spine pathology. Spine. 2013; 38(9):757-761

121 Murakibhavi VG, Khemka AG. Caudal epidural steroid injection: a randomized controlled trial. Evidence-Based Spine-Care Journal. 2011; 2(4):19-26

122 Nabhan A, Al-Yhary A, Ishak B, Steudel WI, Kollmar O, Steimer O. Analysis of spinal kinematics following implantation of lumbar spine disc prostheses versus fusion: radiological study. Journal of Long-Term Effects of Medical Implants. 2007; 17(3):207-216

123 Nath S, Nath CA, Pettersson K. Percutaneous lumbar zygapophysial (Facet) joint neurotomy using radiofrequency current, in the management of chronic low back pain: a randomized double-blind trial. Spine. 2008; 33(12):1291-1298

124 National Institute for Health and Clinical Excellence. Therapeutic endoscopic division of epidural adhesions. England. London: National Institute for Health and Clinical Excellence (NICE), 2010. Available from: http://www.nice.org.uk/nicemedia/live/11066/30842/30842.pdf

125 National Spinal Taskforce. Commissioning spinal services – getting the service back on track. A guide for commissioners of spinal services, 2013. Available from: http://www.nationalspinaltaskforce.co.uk/pdfs/NHSSpinalReport_vis7%2030.01.13.pdf

126 Ng L, Chaudhary N, Sell P. The efficacy of corticosteroids in periradicular infiltration for chronic radicular pain: a randomized, double-blind, controlled trial. Spine. 2005; 30(8):857-862

127 Niemisto L, Kalso E, Malmivaara A, Seitsalo S, Hurri H, Cochrane Collaboration Back Review Group. Radiofrequency denervation for neck and back pain: a systematic review within the framework of the cochrane collaboration back review group. Spine. 2003; 28(16):1877-1888

128 Oh WS, Shim JC. A randomized controlled trial of radiofrequency denervation of the ramus communicans nerve for chronic discogenic low back pain. Clinical Journal of Pain. 2004; 20(1):55-60

129 Ohtori S, Koshi T, Yamashita M, Yamauchi K, Inoue G, Suzuki M et al. Surgical versus nonsurgical treatment of selected patients with discogenic low back pain: a small-sized randomized trial. Spine. 2011; 36(5):347-354

130 Ongley MJ, Klein RG, Dorman TA, Eek BC, Hubert LJ. A new approach to the treatment of chronic low back pain. Lancet. 1987; 2(8551):143-146

131 Organisation for Economic Co-operation and Development (OECD). Purchasing power parities (PPP). 2012. Available from: http://www.oecd.org/std/ppp [Last accessed: 1 November 2015]

132 Ostelo RWJG, Vlaeyen JWS, van den Brandt PA, de Vet HCW. Residual complaints following lumbar disc surgery: prognostic indicators of outcome. Pain. 2005; 114(1-2):177-185

133 Osterman H, Seitsalo S, Karppinen J, Malmivaara A. Effectiveness of microdiscectomy for lumbar disc herniation: a randomized controlled trial with 2 years of follow-up. Spine. 2006; 31(21):2409-2414

134 Overdevest GM, Jacobs W, Vleggeert-Lankamp C, Thome C, Gunzburg R, Peul W. Effectiveness of posterior decompression techniques compared with conventional laminectomy for lumbar stenosis. Cochrane Database of Systematic Reviews. 2015; Issue 3:CD010036. DOI:10.1002/14651858.CD010036.pub2

135 Pearson A, Lurie J, Tosteson T, Zhao W, Abdu W, Weinstein JN. Who should have surgery for spinal stenosis? Treatment effect predictors in SPORT. Spine. 2012; 37(21):1791-1802

136 Pearson AM, Blood EA, Frymoyer JW, Herkowitz H, Abdu WA, Woodward R et al. SPORT lumbar intervertebral disk herniation and back pain: does treatment, location, or morphology matter? Spine. 2008; 33(4):428-435

137 Peterson CK, Leemann S, Lechmann M, Pfirrmann CWA, Hodler J, Humphreys BK. Symptomatic magnetic resonance imaging-confirmed lumbar disk herniation patients: A comparative effectiveness prospective observational study of 2 age- and sex-matched cohorts treated with either high-velocity, low-amplitude spinal manipulative therapy or imaging-guided lumbar nerve root injections. Journal of Manipulative and Physiological Therapeutics. 2013; 36(4):218-225

138 Peul WC, Houwelingen HC, Hout WB, Brand R, Eekhof JA, Tans JT et al. [Early surgery or a wait-and-see policy in lumbosacral radicular syndrome: a randomized study]. Nederlands Tijdschrift Voor Geneeskunde. 2007; 151(45):2512-2523

139 Peul WC, van den Hout WB, Brand R, Thomeer RTWM, Koes BW, Leiden-The Hague Spine Intervention Prognostic Study Group. Prolonged conservative care versus early surgery in patients with sciatica caused by lumbar disc herniation: two year results of a randomised controlled trial. BMJ. 2008; 336(7657):1355-1358

140 Peul WC, van Houwelingen HC, van den Hout WB, Brand R, Eekhof JAH, Tans JTJ et al. Surgery versus prolonged conservative treatment for sciatica. New England Journal of Medicine. 2007; 356(22):2245-2256

141 Price C, Arden N, Coglan L, Rogers P. Cost-effectiveness and safety of epidural steroids in the management of sciatica. Health Technology Assessment. 2005; 9(33)

