



CHIROPRACTIC: A SAFE AND COST EFFECTIVE APPROACH TO HEALTH

CARL S. CLEVELAND III, D.C.

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CARL S. CLEVELAND III D.C.

**PRESIDENT OF
CLEVELAND UNIVERSITY-KANSAS CITY
COLLEGE OF CHIROPRACTIC
COLLEGE OF HEALTH SCIENCES**

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FOREWORD

Health care is today's front-page news. It is hotly debated in Washington D.C., in the capitol of your state, on dozens of news programs every day, and in the barber shop on Main Street. This crisis seems to have no imminent cure.

Whether you are a patient, family member, provider, administrator or payor, you care about how this problem is managed. The following work is not intended to address this massive problem. It does, however, point to what could easily be considered the rising star of health care - Chiropractic!

In an age of increasing specialization, decreasing availability of primary care providers, and increasing bureaucracy in accessing care, patients need to interact with care providers who can assess and treat their problems. However, what is even more necessary is a focus on wellness and health optimization. This is the wheelhouse of a chiropractor.

For the last decade and a half I have worked collaboratively with doctors of chiropractic at Bethesda-National Naval Medical Center (now known as Walter Reed National Military Medical Center) caring for our nation's finest. It has been an honor and privilege to have cared for these brave men and women for the vast majority of my medical career.

During this time, I have found the compassion, skill and clinical competencies of the chiropractors and rotating chiropractic interns to be sound and effective for the management of functional spine and extremity disorders. Their diagnostic abilities and artful patient care imbricate wonderfully into effective partnerships with other medical providers at the hospital. As part of the healthcare team managing complex cases including trauma patients with serious cases of structural impairment and dysfunction, chiropractors offer a safe, complementary option to drugs and surgery by using manual manipulation.

Manipulation, which chiropractors usually refer to as an "adjustment," continues to meet the threshold of scientific scrutiny for many neurological and musculoskeletal conditions. In addition to the adjustment, chiropractors often advise and instruct on posture, stretching, exercise, rehabilitation, nutrition, hydration, and stress management as part of their care. While often assisting in repair and recovery of patient health, a chiropractor's focus is primarily on healthy living (now commonly referred to as wellness by the rest of the population) and optimization (helping a patient get the best outcome from their body). I have personally sought their treatment for my own musculoskeletal complaints ranging from operative fatigue, overuse, degenerative disease and to enhance my athletic performance.

I am pleased to provide the Foreword to *Chiropractic: A Safe and Cost Effective Approach to Health* and am confident that the unique approach to healthcare, wellness, and optimization by the chiropractic profession will continue to advance the human condition for a thriving world populace.

Robert E. Rosenbaum, MD FAANS FACS

USN - Retired

**Dept. Of Neurosurgery/ Red Cross Volunteer
Walter Reed National Military Medical Center**

OVERVIEW

Chiropractic: Healing with a Human Touch

Doctors of chiropractic (DCs) are primary health care professionals focused on diagnosis, care and prevention of disorders of the spine as well as other parts of the musculoskeletal system*, and the associated effects on the neurological system. Chiropractic services are used most often to care for neuromusculoskeletal complaints**, including but not limited to back pain, neck pain, pain in the joints of the arms or legs, and headaches.¹ These disorders impact 44.6 million Americans annually, with an estimated cost to society of \$267.2 billion², and are increasingly the result of poor posture, workplace and sports-related injuries, motor vehicle accidents or simply sedentary lifestyles.

Studies demonstrate that back pain is the leading cause of work-related disability and absenteeism. Chronic back pain is associated with reduced mobility, quality of life and longevity,³ and often includes increased rates of other health problems.⁴ Neck pain is the third most common chronic pain condition in the United States and the fourth leading cause of disability worldwide, with disability from neck pain having increased by 29% in the United States over the past two decades.⁵ Back and neck pain represent a substantial burden to society.

Satisfaction with the chiropractic approach to spine care ranks in the high 80th and into the 90th percentile as demonstrated by public⁶, Medicare⁷ and Tricare⁸ patient polls. Indeed, throughout its history, satisfied patients have always been the mainstay of chiropractic care.⁷ As primary care professionals for spinal health and well-being, doctors of chiropractic provide qualified, effective care to some 35.5 million American adults, representing more than 14 percent of the adult population, who seek chiropractic care each year to promote health, alleviate pain and improve quality of life. Approximately three in four of these adults (77 percent) describe the treatment received as “very effective,” with 80 percent agreeing that the quality of care was a good value for the money.⁶

Research demonstrates that the primary reasons patients consult chiropractors are:

- Back pain (approximately 60 percent)
- Other musculoskeletal pain i.e. neck, shoulder or extremities and arthritic pain (20 percent)
- Headaches including migraine (10 percent)
- About 10 percent of patients present with a wide variety of conditions, either caused, aggravated or mimicked by neuromusculoskeletal disorders (e.g., dysmenorrhea, pseudo angina, and digestive and respiratory dysfunctions).

Today, chiropractic (Greek, meaning “done by hand”) is taught and practiced throughout the world. The profession has earned broad acceptance from national health care systems as well as the public. The chiropractic profession is the third-largest physician-level independent health profession in the Western world.¹²

* Disorders to the Musculoskeletal System include injuries and disorders of muscles, nerves, tendons, ligaments, joints, cartilage, and spinal disks.¹⁰ The musculoskeletal system supports the body’s weight, enables body movement, and protects the vital organs including the nerves in and around the spinal column.

**Neuromusculoskeletal: pertaining to the interactions between nerves, muscles and the skeleton.¹¹

The Chiropractic Perspective and Practice

The relationship between *structure*--primarily the spine and musculoskeletal system--and *function*--as coordinated by the nervous system--is central to chiropractic's approach to patient care, health and well-being.^{13, 14, 15}

Doctors of chiropractic acknowledge the importance of the nervous system in the control, coordination and regulation of the body, and that spinal or extremity joint dysfunction, termed *subluxation** or *subluxation complex*, can adversely affect nerve function,¹⁶ and the body's ability to regulate and maintain health.¹⁷ The core purpose of chiropractic practice and procedure is to address disturbed joint biomechanics and the associated effects on nerve system function. This is achieved through the skilled procedure termed the *spinal adjustment* or *manipulation*.

Chiropractic is an inherently conservative approach to health care, and the profession values the intrinsic biologic ability or innate tendency of the body to self-regulate, restore and maintain health through compensating homeostatic mechanisms, reparative processes and adaptive responses to environmental challenges.¹⁸ The chiropractic paradigm represents a holistic biopsychosocial** philosophy of health rather than a biomedical one, and embraces a belief in optimizing health through good nutrition, constructive exercise, stress management, and a focus on the importance of good posture, as well as proper spinal and extremity joint biomechanics.¹⁵

Chiropractic patient management includes manual techniques with particular competency in joint adjustment and/or manipulation, rehabilitation exercises, patient education in lifestyle and nutritional modification, and the use of adjunctive therapeutic modalities, orthotics and other supports. Current accreditation and state licensing standards in the United States give doctors of chiropractic the responsibility as a primary portal of entry provider, with the requirement to establish a diagnosis, determine indications for providing chiropractic care, and to consult with or refer to other health care practitioners when appropriate.¹⁹

The First Visit to the Chiropractor: What to Expect

The doctor of chiropractic starts by taking a patient's history, and then performs a physical examination, to include the assessment of spinal and musculoskeletal joint function. The chiropractic examination focuses on evaluation of joint pain or tenderness, asymmetry, changes in range of joint motion, muscle tone and strength, posture and spinal or other joint stability.²³ Lab tests or imaging such as MRI, CT scan or X-ray may be indicated.

The combination of the history, examination, and diagnostic studies help determine whether chiropractic services are appropriate for the patient's condition. As part of this process, the doctor will explain the clinical findings, recommend a treatment plan and review the risks and benefits of all procedures.

*Reimbursement through Medicare for chiropractic manipulation of the spine requires that the primary diagnosis be subluxation. As part of the physical examination, the acronym P.A.R.T. serves to identify the diagnostic criteria for spinal dysfunction (subluxation), to include **P**ain/tenderness; **A**symmetry/misalignment; **R**ange of motion abnormality; and **T**issue tone, texture, and temperature abnormality. Two of the four P.A.R.T criteria are required (one of which must be Asymmetry/misalignment or Range of motion abnormality) and should be documented.

Biopsychosocial: The **biopsychosocial model is a view that attributes disease to the interaction of *biological factors* (biochemical, genetic), *psychological factors* (behavior, mood, personality), and *social factors* (cultural, familial, socioeconomic, medical).²¹ The biopsychosocial model counters the biomedical model, which generally attributes disease to only biological factors, such as viruses, genes, or somatic abnormalities.²²

Through a process of shared decision-making, the patient and doctor will determine if it is appropriate to proceed with a short trial of chiropractic services. If the examination findings indicate that the patient would be more appropriately managed or co-managed by another health care professional, the chiropractor would make the proper referral.

Based on the clinical indications, timing or severity of the patient's condition, chiropractic interventions may require a series of visits in order to relieve pain and improve joint function. Patients may also receive advice on home care, lifestyle modifications, exercise instruction and nutritional advice.

The Chiropractic Adjustment

Doctors of chiropractic are extensively educated in the assessment and management of conditions affecting the spinal and extremity joints and associated neurology, and based on examination findings and indication for care, the chiropractor will recommend a short course of care to help relieve pain and improve function. Chiropractic care involves spinal adjustment or extremity manipulation, and may include mobilization, muscle stretching and soft tissue therapy, along with exercise, the use of modalities (i.e. traction, ultrasound or laser) and rehabilitation and active care.²⁴ Chiropractors are also trained to provide recommendation on injury prevention strategies.

The chiropractic *adjustment* or *manipulation* is a manual procedure applying a force, sometimes mild, sometimes firm, directed to one or more dysfunctional hypomobile joint segments, and is a procedure that requires highly refined skills developed during the doctor's intensive years of chiropractic education. The adjustive procedures and techniques are precise and controlled and designed to introduce motion into a dysfunctional joint.

The patient is positioned on a specifically-designed adjusting table, chair, or other specialized equipment. The doctor typically uses his or her hands, or an instrument, to then skillfully apply a controlled force directing motion into the joints of the body in order to restore proper alignment or movement within the normal ranges of motion. Particular attention is directed to the areas of the spine where vertebral joint dysfunction has been detected. The adjustment often helps restore joint mobility and function, resolves joint inflammation and reduces the patient's pain.

