Foundation for Chiropractic Progress

CHIROPRACTIC: A SAFE AND COST-EFFECTIVE APPROACH TO HEALTH

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COLLEGE OF HEALTH SCIENCES

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FOREWORD

Research from the National Association of Worksite Health Centers, where I serve as the executive director, reports that employers are implementing onsite and near-site health centers due to the positive impact on employee health and productivity, and while reducing unnecessary costs and medical services. Among employees, the worksite health centers are a popular benefit due to the easy access to a variety of low or no cost health and wellness services, and especially the inclusion of chiropractic care.

The value of a worksite health center increases as more services are included onsite, reducing the need for employees to leave the workplace to get care. With many employees seeking chiropractic care in their local community we're finding an increasing interest among employers in having doctors of chiropractic (DCs) join their centers' clinical teams.

In addition to addressing back and neck pain, and related neuromusculoskeletal conditions, many employees visit the DC for prevention and to maintain spine and joint function. Employers report lower costs, high satisfaction and faster return to work when employees with back or neck pain receive care from a DC. Word spreads quickly in the workplace when employees learn the value of having a DC onsite along with their primary care provider.

The integration of a DC along with medical doctors, physical therapists, massage therapists and acupuncturists in treating musculoskeletal problems is a growing development among worksite health centers. Treating structural imbalances in the body through spinal manipulative therapy performed by a DC is often a safer and far more effective way to manage pain, as Carl S. Cleveland III, DC, describes in this useful and comprehensive guide to the health and economic benefits of chiropractic care.

Indeed, 80% of our employer members indicated that musculoskeletal disorders are among their top cost drivers, representing a primary consideration for offering chiropractic services as part of their onsite clinics. As Dr. Cleveland documents in the following pages, chiropractic is part of the cultural transformation in pain prevention, its diagnosis, and management and represents an important non-pharmacologic approach towards helping solve the today's opioid crisis. The tragedy of opioid abuse and the impact on employees and their families, and the resulting lost productivity in the workplace is incalculable.

Chiropractic care is increasingly viewed as a first-line approach by employees and employers for pain management, for improved mobility and sense of well-being. I know you'll enjoy reviewing this informative and authoritative guide and I hope it helps drive positive change in your workplace, your community and for your personal health.

Larry Boress Executive Director,
National Association of Worksite Health Centers

OVERVIEW
CHIROPRACTIC: HEALING WITH A HUMAN TOUCH

Doctors of chiropractic (DCs) are primary healthcare 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 of these disorders on the nervous system and general health. [1, 2, 3, 4, 5]

Chiropractic services are used most often to care for musculoskeletal complaints,**[6] including but not limited to back pain, neck pain, pain in the joints of the arms or legs, and headaches.[2] Musculoskeletal pain, particularly related to joints and the back, is the most common type of chronic pain.[7, 8] Chronic back pain is associated with reduced mobility, quality of life and longevity,[9] and often includes increased rates of other health problems.[10]

Back and neck pain, ranked number 1 out of 154 in an analysis of U.S. healthcare spending in 2016 for the 100 most expensive health conditions, and at a cost of $134 billion for that year.[11] Back and neck pain are increasingly the result of poor posture, workplace and sports-related injuries, motor vehicle accidents, obesity or simply sedentary lifestyles.[12]

Worldwide, back pain is the single leading cause of disability and absenteeism, preventing many people from engaging in work and other activities of daily living.[13, 14, 15, 16, 17, 18] Globally, years lived **with disability caused by low back pain increased by 54% between 1990 and 2015, mainly as a** result of population increase and aging, with the biggest increase seen in low-income and middle-income countries.[13]

Approximately 31 million Americans experience low back pain at any given time,[19] and one-half of all working Americans admit to having back pain symptoms each year.[20] Back pain accounts for more than 264 million lost work days in one year, equivalent to two work days for every full-time worker in the U.S.[21] It is estimated that up to 80% of the population will experience back pain at some time in their lives, and can affect people of all ages, from adolescents to the elderly.[22]

Neck pain is the third most common chronic pain condition in the U.S., and the fourth leading cause of disability worldwide, with disability from **neck pain having increased by 29%** in the U.S. over the past two decades.[23] **Back and neck pain affects nearly one in three, or 75.7 million adults**,[24] and represents a substantial burden to society.[25, 26, 27, 28]

Although DCs treat more than just back pain, many patients initially visit a chiropractor looking for relief from this pervasive condition. Satisfaction with the chiropractic approach to spine care ranks in the high 80th and into the 90th percentile as demonstrated by **Consumer Reports,[29] Gallup-Palmer Report,[30] Medicare[31] and Tricare[32] patient polls.** Indeed, throughout its history, satisfied patients have always been the mainstay of chiropractic care.[29]

As primary care professionals for spinal health and well-being, DCs provide qualified, effective care to some 35.5 million American adults, representing more than 14% 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%) describe the treatment as "very effective," with 80% agreeing that the quality of care was a good value for the money.[30]

Research demonstrates that the primary reasons patients consult chiropractors are:[33]

- Back pain **(approximately 60%)**
- Other musculoskeletal pain i.e. neck, shoulder or extremities and arthritic pain **(20%)**
- Headaches including migraine **(10%)**
- **About 10% 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).