142 Riew KD, Yin Y, Gilula L, Bridwell KH, Lenke LG, Lauryssen C et al. The effect of nerve-root injections on the need for operative treatment of lumbar radicular pain. A prospective, randomized, controlled, double-blind study. Journal of Bone and Joint Surgery - American Volume. 2000; 82-A(11):1589-1593

143 Riew KD, Park JB, Cho YS, Gilula L, Patel A, Lenke LG et al. Nerve root blocks in the treatment of lumbar radicular pain. A minimum five-year follow-up. Journal of Bone and Joint Surgery - American Volume. 2006; 88(8):1722-1725

144 Rischke B, Zimmers KB, Smith E. Viscoelastic Disc Arthroplasty Provides Superior Back and Leg Pain Relief in Patients with Lumbar Disc Degeneration Compared to Anterior Lumbar Interbody Fusion. International Journal of Spine Surgery. 2015; 9:26

145 Rivero-Arias O, Campbell H, Gray A, Fairbank J, Frost H, Wilson-MacDonald J. Surgical stabilisation of the spine compared with a programme of intensive rehabilitation for the management of patients with chronic low back pain: cost utility analysis based on a randomised controlled trial. BMJ. 2005; 330:1239-1243

146 Rogers P, Nash T, Schiller D, Norman J. Epidural steroids for sciatica. Pain Clinic. 1992; 5(2):67-72

147 Rubinstein SM, van TM. A best-evidence review of diagnostic procedures for neck and low-back pain. Best Practice and Research: Clinical Rheumatology. 2008; 22(3):471-482

148 Santavirta N, Bjorvell H, Konttinen YT, Solovieva S, Poussa M. Sense of coherence and outcome of low-back surgery: 5-year follow-up of 80 patients. European Spine Journal. 1996; 5(4):229-235

149 Sasso RC, Kitchel SH, Dawson EG. A Prospective, Randomized Controlled Clinical Trial of Anterior Lumbar Interbody Fusion Using a Titanium Cylindrical Threaded Fusion Device. Spine. 2004; 29(2):113-121

150 Sasso RC, Foulk DM, Hahn M. Prospective, randomized trial of metal-on-metal artificial lumbar disc replacement: initial results for treatment of discogenic pain. Spine. 2008; 33(2):123-131

151 Serrao JM, Marks RL, Morley SJ, Goodchild CS. Intrathecal midazolam for the treatment of chronic mechanical low back pain: a controlled comparison with epidural steroid in a pilot study. Pain. 1992; 48(1):5-12

152 Silverplats K, Lind B, Zoega B, Halldin K, Rutberg L, Gellerstedt M et al. Clinical factors of importance for outcome after lumbar disc herniation surgery: long-term follow-up. European Spine Journal. 2010; 19(9):1459-1467

153 Simmons JW, McMillin JN, Emery SF, Kimmich SJ. Intradiscal steroids. A prospective double-blind clinical trial. Spine. 1992; 17(6 Suppl):S172-S175

154 Skold C, Tropp H, Berg S. Five-year follow-up of total disc replacement compared to fusion: A randomized controlled trial. European Spine Journal. 2013; 22(10):2288-2295

155 Smith AL, Kolt GS, McConville JC. The effect of the Feldenkrais method on pain and anxiety in people experiencing chronic low back pain. New Zealand Journal Physiotherapy. 2001; 29(1):6-14

156 Smith JS, Sidhu G, Bode K, Gendelberg D, Maltenfort M, Ibrahimi D et al. Operative and nonoperative treatment approaches for lumbar degenerative disc disease have similar long-term clinical outcomes among patients with positive discography. World Neurosurgery. 2014; 82(5):872-878

157 Snoek W, Weber H, Jorgensen B. Double blind evaluation of extradural methyl prednisolone for herniated lumbar discs. Acta Orthopaedica Scandinavica. 1977; 48(6):635-641

158 Sonne M, Christensen K, Hansen SE, Jensen EM. Injection of steroids and local anaesthetics as therapy for low-back pain. Scandinavian Journal of Rheumatology. 1985; 14(4):343-345

159 Spijker-Huiges A, Vermeulen K, Winters JC, van WM, van der Meer K. Costs and cost-effectiveness of epidural steroids for acute lumbosacral radicular syndrome in general practice: an economic evaluation alongside a pragmatic randomized control trial. Spine. 2014; 39(24):2007-2012

160 Spijker-Huiges A, Vermeulen K, Winters JC, van Wijhe M, van der Meer K. Epidural steroids for lumbosacral radicular syndrome compared to usual care: quality of life and cost utility in general practice. Archives of Physical Medicine and Rehabilitation. 2015; 96(3):381-387

161 Spijker-Huiges A, Winters JC, van Wijhe M, Groenier K. Steroid injections added to the usual treatment of lumbar radicular syndrome: a pragmatic randomized controlled trial in general practice. BMC Musculoskeletal Disorders. 2014; 15:341

162 Staal JB, de BR, de Vet Henrica CW, Hildebrandt J, Nelemans P. Injection therapy for subacute and chronic low-back pain. Cochrane Database of Systematic Reviews. 2008; Issue 3:CD001824. DOI:10.1002/14651858.CD001824.pub3

163 Straube S, Derry S, Moore RA, Cole P. Cervico-thoracic or lumbar sympathectomy for neuropathic pain and complex regional pain syndrome. Cochrane Database of Systematic Reviews. 2013; Issue 9:CD002918. DOI:10.1002/14651858.CD002918.pub3

164 Tafazal S, Ng L, Chaudhary N, Sell P. Corticosteroids in peri-radicular infiltration for radicular pain: a randomised double blind controlled trial. One year results and subgroup analysis. European Spine Journal. 2009; 18(8):1220-1225

