

Chapter 2

Review of Research Literature on Chiropractic Care

As an adjunct to its survey of chiropractors, the National Board of Chiropractic Examiners (NBCE) conducted a review of the research literature on chiropractic care to provide a complementary source of information on chiropractic practice and empirical evidence of the efficacy of chiropractic care.

Efficacy of Chiropractic Care

As reported in detail later in this text, a 2003 survey of chiropractors by the NBCE establishes that chiropractic patients' chief complaints include the following:

Most Common Reasons People Seek Chiropractic Care

- Low-back/pelvis pain: 23.6%
- Neck pain: 18.7%
- Headache or facial pain: 12.0%
- Mid-back pain: 11.5%
- Lower extremity pain: 8.8%
- Upper extremity pain: 8.3%
- Wellness care: 8.0%

The literature review, as shown below, demonstrates that chiropractors provide effective, readily available treatment that is caring and sympathetic, low cost, low risk, and non-invasive (Haldeman 2001).

A very recent study conducted by a medical doctor and a chiropractic physician has confirmed that chiropractors appropriately serve as primary care providers. In their article published in the *Journal of Manipulative and Physiological Therapeutics* (June 27, 2004), Richard Sarnat, M.D., and James Winterstein, D.C., reported their analysis of a managed care network in which doctors of chiropractic — as primary care physicians (PCPs) — were integrated with allopathic physicians. The study took place from January 1, 1999, through December 31, 2002, in an integrative medicine organization (IPA) contracted with an accredited health maintenance organization (HMO) in Chicago. The results showed that doctors of chiropractic as PCPs provided care at substantially reduced costs for patients when compared to care given by medical doctors and osteopaths.

Over the four-year period, compared to patients who saw medical PCPs, those who saw chiropractic PCPs demonstrated the following results:

- A 43.0% decrease in hospital admissions;
- A 58.4% decrease in hospital days;
- A 43.2% decrease in outpatient surgeries and other procedures;
- A 51.8% decrease in pharmaceutical costs; and
- A higher rating in patient satisfaction.

The authors state that the results of their study show "...a nonpharmaceutical/nonsurgical orientation can reduce overall health care costs significantly and yet deliver high-quality care. These results have been achieved not by decreasing or denying access to care but, rather, by increasing the frequency of PCP prevention-oriented encounters."

In the past 10 years or so, the research into the effectiveness of chiropractic treatments has grown exponentially. While only one chiropractic peer-reviewed scientific journal (*Journal of Manipulative and Physiological Therapeutics*) existed 17 years ago, now more than 10 such journals exist in North America alone (McClelland 2000). Numerous articles point to the growing number of randomized controlled trials of spinal manipulative therapy (SMT) and other interventions, many of which have demonstrated SMT's vital role in treating back, neck, and head pain (McClelland 2000; Meeker and Haldeman 2002; Rosner 2001). Randomized controlled trials (RCTs) are those in which patients selected for a study are randomly assigned to particular treatment groups or to a control (placebo) group by a "draw a name out of a hat" type of process in order to decrease the study's bias. Also, many such studies include "blinded" participants. This concept requires that either the study's patients or health care practitioners (or both) do not know to which group they have been randomly assigned or which treatment protocol they are receiving, again in the attempt to decrease the study's potential bias. With the growing use of RCTs, chiropractors may reasonably conclude that their profession has made significant strides in conducting and publishing research that documents chiropractic efficacy.

Articles concerning the efficacy of spinal manipulation now appear in such prestigious medical journals as *The Journal of the American Medical Association* (JAMA), *The New England Journal of Medicine*, *Spine*, and *Annals of Internal Medicine*. In addition, Meeker cites a 1998 survey, published in JAMA, which indicates of 117 medical schools responding, 64% offer some form of complementary and alternative medicine¹ (CAM) instruction, including some that require such course work. This growing acceptance of CAM including chiropractic has recently led to increased research funding. The National Center for Complementary and Alternative Medicine

¹ It should be noted that since chiropractic represents the third largest primary health care profession, surpassed in numbers only by medical doctors and dentists, chiropractic practitioners and those served by the profession do not generally apply the terms alternative, complementary, or unconventional to describe chiropractic care. Where the terms appear in this chapter, they are by a particular author's choice.

(NCCAM) has increased its budget for chiropractic and other CAM research from \$77.8 million in 2000 to an estimated \$121 million in 2005 (NIH Web site), added new “centers of excellence,” developed career training programs, plus other initiatives because of the growing evidence for chiropractic effectiveness and the importance placed upon such research by the U.S. Congress (Meeker 2000).

Chiropractic and the Treatment of Back Pain

Palmieri and Smoyak (2002) cite studies by Hart, Deyo, and Cherkin who note that low-back pain affects 60% to 80% of the U.S. population with an estimated cost of between \$20 and \$50 billion each year. Many studies over the years have noted that back pain often has an unknown etiology and recurrent nature that confounds many health care providers.

In 2003, Wolsko et al. published a nationally representative telephone survey conducted between November 1997 and February 1998, contacting 2,055 respondents, 33% of whom reported back pain, neck pain, or combinations of both within the previous year. Those reporting pain also said that their treatment options commonly included complementary therapies, most notable of which (20%) was chiropractic care. In fact, Hurwitz and Morgenstern note that nearly one-third more back pain patients seek treatment from chiropractors than they do medical doctors (cited in Hertzman-Miller et al. 2002), and two-thirds of such patients rated chiropractic “very helpful” for their back pain problems while only one-fourth gave conventional medical care the same rating.

Studies of spinal manipulative therapy (SMT) demonstrate the efficacy of SMT for back pain. It is important to note that all the studies find real benefits in SMT and none of the studies thus far indicate that SMT is of *lesser* efficacy than other treatments, including commonly accepted drug treatments and physical therapy.

Recent Back Pain Studies

1998 Back Pain Studies

Skargren, Carlsson and Oberg conducted a randomized trial of 323 patients (18 to 60 years of age) with low-back pain, one group treated with SMT and the other with physiotherapy. The study was conducted within primary care, since most patients of this type in Sweden access treatment from a general practitioner, and all of the participants had already done so. A 12-month follow-up noted that both groups responded positively to therapy in terms of pain frequency, use of painkillers, and well-being. The authors concluded that “...chiropractic did not add a considerable difference in the treatment of patients with back pain” (p. 1881), but also reported that the subgroup of patients with acute, uncomplicated problems gained more from chiropractic care than from physiotherapy at a similar cost. Thus, treatment options should consider subgroups within the back pain population.

Shekelle et al. conducted a study of 131 chiropractic offices in the United States and Canada, reviewing 10 medical records each for 1,310 patients with low-back

pain. The purpose of the study was to determine if chiropractors made appropriate decisions in the use of spinal manipulation for low-back pain. "Appropriate" was defined as "an indication for which the expected health benefits exceeded the expected health risks by a sufficiently wide margin that spinal manipulation was worth doing" (p. 10). The study found that nearly half of the cases were treated for indications meeting the appropriateness criteria, one-fourth of the cases were judged uncertain, and more than one-fourth (29%) of cases were treated with inappropriate indications. The authors concluded that this ratio is similar to the appropriateness rates for many medical and surgical procedures after initial evaluations. The authors stated that "...for patients with appropriate indications, internists [who often see back pain patients concurrently with chiropractors] should offer spinal manipulation as a therapeutic option of accepted efficacy; in many settings, referral to a chiropractor is the most practical way of achieving this" (p. 16).

1999 Back Pain Studies

In a study published in *The New England Journal of Medicine*, Andersson et al. compared osteopathic spinal manipulation with standard medical care for low-back pain patients. The 155 patients randomly assigned to the two treatment groups completed the 12-week study. The manipulation techniques used for the manipulation group included thrust, muscle energy, counterstrain, articulation (sic), and myofascial release. The standard care group primarily received anti-inflammatory medication including ibuprofen, naproxen, and piroxicam, and may have received analgesics such as aspirin, acetaminophen, codeine, or oxycodone. The comparison showed that patients in both groups improved over the 12 weeks, with no statistical difference in outcome. However, the spinal manipulation group needed significantly less medication for pain. And since nonsteroidal anti-inflammatory drug therapy has known and potentially serious harmful effects, "...the achievement of equal outcomes in regard to pain relief, function, and satisfaction, with less use of medication and physical therapy, suggests an important benefit of ... manipulative treatment..." (p. 1431).