Adjustment or manipulation of a joint may be accompanied by an audible popping sound. The noise is a result of a change of pressure within the joint, as part of the application of the adjustment, and is caused by dispersion of microscopic gas bubbles within the joint.²⁵ This is a natural occurrence and is similar to one cracking the knuckles.

The chiropractor adapts the adjustive technique and procedure to address the age, condition, and specific needs of each patient. Patients often note positive changes in their symptoms immediately following care. The chiropractic adjustment rarely causes discomfort.

Among the benefits of chiropractic care are included:

- Relief from back and neck pain^{39, 45, 46, 47, 48, 49, 50}
- Relief from headaches^{51, 52, 53, 54, 55}
- Relief from pregnancy-related backache^{26, 75}
- Correction of hip, gait, and foot problems^{27, 28}
- Improved flexibility, stability, balance and coordination^{29, 30, 31}
- Prevention of work-related muscle and joint injuries^{145, 147}
- Improved function and ability to better perform the activities of daily living^{32, 33, 145, 147}

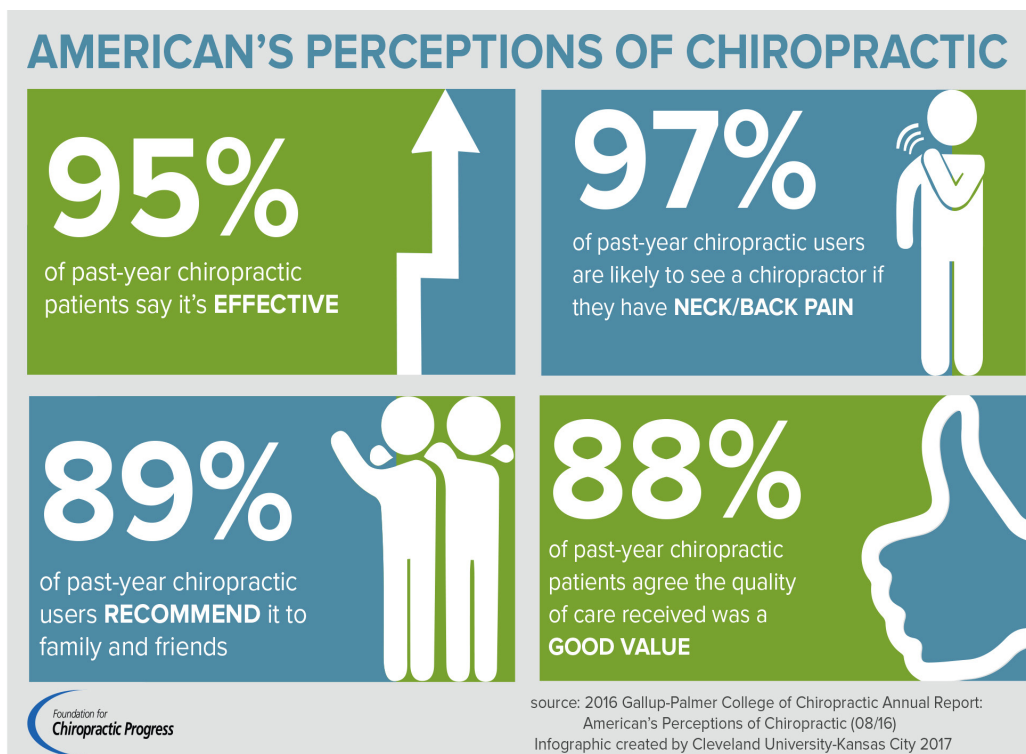
Patient Satisfaction

Consumer Reports, and Gallup-Palmer Surveys

From the June 2016 issue of *Consumer Reports* ranking chiropractic care as the number one preferred treatment for low back pain³⁴, to the August 2016 Gallup-Palmer Report, surveys show that health care consumers rank the services from their doctor of chiropractic high. The Gallup survey found that approximately half of adults in the U.S. have been to a chiropractor as a patient. Fourteen percent of adults say they saw a chiropractor in the last 12 months, 12% say they saw a chiropractor in the last five years, and 25% say they saw a chiropractor more than five years ago.³⁵

The 2016 Gallup-Palmer findings report that:

- 95 percent of recent chiropractic users rate chiropractic effective
- 97 percent of past-year chiropractic users are likely to see a chiropractor if having neck or back pain
- 89 percent of the past-year chiropractic users recommended it to family and friends
- 88 percent of past-year chiropractic users agree that it is a good value for the money⁶



Source: 2016 Gallup-Palmer College of Chiropractic Annual Report: American's Perceptions of Chiropractic⁶

In a June 2017 *Consumer Reports* nationally representative survey of 3,562 back-pain sufferers who said they had consulted with a professional for advice or treatment, 83% of the respondents having seen a chiropractor found treatment or advice from the chiropractor to be helpful. Regarding total spent out of pocket by survey respondents, reflecting regional cost variations and differences in number of treatments, 38% spent less than \$100 and 11% spent up to \$1000 or more.³⁶

The Doctor of Chiropractic: An Emerging Role in the Future of Health Care

Increasingly today, policy makers, third party payers and patients are seeking greater accountability from the health system, and from individual physicians and care providers. In a perfect world of science, this accountability is benchmarked by the three goals of *improved outcomes, lower costs, and patient satisfaction*.³⁷ For the profession of chiropractic, the compelling results speak for themselves.

Trends including consumer interest in a non-pharmacological approach to health, public concern for side effects of prescribed and over-the-counter medicine, the epidemic of opioid addiction, and an aging “boomer” population seeking to remain mobile and active in their golden years, are creating an expanding role for doctors of chiropractic. Couple these trends with decades of outcomes research demonstrating effectiveness, value and cost savings of chiropractic care, the profession is well positioned as a health care authority for safe and conservative, first-contact, primary spine care for structural health and well-being.³⁸

WHAT THE RESEARCH EVIDENCE SHOWS ABOUT CHIROPRACTIC CARE

A growing list of research studies and reviews demonstrate that the services provided by doctors of chiropractic are clinically effective, safe and cost-effective. Following are excerpts and summaries from a few of those studies. The evidence supports the conservative, drug-free approach of chiropractic for managing a variety of conditions.

Acute, Subacute and Chronic Back and Neck Pain

The American College of Physicians (2017) Guidelines published in the *Annals of Internal Medicine*³⁹ present evidence and provide clinical recommendations on noninvasive management for low back pain. The guideline emphasized conservative noninvasive treatments for acute, subacute and chronic low back pain. In Recommendation 1 of the guideline, it states, “...clinicians and patients should select non-pharmacological treatment with superficial heat, massage, or acupuncture or spinal manipulative therapy.”

Qaseem et al. (2017) *Annals of Internal Medicine*

Guidelines published May 2017 in the *Canadian Medical Association Journal (CMAJ)* strongly recommend non-pharmacologic therapy, including chiropractic, before using opioid therapy for chronic non-cancer pain. Guideline Recommendation 10 provides for “...a coordinated multidisciplinary collaboration that includes several health professionals whom physicians can access according to their availability (possibilities include, but are not limited to, a primary care physician, a nurse, a pharmacist, a physical therapist, a chiropractor, a kinesiologist, an occupational therapist, an addiction medicine specialist, a psychiatrist and a psychologist).⁴⁰

Busse, J (2017) *Canadian Medical Association Journal*

Stochkendahl et al., from the Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, completed a review of recommendations of approximately 20 non-surgical interventions for recent onset (less than 12 weeks) non-specific low back pain (LBP) and lumbar radiculopathy (LR) based on two guidelines from the Danish Health Authority. The results of the review conclude that if treatment is needed,

the guidelines suggest using patient education, supervised exercise, and spinal manual therapy. The guidelines recommend against acupuncture, the routine use of imaging, extraforaminal glucocorticoid injection, paracetamol, NSAIDs, and opioids. Recommendations are based on low to moderate quality evidence or on consensus, but are well aligned with recommendations from international guidelines.⁴¹

Stochkendahl, et al. (2017) *European Spine Journal*

In a 2017 study published in the *Journal of the American Medical Association*, Paige et al., completed a systematic review of randomized controlled trials (RCTs) on the effectiveness and harms of Spinal Manipulative Therapy (SMT) for acute (6 weeks) low back pain. Of 26 eligible studies identified, 15 RCTs (1711 patients) provided moderate-quality evidence that SMT has a statistically significant association with improvements in pain, and twelve RCTs (1381 patients) produced moderate-quality evidence that SMT has a statistically significant association with improvements in function. The RCTs represented studies of adults with low back pain treated in ambulatory settings with spinal manipulative therapy compared with sham or alternative treatments, and that measured pain or function outcomes for up to 6 weeks. The authors conclude that among patients with acute low back pain, spinal manipulative therapy was associated with modest improvements in pain and function at up to 6 weeks, with transient minor musculoskeletal harms.⁴²

Paige et al. (2017) *Journal of the American Medical Association*

In the May 2017 *FDA Education Blueprint for Health Care Providers Involved in the Management or Support of Patients with Pain*, the document outlines the components of an effective treatment plan, with goals of treatment to include the expectations regarding improvement in pain, and improvement in function, where relevant. Section II references a number of nonpharmacologic therapies that can play an important role in managing pain, particularly musculoskeletal pain and chronic pain. The listing includes cognitive behavioral, physical and occupational therapy, surgical approach, and complementary therapies, e.g., acupuncture and *chiropracty (sic)*. Further the document states that health care providers should be knowledgeable about the range of available therapies, when they may be helpful, and when they should be used as part of a multidisciplinary approach to pain management.⁴³

US Food and Drug Administration (2017)

The Joint Commission, an independent organization that accredits and certifies nearly 21,000 health care organizations and programs in the United States, published revisions to pain management Standard PC.01.12.17, stating that, effective January 1, 2015, for ambulatory care, critical access hospital, home care, hospital, nursing care center, and office-based surgery accredited programs, that both pharmacologic and nonpharmacologic strategies have a role in management of pain. Further, the Joint Commission identifies Nonpharmacologic strategies to include: physical modalities (for example, acupuncture therapy, chiropractic therapy, osteopathic

manipulative treatment, massage therapy, and physical therapy), relaxation therapy, and cognitive behavioral therapy.⁴⁴

Joint Commission (2015)

“Many treatments are available for low back pain. Often exercises and physical therapy can help. Some people benefit from chiropractic therapy or acupuncture.” The authors further states, “Surgery is not usually needed but may be considered if other therapies have failed.”⁴⁵