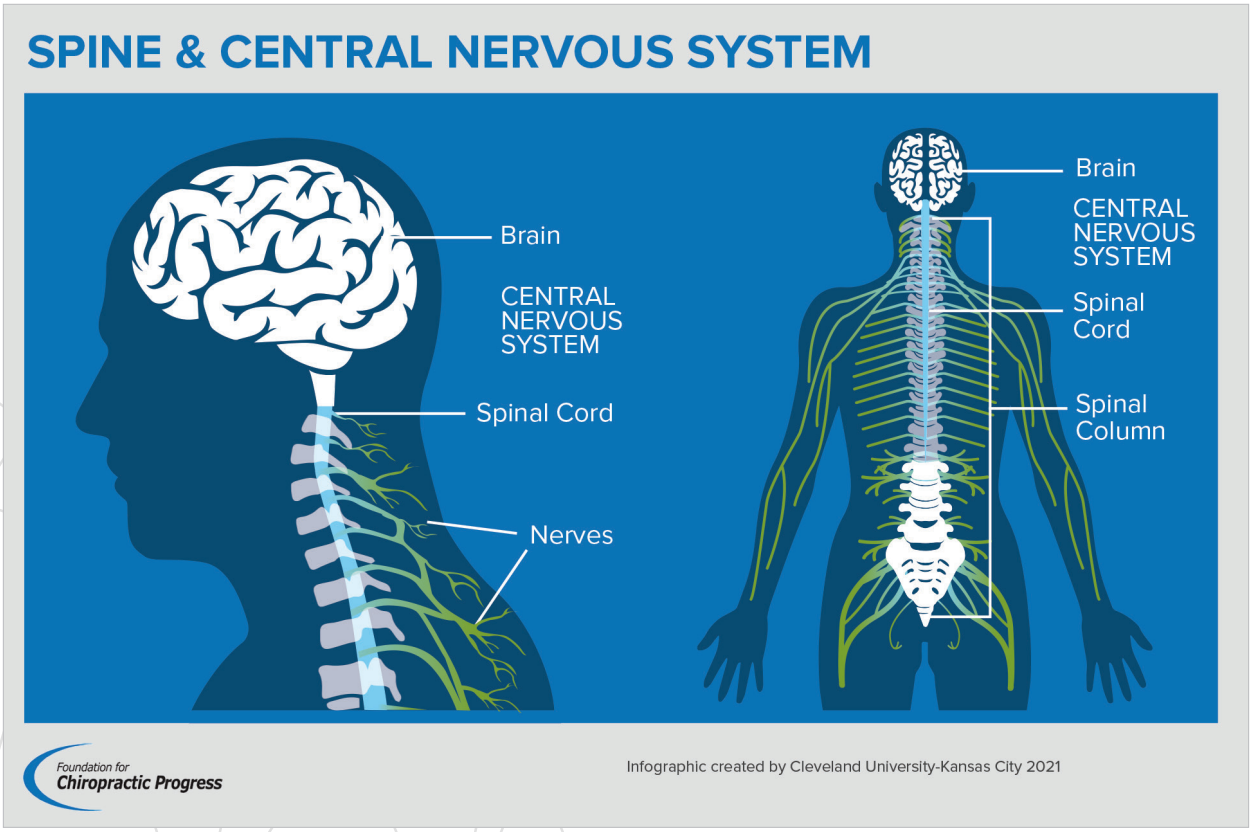
Today, chiropractic (Greek, meaning "done by hand") is taught and practiced throughout the world. The profession has earned broad acceptance from national healthcare systems, as well as the public. The chiropractic profession is the third-largest physician-level independent health profession in the Western world.[34]

* Disorders to the musculoskeletal system include injuries and disorders of muscles, nerves, tendons, ligaments, joints, cartilage and spinal disks.[35] 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.[6]