Also in 1999, Giles and Muller published the results of a clinical pilot trial comparing acupuncture, a nonsteroidal anti-inflammatory drug, and spinal manipulation for the treatment of chronic spinal pain. Conducted in Australia, the study included 77 patients who were all over 18 and who had suffered from spinal pain for at least 13 weeks. These patients were randomized into three groups and given six 20-minute treatments over a four-week period. The entire study group experienced a 3.5% median decrease on the Oswestry Index, with the spinal manipulation group showing a median decrease of 8.5%. Visual Analogue Scale (VAS) results also showed that pain intensity was reduced significantly only in the spinal manipulation group (lower back, -50%; upper back, -46%; and neck, -33.3%). Furthermore, some patients, due to inefficacy or side effects, chose to switch treatment groups; the spinal manipulation group saw only a 22.2% change while 60% of the acupuncture group and 62% of the medication group elected to change. The authors concluded that the

manipulation group displayed the most significant improvements and that spinal manipulation “has an important role to play in the treatment of spinal pain syndromes” (p. 380).

A study by West et al., published in the *Journal of Manipulative and Physiological Therapeutics*, evaluated the effects of manipulation under anesthesia (MUA). A total of 168 patients completed the program. These patients were selected based on certain criteria: if manipulation seemed a viable option, but their pain threshold prohibited conscious manipulation; if they required greater mobility for efficacy; if MUA might serve as an alternative to disc surgery; if mitigating factors prohibited completion of conservative manipulation; or if MUA might provide an additional therapeutic benefit to conservative spinal injection. The researchers used midazolam as a mild sedative and amnesic agent and then provided each patient with three serial MUA’s consisting of stretching, passive ranges of motion, and short-lever arm adjustive techniques. A number of other interventions, including at-home exercises, were also used at various points during therapy. Group averages showed range of motion improvements of 47% in the cervical spine and 83.3% in the lumbar spine. VAS (Visual Analogue Scale) ratings improved 62.2% for cervical patients and 60.1% for lumbar patients. Interestingly as well, for those patients out of work before therapy, 64.1% were able to return to unrestricted activities after six months, and 68.6% had a nearly complete reversal of symptoms.

2000 Back Pain Studies

As reported in the *Journal of Manipulative and Physiological Therapeutics*, McMorland and Suter conducted a study that, while not a randomized clinical trial (RCT), did represent practice in a typical chiropractor’s office. The authors reviewed the records of 119 patients with uncomplicated neck or low-back pain. Fifty-eight patients with low-back pain and 61 with neck pain (18 of whom reported concomitant headaches as well) averaged, over four weeks, 12 treatments of spinal manipulation, soft-tissue techniques, home-care instructions, and return-to-activity advice. The patients had significant reductions in pain and disability. The lower back pain group experienced a 52.5% reduction in pain and a 52.9% reduction in disability; the neck pain group experienced a 53.8% reduction in pain and a 48.4% reduction in disability. However, the chronic low-back pain group realized far less reduction in pain and disability, 19.7% and 19.8% respectively. The authors concluded that under chiropractic care, those with mechanical neck pain and low-back pain show significant improvement.

In a study conducted in the Portland, Oregon, area, Nyiando, Haas, and Goodwin evaluated the one-month outcomes for patients with chronic low-back pain when treated either with spinal manipulation or anti-inflammatory drugs. The study’s participants included 33 medical physicians and 45 chiropractors who treated 45 medical patients (averaging one visit) and 93 chiropractic patients (averaging four visits) respectively. The results at the one-month follow-up were more favorable for the chiropractic patients who showed a five times greater improvement than that of

the medical patients on the VAS (Visual Analogue Scale); the chiropractic patients likewise reported greater reduction in pain. The medical patients, on the other hand, regressed from 26% to 29% on the MPQ (McGill Pain Questionnaire), and nearly one-third of them reported an increase in pain at the same follow-up. In addition, 90% of chiropractic patients reported satisfaction with their care while only 52% of medical patients reported the same. The greater satisfaction expressed by chiropractic patients is consistent with other studies that suggest such satisfaction results from 1) the amount of information given them, 2) the provider's concern for their health, and 3) their provider's level of comfort and confidence in dealing with low-back pain.

2001 Back Pain Studies

Adjunct to the 2000 study described above, Nyiendo, Haas, Goldberg, and Lloyd explored the psychosocial aspects of a clinical encounter for patients with chronic low-back pain and pain below the knee. The authors wanted to describe traditional physicians' practices and compare them to those of chiropractors and patients' self-management attitudes to determine if these had an effect on pain and disability outcomes over a year's time for this patient cohort. Since chiropractors have traditionally spent greater time and effort enhancing patients' self-efficacy, this study determined that such a factor may have increased the satisfaction and health results of those low-back pain patients under chiropractic care when compared to the results of patients under traditional medical care. Because the patients in the chiropractic cohort experienced better outcomes, the authors concluded that the chiropractic encounter may indeed have increased patients' self-help motivation. In fact, since chiropractors more often educate their patients about how to self-treat their back pain, the proportion of patients who related a high level of self-efficacy motivation was 61% higher in chiropractic patients than in medical patients after one year. Chiropractic patients "...reported greater confidence in themselves with respect to dealing with the low-back problem on a number of levels: controlling the problem to enable enjoyment of life, decision-making regarding treatment, and dealing with the frustration of low-back pain" (p. 548). The chiropractor's personal attention helped patients to reduce pain and increase their abilities to cope with their pain over time. Such knowledge may prove useful to medical physicians, as the influence of psychosocial factors becomes better understood in the future.

2002 Back Pain Studies

Corroborating the psychosocial implications of the Nyiendo et al. study previously reported, Hertzman-Miller et al. compared the treatment satisfaction of low-back pain patients treated by chiropractic or traditional medicine. The study sought to answer three questions: 1) whether chiropractic or traditional medical patients are more satisfied with their back pain treatment, 2) whether chiropractors offer more advice and information to their patients than do medical doctors, and 3) whether any noted differences contribute to greater patient satisfaction with treatment. The authors drew a number of conclusions. In this assessment, chiropractic patients were more satisfied with their providers after four weeks of treatment than were patients

treated by medical doctors. It seems likely that patients who receive advice and information about their low-back condition and its treatment have increased satisfaction with their care – and chiropractors often offer more advice and information than do medical doctors. In addition, “[t]he hands-on nature of chiropractic treatment may also lead to a greater perception of efficacy and thus to greater satisfaction than medical treatment” (p. 1631). The authors claim that “[g]iving self-care advice and explaining treatment plans may be part of a helpful or reassuring communication style. Providers who communicate in this way may also demonstrate more concern for their patients as individuals or encourage patients to take a more active role in their own care – characteristics often attributed to chiropractors” (p. 1633).

Palmieri and Smoyak examined the effects of delivering manipulation under anesthesia (MUA) in their article published in the October 2002 *Journal of Manipulative and Physiological Therapeutics*. The number of patients studied was relatively small (87), and patients were selected for convenience from those of two chiropractors who perform MUA in their practices. The patients in the MUA group reported better outcomes than the non-MUA group (an average decrease of 50% on the Numeric Pain Scale and an average of 51% decrease on Roland-Morris Questionnaire scores). However, the small number of patients and potential bias in their selection may preclude any extrapolation of their outcomes to broader populations of patients. Nonetheless, the authors believe larger scale studies of MUA are warranted and that such larger studies may provide positive clinical recommendations for MUA.