165 Tekin I, Mirzai H, Ok G, Erbuyun K, Vatansever D. A comparison of conventional and pulsed radiofrequency denervation in the treatment of chronic facet joint pain. Clinical Journal of Pain. 2007; 23(6):524-529

166 Tosteson AN, Lurie JD, Tosteson TD, Skinner JS, Herkowitz H, Albert T et al. Surgical treatment of spinal stenosis with and without degenerative spondylolisthesis: cost-effectiveness after 2 years. Annals of Internal Medicine. 2008; 149(12):845-853

167 Tosteson ANA, Skinner JS, Tosteson TD, Lurie JD, Andersson GB, Berven S et al. The cost effectiveness of surgical versus nonoperative treatment for lumbar disc herniation over two years: Evidence from the Spine Patient Outcomes Research Trial (SPORT). Spine. 2008; 33(19):2108-2115

168 Trief PM, Grant W, Fredrickson B. A prospective study of psychological predictors of lumbar surgery outcome. Spine. 2000; 25(20):2616-2621

169 Udeh BL, Costandi S, Dalton JE, Ghosh R, Yousef H, Mekhail N. The 2-year cost-effectiveness of 3 options to treat lumbar spinal stenosis patients. Pain Practice. United States 2014; 15(5):107-116

170 Valat JP, Giraudeau B, Rozenberg S, Goupille P, Bourgeois P, Micheau-Beaugendre V et al. Epidural corticosteroid injections for sciatica: a randomised, double blind, controlled clinical trial. Annals of the Rheumatic Diseases. 2003; 62(7):639-643

171 van den Hout WB, Peul WC, Koes BW, Brand R, Kievit J, Thomeer RT. Prolonged conservative care versus early surgery in patients with sciatica from lumbar disc herniation: cost utility analysis alongside a randomised controlled trial. BMJ. Netherlands 2008; 336(7657):1351-1354

172 van Kleef M, Barendse GA, Kessels A, Voets HM, Weber WE, de Lange S. Randomized trial of radiofrequency lumbar facet denervation for chronic low back pain. Spine. 1999; 24(18):1937-1942

173 van Wijk RMAW, Geurts JWM, Wynne HJ, Hammink E, Buskens E, Lousberg R et al. Radiofrequency denervation of lumbar facet joints in the treatment of chronic low back pain: a randomized, double-blind, sham lesion-controlled trial. Clinical Journal of Pain. 2005; 21(4):335-344

174 Waseem Z, Boulias C, Gordon A, Ismail F, Sheean G, Furlan AD. Botulinum toxin injections for low-back pain and sciatica. Cochrane Database of Systematic Reviews. 2011; Issue 1:CD008257. DOI:10.1002/14651858.CD008257.pub2

175 Weber H. Lumbar disc herniation. A controlled, prospective study with ten years of observation. Spine. 1983; 8(2):131-140

176 Weinstein JN, Lurie JD, Tosteson TD, Skinner JS, Hanscom B, Tosteson AN et al. Surgical vs nonoperative treatment for lumbar disk herniation: the Spine Patient Outcomes Research Trial (SPORT) observational cohort. JAMA. 2006; 296(20):2451-2459

177 Weinstein JN, Tosteson TD, Lurie JD, Tosteson AN, Blood E, Hanscom B et al. Surgical versus nonsurgical therapy for lumbar spinal stenosis. New England Journal of Medicine. 2008; 358(8):794-810

178 Weinstein JN, Tosteson TD, Lurie JD, Tosteson AN, Hanscom B, Skinner JS et al. Surgical vs nonoperative treatment for lumbar disk herniation: the Spine Patient Outcomes Research Trial (SPORT): a randomized trial. JAMA. 2006; 296(20):2441-2450

179 Weinstein JN, Tosteson ANA, Tosteson TD, Lurie JD, Abdu WA, Mirza SK et al. The SPORT value compass: do the extra costs of undergoing spine surgery produce better health benefits? Medical Care. 2014; 52(12):1055-1063

180 Yu Y, Liu W, Song D, Guo Q, Jia L. Diagnosis of discogenic low back pain in patients with probable symptoms but negative discography. Archives of Orthopaedic and Traumatic Surgery. 2012; 132(5):627-632

181 Zahaar El. The value of caudal epidural steroids in the treatment of lumbar neural compression syndromes. Journal of Neurology Orthopedic Medical Surgery. 1991; 12:181-184

30 Acronyms and abbreviations

Acronym or abbreviation	Description
ACT	Acceptance and Commitment Therapy
ADL	Activities of daily living
ALBP	Aberdeen Low Back Pain
ALBPSQ	Acute low back pain screening questionnaire (alternative name for OMPQ)
APTA	American Physical Therapy Association
ATEAM	Alexander technique lessons, technology and massage
AUC	Area under curve
BDI	Beck depression inventory
BPI	Brief Pain Inventory
CFT	Compassion Focused Therapy
CI	Confidence interval
CPG	Clinical Practice Guidelines
CPR	Clinical prediction rule
CTIP	Cognitive treatment of illness perception
CUA	Cost-utility analysis
DRAM	Distress and Risk Assessment Method
EIFEL	French version of the Roland Morris disability questionnaire
EMG	Electromyographic
FABQ	Fear Avoidance Beliefs Questionnaire
FRI	Functional Rating Index
GDG	Guideline Development Group
GHQ	General Health Quality
GPR	Global Posture Re-education
HADS	Hospital Anxiety and Depression Scale
HILT	High Intensity Laser Therapy
HTA	Health Technology Assessment
ICER	Incremental cost-effectiveness ratio
iLSO	Inextensible lumbosacral orthotics
IQR	Interquartile range
LBP	Low back pain
MET	Muscle energy technique
MBR	Multi-disciplinary biopsychosocial rehabilitation
MBSR	Mindfulness-Based Stress Reduction
MCS	Mental Component Score
MID	Minimum important difference
MODI	Modified Oswestry disability index
MPQ	McGill Pain Questionnaire
MVAS	Million Visual Analogue Scale
NICE	National Institute for Health and Care Excellence
NIOSH	National Institute for Occupational Safety and Health
NRS	Numeric pain rating scale