THE CHIROPRACTIC PERSPECTIVE AND PRACTICE

The spinal column protects the spinal cord, which is an extension of the brain and is part of the central nervous system (CNS). Nerves from the spinal cord exit the spinal column and branch out like a delicate web to transmit information back and forth between the CNS and the rest of the body. Because of the close relationship between the spine and the nervous system abnormal or dysfunctional spinal movement can adversely impact nerve function affecting the communication between the brain and the body.[36]



The relationship between structure, primarily the spine and function as coordinated by the nervous system, is central to chiropractic's approach to patient care, health and well-being. [37, 38, 39]

DCs 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,[40] and the body's ability to regulate and maintain health.[41] This 'entity,' which generally describes areas of the spine with muscle tightness, tenderness

to touch and restricted intersegmental movement, is also referred to as 'spinal fixation,' or 'manipulable spinal lesion.'[42] Physical medicine specialists, physical therapists or osteopaths may identify this dysfunctional spinal segment using alternate terminology.[43, 44, 45]

The core focus 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. When a DC adjusts these dysfunctional segments and restores appropriate spinal movement patterns, this contributes to more appropriate sensory input to the brain and spinal cord. Several research studies [40. 46, 47, 48, 49, 50, 51] have documented changes in nerve function following vertebral column dysfunction and the application of the controlled high-velocity, low-amplitude (HVLA) thrust adjustment. The mechanisms for these changes are still not fully understood.

Chiropractic is an inherently conservative approach to healthcare, 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.[52] 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.[5]

In addition to joint adjustment and/or manipulation, chiropractic patient management includes 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 U.S. give DCs 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 healthcare practitioners when appropriate.[53]

*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 Pain/tenderness; Asymmetry/misalignment; Range of motion abnormality; and Tissue 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).[54] The biopsychosocial model counters the biomedical model, which generally attributes disease to only biological factors, such as viruses, genes, or somatic abnormalities.[55]

THE FIRST VISIT TO THE CHIROPRACTOR: WHAT TO EXPECT

The DC 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.[43] 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.

Through a process of shared decision-making, the patient and doctor will determine if it is appropriate to proceed with a trial of chiropractic care. If the examination findings indicate that the patient would be more appropriately managed or co-managed by another healthcare professional, the DC 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.[98] Patients may also receive advice on home care, lifestyle modifications, exercise instruction and nutritional advice.

THE CHIROPRACTIC ADJUSTMENT

DCs are extensively educated in the assessment and management of conditions affecting the spinal and extremity joints and associated neurological manifestations, and based on examination findings and indication for care, the chiropractor will recommend an initial course of care. 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.[56] DCs 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 the 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.[57] This is a natural occurrence and is similar to one cracking the knuckles.

The DC 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.[58] However, patients may sometimes experience mild soreness or aching following treatment (as may be experienced with some forms of exercise) that usually resolves within 12 to 48 hours. Compared to other common treatments for pain, such as over-the-counter and prescription pain medications, chiropractic's conservative approach offers a safe and effective option.[2, 3]

Simply stated, the adjustment is applied to a joint to restore motion with the body's own muscles cannot. Chiropractic adjustments help relieve pain, as well as restore and maintain normal movement, biomechanics and function.

Among the benefits of chiropractic care are included:

- Relief from back and neck pain[59, 60, 61, 62, 63, 64, 65]
- Relief from headaches[66, 67, 68, 69, 70]
- Relief from pregnancy-related backache[71, 72]
- Correction of hip, gait and foot problems[73, 74]
- Improved flexibility, stability, balance and coordination[49, 75, 76]
- Prevention of work-related muscle and joint injuries[77, 78]
- Improved function and ability to better perform the activities of daily living.[77, 79, 80, 81, 82]