Goodman et al. (2013) *Journal of the American Medical Association*

“The results of this trial suggest that [Chiropractic Manipulative Therapy] in conjunction with standard medical care offers a significant advantage for decreasing pain and improving physical functioning when compared to standard care alone, for men and women between the ages of 18-35 with acute low back pain.”⁴⁶

Goertz et al. (2013), *Spine Journal*

Gross et al., in a review of randomized controlled trials found that for acute to subacute neck pain, cervical spine manipulation was more effective than various combinations of prescription medications for improving pain and functional improvement.⁴⁷

Gross et al. (2015) *Cochrane Database Systemic Review*

A 2014 report concluded that interventions commonly used in chiropractic care improved outcomes for the treatment of acute and chronic neck pain. Treatment recommendations for neck pain include manual manipulation and exercise in combination with other modalities. Strong recommendations were also made for the treatment of chronic neck pain with stretching, strengthening, and endurance exercises alone.⁴⁸

Bryans et al. (2014) *Journal of Manipulative and Physiological Therapeutics*

Bronfort et al., in a randomized controlled trial funded by the National Institute of Health’s National Center for Complementary and Alternative Medicine, undertook a study of the effectiveness of different treatment approaches for mechanical neck pain. The 272 study participants were divided into three groups, one receiving spinal manipulative therapy from a doctor of chiropractic, a group receiving pain medication (over-the-counter pain relievers, narcotics and muscle relaxants), and another received exercise recommendations. After 12 weeks, approximately 57 percent of those under chiropractic treatment, and 48 percent of the subjects that exercised reported at least a 75 percent reduction in pain, compared to 33 percent of the subjects in the medication group.⁴⁹

Bronfort et al. (2012) *Annals of Internal Medicine*

In a study of patients with mechanical neck pain randomized to receive a spinal manipulation compared to non-thrust mobilization, the results indicated that the participants, “...receiving a combination of upper cervical and upper thoracic spinal manipulation experienced significantly greater reductions in disability (50.5 percent) and pain (58.5 percent) than those of

the non-thrust mobilization group following treatment.” The study further concluded that the spinal manipulation group had significantly greater improvement in both passive upper cervical (C1-2) rotation range of motion and motor performance.⁵⁰

Dunning et al. (2012) *Journal of Orthopaedic and Sports Physical Therapy*

Headaches

One hundred and ten participants with cervicogenic headache were randomized to receive both cervical and thoracic spinal manipulation, or combined mobilization and exercise. The findings indicated that manipulation was more effective at reducing headache intensity and disability. Additionally, the manipulation group experienced significantly reduced duration and frequency of headaches. These findings suggest that high-velocity low-amplitude manipulation was more effective in the treatment of cervicogenic headache than the slow mobilization technique intervention.⁵¹

Dunning et al. (2016) *BioMed Central Musculoskeletal Disorders*

Evidence suggests that chiropractic care, including spinal manipulation, improves migraine and cervicogenic headaches. The type, frequency, dosage, and duration of treatment should be based on guideline recommendations, clinical experience, and findings. Evidence for the use of spinal manipulation as an isolated intervention for patients with tension-type headache remains equivocal.⁵²

Bryans et al. (2011) *Journal of Manipulative and Physiological Therapeutics*

Haas et al. in a randomized study looking at pain intensity, and frequency of cervicogenic headache found spinal manual therapy (SMT) to be more effective at reducing pain intensity and disability when compared to light massage. The effects were greater after 16 treatment sessions than after 8 sessions. The mean number of cervicogenic headaches was reduced for the SMT group, with improvement maintained at a 24 week follow-up.⁵³

Haas et al. (2010) *Spine Journal*

A report issued by the Duke University Evidence-Based Practice Center⁵⁴, in a review of behavioral and physical treatments for tension-type and cervicogenic headache concluded, “Cervical spine manipulation was associated with significant improvement in headache outcomes in trials involving patients with neck pain and/or neck dysfunction and headache.” The report further concluded that, “Adverse effects are uncommon with manipulation.”

McCrorry et al. (2001) *Duke Evidence Report*

“The results of this study show that spinal manipulative therapy is an effective treatment for tension headaches...four weeks after cessation of treatment...the patients who received spinal manipulative therapy experienced a sustained therapeutic benefit in all major outcomes in

contrast to the patients that received amitriptyline therapy, who reverted to baseline values.”⁵⁵

Boline et al. (1995) *Journal of Manipulative and Physiological Therapeutics*

Chiropractic and Fibromyalgia

The Center for Disease Control describes Fibromyalgia (FM) as a chronic pain condition characterized by widespread pain and stiffness throughout the body, to include sleep disturbance, fatigue and psychological distress.⁵⁶ According to the National Institute of Arthritis and Musculoskeletal and Skin Diseases, a division of the U.S. National Institute of Health (NIH), research suggests that FM is caused by a disorder in how the body processes pain, resulting in a hypersensitivity to stimuli that normally are not painful.⁵⁷ The heightened sensitivity to pain appears to involve disordered central nervous system sensory nerve function that includes a physical change in regions of the brain (neuroplasticity) resulting in abnormal processing external stimuli.⁵⁸

The National Fibromyalgia and Chronic Pain Association estimates that 2-4% of the world’s population (approximately 210 million in 2015), and approximately 10 million Americans (3% of the U.S. population) are afflicted. FM occurs most often in women (80% women - 20% men), and the condition strikes all ethnic backgrounds, to include children.⁵⁸ For people with severe symptoms, fibromyalgia (FM) can be extremely debilitating and interfere with basic activities of daily living. The cause of FM remains uncertain.^{56, 57, 58}

Jan Chambers, President of the National Fibromyalgia & Chronic Pain Association, states, “...I started seeing a chiropractor who provided a thorough examination, ordered x-rays and then ...created a very rigorous program to address the problems in my neck and lower back. Years later, I still do therapy at home, but it is the chiropractic care that was my lifesaver. I feel like chiropractic care literally saved my life.”⁵⁸

Schneider⁵⁹, in a systematic review of the literature, concluded that several nonpharmacologic treatments and manual-type therapies have acceptable evidence supporting the treatment of FM, to include massage, muscle strength training, aerobic exercises, acupuncture and spa therapy (balneotherapy).

Chiropractic for Children

Chiropractic care is among the most common complementary and integrative health care practice used by children in the United States, according to the US National Center for Health Statistics Report (2015).⁶⁰ Internationally, chiropractic is frequently used by children.^{61, 62, 63, 64, 65, 66} Chiropractic care for children is most often sought for treatment of musculoskeletal conditions, except in the case of infants, where infantile colic is one of the more common presenting complaints.^{61,67}

Safety

Over recent years a number of authors have investigated the safety of chiropractic care for children and infants.^{64, 68, 69} These studies overwhelmingly suggest that chiropractic care can be safely provided to even the youngest members of society.

A survey of almost five and a half thousand chiropractic office visits for children up to the age of 18 found there were only 3 reported adverse events which were described as muscle or spine stiffness or soreness following chiropractic care⁶⁴ and these symptoms were self-limiting and the patients continued under care. The parents of the children in this survey

reported various improvements in their children's health and function after receiving chiropractic care, ranging from improvements in pain through improved mood and immune function.

Alcantara et al. (2009) *Explore*

In 2011 a review on the safety of pediatric chiropractic care was published that concluded that modern chiropractic care is safe, with one in every 100-200 children receiving care reporting soreness for up to 24 hours after receiving the adjustment.⁶⁹

Doyle (2011) *Clinical Chiropractic*

Infantile Colic

In 2011 a systematic review was published on chiropractic care for infants with colic.⁷⁰ In this study the authors summarized the findings from three clinical trials, two survey studies, six case reports, two case series, four cohort studies, five commentaries and four literature reviews. From these 26 articles the authors concluded that chiropractic offers a safe and effective alternative treatment approach for the child with infantile colic.

Alcantara et al. (2011) *Explore*

Researchers at a chiropractic teaching clinic in the United Kingdom assessed the efficacy of chiropractic manual procedure for infants with unexplained persistent crying behavior (infant colic). To remove any effect of parental reporting bias, the one hundred four infants (less than 8 weeks of age) were randomized to 1 of 3 groups: (i) infant treated, with parent aware of the inclusion chiropractic procedure; (ii) infant treated, where parent was unaware of the treatment procedure; and (iii) the infant not treated, and the parent was unaware of any treatment procedure. Over a 10 day period the parents completed daily crying diaries documenting infant behavior. After 10 days the excessively crying infants receiving chiropractic care were almost 12 times less likely to cry compared to the infants not receiving care. Crying behavior in the infants receiving chiropractic care reduced approximately 50% (1.5 hours less per day) over the 10 day period compared to the infant group not receiving chiropractic care.⁷¹

Miller et al. (2012) *Journal of Manipulative and Physiological Therapeutics*

Enuresis (Bedwetting)

In a 10 week controlled clinical trial conducted at the Palmer Institute of Graduate Studies and Research, researchers evaluated the chiropractic management of primary nocturnal enuresis (bedwetting) in forty-six children (31 treatment and 15 control group). The 10 week trial was preceded by and followed by a two-week nontreatment period. The subjects were assigned to a high velocity, short lever chiropractic spinal adjustment group, or to a sham adjustment (control) group using an Activator Instrument at a nontension setting administered to the examiner's underlying contact point. The outcomes measured were frequency of wet nights. The children receiving chiropractic care demonstrated significant improvement, and less frequency of bedwetting, compared to no improvement in the control

group. The study reports that 25% of the children receiving chiropractic care improved by 50% or more over the course of the study.⁷²