Acronym or abbreviation	Description
NR	Not reported
NRS	Numeric rating scale
NSAID	Non-steroidal anti-inflammatory drug
ODI	Oswestry disability index
OECD	Organisation for Economic Co-operation and Development
ÖMPQ	Örebro musculoskeletal pain questionnaire
OMSQ	Modified Orebro Musculoskeletal Screening Questionnaire
PACE	Paracetamol for Low Back Pain
PCS	Physical Component Score
PDI	Pain disability index
PENS	Percutaneous electrical nerve stimulation
PGIC	Patient's global impression of change
PICO	Population, intervention, comparator, outcome
PT	Physical therapists
QALY	Quality-adjusted life year
QBPDQ	Quebec Back Pain Disability Questionnaire
QOL	Quality of life
RCT	Randomised controlled trial
RMDQ	Roland Morris disability questionnaire
ROC	Receiver operator characteristic
SBT	STarT Back Screening Tool
SFI	Spine functional index
SIP	Sickness impact profile
SR	Systematic review
STAI	State –Trait Anxiety Inventory
TENS	Transcutaneous electrical nerve stimulation
TSK	Tampa scale of kinesiophobia
UC	Usual care
VAS	Visual analogue scale

31 Glossary

The NICE Glossary can be found at www.nice.org.uk/glossary.

31.1 Guideline-specific terms

Term	Definition
Acceptance and commitment therapy (ACT)	An empirically-based psychological intervention that uses acceptance and mindfulness strategies, with commitment and behaviour change strategies, to increase psychological flexibility.
Acupuncture	Acupuncture is a treatment derived from ancient Chinese medicine in which fine needles are inserted at certain sites in the body for therapeutic or preventative purposes
Behavioural therapies	Treatment to help change potentially self-destructing behaviours in people with chronic low back pain.
Cognitive behavioural approaches	Cognitive approaches are aimed at altering unhelpful or inappropriate beliefs as a basis for changing behaviour, such as fear-avoidance.
Disc replacement	Also known as spinal arthroplasty, disc replacement is a surgical procedure to relieve low back pain. It involves replacing invertebral units with artificial discs that can act as a functional prosthetic replacement. The pain relief stems from removal of the painful disc.
Electrotherapies	Umbrella term consisting of TENS, PENS, interferential therapy, LLLT, and therapeutic ultrasound, involving the application of forms of energy to the body with the goal of improving symptoms or recovery of low back pain.
Epidural injections	An injection into the epidural space within the spine, using either corticosteroids or anti-TNF agents for their anti-inflammatory and immunosuppressant properties.
Exercise therapies	A wide variation of physical exercise to prevent or treat low back pain. These can be performed on a one-to-one basis or in a group environment. The guideline covers biomechanical, aerobic, mind-body and mixed modality exercise.
Imaging	Radiographic techniques to produce images of the spinal column to assist clinical decision-making when assessing people with low back pain with or without sciatica. These are defined in the guideline by X-rays, CT scans and MRI scans.
Low back pain	Pain in the back between the bottom of the rib cage and the buttock creases.
Manual therapies	Active or passive movements delivered usually by a GP to the neuromusculoskeletal system focussing on joints and soft tissues to improve mobility and function, and to decrease pain. These are reviewed in the guideline by soft tissue techniques, traction, manipulation or mobilisation and mixed modality manual therapy.
Mindfulness therapy	Therapy to make patient aware of the present moment, and non-judgmentally to the unfolding of experience moment by moment to alter behaviours towards low back pain.
Multidisciplinary biopsychosocial rehabilitation programmes	An intervention that involves a physical component (such as specific exercise modalities, mobilisation, massage) and at least 1 other element from a biopsychosocial approach, that is psychological or social and occupational or educational (defined educational intervention e.g. education on anatomy, psychology, imaging, coping, medication, family, work and social life). The different components of the intervention had to be offered as an integrated programme involving communication between the providers responsible for the different components. These programmes may include various components delivered by 1 individual, or by a number of people, such as the