2003 Back Pain Studies

In 2003, Giles and Muller (see above) conducted another randomized controlled trial (published in *Spine*) to assess the effectiveness of spinal manipulation, medication, and acupuncture for the treatment of chronic spinal pain. Patients receiving chiropractic care improved significantly, and the results were impressive:

- 50% improvement on the Oswestry Back Pain Disability Index
- 38% improvement on the Neck Disability Index
- 47% improvement on the Short-Form-36 Health Survey Questionnaire
- 50% improvement on the Visual Analogue Scale for back pain
- 38% improvement in lumbar standing flexion
- 20% improvement in lumbar sitting flexion
- 25% improvement in cervical sitting flexion
- 18% improvement in cervical sitting extension

Perhaps the key finding in this study is that for chronic spinal pain, it appears spinal manipulation affords the greatest short-term results. Significantly, the spinal manipulation group had the longest pre-treatment duration of pain (8.3 years average vs. 6.4 years and 4.5 years for the medication and acupuncture groups respectively); however, 27% of chiropractic patients recovered in a nine-week period or less. Overall results from the study show that 47% of chiropractic patients

improved while only 18% and 15% improved in the drug therapy group and acupuncture group respectively.

Also published in *Spine*, Aure et al. conducted a study to compare the effects of manual therapy to those of exercise therapy in the treatment of chronic low-back pain. Forty-nine patients were randomly assigned to the two groups, provided 16 treatments each over two months, and completed a follow-up at four weeks, six months, and one year. The patients were both men and women who had missed work for between eight weeks and six months due to low-back pain. Each group was given six home exercises and encouraged to exercise (walk, run etc.) three times per week. Mean reduction in pain from pre-test to post-test in the manual therapy group was twice that of the exercise group. The manual therapy group showed more favorable results, both short-term and long-term, in pain, disability, general health, spinal range of motion, and return to work. In fact, after the two-month treatment, 67% of the manual therapy group had returned to work, while only 27% of the exercise therapy group had done so.

Ferreira et al. conducted a meta-analysis to examine the efficacy of spinal manipulation for patients experiencing low-back pain for less than three months' time. The results were published in the November/December issue of the *Journal of Manipulative and Physiological Therapeutics*. The authors analyzed 34 papers (27 trials) that examined SMT's comparative effectiveness to other types of therapies for low-back pain. They concluded that SMT, exercise, physiotherapy, and medical care seem to produce similar outcomes in the first four weeks of treatment. In general, however, SMT is more effective for the relief of low-back pain than is placebo therapy, massage, short wave therapy, or no treatment.

Published in *Spine*, a study by Niemisto et al. compared the effectiveness of the combination of manipulation, stabilizing exercises, and physician consultation with physician consultation alone for chronic low-back pain. Two hundred four patients with chronic low-back pain (Oswestry Disability Index at least 16%) were randomly assigned to either the manipulative-treatment group (who received four sessions of manipulation and stabilizing exercises) or the consultation group. At the five-month and 12-month follow-ups, the manipulation group demonstrated significant reductions in pain and disability. The authors concluded that manipulative therapy was superior to consultation alone and showed that short, specific treatments may change the course of chronic low-back pain.

In their study published in the *Journal of Manipulative and Physiological Therapeutics*, Hayden, Mior, and Verhoef examined the effects of chiropractic care for pediatric patients. This group of low-back pain sufferers ranged from 4 to 18 years old, with an average age of 13.1. The patients' pain was generally attributed to some traumatic event, most commonly sports related; most of the patients received spinal manipulative therapy. After seven days of treatment, 40% of patients reported their symptoms were "much improved," and this increased to 82% at 30 days and 87% at 45 days. While the study was limited by its size (records from 15 chiropractors and 54

patients), the study did suggest that younger patients respond favorably to chiropractic treatment for low-back pain. The authors called for future studies to compare chiropractic care to the natural course of improvement often seen in pediatric patients.

In a presentation given at the World Federation of Chiropractic 7th Biennial Congress, Haas summarized a study comparing the effectiveness of chiropractic care and standard medical care for low-back pain patients. The 2,870 patients were recruited from 60 chiropractors and 111 general medical practitioners. Patients' low-back pain was measured using a 100-point Visual Analogue Scale (VAS) and their functional disability measured using the Revised Oswestry Disability Questionnaire. Measurements were conducted at the baseline and eight times thereafter.

The most improvement from both types of treatment was observed at three months to one year. However, chiropractic patients with chronic back pain showed a clinically important advantage in the short-term, with both acute and chronic patients having greater relief for up to one year. Haas also reported, "The advantage for DC care was prominent for chronic patients with leg pain below the knee..." (p. 253).

In their study, Descarreaux et al. examined whether or not preventive chiropractic care (after an initial series of treatment) would reduce recurring back pain. Thirty patients with chronic non-specific low-back pain were randomly assigned to two groups. Each group received lumbar and pelvic manipulations, but only one group had additional manipulation (once every three weeks) after the initial 12 treatments. The study found that the initial treatments produced significant reductions in pain and disability for both groups; however, disability scores were significantly lower for the group who continued care. Pain levels for both groups remained similar to that measured after the initial 12 treatments. The Descarreaux et al. study demonstrated "the positive effects of preventive chiropractic treatments in maintaining functional capacities after an acute phase of treatment" (p. 248).

Citing a dearth of studies on thoracic spinal pain, Schiller examined the clinical effects of spinal manipulation for thoracic pain patients (published in the *Journal of Manipulative and Physiological Therapeutics*). Schiller randomized 30 patients, 16 to 60 years old, into two groups. Fifteen patients received thoracic spinal manipulation, while the other 15 (the placebo group) received nonfunctional ultrasound applications. Both groups had six treatments over two to three weeks and participated in a one-month follow-up. After the final treatment, the spinal manipulation group had positive results, showing statistically significant pain relief and increases in both right and left lateral flexion. However, at the one-month follow-up, no statistically significant difference between the two groups was noted.

Most chiropractic treatment occurs within a primary care setting, so Wilkey et al. designed a study to determine the effectiveness of chiropractic treatment in a secondary care setting (within a hospital pain clinic). Thirty patients were randomly assigned either to pain clinic treatment (the control group) or to chiropractic care (the experimental group). All treatments took place within the hospital for eight weeks,

for a maximum of 16 sessions. Outcomes were measured every two weeks during treatment, and then at one, three, and six months.

Patients with higher initial pain and disability showed less improvement in both groups. The mean pain and disability scores for the pain clinic cohort remained the same throughout treatment. The chiropractic cohort showed improvement in both pain and disability after treatment. The authors conclude that “Initial indications suggest that chiropractic treatment may bestow some benefit at least comparable to NHS [National Health Service, Wales] Pain Clinic protocols” (p. 373).

2004 Back Pain Studies

A study by Haas, Goldberg, Aickin et al., published in the *Journal of Manipulative and Physiological Therapeutics*, studied the effectiveness of chiropractic care versus traditional medical care for patients with acute and chronic low-back pain (LBP). This article more thoroughly presents findings from the authors’ 2003 report cited earlier in this text. In all, 2,870 patients from medical doctors and chiropractors at more than 60 clinics were studied over a two-year period. Some patients enrolled during the first year of the study and received either chiropractic treatment (including spinal manipulation, physical therapy, exercises, and self-care education) or medical care (including prescription drugs, exercises, and self-care advice). The other two groups enrolled during the second year and received similar treatments.

All four groups demonstrated improvements in disability and pain reduction, mostly at the three-month follow-up and up to 12 months following treatment. However, clinically significant differences in pain levels were noted for those patients receiving chiropractic care when compared to those receiving medical care. The average VAS (Visual Analogue Scale) scores were 12.2 points lower in chronic LBP chiropractic patients at the one-month follow-up and 10.5 points lower at the three-month follow-up. Such differences were even greater for patients experiencing concurrent leg pain. The researchers concluded that chiropractic care demonstrated a distinct advantage over medical care for chronic patients (particularly those with leg pain below the knee) in the first year of treatment.