Reed et al. (1994) *Journal of Manipulative and Physiological Therapeutics*

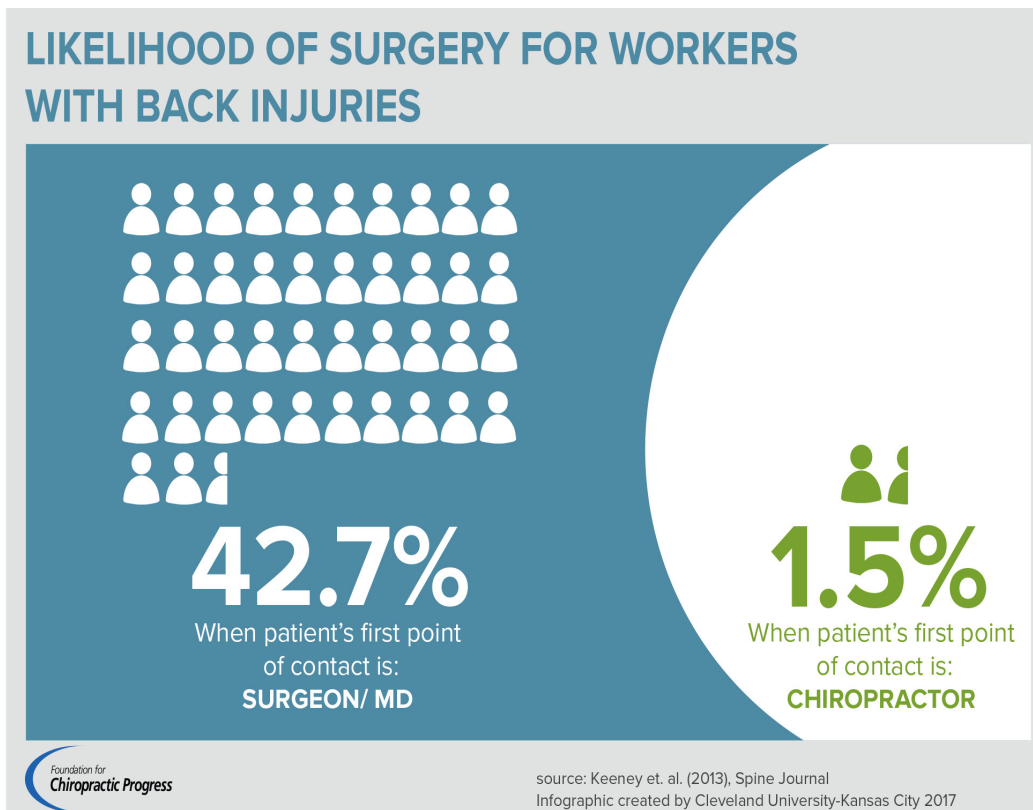
Comparing Chiropractic to Other Treatments

A randomized controlled trial with six-month follow-up reports that 94% of manual-thrust manipulation recipients under chiropractic care had a 30% reduction in low back pain at week four while only 56% of medical care recipients had a 30% reduction in low back pain at week four. This represents a 38% (94% - 56%) increase in effectiveness by seeing a doctor of chiropractic first. The study also determined that patients are best served when informed of nonpharmacological therapies for low back pain before electing riskier, less effective treatments. Manual-thrust manipulation, performed by doctors of chiropractic, achieves a greater short-term reduction in pain compared with common medical treatments.⁷³

Schneider et al. (2015) *Spine Journal*

In a prospective population-based study to identify early predictors of the likelihood of spine surgery for workers with back injuries⁷⁴, Keeney, from the Department of Orthopaedics at Dartmouth Medical School found that, “Reduced odds of surgery were observed for... those whose first provider was a chiropractor; 42.7 percent of workers [with back injuries] who first saw a surgeon had surgery, in contrast to only 1.5 percent of those who saw a chiropractor.”

Keeney et al. (2013) *Spine Journal*



Source: Keeney et al (2013) Spine Journal ⁷⁴

A randomized controlled trial of 169 women reported in the *American Journal of Obstetrics and Gynecology* concluded that a combination of chiropractic spinal manual therapy, exercise and patient education reduces low back and pelvic pain, improved joint range of motion and stability, and provided global improvements in daily activities. This multimodal approach to musculoskeletal low back and pelvic pain instituted in the late second and third trimester of pregnancy benefits patients above and beyond standard obstetrical provider care received.⁷⁵

George et al. (2013) *American Journal of Obstetrics and Gynecology*

A 2013 analysis of Medicare data through 2008⁷⁶ showed that chiropractic claims represented less than one tenth of one percent of Medicare costs. Chiropractic claims peaked in 2005 and then declined through 2008, contrasted to an overall increase in Medicare costs.

Whedon et al. (2013) *Spine Journal*

Acute and chronic chiropractic patients experienced better outcomes in pain, functional disability, and patient satisfaction; clinically important differences in pain and disability improvement were found for chronic patients.⁷⁷

Haas et al. (2005) *Journal of Manipulative and Physiological Therapeutics*

“In our randomized, controlled trial, we compared the effectiveness of manual therapy, physical therapy, and continued care by a general practitioner in patients with nonspecific neck pain. The success rate at seven weeks was twice as high for the manual therapy group (68.3 percent) as for the continued care group (general practitioner). Manual therapy scored better than physical therapy on all outcome measures. Patients receiving manual therapy had fewer absences from work than patients receiving physical therapy or continued care, and manual therapy and physical therapy each resulted in statistically significant less analgesic use than continued care.”⁷⁸

Hoving et al. (2002) *Annals of Internal Medicine*

Cost Effectiveness

For older adults with chronic mechanical neck pain, spinal manipulative therapy (SMT) plus home exercise and advice (HEA) results in better clinical outcomes and lower costs versus supervised rehabilitative exercise (SRE) plus HEA, according to a study published by researchers from the University of Minnesota in Minneapolis. The study examined the clinical outcomes and cost-effectiveness of HEA, SMT plus HEA, and SRE plus HEA in a sample of 241 older adults with chronic mechanical neck pain over a one-year time horizon.⁵

Leininger et al. (2016) *Spine Journal*

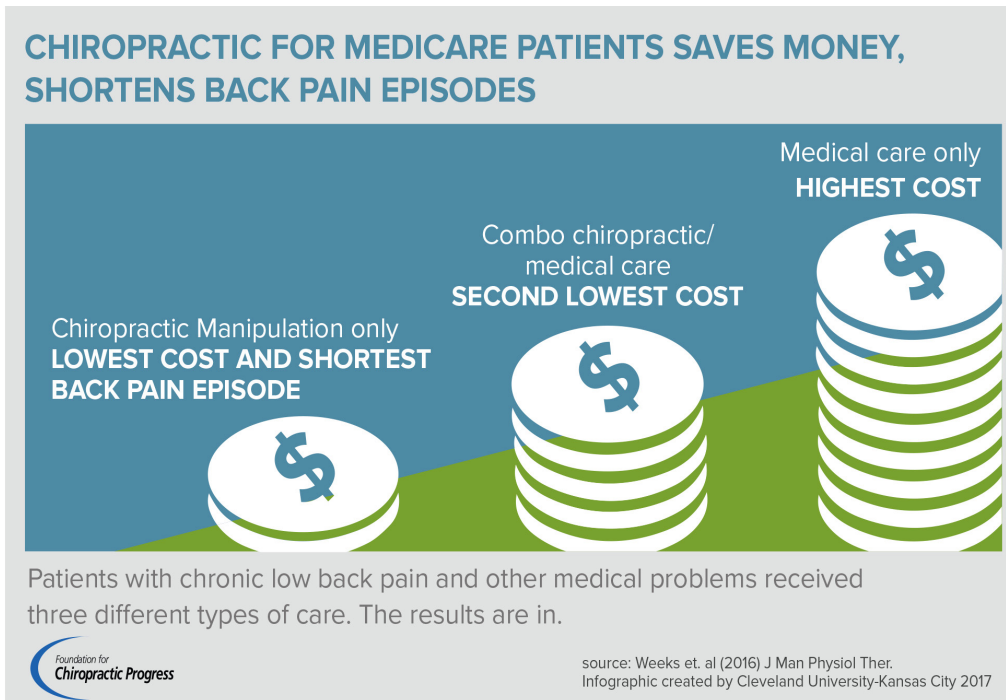
Findings from a study utilizing data from the North Carolina State Health Plan collected between 2000-2009 show that care by a doctor of chiropractic (DC) alone or DC care in conjunction with care by a medical doctor (MD) incurred “appreciably fewer charges” for uncomplicated lower

back pain than MD care with or without care by a physical therapist.⁷⁹

Hurwitz et al. (2016) *Journal of Manipulative and Physiological Therapeutics*

Older Medicare patients with chronic low back pain and other medical problems who received spinal manipulation from a chiropractic physician had lower costs of care and shorter episodes of back pain compared to patients in other treatment groups. Patients who received a combination of chiropractic and medical care had the next lowest Medicare costs, and patients who received medical care only incurred the highest costs.⁸⁰

Weeks et al. (2016) *Journal of Manipulative and Physiological Therapeutics*



Source: Weeks et al. (2016) J Man Physiol Ther.⁸⁰

In a 2016 systematic review of the interventions that are cost-effective for management of whiplash-associated and neck pain-associated disorders, the authors found that structured education is cost-effective for whiplash-associated disorder and that for neck pain and associated disorders, advice, exercise and multimodal care including manual therapy are cost effective.⁸¹

van der Velde et al. (2016) *Spine Journal*

A 2015 cross-sectional study of 17.7 million older adults enrolled in Medicare indicated that greater availability of chiropractic care in some areas may be offsetting Primary Care Provider services for back and/or neck pain among older adults. Researchers estimate that chiropractic care may reduce the number of Medicare patient visits to primary care medical physicians for back and/or neck pain resulting in \$83.5 Million in annual savings.⁸²

Davis et al. (2015) *Journal of the American Board of Family Medicine*

REDUCED MEDICARE COSTS WITH CHIROPRACTIC

Researchers estimate that chiropractic care may reduce the number of Medicare patient visits to primary care medical physicians for back and/or neck pain, resulting in

\$83.5 MILLION IN ANNUAL SAVINGS



source: Davis et al (2015) J Am Board Fam Med.
Infographic created by Cleveland University-Kansas City 2017

Source: Davis et al (2015) J Am Board Fam Med.⁸²

Houweling et al., in a study to identify outcomes, patient satisfaction and related health care costs for the treatment of spinal, hip, and shoulder pain, where patient initial first-contact care was with a medical vs. chiropractic provider, found that patients initially consulting MDs had significantly less reduction in their numerical pain rating score and were significantly less likely to be satisfied with the care received and outcome of care. The study sample included 403 patients who had seen MDs and 316 patients who had seen DCs as initial health care providers for their complaint. The mean costs per patient over four months were significantly lower in patients initially consulting DCs (difference of U.S. \$368).⁸³

Houweling et al. (2015), *Journal of Manipulative and Physiological Therapeutics*