Term	Definition
	multi-disciplinary aspect applies to the interventions included in the package (across disciplines), not to the number of people / disciplines delivering this.
Multi-modal treatment package	Exercise alongside at least one of self-management, manual therapy or psychological therapy (for example, cognitive behavioural therapy).
Orthotics and appliances	Generic or bespoke insoles, corsets, belts or supports aiming to reduce the impact or provide support to the lower back and pelvic muscles.
Pharmacological interventions	Oral/sublingual, rectal, intra-muscular and transdermal drug treatments to relieve low back pain with or without sciatica. This does not include pharmacological treatment for the management of sciatica alone.
Postural therapies	Postural therapies aim to prevent or reduce low back pain by focusing on the correction of postures that are theorised to be suboptimal and place excessive or damaging loads upon the spine.
Radiofrequency denervation	A minimally invasive and percutaneous procedure performed under local anaesthesia or light intravenous sedation. Radiofrequency energy is delivered along an insulated needle in contact with the target nerves to denature the nerve.
Risk assessment tools	Tools developed to support clinical decision-making. These include: the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMSPQ), the STarT Back Screening Tool and the Distress and Risk Assessment Method (DRAM).
Risk stratification	Risk stratified care strategies were developed in order to avoid a 'one size fits all' approach. There are many different stratifications and it is appreciated that there can be overlap between groups.
Self-management	Programmes to assist people with low back pain and sciatica returning to normal activities. This includes education and advice for staying active.
Spinal decompression	Removal of pressure from the nervous structures within the spinal column. This guideline covers the following procedures: laminectomy, discectomy, facetectomy, foraminotomy, fenestration, spinal decompression, sequestration and laminotomy.
Spinal fusion	Spinal fusion is an operation performed to achieve solid bone union between spinal vertebrae to prevent movement, using either the patient's own bone or artificial bone substitutes.
Spinal injections	Variations of injected agents which aim to either reduce inflammation in tissue or induce inflammation to stimulate healthy tissue regrowth. These include facet joint injections, medial branch blocks, intradiscal therapy and prolotherapy.

31.2 General terms

Term	Definition
Abstract	Summary of a study, which may be published alone or as an introduction to a full scientific paper.
Algorithm (in guidelines)	A flow chart of the clinical decision pathway described in the guideline, where decision points are represented with boxes, linked with arrows.
Allocation concealment	The process used to prevent advance knowledge of group assignment in an RCT. The allocation process should be impervious to any influence by the individual making the allocation, by being administered by someone who is not responsible for recruiting participants.
Applicability	How well the results of a study or NICE evidence review can answer a clinical question or be applied to the population being considered.
Arm (of a clinical study)	Subsection of individuals within a study who receive 1 particular intervention, for example placebo arm.

Term	Definition
Association	Statistical relationship between 2 or more events, characteristics or other variables. The relationship may or may not be causal.
Base case analysis	In an economic evaluation, this is the main analysis based on the most plausible estimate of each input. In contrast, see Sensitivity analysis.
Baseline	The initial set of measurements at the beginning of a study (after run-in period where applicable), with which subsequent results are compared.
Bias	Influences on a study that can make the results look better or worse than they really are. (Bias can even make it look as if a treatment works when it does not.) Bias can occur by chance, deliberately or as a result of systematic errors in the design and execution of a study. It can also occur at different stages in the research process, for example, during the collection, analysis, interpretation, publication or review of research data. For examples see selection bias, performance bias, information bias, confounding factor, and publication bias.
Blinding	A way to prevent researchers, doctors and patients in a clinical trial from knowing which study group each patient is in so they cannot influence the results. The best way to do this is by sorting patients into study groups randomly. The purpose of 'blinding' or 'masking' is to protect against bias. A single-blinded study is one in which patients do not know which study group they are in (for example whether they are taking the experimental drug or a placebo). A double-blinded study is one in which neither patients nor the researchers and doctors know which study group the patients are in. A triple blind study is one in which neither the patients, clinicians or the people carrying out the statistical analysis know which treatment patients received.
Carer (caregiver)	Someone who looks after family, partners or friends in need of help because they are ill, frail or have a disability.
Clinical effectiveness	How well a specific test or treatment works when used in the 'real world' (for example, when used by a doctor with a patient at home), rather than in a carefully controlled clinical trial. Trials that assess clinical effectiveness are sometimes called management trials. Clinical effectiveness is not the same as efficacy.
Clinician	A healthcare professional who provides patient care. For example, a doctor, nurse or physiotherapist.
Cochrane Review	The Cochrane Library consists of a regularly updated collection of evidence-based medicine databases including the Cochrane Database of Systematic Reviews (reviews of randomised controlled trials prepared by the Cochrane Collaboration).
Cohort study	A study with 2 or more groups of people – cohorts – with similar characteristics. One group receives a treatment, is exposed to a risk factor or has a particular symptom and the other group does not. The study follows their progress over time and records what happens. See also observational study.
Comparability	Similarity of the groups in characteristics likely to affect the study results (such as health status or age).
Confidence interval (CI)	There is always some uncertainty in research. This is because a small group of patients is studied to predict the effects of a treatment on the wider population. The confidence interval is a way of expressing how certain we are about the findings from a study, using statistics. It gives a range of results that is likely to include the 'true' value for the population. The CI is usually stated as '95% CI', which means that the range of values has a 95 in a 100 chance of including the 'true' value. For example, a study may state that "based on our sample findings, we are 95% certain that the