Chiropractic and the Treatment of Neck Pain

Neck pain continues to be one of the most prevalent and costly health problems in the United States. Hurwitz, Morgenstern, Harber et al. (2002) cite studies that claim 50% to 70% of U.S. residents experience neck pain at least once in their lives, with as many as one-third affected each year. Bronfort, Evans, and Nelson et al. (2001) cite studies reporting a slightly lower percentage of those suffering from neck pain at any one time (10% to 20%), but such notable patient need reveals why neck pain ranks second only to back pain as the most common reason patients seek chiropractic care (Hurwitz and Haldeman 2002; Christensen and Kollasch 2005). Gore (1999) reports that at least one-third of those suffering from neck pain may experience on-going treatment costs, individual suffering, lost work time, and even long-term disabilities. Under such circumstances, the effectiveness of chiropractic care for neck pain

continues to gain acceptance and recognition from patients, the medical community, and the general public.

Chiropractors and other health care providers have long found the physiological causes of neck pain difficult to ascertain, yet many recent studies suggest that adjustments and mobilization by chiropractors provide some of the most viable treatments available. Hurwitz and Haldeman (2002) summarize the findings of such studies:

Manipulation, mobilization, or physiotherapy are all probably more effective than muscle relaxants or usual medical care in producing short-term pain relief among some patients with subacute or chronic neck pain, and manipulation is probably slightly more effective than mobilization or physical therapy (p. 188).

A 1997 literature review by Shekelle and Coulter examined the efficacy of spinal manipulation for neck pain and headache. They, along with a multidisciplinary expert panel, agreed that the evidence demonstrated that “cervical spine manipulation is an appropriate therapy for selected patients with neck pain...” (cited in Licht, Christensen, and Hoilund-Carlsen, p. 51). The issue, at this point in chiropractic history, is not that manipulation (SMT), mobilization (MOB), or combinations of the two treat neck pain more effectively, but that both procedures – common to chiropractic intervention – work well. In their review of studies published since 1997, Bronfort, Haas et al. (2003) conclude that “recommendations can be made with some confidence regarding the use of SMT and/or MOB as a viable option for the treatment of neck pain” (p. 26). Of course, an individual chiropractor’s preferences and training influence which procedure that chiropractor may select, including a decision to employ multi-modal techniques. Meeker and Haldeman (2002) also point out that many chiropractors suggest rehabilitative exercises and other therapies for many of their patients.

A number of studies (see Hurwitz, Morgenstern, Harber et al.; Korthals-de Bos et al.; Hurwitz, Morgenstern, Vassilski, Chang, below) promote mobilizing rather than manipulating patients for neck pain. Other studies (see Bronfort, Evans, Nelson et al.; Gross, Kay, Hondras et al., also below) concluded that multi-modal treatments (those combining manipulation with exercise or other therapies) prove more effective in alleviating neck pain.

Although Hoving, Gross, et al. (2001) note a lack of methodological consistency among recent studies, this chapter’s summaries of studies demonstrate the relative efficacy of manipulation and other chiropractic therapies for neck pain. Significantly, those comparing one therapy to others do not conclude that spinal adjustments are of lesser efficacy for the treatment of neck pain. In fact, Haldeman (2003) states that “...the use of spinal manipulation as a method of reducing symptoms and increasing neck mobility is being accepted by most of the independent reviewers although not without some reservations and caveats. There does not appear to be any treatment approach with greater evidence for its use than manipulation” (p. 84).

Recent Neck Pain Studies

1998 Neck Pain Studies

A Danish study by Jordan et al. (published in *Spine*) included 119 patients (88 female, 31 male) who had experienced neck pain for greater than three-months' duration. The authors randomly assigned the patients to three groups: 1) those who received intensive training of the neck and shoulder muscles (stretching of the cervical, shoulder, chest and scapular muscles; and the use of a neck-training apparatus), 2) those who received physiotherapy (hot packs, massage, ultrasound, and passive mobilization), and 3) those who received spinal manipulation. Each study participant received instruction concerning the likely causes of neck pain, neck/shoulder anatomy, and ergonomic principles. Patients were assessed at the end of the six-week study and again (with postal questionnaires) at 4 and 12 months.

The results of this study were somewhat inconclusive. Patients in all three groups reported considerable pain reduction (approximately 50%) and remained statistically similar at the 4- and 12-month follow-ups. Additionally, medication use decreased in all three groups. Because no control group was used, the authors could not determine if the reductions in neck pain occurred due to particular interventions – or were simply a result of time – and so concluded that among the three treatments, no clinical differences were evident.

1999 Neck Pain Studies

West et al. studied the effectiveness of manipulation under anesthesia (MUA) for neck pain (and other spinal pain) in their study published in the *Journal of Manipulative and Physiological Therapeutics*. The study included 177 patients (168 completed the study), ranging in age from 17 to 65 years, who reported various types of spinal discomfort, including cervical. The patients underwent three manipulations under sedation, followed by four to six weeks of spinal manipulation and other therapies. Results were positive for the overall group of back pain patients, with most out-of-work patients returning to work six months after MUA. There was a 58.4% reduction in the number of patients requiring prescription pain medication, with 24% requiring no medication at all at six months following MUA. Most importantly to neck pain sufferers, the average VAS (Visual Analog Scale) ratings improved by 62.2% in those participants receiving MUA for cervical pain.

2001 Neck Pain Studies

Bronfort, Evans, and Nelson et al. published a study in *Spine* entitled "A Randomized Clinical Trial of Exercise and Spinal Manipulation for Patients with Chronic Neck Pain." The study included 191 patients – each having had mechanical neck pain for 12 weeks or more – who received 20 sessions of therapy each over 11 weeks, with follow-ups at 3, 6, and 12 months. The patients were randomly assigned to a spinal manipulation with rehabilitative exercise group, a MedX (high-tech rehabilitative equipment) exercise group without spinal manipulation, or a spinal manipulation alone group. After the 11-week treatment, the spinal manipulation

with exercise cohort demonstrated greater gains in strength, endurance, and range of motion than did the spinal manipulation alone group. Also, the MedX group showed greater gains in extension, strength, and flexion-extension range of motion than did the spinal manipulation alone group. These differences continued during the follow-up year.

During treatment, all three groups reported substantial improvements, though the authors noted no clinically important differences among the groups, with the exception that the spinal manipulation combined with exercise patients reported greater satisfaction with their treatment. The authors concluded that overall, strengthening exercises or those performed on MedX machines – when combined with spinal manipulation – provide more benefit for chronic neck pain than does spinal manipulation alone. (See the follow-up study later in this text.)

In their article published in the *Journal of Manipulative and Physiological Therapeutics*, Whittingham and Nilsson reported on spinal manipulation's effectiveness for cervical range of motion. This randomized controlled trial, conducted in Melbourne, Australia, involved 105 patients who reported four or more days of headache per month for more than six months. These patients experienced headaches provoked by neck movements or positions, experienced decreased cervical range of motion, and had a history of head or neck trauma. Whittingham and Nilsson conducted their study in four phases (three weeks each), using two randomly assigned groups. Phase 1 was a three-week baseline observation period for both groups. During Phase 2, Group 1 was given sham manipulation three times per week, while Group 2 was given manipulation (toggle recoil) at the same frequency. In Phase 3, Group 1 received manipulation and Group 2 had no treatment. The authors concluded their study with Phase 4 in which Group 1 received no treatment, and Group 2 received sham manipulation. The authors reported "a consistent and statistically significant increase in active range of motion in the cervical spine after manipulation."

2002 Neck Pain Studies

Hurwitz, Morgenstern, and Harber et al. compared the effectiveness of manipulation to that of mobilization for neck pain. The 336 patients recruited for the trial were HMO members, had sought previous care for neck pain, had experienced recent neck pain but had not received treatment in the past month, and were 18 to 70 years old. All patients were instructed about posture, stretching, flexibility, strengthening exercises, ergonomics, and workplace modifications. The patients were then randomly assigned to four groups: 1) manipulation with and without heat, 2) manipulation with and without electrical muscle stimulation (EMS), 3) mobilization with and without heat; and 4) mobilization with and without EMS. The study lasted six months, with assessments at two and six weeks, and three and six months.