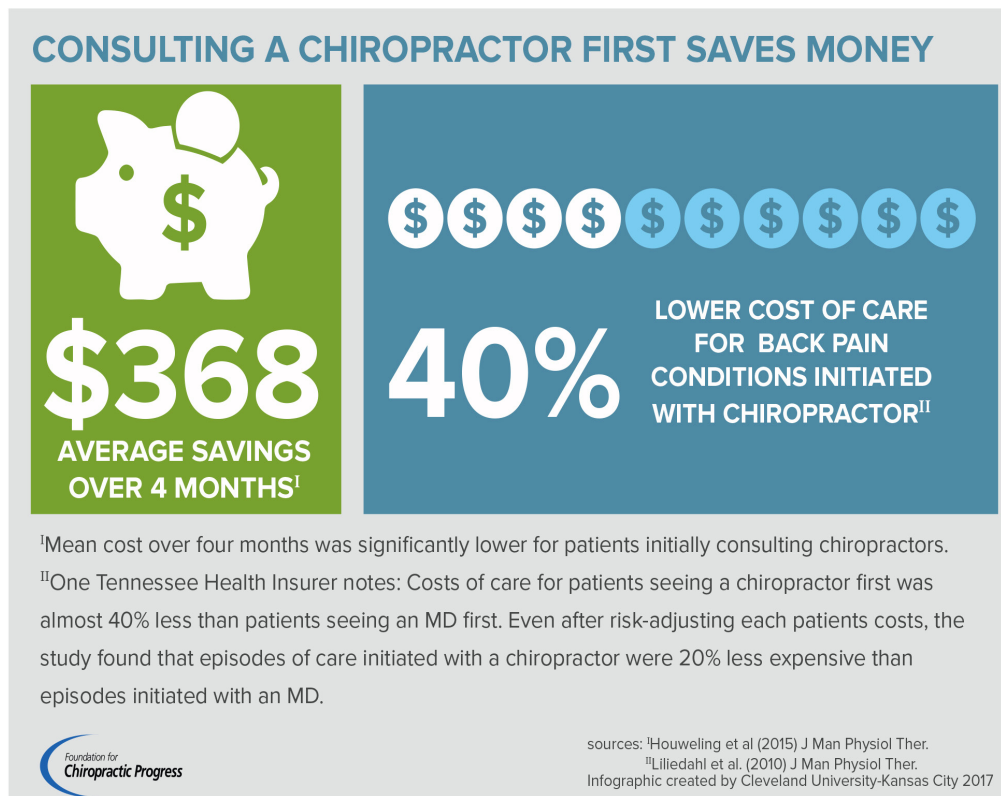
An analysis of health care costs associated with the use of complementary and alternative medicine (CAM) by patients with spine problems determined that seeing a chiropractic resulted in an estimated \$424 lower adjusted annual healthcare cost for spine-related costs when compared to non-CAM users. Additionally, those who used complementary and alternative providers, including doctors of chiropractic, had significantly lower hospitalization expenditures.⁸⁴

Martin et al. (2012) *Medical Care*

Low back pain initiated with a doctor of chiropractic (DC) saves 40 percent on health care costs when compared with care initiated through a medical doctor (MD), according to a study that analyzed data from 85,000 Blue Cross Blue Shield (BCBS) beneficiaries in Tennessee over a two-year span. Researchers estimated that allowing DC-initiated episodes of care would have resulted in an annual cost savings of \$2.3 million for BCBS of

Tennessee. The authors conclude that insurance companies that restrict access to chiropractic care for low back pain treatment may inadvertently pay more for care than if they removed such restrictions.⁸⁵

Liliedahl et al. (2010) *Journal of Manipulative and Physiological Therapeutics*



Sources: i Houweling et al. (2015) J Man Physiol Ther ⁸³

ii Liliedahl et al (2010) J Man Physiol Ther ⁸⁵

Niteesh Choudhry, MD, PhD of Harvard Medical School, and Arnold Milstein, MD, Chief Physician at Mercer Health and Benefits and Medical Director of the Pacific Business Group on Health, co-authored the 2009 report, *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 Healthcare Spending*.⁸⁶ Using data from high-quality randomized controlled trials, this report combined a rigorous analysis of direct and indirect costs with the evidence concerning clinical effectiveness of chiropractic care. Including both the clinical effectiveness and cost, chiropractic care was far more valuable than medical treatment for neck and low back pain.

These authors found that for neck pain, chiropractic care decreases annual spending by \$302 compared to medical physician care, and that for low back pain, chiropractic increases total annual per-patient spending by \$75 compared to medical physician care.

This report concludes that, “when considering effectiveness and cost together, chiropractic physician care for low back and neck pain is highly cost effective, represents a good value in comparison to medical physician care and to widely accepted cost-effectiveness thresholds.” Further, the authors state that, “Because we were unable to incorporate savings in drug spending commonly associated with U.S. chiropractic care, our estimate of its comparative cost-effectiveness is likely to be understated.”

Choudhry and Milstein (2009) *Mercer Report*

Chiropractic Spine Care and Changes to Nervous System, Muscle Reflexes, Brain Function and Human Performance

A growing body of scientific evidence has demonstrated that spinal function impacts central neural function in the spinal cord and brain in multiple ways,^{16, 87, 88, 89, 90, 91, 92, 93} and that improving spinal function results in positive clinical outcomes not only in enhanced spinal motion and pain reduction, but also in improved sensory and motor nerve processing, termed sensorimotor integration*.^{30, 94, 95, 96, 97} Scientists have known for decades that neurons (nerve cells) continuously adapt in structure and function in response to stimuli from our ever-changing environment^{98,99,100} and when the nervous system is subjected to unaccustomed sensory inputs, as example in altered spinal joint movement, this changes the way the nerve system processes all subsequent sensory inputs.^{101, 102, 103, 104, 105, 106, 107, 108}

This ability of the nervous system to change, and to reorganize its response to stimuli has been termed neuroplasticity**.¹⁰⁸ The process of neuroplasticity partially explains how individuals compensate or recover function after injury to the nervous system, as example, in recovery from the damage that occurs with strokes.

Research studies have demonstrated that for individuals with a history of spinal problems, even when in the absence of pain, their brain works differently compared to people without a history of spinal pain or injury.^{89, 109} It is hypothesized that the spinal dysfunction, or subluxation, in neurophysiological terms represents a central nervous system segmental motor control problem.^{16, 110, 111}

As example, following an injury or with prolonged poor posture, an alteration in spinal or related joint movement will change the way the small muscles that surround that joint provide feedback or “tell” the brain what is going on in and around the body. Without appropriate feedback, the brain cannot appropriately control the body’s movement pattern.

Researchers have demonstrated that spinal adjustments can change various aspects of nervous system function.¹⁶ There is accumulating evidence to support that the effect of chiropractic adjustments is to interrupt the self-perpetuating reflex cycle that adversely affects the function of many sensorimotor integration systems, processes and functions of the body.

For example, chiropractic spinal adjustments have been reported to improve or alter visual acuity and visual field size,^{114,115} joint position sense error,^{89, 116} reaction time,^{116, 117} cortical processing,¹¹¹ cortical sensorimotor integration,^{111, 118, 119, 120} reflex excitability,^{121, 122, 123, 124, 125} motor control,^{116, 123, 126, 127} and lower limb muscle strength.^{125, 128} Much of this evidence suggests a role for the doctor of chiropractic beyond the management of back and neck pain, and headache, in that chiropractic adjustments have a positive neuroplastic effect on the central nervous system, enhancing function and human performance.

*Sensorimotor integration: The capability of the central nervous system to integrate different sources of stimuli, and parallelly, to transform such inputs in motor actions.¹¹²

** Neuroplasticity: The brain’s ability to reorganize itself by forming new neural connections throughout life. Neuroplasticity allows the neurons (nerve cells) in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment.¹¹³

MANAGING JOINT FUNCTION AND MOBILITY

Physical inactivity is considered the fourth leading risk factor for global mortality and the cause of an estimated 3.2 million deaths annually across the globe.¹²⁹ Inactivity is a fast-growing public health concern and contributes to a variety of chronic diseases and health complications.¹³⁰

Lack of motion within joints can result in disturbed biomechanics, with or without pain or other subjective symptoms. Disturbed joint biomechanics is known to adversely affect sensorimotor function altering arm or leg position sense and reducing optimum joint performance.⁸⁹ Disturbed joint function alters the brain's ability to integrate multiple sensory stimuli and affect neural processing spatial judgement.¹³¹

A brain that less accurately processes sensory stimuli, and is less aware of its position sense and spatial body orientation, may be less accurate in maintaining biomechanical movement control. Therefore, spinal joint dysfunction is likely to result in reduced optimal performance and increased risk of injury. Further, disturbed biomechanics accelerates joint degeneration¹³² and results in pain.

It is the role of the doctor of chiropractic to identify dysfunctional subluxated joints and provide spinal and extremity adjustments to help restore normal biomechanics. Chiropractic adjustments specifically applied to joints can restore motion when the body's own muscles cannot. This helps relieve pain, as well as to restore and maintain normal movement, biomechanics and function. Maintaining good motion is critical to the health of discs, muscles and joints, which may reduce the risk of future problems or injuries.

Joint Function and Motion in the Aging Patient

Senior citizens often experience structural problems such as degenerative joint disease or osteoarthritis, and frequently present with pain and stiffness related to the spine and extremities. In the United States and across the globe, chronic back pain in the senior population (ages 65 and older) gives rise to increasing health care costs, and is of increasing concern to third-party payers.

Older adults are more likely to have neuro-musculoskeletal and joint problems, and are increasingly seeking treatment from doctors of chiropractic for these conditions as they lead longer, more active lives.¹³³ As the health care of this aging population is covered by the U.S. federal government through Medicare, this underscores the importance of a recent study funded by the National Institute of Health (NIH) demonstrating that upon study of Medicare data for comparable patient groups, overall costs of care, back surgery rates and pharmaceutical costs were substantially lower for those receiving chiropractic treatment.⁸⁰ The report findings suggest chiropractic as a first line approach for management of senior, comorbid, patients with chronic low back pain.

The doctor of chiropractic may outline a program of exercise that allows for monitoring the patient's progress, with a focused objective to rehabilitate and strengthen specific muscle groups. Alternatively, the chiropractor may recommend regular moderate-intensity physical activity such as walking or cycling, as these activities can have significant benefits for health. This physical activity may include age-appropriate group activities or sports. It is well known that regular moderately intensive activities can reduce the risk of cardiovascular diseases, diabetes, colon and breast cancer, and depression. Moreover, adequate levels of physical activity will decrease the risk of a hip or vertebral fracture and help control weight.¹²⁹

Simply stated, a solution for the growing physical inactivity problem in America is movement. Doctors of chiropractic are well positioned to include guidance for exercise and physical activity when designing care plans for patients, as it is well substantiated that exercise and mobility are integral to prevention and management of chronic disease.^{30, 134}

Sports Performance and Injury Prevention

Doctors of chiropractic are well-represented on interdisciplinary healthcare teams serving professional, collegiate, high school, and recreational athletes national and across the globe, assisting in management of athletic performance and treatment of sports injuries. All NFL teams and most professional sports teams have doctors of chiropractic as part of the medical staff.¹³⁵ William Moreau, DC, Medical Director for Team USA and Olympic Games Chief Medical Officer reports that the formal participants of the interdisciplinary U.S. medical team at the 2016 Rio Olympics included 28 medical doctors/doctors of osteopathic medicine, 18 doctors of chiropractic, 16 massage therapists and 10 physical therapists.¹³⁶

In a study performed with elite Tae Kwon Do athletes,¹³⁷ researchers found an 8% increase in strength after a single chiropractic adjustment session. The changes in strength in this study were also thought to be due to an increase in cortical drive. (The brain is able to influence muscle movement more effectively). The researchers concluded that spinal adjustments in this group resulted in increased strength and cortical drive and appeared to prevent fatigue. The strength findings lasted for 30 minutes and the cortical drive increase persisted for at least 60 minutes.