Term	Definition
	'true' population blood pressure is not higher than 150 and not lower than 110". In such a case the 95% CI would be 110 to 150. A wide confidence interval indicates a lack of certainty about the true effect of the test or treatment – often because a small group of patients has been studied. A narrow confidence interval indicates a more precise estimate (for example, if a large number of patients have been studied).
Control group	A group of people in a study who do not receive the treatment or test being studied. Instead, they may receive the standard treatment (sometimes called 'usual care') or a dummy treatment (placebo). The results for the control group are compared with those for a group receiving the treatment being tested. The aim is to check for any differences. Ideally, the people in the control group should be as similar as possible to those in the treatment group, to make it as easy as possible to detect any effects due to the treatment.
Cost-consequences analysis (CCA)	Cost-consequences analysis is one of the tools used to carry out an economic evaluation. This compares the costs (such as treatment and hospital care) and the consequences (such as health outcomes) of a test or treatment with a suitable alternative. Unlike cost-benefit analysis or cost-effectiveness analysis, it does not attempt to summarise outcomes in a single measure (like the quality-adjusted life year) or in financial terms. Instead, outcomes are shown in their natural units (some of which may be monetary) and it is left to decision-makers to determine whether, overall, the treatment is worth carrying out.
Cost-effectiveness analysis (CEA)	Cost-effectiveness analysis is one of the tools used to carry out an economic evaluation. The benefits are expressed in non-monetary terms related to health, such as symptom-free days, heart attacks avoided, deaths avoided or life years gained (that is, the number of years by which life is extended as a result of the intervention).
Cost-effectiveness model	An explicit mathematical framework, which is used to represent clinical decision problems and incorporate evidence from a variety of sources in order to estimate the costs and health outcomes.
Cost-utility analysis (CUA)	Cost-utility analysis is one of the tools used to carry out an economic evaluation. The benefits are assessed in terms of both quality and duration of life, and expressed as quality-adjusted life years (QALYs). See also utility.
Discounting	Costs and perhaps benefits incurred today have a higher value than costs and benefits occurring in the future. Discounting health benefits reflects individual preference for benefits to be experienced in the present rather than the future. Discounting costs reflects individual preference for costs to be experienced in the future rather than the present.
Dominance	A health economics term. When comparing tests or treatments, an option that is both less effective and costs more is said to be 'dominated' by the alternative.
Drop-out	A participant who withdraws from a trial before the end.
Economic evaluation	An economic evaluation is used to assess the cost-effectiveness of healthcare interventions (that is, to compare the costs and benefits of a healthcare intervention to assess whether it is worth doing). The aim of an economic evaluation is to maximise the level of benefits – health effects – relative to the resources available. It should be used to inform and support the decision-making process; it is not supposed to replace the judgement of healthcare professionals. There are several types of economic evaluation: cost-benefit analysis, cost-consequences analysis, cost-effectiveness analysis, cost-minimisation analysis and cost-utility analysis. They use similar methods to define and

Term	Definition
	evaluate costs, but differ in the way they estimate the benefits of a particular drug, programme or intervention.
Effect (as in effect measure, treatment effect, estimate of effect, effect size)	A measure that shows the magnitude of the outcome in one group compared with that in a control group. For example, if the absolute risk reduction is shown to be 5% and it is the outcome of interest, the effect size is 5%. The effect size is usually tested, using statistics, to find out how likely it is that the effect is a result of the treatment and has not just happened by chance (that is, to see if it is statistically significant).
Effectiveness	How beneficial a test or treatment is under usual or everyday conditions, compared with doing nothing or opting for another type of care.
Efficacy	How beneficial a test, treatment or public health intervention is under ideal conditions (for example, in a laboratory), compared with doing nothing or opting for another type of care.
EQ-5D (EuroQol 5 dimensions)	A standardised instrument used to measure health-related quality of life. It provides a single index value for health status.
Evidence	Information on which a decision or guidance is based. Evidence is obtained from a range of sources including randomised controlled trials, observational studies, expert opinion (of clinical professionals or patients).
Exclusion criteria (literature review)	Explicit standards used to decide which studies should be excluded from consideration as potential sources of evidence.
Exclusion criteria (clinical study)	Criteria that define who is not eligible to participate in a clinical study.
Extended dominance	If Option A is both more clinically effective than Option B and has a lower cost per unit of effect, when both are compared with a do-nothing alternative then Option A is said to have extended dominance over Option B. Option A is therefore cost-effective and should be preferred, other things remaining equal.
Extrapolation	An assumption that the results of studies of a specific population will also hold true for another population with similar characteristics.
Follow-up	Observation over a period of time of an individual, group or initially defined population whose appropriate characteristics have been assessed in order to observe changes in health status or health-related variables.
Generalisability	The extent to which the results of a study hold true for groups that did not participate in the research. See also external validity.
GRADE, GRADE profile	A system developed by the GRADE Working Group to address the shortcomings of present grading systems in healthcare. The GRADE system uses a common, sensible and transparent approach to grading the quality of evidence. The results of applying the GRADE system to clinical trial data are displayed in a table known as a GRADE profile.
Harms	Adverse effects of an intervention.
Health economics	Study or analysis of the cost of using and distributing healthcare resources.
Health-related quality of life (HRQoL)	A measure of the effects of an illness to see how it affects someone's day-to-day life.
Heterogeneity or Lack of homogeneity	The term is used in meta-analyses and systematic reviews to describe when the results of a test or treatment (or estimates of its effect) differ significantly in different studies. Such differences may occur as a result of differences in the populations studied, the outcome measures used or because of different definitions of the variables involved. It is the opposite of homogeneity.
Imprecision	Results are imprecise when studies include relatively few patients and few