The manipulation groups received at least one controlled dynamic thrust, while the other groups received one or more low velocity, variable amplitude mobilization techniques. Patients in the heat groups received 10-minute applications of heat before

manipulation or mobilization. More than 50% of the study's participants showed pain reduction of two or more scale points (on an 11-point scale) at six weeks, and 65% showed similar reductions at six months. The authors reported that clinical improvements for both manipulation and mobilization groups were similar, though short-term (two weeks) clinically significant reductions in pain were 60% more likely in the heat treatment groups. The authors concluded that their results

suggest that cervical spine mobilization is as effective as manipulation in reducing neck pain and related disability... [and][g]iven the comparable outcomes and the risk of serious complications resulting from cervical spine manipulation, chiropractors may obtain equally effective results with less risk of adverse effects by treating neck-pain patients with mobilization rather than manipulation. However, manipulation may be more effective than mobilization for specific clinical indications (p. 1640).

In a systematic review of 20 selected randomized controlled trials (RCTs), Gross et al. wanted to determine if manual therapy improved the pain, function, and patient satisfaction in patients suffering from neck disorders (with or without radicular findings or headache). The RCTs examined manipulation alone, mobilization alone, manipulation and mobilization, and treatments that included massage. The authors concluded that all of the examined interventions showed similar outcomes when compared to a placebo, a waiting period, or a controlled therapy. Their review does suggest, however, that to be most beneficial, manual therapies should be conducted with exercise to improve pain and patient satisfaction. Using manipulation or mobilization alone appears less effective.

Spine published a study by Evans, Bronfort, and Nelson et al. which was a two-year follow-up of their randomized clinical trial first published in 2001. The authors again compared the effectiveness of spinal manipulation with low-tech rehabilitative exercise to high-tech MedX rehabilitative exercise and to spinal manipulation alone for chronic neck pain. Over the two-year period, 178 randomly assigned patients completed the initial therapy trial, with 145 providing all the necessary data for the follow-up. As in their previous trial, the authors reported that patients experienced better results in the spinal manipulation with exercise group and in the MedX group over those results from the spinal manipulation alone group. The authors again suggested that "supervised rehabilitative exercise should be considered for chronic neck pain patients" (p. 2388), especially if future cost-effectiveness studies prove positive.

Published in the *Annals of Internal Medicine*, a study by Hoving et al. compared the effectiveness of manual therapy, physical therapy, and continued care by a general practitioner for neck pain patients. In this study lasting six weeks, 183 patients were selected who were between 18 and 70 years old, experienced pain or stiffness in the neck for at least two weeks, and had not received physical or manual therapy for neck pain during the previous six months. Patients were randomly assigned to three

groups. Manual therapy was defined as “the use of passive movements to help restore normal spinal function” (p. 715) and primarily included mobilization techniques. Spinal manipulation was not included in the manual therapy intervention. Physical therapy primarily included active exercise regimens, and continued care included practitioner advice on prognosis, psychosocial issues, self-care, ergonomics, and encouragement to await recovery.

The results of this trial pointed resoundingly to the effectiveness of manual therapy for neck pain relief. Treatment was considered successful when patients responded that they were much improved in or completely recovered from their neck pain. After seven weeks, the manual therapy cohort experienced a success rate of 68.3%, while the physical therapy group and the general care group had success rates of 50.8% and 35.9% respectively. In addition, physical dysfunction, pain, and disability were less severe in the manual therapy group whose members also reported fewer lost workdays. The authors concluded, “We found that manual therapy was more effective than continued care [by medical doctors], and our results consistently favored manual therapy on almost all outcome measures” (p. 720).

2003 Neck Pain Studies

In 2003, Evans, Bronfort, Bittell, and Anderson conducted a pilot study for a larger randomized clinical trial to assess conservative treatments for acute and subacute neck pain. Twenty-eight patients, 21 to 65 years old, who had experienced neck pain for less than 12 weeks were enrolled in the 12-week study. The patients were randomly assigned to three groups: the spinal manipulation group, who received an average of 20.5 manipulations; the medication group, who received a total of 52 prescriptions (24 nonsteroidal anti-inflammatory drugs, 2 non-narcotic analgesics, 16 narcotic analgesics, and 10 sedatives or muscle relaxants); and the self-care group, who received two 45-minute sessions on self-care treatments and ergonomics from a physical therapist plus a self-care information booklet.

The authors drew no group comparisons due to the small study group size. However, all patients experienced substantial improvement, with the greatest improvement in pain severity. More than half reported a 75% to 100% improvement. This pilot study paved the way for a full-scale trial, funded by the National Institutes of Health, which began in 2002 and will last for five years.

Korthals-de Bos et al. conducted a study, published in the *British Medical Journal*, to evaluate not only the efficacy of physiotherapy, manual therapy, and general practitioner care for neck pain, but to compare costs for the three interventions. This study was conducted alongside that done by Hoving et al. in 2002 (discussed earlier in this text). In this trial, 183 adult patients who reported neck pain for at least two weeks were randomly assigned to three groups for the six weeks of treatment. The manual therapy group did not receive spinal manipulation but instead a variety of treatments including low-velocity spinal mobilization. Outcomes were measured at 3, 7, 13, and 52 weeks.

Manual therapy was rated the most effective of the three treatments. At seven weeks, the manual therapy group had a 68% recovery rate from neck pain, the physical therapy group had a 51% recovery rate, and the general practitioner group had a 36% recovery rate. Also, the use of drugs was lowest in the manual therapy group: at 52 weeks, 64% of the general practitioner group took prescription drugs compared to 39% of the physical therapy group and only 37% of the manual therapy group.

Perhaps the greatest difference demonstrated among the three treatment groups, however, was in cost effectiveness. Not only did patients in the manual therapy group report fewer lost workdays, but lower direct and indirect costs at one year after therapy. The general practitioner group had \$1,586 in costs, compared to \$1,492 for the physical therapy group, and only \$514 for the manual therapy group. In short, not only was manual therapy more effective, but the total costs were around one-third of those for the other two interventions.

Safety of Spinal Manipulation

The health risk of spinal manipulative therapy has also been the subject of recent research. Two significant concerns are cauda equina syndrome, resulting from lumbar spinal manipulation and cerebrovascular accident (CVAs) or stroke, resulting from cervical spinal manipulation. The risk of these complications is discussed below.

In the February 2002 issue of *Annals of Internal Medicine*, Meeker and Haldeman note that the risks of cauda equina syndrome are so rare that assessing any actual risk is difficult: "No serious complication has been noted in more than 73 controlled clinical trials or in any prospectively evaluated case series to date" (p. 222).

Various summaries of research studies place the risk of fatal strokes at 3 per 10 million manipulations, or about 0.00025% (cited in Rosner 2003). Other studies estimate the risk for CVAs at 1 in 400,000 to 1 in 3,000,000 manipulations (cited in Licht, Christensen, and Hoilund-Carlsen 2003), or at 1 in 400,000 to between 3 and 6 per 10 million manipulations (cited in Meeker and Haldeman 2002).

Nelson (1999) reports that "In a study of 1,058 patients who had undergone a total of 4,712 spinal manipulative treatments, researchers found that in no case had SMT [spinal manipulative therapy] caused severe or permanent physical harm" (p. 4). He further notes that the best estimates that strokes may result from SMT are 5 to 10 (and death in 3) of every 10 million cervical manipulations. Estimates of such risks vary due to the difficulty of obtaining such measures from clinical and scientific practice. Hurwitz and Haldeman (2002) note this complication when they assert the following:

It is difficult to estimate the frequency of VBA [vertebrobasilar artery] dissections and other complications among patients undergoing cervical spine manipulation because of the uncertainty of both the number of complications and the number of cervical manipulations that patients receive over time... Estimates of VBA or stroke rates associated with cervical manipulation have ranged from 1 per 400,000 to 1 per 10 million manipulations (p. 189).

Rosner reported in the proceedings of the 2004 European Chiropractic Union's Convention, "A significant number and most likely the majority of [vertebral artery dissections (VADs)] reported in the literature happen to be spontaneous. As indicated in Table [2.1] the annual incidence of spontaneous VADs in hospital or community settings occurs at the rate of one to three per 100,000 patients. Using 10 to represent the average number of manipulations per patient per episode, it appears that the proposed exposure rate for CVAs attributed to spinal manipulation is equivalent to the spontaneous rates for cervical arterial dissections as reported" (p. 49).