Christiansen et al. (2017) *Journal of Chiropractic Education*

Strength changes of the lower limb have been documented following spinal adjustments.^{125, 138} In a group of college students, one single session of spinal adjustments increased the strength of their leg muscle by 16%.¹²⁵ The authors suggested that the changes in strength they observed after chiropractic adjustments is likely due to changes in cortical drive.

Niazi et al. (2015) *Experimental Brain Research*

In a randomized controlled trial performed with elite Judo athletes, researchers tested their grip strength after three sessions of cervical chiropractic adjustments.¹³⁹ After the first session their grip strength increased by an average of 10% across both hands, this increased to 14% after the second and third sessions. No significant changes were observed in the sham group.

Botelho (2012) *Journal of Manipulative and Physiological Therapeutics*

Other studies have shown that chiropractic adjustive intervention can improve brain reaction times^{116, 140} and joint position sense of both the upper and lower limbs.^{89, 116} Applying this observation to the athlete, it is hypothesized that chiropractic care may enhance performance, and help prevent injuries as result of an increased ability of the brain to process sensory information faster and more accurately, resulting in an enhanced awareness of the position and movement of the athlete's arms and legs.

INTERDISCIPLINARY CARE, OCCUPATIONAL HEALTH AND WORKPLACE WELLNESS, AND CHIROPRACTIC IN THE MILITARY

Being Part of Interdisciplinary Care

While most chiropractic services are community-based in private offices, interdisciplinary and integrated practices are now common, with chiropractic doctors, medical doctors, physical therapists, acupuncturists and others working as partners in private practices, occupational health and rehabilitation centers, multidisciplinary corporate health and wellness centers, and national sports medicine teams. Doctors of chiropractic provide care to the U.S. Military and in veterans' hospitals.

An Integrated Approach to Chronic Pain

Since 2005, Advanced Medicine Integration Group (AMI) through its innovative Integrated Chronic Pain Program (ICPP) has provided ongoing services to commercial managed care organizations and state Medicaid providers featuring holistic nurse case management across the continuum of care with referrals to chiropractors, massage therapists and acupuncturists, while coordinating with the member patient's primary care physicians.

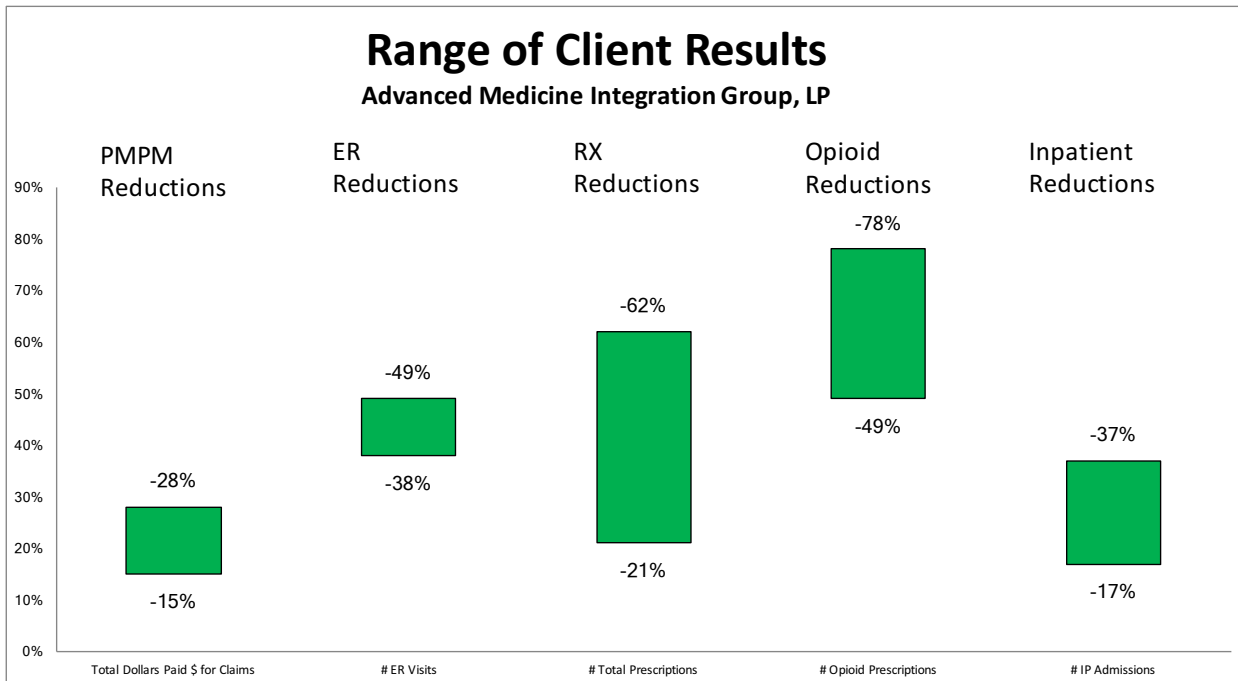
The AMI model highlights the efficacy of an interdisciplinary approach demonstrating a reduction in the overutilization of "non-outcomes producing care and non-outcomes producing costs" by shifting care away from a high cost, high tech, low patient satisfaction model to a low cost, low tech, high patient satisfaction model.¹⁴¹ AMI, an independent physicians association, provides clients (Commercial Managed Care Organizations, State Medicaid Providers) an evidence-based alternative to conventional pharmaceutically and procedure driven protocols for the management of chronic pain conditions.

Client-validated baseline data derived from three years of paid claims was compared before and after AMI integrated chronic pain program participation for enrolled members with chronic pain conditions. Furthermore, in all cases, the positive outcomes of the enrolled patients were measured versus a control group of similar patients, who were program-eligible but not enrolled.¹⁴² The summary below and the analysis illustrated in the graph that follows depicts the range of outcomes for four client organizations over a 12 year period.

The outcomes demonstrate:

- Claims Cost: A per member per month (PMPM)* reduction in total average medical costs net of AMI fees in a range of 15% to 28%
- Emergency Room Visits: A decrease in ER visits in a range of 38% to 49%
- Rx Scripts: A reduction in average number of pharmaceutical prescriptions ranging from 21% to 62%
- Opioid Scripts: A decline in opioid prescriptions in the range of 49% to 78%
- Inpatient Admissions: A 17% to 37% decrease in the average number of inpatient admissions (IP)

*Member months are commonly found in the reports of group insurance companies, such as group health plans. The Per Member Per Month (PMPM) forms the basis upon which managed care organizations pay providers under capitation revenue stream or cost for each enrolled member each month.¹⁴³



Range of Results from a 2005 to 2017 analysis of four client organizations including commercial managed care organizations and state Medicaid members receiving integrated health services through Advanced Medicine Integration Group, LP. This information presented to Rhode Island Quality Institute's Clinical Strategy and Cost Containment Committee, October 2016. Richard Sarnat, MD, Advanced Medicine Integration Group, LP.¹⁴³
 Note: Control group data for each client is proprietary and not cited under non-disclosure agreements.

In a 2017 study published in the journal, *Pain Medicine*, Donovan et al. reported on Rhode Island Medicaid offering the high emergency department utilizer patients the opportunity to take part in the integrated Chronic Pain Program providing complementary therapies to include massage, chiropractic, and acupuncture. A qualitative interview-based study was conducted to elicit information from patients, providers and administrators of the program yielding support that this holistic integrated approach as part of the Rhode Island Chronic Pain Program shows promise for the hard-to-reach Medicaid population.¹⁴⁴

Donivan et al. (2017) *Pain Medicine*

The Growing Role in Occupational Health and On-Site Workplace Health Clinics

Employers across the country are taking a more direct approach to improving the health and well-being of their employees. The inclusion of doctors of chiropractic as part of the on-site corporate health clinic services has become increasingly popular among employers. Employer funded on-site care programs that provide chiropractic services include companies such as Google, Cisco Systems Inc., Cerner Corporation and Facebook. This interest by the corporate community is driven by the favorable outcomes based upon research demonstrating the effectiveness of chiropractic care in the management of the increasingly prevalent and costly neuro-musculoskeletal conditions that represent a common cause of long-term pain and physical disability in the workplace today.

Doctors of chiropractic are well trained to serve as a conservative, first contact, drug-free and non-invasive approach for care for neuro-musculoskeletal care and pain management. Findings published in a 2012 issue of the *Journal of Occupational and Environmental Medicine* suggest that chiropractic

services offered at on-site corporate health clinics, contrasted to off-site physical therapy services, result in lower costs of care, while improving neuro-musculoskeletal function.¹⁴⁵ Further, on-site chiropractic services in the workplace were directly connected with lower utilization of radiology services, lower utilization of outpatient and emergency settings, and lower utilization of physical therapy.¹⁴⁶

In collaboration with the Sweere Center at Northwestern University of Health Sciences, Henriksen and Wolner, in a 2016 study, completed a review of the reduction in workplace injuries through inclusion of an employer sponsored on-site chiropractic care program at Friendship Homes, a Minnesota custom home builder. The evidence of value of on-site chiropractic care as a successful health care delivery model, in year-over-year cost comparisons of workplace sprain-strain and cumulative trauma injuries, is demonstrated by a 63 percent reduction in neuro-musculoskeletal injuries, a 67 percent reduction in average case cost, and an 88 percent cost reduction associated with those injuries. Further, for every \$1.00 invested to include on-site chiropractic services, this resulted in an \$8.35 savings. Although employees had access to on-site chiropractic services during company business hours, Friendship Homes of Minnesota reported no negative effect on productivity.¹⁴⁷

A key observation in this study of this on-site chiropractic services model is that the employee is provided on-the-job access to chiropractic health care, with the focus on injury and illness prevention and early intervention. The benefit to the employer is the reduction in workplace injuries, and the opportunity to control cost of care, a reduction in absenteeism, enhance employee loyalty and retention. Further, the on-site chiropractic services model may be instituted at minimal capital expense, and at low liability risk. For the on-site chiropractic provider, this represents a new and emerging market of service delivery, one that eliminates a need for third party reimbursement, and at a significantly reduced overhead.