Term	Definition
	events and thus have wide confidence intervals around the estimate of effect.
Inclusion criteria (literature review)	Explicit criteria used to decide which studies should be considered as potential sources of evidence.
Incremental analysis	The analysis of additional costs and additional clinical outcomes with different interventions.
Incremental cost	The extra cost linked to using one test or treatment rather than another. Or the additional cost of doing a test or providing a treatment more frequently.
Incremental cost-effectiveness ratio (ICER)	The difference in the mean costs in the population of interest divided by the differences in the mean outcomes in the population of interest for one treatment compared with another.
Indirectness	The available evidence is different to the review question being addressed, in terms of PICO (population, intervention, comparison and outcome).
Intention-to-treat analysis (ITT)	An assessment of the people taking part in a clinical trial, based on the group they were initially (and randomly) allocated to. This is regardless of whether or not they dropped out, fully complied with the treatment or switched to an alternative treatment. Intention-to-treat analyses are often used to assess clinical effectiveness because they mirror actual practice: that is, not everyone complies with treatment and the treatment people receive may be changed according to how they respond to it.
Intervention	In medical terms this could be a drug treatment, surgical procedure, diagnostic or psychological therapy. Examples of public health interventions could include action to help someone to be physically active or to eat a more healthy diet.
Length of stay	The total number of days a participant stays in hospital.
Licence	See 'Product licence'.
Life years gained	Mean average years of life gained per person as a result of the intervention compared with an alternative intervention.
Likelihood ratio	The likelihood ratio combines information about the sensitivity and specificity. It tells you how much a positive or negative result changes the likelihood that a patient would have the disease. The likelihood ratio of a positive test result (LR+) is sensitivity divided by (1 minus specificity).
Long-term care	Residential care in a home that may include skilled nursing care and help with everyday activities. This includes nursing homes and residential homes.
Loss to follow-up	A patient, or the proportion of patients, actively participating in a clinical trial at the beginning, but whom the researchers were unable to trace or contact by the point of follow-up in the trial
Meta-analysis	A method often used in systematic reviews. Results from several studies of the same test or treatment are combined to estimate the overall effect of the treatment.
Multivariate model	A statistical model for analysis of the relationship between 2 or more predictor (independent) variables and the outcome (dependent) variable.
Observational study	Individuals or groups are observed or certain factors are measured. No attempt is made to affect the outcome. For example, an observational study of a disease or treatment would allow 'nature' or usual medical care to take its course. Changes or differences in one characteristic (for example, whether or not people received a specific treatment or intervention) are studied without intervening. There is a greater risk of selection bias than in experimental studies.

Term	Definition
Odds ratio	Odds are a way to represent how likely it is that something will happen (the probability). An odds ratio compares the probability of something in one group with the probability of the same thing in another. An odds ratio of 1 between 2 groups would show that the probability of the event (for example a person developing a disease, or a treatment working) is the same for both. An odds ratio greater than 1 means the event is more likely in the first group. An odds ratio less than 1 means that the event is less likely in the first group. Sometimes probability can be compared across more than 2 groups – in this case, one of the groups is chosen as the 'reference category', and the odds ratio is calculated for each group compared with the reference category. For example, to compare the risk of dying from lung cancer for non-smokers, occasional smokers and regular smokers, non-smokers could be used as the reference category. Odds ratios would be worked out for occasional smokers compared with non-smokers and for regular smokers compared with non-smokers. See also confidence interval, risk ratio.
Opportunity cost	The loss of other healthcare programmes displaced by investment in or introduction of another intervention. This may be best measured by the health benefits that could have been achieved had the money been spent on the next best alternative healthcare intervention.
Outcome	The impact that a test, treatment, policy, programme or other intervention has on a person, group or population. Outcomes from interventions to improve the public's health could include changes in knowledge and behaviour related to health, societal changes (for example, a reduction in crime rates) and a change in people's health and wellbeing or health status. In clinical terms, outcomes could include the number of patients who fully recover from an illness or the number of hospital admissions, and an improvement or deterioration in someone's health, functional ability, symptoms or situation. Researchers should decide what outcomes to measure before a study begins.
P value	The p value is a statistical measure that indicates whether or not an effect is statistically significant. For example, if a study comparing 2 treatments found that one seems more effective than the other, the p value is the probability of obtaining these results by chance. By convention, if the p value is below 0.05 (that is, there is less than a 5% probability that the results occurred by chance) it is considered that there probably is a real difference between treatments. If the p value is 0.001 or less (less than a 1% probability that the results occurred by chance), the result is seen as highly significant. If the p value shows that there is likely to be a difference between treatments, the confidence interval describes how big the difference in effect might be.
Placebo	A fake (or dummy) treatment given to participants in the control group of a clinical trial. It is indistinguishable from the actual treatment (which is given to participants in the experimental group). The aim is to determine what effect the experimental treatment has had – over and above any placebo effect caused because someone has received (or thinks they have received) care or attention.
Postoperative	Pertaining to the period after patients leave the operating theatre, following surgery.
Power (statistical)	The ability to demonstrate an association when one exists. Power is related to sample size; the larger the sample size, the greater the power and the lower the risk that a possible association could be missed.
Preoperative	The period before surgery commences.