Attributed Cause	Rate Per Million
Spontaneous, hospital-based (Shievink 1994, <i>The New England Journal of Medicine</i>)	10-15
Spontaneous, community-based (Shievink 1987-1992, <i>Stroke</i>) (Giroud 1994, <i>Journal of Neurology and Neurosurgical Psychiatry</i>)	25-30
Cervical manipulation (Dvorak 1985, <i>Manual Medicine</i>)	25
Cervical manipulation (Haldeman 1993, <i>Guidelines for chiropractic quality assurance and practice parameters</i>)	10-20 *
Cervical manipulation (Jaskoviak 1980, <i>JMPT</i>)	0
Cervical manipulation (Hurwitz 2001, <i>Spine</i>)	6.4 *
Cervical manipulation (Haldeman 2001, <i>Canadian Medical Association Journal</i>)	1.7 *

* Corrected to represent the average incidence per patient, assuming the average number of manipulations per patient equal 10, as reported in the literature

Table 2.1 Rates of Stroke Compared to Incidence of Arterial Dissections
(Adapted from Rosner 2004).

In summary, a recent article by Licht, Christensen, and Hoilun-Carlsen (2003) (all medical doctors) concluded that "...the fear of CVAs seems greatly exaggerated, considering the low number of reported cases compared to the amount of treatment given and in view of the higher rate of complications with many generally accepted treatments. It is tempting to speculate that the widespread fear of cervical manipulation within the medical profession is more a political than a factual one" (p. 52).

Chiropractic and the Treatment of Headache

Each year in the United States, headache sufferers cost companies and institutions billions of dollars in lost productivity (cited in Bronfort, Assendelft et al. 2001). It is estimated that headaches cause a loss of 120 million workdays per year in the United States alone, with comparable losses in other countries (Grunnet-Nilsson 2003). Such dramatic health needs and costs underscore the results of the 2003 survey conducted by the National Board of Chiropractic Examiners, reported in the later chapters of this document, which places the percentage of chiropractic caseloads devoted to all types of headaches at 12%.

Of the three most common types of headache, tension-type headaches are most common, with 40% to 50% of the population affected each year, and 10% of those afflicted reporting lost workdays (Bronfort, Assendelft et al. 2001). Vernon and McDermaid (1998) cite an even greater population range of sufferers, 30% to 70%. In all, tension-type headaches affect 10% of the population on any given day (Grunnet-Nilsson 2003), and complaints of this problem comprise 5% to 8% of chiropractic caseloads (Vernon and McDermaid 1998).

Alarming statistics are reported for migraine and cervicogenic headache. Bronfort, Assendelft et al. cited studies reporting approximately 10% to 12% of adults suffer from migraines each year. On any given day, 2.5% of the population report migraine pain, with the same percentage reporting cervicogenic headache (Grunnet-Nilsson 2003).

The importance of chiropractic care for headache pain is substantial and far reaching. Bronfort, Assendelft et al. (2001) note that the most common alternative practitioner for headache relief is now the chiropractor. Ten years ago, little was known about the causes of any headache variety, but knowledge has increased in recent years. Grunnet-Nilsson asserts that “for chiropractors it is very satisfying to note that much, if not most, of this new scientific evidence on headache has been unearthed by chiropractic researchers...” (p. 77).

Recent Headache Studies

1998 Headache Studies

In a Danish study published in *The Journal of the American Medical Association*, Bove and Nilsson analyzed the use of spinal manipulation (SMT) in the treatment of episodic tension-type headaches (ETTH). A total of 75 patients, who had more than 5 but fewer than 15 headaches per month, were randomly grouped in this controlled trial. One group received SMT and deep friction massage, while the control group received deep friction massage and low-power laser light (placebo). Participants received eight treatments over four weeks from the same chiropractor. Both groups experienced a reduction in average daily headache hours (the manipulation group decreased from 2.8 to 1.5; the control group decreased from 3.4 to 1.9). The authors report the following: “There was no significant difference between the 2 groups for any outcome variable before or following treatment” (p. 1578); thus, the “study

showed that spinal manipulation did not significantly improve the outcome for ETTH” (p. 1579).

A study by Nelson et al., published in the *Journal of Manipulative and Physiological Therapeutics*, compared the effectiveness of spinal manipulation, amitriptyline, and a combination of both for the treatment of migraine. The study included 218 patients, 18 to 65 years old, who had a history of migraines for at least one year and who had at least four days of headache per month. These patients were randomly assigned to three groups: 77 in the spinal manipulation (SMT) group whose members were treated 14 times over eight weeks; 70 in the amitriptyline group who were seen three times during the treatment period, receiving a 25 mg tablet at first and increasing to a 100 mg tablet after three weeks; and 71 to the combined treatment group. The study included a four-week follow-up.

The authors reported the following findings: Headache Index scores improved 40% in the SMT group, 49% in the amitriptyline group, and 41% in the combined group. At the follow-up, the scores were 42%, 24%, and 25% respectively. Still, the authors concluded that no clinically or statistically significant differences appeared among the groups; and interestingly, the combination of therapies offered no noticeable benefit over the two therapies alone. The authors concluded, “Spinal manipulation seemed to be as effective as a well-established and efficacious treatment (amitriptyline), and on the basis of a benign side effects profile, should be considered a treatment option for patients with frequent migraine headaches” (p. 518).

1999 Headache Studies

In his article, “A Twelve Month Clinical Trial of Chiropractic Spinal Manipulative Therapy for Migraine,” Tuchin assessed the efficacy of spinal manipulation for migraine headache. The 12-month trial, conducted at the Chiropractic Research Centre of Macquarie University in Australia, consisted of three parts: a two-month pretreatment time, a two-month treatment period, and a two-month post treatment period. A follow-up occurred six months later. Thirty-two patients, between ages 20 and 65, with a minimum of one migraine per month were enrolled. When compared to initial baseline levels, all 32 participants showed statistically significant improvement in migraine frequency, Visual Analogue Scale for pain (VAS), disability, and medication use. These improvements continued at the six-month follow-up. While the study size was small (Tuchin called for a larger controlled study), the trial supports the use of spinal manipulation as an effective treatment for migraine.

2000 Headache Studies

Tuchin, Pollard, and Bonello published the results of their 2000 randomized controlled trial on migraine headache pain in the *Journal of Manipulative and Physiological Therapeutics*. This Australian study was conducted at the Chiropractic Research Centre of Macquarie University over a six-month period with 123 patients.

These patients were randomly assigned to a treatment group who received spinal manipulation (SMT) or to the control group who received a treatment in which

electrodes were placed on the patient, but no current was sent through the machine (placebo). In all, 22% of the SMT group reported a better than 90% reduction in their migraines, and 49% reported significant improvement in other complications associated with each migraine episode. The mean number of migraines per month in the SMT group decreased from 7.6 to 4.1 – and this in patients who, at the beginning of the study, had experienced migraine pain for an average of 18.1 years. SMT patients' medication use dropped as well, with a significant number of patients acknowledging that their medication use had dropped to zero by the end of the six-month trial. The authors concluded that overall, the SMT group showed significant improvement in migraine frequency, duration, disability, and medication use when compared to the placebo group. In addition, since 83% of patients in this trial reported stress as a major contributor to their migraines, the authors asserted "It appears probable that chiropractic care has an effect on the physical conditions related to stress and that in these people the effects of the migraine are reduced" (p. 94).

2001 Headache Studies

In a study conducted at the Duke University Evidence-based Practice Center, McCrory et al. assessed the evidence from a large number of randomized controlled trials (RCTs) and other comparative clinical trials (CCTs) for the effectiveness and safety of behavioral and physical treatments for tension-type and cervicogenic headaches. The authors examined 35 trials for behavioral treatments (relaxation training, biofeedback training, and cognitive-behavioral therapy) as well as 17 trials of physical treatments (acupuncture, spinal manipulation, and physiotherapy).