Doctors of chiropractic can be integrated within the on-site corporate health clinic in a variety of ways, ranging from part-time to full-time practitioners to executive positions responsible for leading key internal departments. On-site corporate health clinics are evolving to meet the specific needs of employers of various sizes and industries, and predicted to gain in popularity with a projected growth of 15 to 20 percent annually.¹⁴⁸

Integration of Chiropractic Services in Military and Veteran Health Care Facilities

As of the date of this publication, doctors of chiropractic provide services to active-duty military personnel in 66 interdisciplinary military treatment facilities worldwide (63 in the U.S., others in Japan and Germany).¹⁴⁹ Chiropractic services have been included in the standard medical benefits package available to all enrolled veterans through the U.S. Department of Veterans Affairs, and today chiropractic practitioners are employed in Veterans Administration (VA) hospitals throughout the country.¹⁵⁰ According to Anthony Lisi, DC, Chiropractic Program Director for the Veterans Administration, 122 doctors of chiropractic are serving at 80 VA facilities.¹⁵¹

A 2016 study of the use of chiropractic in the Veterans Administration,¹⁵⁰ found that from 2004 to 2015 the annual number of patients seen in VA chiropractic clinics increased 822 percent. The total number of VA chiropractic clinics grew from 27 to 65 (9.4 percent annually). The VA also purchased care from private sector chiropractors starting in 2000, growing to 159,533 chiropractic visits for 19,435 patients at a cost of \$11,155,654 annually.

Green, et al. in a systematic literature review,¹⁵² report that services are successfully integrated within the military and Veterans Affairs health systems with chiropractors managing common musculoskeletal

and related neurological conditions, to include injuries obtained in combat, complex cases, and cases that include psychosocial factors. The study reports that chiropractors collaboratively manage patients with other providers and focus on reducing morbidity for veterans and rehabilitating military service members to full duty status. Further, preliminary findings reflect that chiropractic management of common musculoskeletal conditions shows significant improvement, and with high patient satisfaction.

The findings from the Chiropractic Care Study¹⁵³ released by the US Department of Defense (DoD) in 2009 following the introduction of doctors of chiropractic at selected TRICARE facilities, reported high satisfaction rates across all branches of the military citing:

- Ninety Four (94.3) percent satisfaction in the Army
- Twelve of 19 Air Force bases reported 100 percent satisfaction rates, with the remaining seven sites reporting ratings higher than 90 percent
- Navy reported satisfaction ratings from 86 to 100 percent
- TRICARE outpatient satisfaction surveys rated chiropractic services at 88.54 percent, representing a 10 percent “higher than the overall satisfaction with all providers” (All provider satisfaction was reported at 78.31 percent.)

The DoD Chiropractic Care Study survey affirmed that Unit Commanders and MTF personnel consider chiropractic care a “valuable adjunct” to the health care offered in the MTFs,” stating that, “The Unit personnel generally consider chiropractors to return Active Duty Service Members to duty faster, and they would select a chiropractor as much or more than a Doctor of Osteopathy or physical therapist.”¹⁵⁴

Chiropractic VA Externship Programs

Selected VA medical facilities maintain formal academic affiliation agreements with chiropractic colleges, providing clinical education and training opportunities for chiropractic students through Chiropractic Externship Programs. The Department of Veterans Affairs reports that since 2004 over 1,500 chiropractic students have completed clinical rotations at 24 VA facilities.¹⁵⁵

Chiropractic VA Residency Programs

Graduate doctors of chiropractic are eligible to participate in VA resident training hospitals side by side with medical graduates receiving clinical training in these facilities.¹⁵⁵

The VA has implemented hospital-based Chiropractic Residency Programs focused on integrated clinical practice, with training emphasizing the provision of chiropractic care in an integrated health care system, collaborating with primary care Patient Aligned Care Teams (PACTs), specialty care, and other medical and associated health providers and trainees. The residencies provide advanced clinical training in complex case management, allowing recent graduates to increase their scope and depth of clinical knowledge, experience and acumen.

Residents are mentored by senior VA chiropractors who are experienced in integrated chiropractic practice, and who share their expertise in inpatient care, academics and research to provide a robust educational experience. These training programs expand the residents’ ability to collaborate with other health care professionals in team care, and prepare the resident for future positions in VA, other health care systems, and/or academic settings.

Residents provide diagnostic and management services of musculoskeletal and neuromuscular conditions under the mentorship of senior VA doctors of chiropractic. This includes team-based management of complex conditions in collaboration with other medical specialists and health care providers.

The national residency program is administered by VA Office of Academic Affiliations, in conjunction with Rehabilitation and Prosthetic Services. Each VA facility partners with an affiliated Council on Chiropractic Education (CCE) accredited member institution in conducting the program.¹⁵⁵

SAFETY OF CHIROPRACTIC

Researchers from the Departments of Neurosurgery, at Penn State Hershey Medical Center, Loma Linda University Medical Center and The Pennsylvania State University, in conducting a systematic review and meta-analysis of chiropractic neck manipulation and cervical artery dissection, found no convincing evidence to support a causal link. Further, the authors conclude that the unfounded belief in causation may lead to episodes of litigation.¹⁵⁶

Church et al. (2016) *Cureus*

Whedon et al. in a 2015 cohort study published in *Spine Journal* found that, “among Medicare beneficiaries aged 66 to 99 years with an office visit for a neuro-musculoskeletal problem, risk of injury to the head, neck, or trunk within 7 days was 76 percent lower among subjects with a chiropractic office visit than among those who saw a primary care physician.”¹⁵⁷

Whedon et al. (2015) *Spine Journal*

In a separate 2015 cohort study, Whedon et al. found that “among Medicare B beneficiaries aged 66 to 99 years with neck pain, incidence of vertebrobasilar stroke was extremely low. Small differences in risk between patients who saw a chiropractor and those who saw a primary care physician are probably not clinically significant.”¹⁵⁸

Whedon et al. (2015) *Journal of Manipulative and Physiological Therapeutics*

The results of a case-control study in U.S. commercial and Medicare Advantage patient populations by Kosloff et al. concluded, “We found no significant association between exposure to chiropractic care and the risk of vertebrobasilar artery (VBA) stroke. We conclude that manipulation is an unlikely cause of VBA stroke. The positive association between primary care provider (PCP) visits and VBA stroke is most likely due to patient decisions to seek care for the symptoms (headache and neck pain) of arterial dissection. We further conclude that using chiropractic visits as a measure of exposure to manipulation may result in unreliable estimates of the strength of association with the occurrence of VBA stroke.”¹⁵⁹

Kosloff et al. (2015) *Chiropractic Manual Therapy*

In a 2008 population-based, case-control and case-crossover study published in *Spine Journal*, Cassidy et al. concluded that “Vertebrobasilar Artery (VBA) stroke is a very rare event in the population. The increased risks of VBA artery stroke associated with chiropractic and primary care medical provider visits is likely due to patients with headache and neck pain from vertebrobasilar artery dissection seeking care before their stroke.”

The authors found no evidence of excess risk of VBA stroke associated with chiropractic care compared to primary care.¹⁶⁰

Cassidy et al. (2008) *Spine Journal*

Chiropractic – A Safer Strategy Than Opioids

The new Guidelines of the American College of Physicians (ACP) published in the *Annals of Internal Medicine*, February 2017,¹⁶¹ call for non-drug therapy as a first approach in the treatments of acute, subacute and chronic low back pain. “Clinicians and patients should select non-pharmacologic treatment with superficial heat massage, acupuncture or spinal manipulation,” according to the guideline.

The guideline states that, “Exercise, rehabilitation, acupuncture...and spinal manipulation are shown to improve symptoms with little risk of harm.” Further, “If these non-medicine treatments do not work, patients...and their doctors should discuss medicines...” The ACP *Summaries for Patients* document states, “Opioids should be considered only if no other treatments work and only if there are more benefits than risks for an individual patient.”¹⁵⁷

Fighting Opioid Abuse With Solutions That Work

“America’s Health Insurance Plans (AHIP), with its members, support programs and tools to combat opioid addiction ... are playing a leadership role in combating this crisis...”

“Because the risk of addiction is so great and the consequences so profound, our members encourage physicians and patients to jointly develop pain treatment plans that consider non-narcotic treatment options, such as physical or occupational therapy, chiropractic care, or acupuncture. Many plans support the CDC’s opioid prescribing guidelines that state opioids should not be first-line or routine therapy for chronic pain. Opioid addiction and abuse is a crisis, but working together – health plans, physicians, nurses, and pharmacists – with the right solutions, we can tackle it.”

Carmella Bocchino

Executive Vice President at America’s Health Insurance Plans (AHIP)

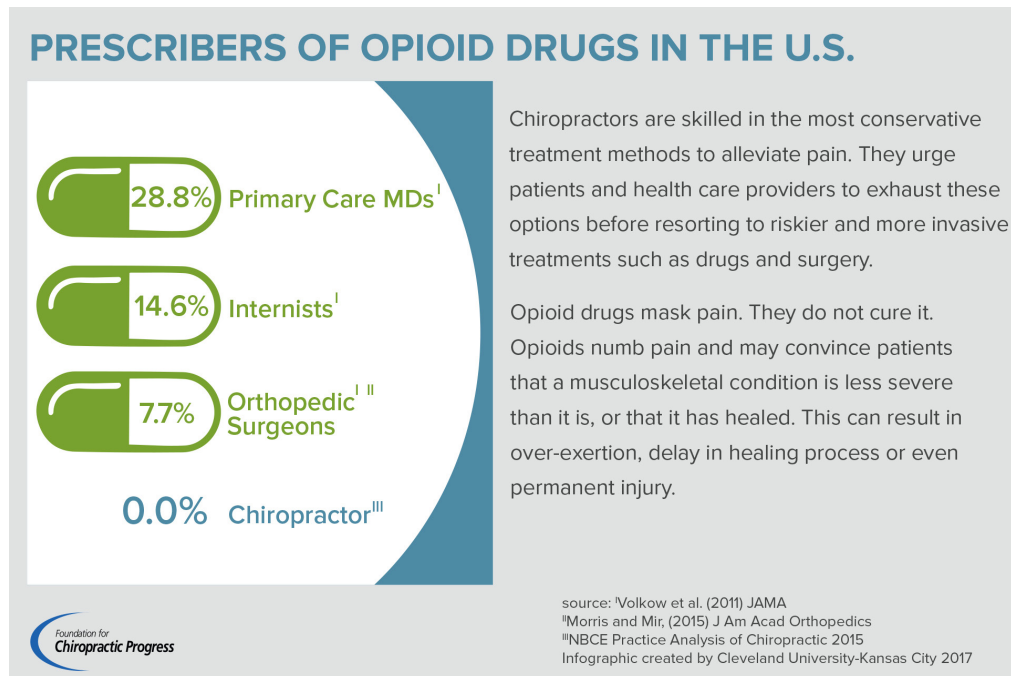
October 11, 2016¹⁶²

The cover of *Time Magazine*, June 15, 2015,¹⁶³ conveyed the crushing impact of opioid drug use and abuse clearly: “They’re the most powerful pain killers ever invented. And they’re creating the worst addiction crisis America has ever seen.” Accidental death from prescription drug overdose is the biggest man-made epidemic in the United States.