Term	Definition
Primary care	Healthcare delivered outside hospitals. It includes a range of services provided by GPs, nurses, health visitors, midwives and other healthcare professionals and allied health professionals such as dentists, pharmacists and opticians.
Primary outcome	The outcome of greatest importance, usually the one in a study that the power calculation is based on.
Probabilistic analysis	In economic evaluation, this is an analysis that uses a probability distribution for each input. In contrast, see Deterministic analysis.
Product licence	An authorisation from the MHRA to market a medicinal product.
Prognosis	A probable course or outcome of a disease. Prognostic factors are patient or disease characteristics that influence the course. Good prognosis is associated with low rate of undesirable outcomes; poor prognosis is associated with a high rate of undesirable outcomes.
Publication bias	Publication bias occurs when researchers publish the results of studies showing that a treatment works well and don't publish those showing it did not have any effect. If this happens, analysis of the published results will not give an accurate idea of how well the treatment works. This type of bias can be assessed by a funnel plot.
Quality of life	See 'Health-related quality of life'.
Quality-adjusted life year (QALY)	A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health. QALYS are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality of life score (on a scale of 0 to 1). It is often measured in terms of the person's ability to perform the activities of daily life, freedom from pain and mental disturbance.
Randomisation	Assigning participants in a research study to different groups without taking any similarities or differences between them into account. For example, it could involve using a random numbers table or a computer-generated random sequence. It means that each individual (or each group in the case of cluster randomisation) has the same chance of receiving each intervention.
Randomised controlled trial (RCT)	A study in which a number of similar people are randomly assigned to 2 (or more) groups to test a specific drug or treatment. One group (the experimental group) receives the treatment being tested, the other (the comparison or control group) receives an alternative treatment, a dummy treatment (placebo) or no treatment at all. The groups are followed up to see how effective the experimental treatment was. Outcomes are measured at specific times and any difference in response between the groups is assessed statistically. This method is also used to reduce bias.
RCT	See 'Randomised controlled trial'.
Receiver operated characteristic (ROC) curve	A graphical method of assessing the accuracy of a diagnostic test. Sensitivity is plotted against 1 minus specificity. A perfect test will have a positive, vertical linear slope starting at the origin. A good test will be somewhere close to this ideal.
Reference standard	The test that is considered to be the best available method to establish the presence or absence of the outcome – this may not be the one that is routinely used in practice.
Reporting bias	See 'Publication bias'.
Retrospective study	A research study that focuses on the past and present. The study examines past exposure to suspected risk factors for the disease or condition. Unlike

Term	Definition
	prospective studies, it does not cover events that occur after the study group is selected.
Review question	In guideline development, this term refers to the questions about treatment and care that are formulated to guide the development of evidence-based recommendations.
Risk ratio (RR)	The ratio of the risk of disease or death among those exposed to certain conditions compared with the risk for those who are not exposed to the same conditions (for example, the risk of people who smoke getting lung cancer compared with the risk for people who do not smoke). If both groups face the same level of risk, the risk ratio is 1. If the first group had a risk ratio of 2, subjects in that group would be twice as likely to have the event happen. A risk ratio of less than 1 means the outcome is less likely in the first group. The risk ratio is sometimes referred to as relative risk.
Secondary outcome	An outcome used to evaluate additional effects of the intervention deemed a priori as being less important than the primary outcomes.
Selection bias	Selection bias occurs if: a) The characteristics of the people selected for a study differ from the wider population from which they have been drawn, or b) There are differences between groups of participants in a study in terms of how likely they are to get better.
Sensitivity	How well a test detects the thing it is testing for. If a diagnostic test for a disease has high sensitivity, it is likely to pick up all cases of the disease in people who have it (that is, give a 'true positive' result). But if a test is too sensitive it will sometimes also give a positive result in people who don't have the disease (that is, give a 'false positive'). For example, if a test were developed to detect if a woman is 6 months pregnant, a very sensitive test would detect everyone who was 6 months pregnant, but would probably also include those who are 5 and 7 months pregnant. If the same test were more specific (sometimes referred to as having higher specificity), it would detect only those who are 6 months pregnant, and someone who was 5 months pregnant would get a negative result (a 'true negative'). But it would probably also miss some people who were 6 months pregnant (that is, give a 'false negative'). Breast screening is a 'real-life' example. The number of women who are recalled for a second breast screening test is relatively high because the test is very sensitive. If it were made more specific, people who don't have the disease would be less likely to be called back for a second test but more women who have the disease would be missed.
Sensitivity analysis	A means of representing uncertainty in the results of economic evaluations. Uncertainty may arise from missing data, imprecise estimates or methodological controversy. Sensitivity analysis also allows for exploring the generalisability of results to other settings. The analysis is repeated using different assumptions to examine the effect on the results. One-way simple sensitivity analysis (univariate analysis): each parameter is varied individually in order to isolate the consequences of each parameter on the results of the study. Multi-way simple sensitivity analysis (scenario analysis): 2 or more parameters are varied at the same time and the overall effect on the results is evaluated. Threshold sensitivity analysis: the critical value of parameters above or below which the conclusions of the study will change are identified.

Term	Definition
	Probabilistic sensitivity analysis: probability distributions are assigned to the uncertain parameters and are incorporated into evaluation models based on decision analytical techniques (for example, Monte Carlo simulation).
Specificity	The proportion of true negatives that are correctly identified as such. For example in diagnostic testing the specificity is the proportion of non-cases correctly diagnosed as non-cases. See related term 'Sensitivity'. In terms of literature searching a highly specific search is generally narrow and aimed at picking up the key papers in a field and avoiding a wide range of papers.
Stakeholder	An organisation with an interest in a topic that NICE is developing a clinical guideline or piece of public health guidance on. Organisations that register as stakeholders can comment on the draft scope and the draft guidance. Stakeholders may be: • manufacturers of drugs or equipment • national patient and carer organisations • NHS organisations • organisations representing healthcare professionals.
Systematic review	A review in which evidence from scientific studies has been identified, appraised and synthesised in a methodical way according to predetermined criteria. It may include a meta-analysis.
Time horizon	The time span over which costs and health outcomes are considered in a decision analysis or economic evaluation.
Transition probability	In a state transition model (Markov model), this is the probability of moving from one health state to another over a specific period of time.
Univariate	Analysis which separately explores each variable in a data set.
Utility	In health economics, a 'utility' is the measure of the preference or value that an individual or society places upon a particular health state. It is generally a number between 0 (representing death) and 1 (perfect health). The most widely used measure of benefit in cost–utility analysis is the quality-adjusted life year, but other measures include disability-adjusted life years (DALYs) and healthy year equivalents (HYEs).