The efficacy of spinal manipulation was well supported by the McCrory et al. assessment. Manipulation resulted in a 49% decrease in headache severity compared to unchanged severity levels in palpatory and rest period control groups. When compared to soft-tissue therapy, manipulation demonstrated a 69% reduction in headache frequency and a 36% reduction in headache severity, compared to the demonstrated reductions for soft-tissue therapy of 37% and 17% respectively. Spinal manipulation also showed better results for headache pain than did the commonly prescribed amitriptyline. While one trial showed that amitriptyline was significantly better than manipulation in the immediate reduction of tension-type headache severity, no significant difference between the two treatments occurred for headache frequency. However, during the four weeks following treatment, the amitriptyline patients returned to their baseline scores for both frequency and severity, while spinal manipulation patients retained their improvements. In addition, 82% of amitriptyline patients reported adverse effects, but only 4% of manipulation patients reported adverse effects.

Bronfort, Assendelft et al. reviewed randomized clinical trials (RCTs) to assess the effectiveness of spinal manipulation therapy (SMT) for chronic headache. RCTs were included if they compared SMT with a placebo or other therapeutic interventions. In all, the authors reviewed nine RCTs and concluded that 1) moderate evidence exists

that SMT is more effective than massage for cervicogenic headache, 2) moderate evidence exists that SMT is comparable with amitriptyline in short-term effectiveness for chronic tension-type and migraine headache, and 3) the study's findings "provide a basis for considering SMT in the therapeutic management of migraine, chronic tension-type and cervicogenic headaches" (p. 462).

2002 Headache Studies

In a study published in *Spine*, Jull et al. sought to determine the effectiveness of manipulative therapy and a low-load exercise program for cervicogenic headache when used alone or in combination, as compared with a control group. The six-week trial included 200 patients randomly assigned to four groups: the manipulative therapy group, the exercise therapy group, the combined therapy group, and the control group. Patients were included if they had a cervicogenic headache frequency of at least one per week for a period of 2 months to 10 years. Follow-ups were conducted at 3, 6, and 12 months.

Results of the study showed that both the manipulation, exercise group, and the combined group all showed significantly reduced headache frequency and severity when compared to the control group. However, there were no statistically significant differences among treatment groups. The authors concluded that manipulative therapy and exercise effectively reduce the symptoms of cervicogenic headache for both short-term and long-term results.

2003 Headache Studies

In a brief literature review of three randomized controlled trials and four clinical trials, Tuchin and Bonello summarized the effectiveness of chiropractic treatment for migraine headache. The reviewed studies measured the frequency, intensity, duration, disability, use of medication, and spinal manipulation for migraine sufferers. The authors concluded, "Chiropractic SMT [spinal manipulative therapy] appears to have a similar effect to amitriptyline, and a greater effect than cervical mobilization in the improvement of standard migraine outcome measures" (p. 363).

At the 2003 World Federation of Chiropractic 7th Biennial Congress, Grunnet-Nilsson summarized a Cochrane Collaboration systematic review by Bronfort, Nilsson, Evans et al. The review entitled "Noninvasive Physical Treatments for Chronic Headache" drew a number of conclusions about spinal manipulation's (SMT) effectiveness for the three most common headache types: migraine, tension-type, and cervicogenic.

The authors assert that there is scientific evidence showing spinal manipulation is effective in the prevention of and care for migraine, whereas evidence for physical therapy and TENS is limited. So, "...chiropractors...can truthfully tell their patients that 14 sessions of spinal manipulation over an 8 week period is expected to reduce the number of migraine attacks by about 40%" (p. 75).

The evidence for the use of SMT for tension-type headaches is much weaker. While massage may help, "adding spinal manipulation to a course of soft-tissue

therapy does not improve clinical outcome" (p. 76). Such a conclusion, however, reflects other studies on the difficulty of treating tension-type headaches by any means.

For cervicogenic headache, the authors note evidence that neck exercises will lower the frequency and intensity of such headaches in the short and long term. They also point to evidence that a six- to eight-week course of SMT will reduce the intensity, frequency, and medication use; thus, "For practitioners of spinal manipulation and exercise therapy, this means that they are the only practitioners who can deal with cervicogenic headache on the basis of scientific evidence" (p. 76).

Chiropractic Treatment for Other Disorders

Colic

A study conducted in 1999 demonstrated the effectiveness of spinal manipulation for the treatment of infantile colic. In Ballerue, Denmark, Wiberg, Nordsteen, and Nilsson treated infants, 2 to 10 weeks old, who had exhibited a minimum of one three-hour violent crying spell per day for five of the previous seven days. Each of the infants displayed typical colic behaviors: motor unrest; flexing knees against the abdomen; or extending the trunk, neck, and extremities. The patients were randomly assigned to two groups: one received daily doses of dimethicone for two weeks, and the other received spinal manipulation for the same period. Both groups' parents also received counseling on breast feeding, bottle feeding, air swallowing, mother's diet, burping technique, bowel movements, and other typical activities. All participants in the spinal manipulation group completed the study, while more than one-third of the dimethicone group withdrew due to worsening conditions. Results showed that beginning on day 12 of the study, the manipulation group showed a significant (67%) reduction in colic symptoms, compared to a much smaller reduction (38%) in the dimethicone group. The authors noted " [s]pinal manipulation is normally used in the treatment of musculoskeletal disorders, and results of this trial leave open two possible interpretations. Either spinal manipulation is effective in the treatment of the visceral disorder infantile colic or infantile colic is, in fact, a musculoskeletal disorder, and not, as normally assumed visceral" (p. 520). Either way, the authors concluded that spinal manipulation has a positive effect on the treatment of infantile colic.

To study the efficacy of spinal manipulation for colic, Olafsdottir, Forshei, and Markestad (2002) conducted a randomized controlled trial of 86 infants in Norway. All of the infants displayed typical colicky behaviors, with a minimum of three hours of crying per day, three days per week, for the previous three weeks. The participants were randomly assigned to two groups; one received palpations of spinal articulations in areas of dysfunction (manipulated and mobilized using light finger-tip pressure), while the other (control) group did not receive manipulation but were instead just held by nurses for approximately 10 minutes. Treatment lasted for eight days, with an observation period of 8 to 14 days. Both groups showed a reduction in hours of crying (69.9% in the manipulation/mobilization group and 60% in the control

group), but the authors noted no significant difference between the manipulation and control groups, concluding that spinal manipulation is no more effective than placebo in the treatment of infantile colic. (Interestingly, however, the infants in the manipulation group did show improvement, with 69.9% of them reducing their crying time.)

In the Archives of Disease in Childhood (2002), Hughes and Bolton compared the Wiberg and Olafsdottir colic studies (both previously discussed), finding that both were high-quality studies that reached differing conclusions. The only difference noted by Hughes and Bolton was that in the Olafsdottir study, the parents were “blinded” to the type of treatment their infants received. The comparison of the studies did indicate that good evidence exists for taking a colicky infant to a chiropractor to reduce the number of hours of crying. The authors concluded the following:

In this clinical scenario where the family is under significant strain, where the infant may be at risk of harm and possible long term repercussions, where there are limited alternative effective interventions, and where the mother has confidence in a chiropractor from other experiences, the advice is to seek chiropractic treatment (p. 384).

Premenstrual Syndrome

In 1999, Walsh and Polus conducted two related studies to examine the effectiveness of spinal manipulative therapy (SMT) for premenstrual syndrome (PMS). First, the authors wanted to know if PMS sufferers had underlying spinal dysfunction. Fifty-four patients with diagnosed PMS and 30 female patients without diagnosed PMS were selected, all undergoing a physical and chiropractic examination. The authors found that 81.8% of the PMS group had a history of non-PMS-related spinal problems (neck, thoracic, or low-back pain; headaches; and arm or leg pain) while significantly fewer (60.9%) of the non-PMS group experienced the same. The PMS group also had a significant increase in cervical, thoracic, and low-back tenderness; low-back muscle weakness; and Neck Disability Index scores. In all, the study indicated that the PMS group averaged 5.4 of the 12 possible measurements (history of spinal problems, reduction or pain of movement, presence of at least one positive orthopedic test result, presence of a functional short leg, etc.), compared with 3.0 average for the non-PMS group. The authors theorized that the presence of such clinically significant spinal measures might be associated with PMS and that correction of the underlying spinal causes through chiropractic therapy could reduce PMS symptoms.