CNN’s Dr. Sanjay Gupta, on May 16, 2016, featured Dr. Gary Franklin, medical director for the Washington State Department of Labor and Industries in a presentation titled “Let’s end the prescription drug death epidemic,” which summarized that:

- Addiction to prescribed opioids is leading to the most common cause of preventable death in America today

- A person dies every 19 minutes, on average, from an accidental prescription drug overdose
- And now is a leading cause of accidental deaths in the United States, surpassing car crashes



Sources: Volkow et al. (2011) JAMA¹⁶⁵, Morris and Mir, (2015) J Am Acad Orthopedics¹⁶⁶, NBCE Practice Analysis of Chiropractic 2015¹⁶⁷

The presentation continued, stating that, “The most common scenario involves a man in his 40s or 50s who visits a doctor with a backache and walks out with a pain pill prescription. About three years later, typically, the man dies in his sleep from taking too many pills, or mixing them with alcohol.”

In the face of this epidemic of opioid addiction there is growing interest within health care for how to best blend conventional and complementary non-drug approaches in the management of musculoskeletal disorders. This is especially true for the costly and burdensome effects of low back pain, which has prompted increased research into the mechanisms, benefits and risks of the complementary approach to spine care provided by doctors of chiropractic.¹⁶⁸

The Institute of Medicine in 2011 called for cultural transformation in pain prevention, its diagnosis and management, and recommended greater collaboration between the different clinical disciplines.¹⁶⁹ In November 2014, The Joint Commission revised its Pain Management Standard PC.01.02.07 for ambulatory care, critical access hospital, home care, hospital, nursing care center, and office-based surgery accreditation programs, stating upon extensive literature review by clinical authorities providing guidance on the future direction of pain management, that:

“The experts affirmed that treatment strategies may consider both pharmacologic and non-pharmacologic approaches. In addition, when considering the use of medications to treat pain, organizations should consider both the benefits to the patient, as well as the risks of dependency, addiction, and abuse of opioids.”

The following examples are not exhaustive, but strategies may include the following:

- *Non-pharmacologic strategies: physical modalities (for example, acupuncture therapy, chiropractic therapy, osteopathic manipulative treatment, massage therapy and physical therapy), relaxation therapy and cognitive behavioral therapy.*
- *Pharmacologic strategies: nonopioid, opioid, and adjuvant analgesics.*¹⁴⁴

The American Society of Interventional Pain Physicians published that Americans constitute 4.6 percent of the world population, yet consume 80 percent of the global opioid supply, and 99 percent of the global hydrocodone supply. At stake is the health and the lives of millions of Americans hanging in the balance.¹⁷⁰

For the overwhelming numbers of Americans who suffer with chronic pain, chiropractic care offers a non-pharmaceutical, non-invasive and cost-effective alternative for pain management. Third party payers and insurance plan sponsors, both governmental and commercial, have opportunity to improve member satisfaction and benefit programs by making chiropractic services an accessible and affordable option for chronic pain relief, through reimbursement of doctors of chiropractic as covered providers.

The United States has awakened on every level to the crushing impact of opioid abuse epidemic. Calls have come forward from the Centers on Disease Control and Prevention, the Institute of Medicine, the Food and Drug Administration, and Joint Commission,¹⁷¹ for a shift away from opioid use toward non-pharmacologic approaches to manage chronic pain.¹⁷²

The data speaks for itself. Overdose deaths involving prescription opioids have quadrupled since 1999,¹⁷³ as have sales of these prescription drugs.¹⁷⁴ From 1999 to 2014, more than 165,000 people – three times the U.S. military deaths during the twenty years of the Vietnam War – have died in the U.S. from overdoses related to prescription opioids.¹⁷⁵ An important non-pharmacologic approach to helping to solve this opioid crisis is chiropractic care.

CHIROPRACTIC EDUCATION AND LICENSURE, AND LEGAL RECOGNITION

Doctors of Chiropractic in the United States Complete Seven Years Minimum Higher Education

The Council on Chiropractic Education USA (CCE-USA), recognized by the U.S. Office of Education since 1974, is the national accrediting body for the fifteen chiropractic degree programs offered at eighteen locations in the U.S. The Council establishes minimum standards for chiropractic education; individual member chiropractic programs may establish additional requirements for admissions, curricular content and clinical competency.

The Accreditation Standards of the CCE-USA¹⁷⁶ require that applicants seeking admission to the doctor of chiropractic program have completed the equivalent of three academic years of undergraduate study (90 semester hours) at an institution accredited by an agency recognized by the U.S. Department of Education, or an equivalent foreign agency. A minimum of 24 semester hours in life and physical science courses, with at least half of these courses to include a laboratory component, is to be

included within the 90 hours, along with well-rounded general education courses in humanities and social sciences.

The curriculum for the doctor of chiropractic degree in the U.S. typically represents a four academic year program with a minimum of 4,200 instructional hours beyond the undergraduate prerequisite requirements. The CCE-USA Educational Standards identify the following subject categories and courses:

- Foundations in Chiropractic – principles, practices, philosophy and history of chiropractic
- Basic Sciences – anatomy; physiology; biochemistry; microbiology and pathology
- Clinical Sciences – physical, clinical and laboratory diagnosis; diagnostic imaging; spinal analysis; orthopedics; biomechanics; neurology; spinal adjustment/manipulation; extremities manipulation; rehabilitation and therapeutic modalities/procedures (active and passive care); toxicology; patient management; nutrition; organ systems; special populations; first aid and emergency procedures; wellness and public health; and clinical decision making
- Professional Practice – ethics and integrity; jurisprudence; business and practice management and professional communications
- Information Literacy and Research Methodology - ability to access and understand information and critically analyze outcomes associated with research and scholarly activities

The CCE-USA Educational Standards document identifies mandatory meta-competencies outlining the skills, attitudes, and knowledge required to prepare graduates to serve as primary care chiropractic physicians. These competencies require the chiropractic graduate to demonstrate the ability to:

- perform an initial assessment and diagnosis
- create and execute an appropriate case management/treatment/intervention plan
- promote health, wellness, safety and disease prevention
- communicate effectively with patients, doctors of chiropractic and other health care professionals, regulatory agencies, third party payers, and others as appropriate
- produce and maintain accurate patient records and documentation
- be proficient in neuro-musculoskeletal evaluation, treatment and management
- access and use health related information
- demonstrate critical thinking and decision making skills, and sound clinical reasoning and judgment
- understand and practice the ethical conduct and legal responsibilities of a health care provider
- critically appraise and apply scientific literature and other information resources to provide effective patient care
- understand the basic, clinical, and social sciences and seek new knowledge in a manner that promotes intellectual and professional development

Visit the Council on Chiropractic Education website www.cce-usa.org for more information on chiropractic accreditation, and the Association of Chiropractic Colleges website www.chirocolleges.org for information on chiropractic education.

Licensure and Legal Recognition

All 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands have statutes recognizing and regulating the practice of chiropractic as an independent portal of entry health provider. Although specific requirements vary by state, all jurisdictions require the completion of a doctor of chiropractic program.

Requirements for licensure include successful completion of the examinations conducted by the National Board of Chiropractic Examiners, which includes the basic and clinical science subjects, clinical case studies and a practical exam. Certain jurisdictions may require applicants be examined over the law governing the practice of chiropractic in that state. Requirements for continuing education for license renewal vary with each state.¹⁹

Chiropractic services are recognized and reimbursed through Medicare, and most state Medicaid acts include doctors of chiropractic as primary health providers.¹⁷⁷ Chiropractic services are covered by the vast majority of health insurance policies. The U.S. Department of Labor, Office of Workers' Compensation Programs, Division of Federal Employees' Compensation, recognizes chiropractors as physicians for treatment of manual manipulation of the spine.¹⁷⁸

Including the U.S., the practice of chiropractic is recognized and regulated by law in 48 countries.¹⁷⁹ Common features of legislation and practice include a role as a primary care provider, allowing direct contact with patients, and the right and duty to diagnose, including taking and/or ordering skeletal imaging.

For information on chiropractic licensure and regulation go to the Federation of Chiropractic Licensing Boards website: www.fclb.org.

CONCLUSION

Across this nation and internationally, responsible economists and policy makers are seeking the best outcomes in health care delivery, looking for cost containment with a move away from excessive and high risk interventions, yet focused on achieving higher patient satisfaction through better results.

Considering that back pain and musculoskeletal disorders now lead among the disabling conditions in the nation¹⁸², including the military¹⁸⁰, the need for non-drug, non-surgical and effective spine care is paramount for health care reform. Rising to address this need, the chiropractic profession is widely regarded as a leading example of an emerging health care discipline reaching maturity and extending its role within mainstream health care.

Strengthened with the evidence gained through research and outcome-effectiveness studies, doctors of chiropractic are attuned to the increasing health care consumer interest in a conservative, effective and non-invasive approach to maintain health, and one less reliant on addictive pain killers.

Chiropractors today appear steadfast in their role as America's primary spine care provider in this epidemic of chronic pain, with a focus on restoring joint function, returning the patient to the activities of daily living, and improving quality of health.

With mounting public interest in diet, nutrition, exercise, and considering the aging boomers are seeking vitality and to remain active as they move through their golden years, the doctor of chiropractic is well positioned by education and clinical training to lead in conservative primary spine care and in the management of neuromusculoskeletal health.

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