Later in 1999, Walsh and Polus conducted a randomized clinical trial of the effectiveness of chiropractic therapy on premenstrual syndrome (PMS). In all, 25 patients, randomly assigned to two groups, completed the study. Group One (n=16) received initial chiropractic treatment (standard high-velocity, low-amplitude spinal manipulations) for three cycles, followed by a placebo treatment (an Activator Adjusting

Instrument wound down to minimize the effect). Group Two (n=9) received the placebo first, followed by manipulation. Within the limitations of this study, the authors found that PMS symptoms were significantly reduced in some women (just over half of the patients who completed the study showed significant improvement in symptom levels) after spinal manipulation and soft-tissue therapy. The authors called for further studies into the effects of spinal manipulation on premenstrual syndrome.

Fibromyalgia

In 2000, Hains and Hains reported their results of a study to determine if chiropractic treatments that combine ischemic compression and spinal manipulation would reduce pain intensity, sleep disturbance, and fatigue associated with fibromyalgia. Fifteen women who had fibromyalgia for more than three months completed a 30-treatment trial. The researchers noted statistically significant lessening of pain (77.2%), improvements in quality of sleep (63.5%), and lessening of fatigue (74.8%). These results were maintained after one month without further treatment. The authors conclude that chiropractic care has a potential role in the treatment of fibromyalgia.

Carpal Tunnel Syndrome

In 1998, Davis, Hulbert, Kassak, and Meyer compared the efficacy of conservative medical treatment to chiropractic treatments for carpal tunnel syndrome (CTS). Conducted at the Wolfe-Harris Center for Clinical Studies at Northwestern College of Chiropractic in Bloomington, Minnesota, the study lasted nine weeks with a one-month follow-up. Ninety-one patients with diagnosed CTS participated, 46 in the randomly selected medical group (who received cumulative daily doses of ibuprofen of 2400 mg and nocturnal wrist supports) and 45 in the chiropractic group (who received high-velocity, low-amplitude manual thrust procedures). Both groups reported significant decreases in both physical and mental distress (focused on hand discomfort and function) following treatment, though the medical group reported a greater decrease in mental distress than did those in the chiropractic group. Both groups also demonstrated meaningful improvement in vibrometer (used to measure the tactile sensibility of the hand, especially the fingers) scores, but the authors noted no significant difference in the two groups' improvement. However, 22% of the medical group reported some degree of adverse reaction to ibuprofen, while only one of the 45 chiropractic patients reported any discomfort related to treatment. The authors concluded that chiropractic treatment is as effective as medical treatment for carpal tunnel syndrome and may be a viable option for patients unable to tolerate ibuprofen.

Asthma

In 1998, Balon et al. published a comparison of active and simulated manipulation for the treatment of childhood asthma. The study took place in Ontario, Canada. Eighty children, ages 7 to 16, were randomized into either the active manipulation

(n=38) or the simulated manipulation (n=42) groups for four months. Active treatment consisted of manipulation of spinal or pelvic joints, while simulated treatment consisted of soft-tissue massage and gentle palpation to the spine, paraspinal muscles, and shoulders. The primary outcome measure for these patients, who had asthma for more than one year, was the change from baseline scores in peak expiratory flow – measured only in the morning – at two and four months. Each patient received between 20 and 36 treatments.

The authors noted no significant changes in airway function between the two groups even though patients experienced an improvement in quality of life, and symptoms and use of beta-agonists decreased in both. Thus, the authors concluded “...the addition of chiropractic spinal manipulation to usual medical care for four months had no effect on the control of childhood asthma” (p. 1018).

However, the Foundation for Chiropractic Education and Research (FCER) Director of Research, Anthony Rosner (1998), took exception to the above study’s design and subsequent conclusions. In an FCER news release (October 14, 1998), Rosner cited the following problems:

- With so many commonly used techniques in chiropractic, it is difficult to distinguish what constitutes a proper “sham” or simulated treatment. In fact, “there is high probability that the sham procedure is invasive and overlaps to a large extent with the maneuvers chosen for the actual manipulation.”
- Since all the patients in the study had been medicated, doing so may have masked the benefits that might have been noted from spinal manipulation.
- The study gave no indication of the personal interaction (as found in a typical clinical setting) between patient and chiropractor. So, with patients as young as those in the study, answers to questions about their symptoms and improvement may have been skewed.
- The study did indicate that there was improvement in peak expiratory flow rates and pediatric quality of life. What is uncertain from the study is which form of intervention, if any, caused the improvements.
- Lastly, since the human diurnal cycle lasts 24 hours, but the study only examined daytime measurements, the study may have indicated only half the picture of these patients’ improvements.

In a Cochrane Database Systematic Review (2002), Hondras, Linde, and Jones evaluated a number of trials using manual therapy to treat patients with asthma. The authors included five randomized controlled trials (RCTs) (290 patients) for their study. Believing that most of the examined studies were of inadequate quality, Hondras, Linde, and Jones concluded that insufficient evidence exists to support the use of manual therapies for asthma treatment and called for larger RCTs with “blinded” observers to test further the efficacy of manual therapies.

Rosner believes that the above systematic review possesses its own inadequacies as well. In another FCER news release (2000), Rosner cautions against using RCTs at face value, especially those studying physical interventions, because “blinding” the chiropractors and observers involved is all but impossible. Likewise, RCTs are subject to misinterpretations and may not properly represent sound, well-documented observations found in clinical, not laboratory, settings. In short, Rosner believes systematic reviews such as that by Hondras, Linde, and Jones may have incorrectly evaluated the best available clinical evidence while at the same time citing RCTs with potential design flaws.

Bronfort, Evans, Kubic, and Filkin published a study in the *Journal of Manipulative and Physiological Therapeutics* to determine if spinal manipulation therapy (SMT) in addition to optimal health care management would lead to clinically significant improvements in childhood asthma cases. The study took place at Northwestern College of Chiropractic (Bloomington, Minnesota) and Children’s Health Care (St. Paul, Minnesota). Thirty-six patients, 6 to 17 years old, with mild and moderate persistent asthma participated. These patients were randomly assigned to two groups, one an active SMT group (who received manipulation to the spine and pelvis as needed) and the other a sham SMT group (who received light manual contact to the spine without manipulative thrust), and all patients received medication as needed. Each patient received 20 treatments over the three-month study.

The results showed no clinically important changes in pulmonary lung function, expiratory flow, or patient-rated day and nighttime symptoms. However, clinically important changes were noted in patient-rated quality of life (especially an increase in activity levels) and in patient-rated asthma severity and improvement—all maintained at the one-year follow-up in patients who received SMT along with optimal health care management. The authors, however, claimed that observed improvements are not necessarily related to SMT but may be related to 1) physical touch by the chiropractor, 2) increased knowledge about and control of asthma (for both patients and parents), and 3) increased social contact between chiropractors and patients. The study also provides the groundwork for a full-scale randomized clinical trial.

At the Ninth International Conference on Spinal Manipulation held in Toronto, Canada in 2002, an investigative team headed by Hayek reported on a trial conducted at 16 chiropractic treatment centers in Australia. The study involving 420 patients sought to determine what effects spinal manipulation has on symptoms, depression and anxiety, general health, and levels of immunity in asthma patients. Hayek reported that only the patient group receiving spinal manipulation (by any of four commonly used manipulative protocols) displayed significant improvement in asthma symptoms, and depression and anxiety scores. In addition, patients receiving spinal manipulation showed increased blood serum levels of IgA and decreased levels of cortisol, indicating that manipulative treatment helps increase immunological capacities that could ward off subsequent asthmatic attacks.

Conclusion

As the studies in this chapter have shown, the efficacy of chiropractic care for a number of common ailments is increasingly supported by evidence-based, scientific inquiry. Many chiropractic interventions repeatedly prove as effective, if not more so, than other common treatments – including drug treatments – for back pain, neck pain, headache, and other health problems. As a result, the chiropractic profession continues to gain acceptance from government entities, the traditional medical community, and third-party payers.