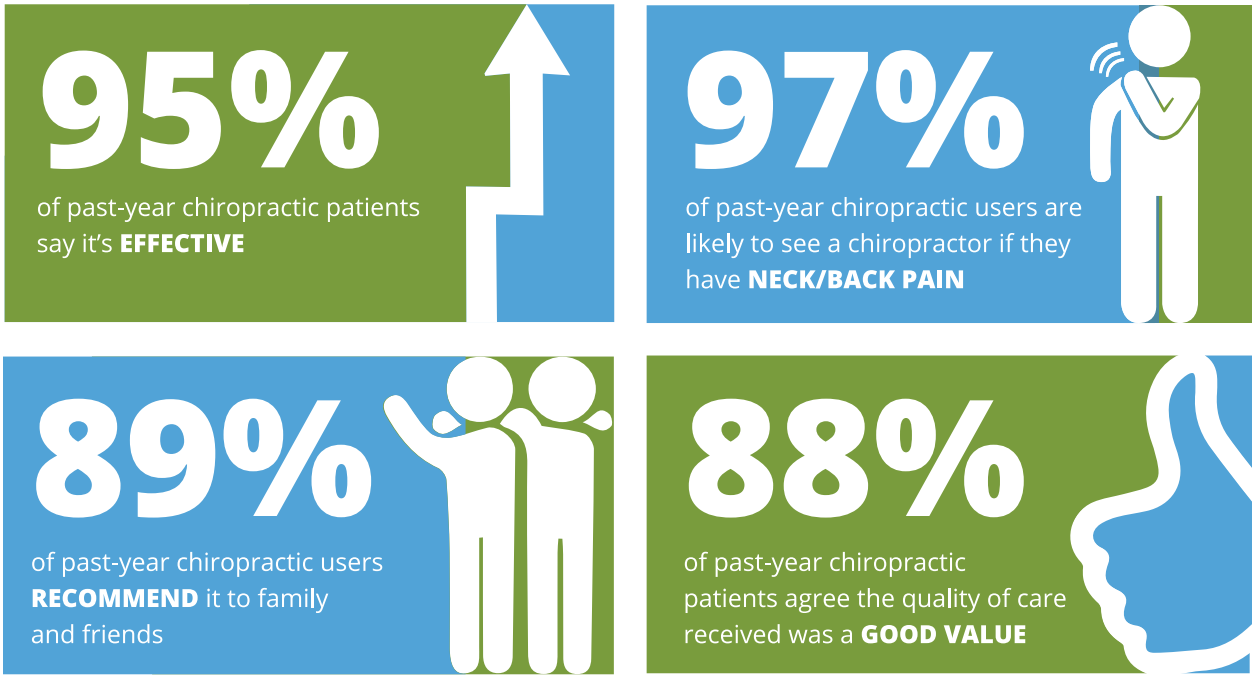
PATIENT SATISFACTION

Researchers analyzing the prevalence, patterns and predictors of chiropractic utilization in the U.S. general population found that, "Back pain and neck pain were the most prevalent health problems for chiropractic consultations and the majority of users reported chiropractic helping a great deal with their health problem and improving overall health or well-being."[83, 84]

Consumer Reports and Gallup-Palmer Reports

From the June 2016 issue of Consumer Reports ranking chiropractic care as the number one preferred treatment for low back pain to the August 2016 Gallup-Palmer Report, surveys show that healthcare consumers rank the services from their DC high. The Gallup report found that approximately half of adults in the U.S. have been to a DC as a patient. Fourteen percent of adults say they saw a DC in the last 12 months, 12% say they saw a DC in the last five years, and 25% say they saw a DC more than five years ago.[30]

American's Perceptions of Chiropractic



Source:
2016 Gallup-Palmer College of Chiropractic Annual Report: American's Perceptions of Chiropractic (08/16)
Infographic created by Cleveland University-Kansas City 2017

The 2016 Gallup-Palmer findings report that:

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

In a February 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 DC found treatment or advice from the DC to be helpful.[85]

THE DOCTOR OF CHIROPRACTIC: AN EMERGING ROLE IN THE FUTURE OF HEALTHCARE

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 an ideal world, this accountability is benchmarked by the three goals of ***improved outcomes, lower costs and patient satisfaction.***[85] For the profession of chiropractic, the need has never been greater and the compelling results speak for themselves.

Back and neck pain, ranked number **1 out of 154 in an analysis of U.S. healthcare spending in 2016 for the 100 most expensive health conditions** as reported in the *Journal of the American Medical Association* (March 2020), and at a cost of $134 billion for that year.[11] Back and neck pain are increasingly the result of poor posture, workplace and sports-related injuries, motor vehicle accidents, obesity or simply sedentary lifestyles.[12, 87]

A 2020 analysis reported in the *Journal of the American Medical Association* ranked **back and neck pain the most expensive healthcare conditions in the U.S. at a cost of $134 billion in 2016**[11] up from a cost of $87.6 billion in 2013,[88] and represent conditions having impact at both an individual patient and societal level.[89, 90] Back pain is one of most common reasons people see a doctor or miss days at work.[91]

Research Economist John McGowan, PhD, of St. Louis University in an analysis of the ***Cost-Efficiency and Effectiveness of Including Doctors of Chiropractic to Offer Treatment under Medicaid in the State of Missouri***, reported a cost savings to the state of Missouri with the inclusion of DCs as covered providers under Missouri Medicaid may range between $14.1 and $49.2 million. The study found that chiropractic care provides better outcomes at lower cost, and that chiropractic treatment and care leads to a reduction in cost of spinal surgery. Further this study demonstrates that chiropractic care leads to cost savings from reduced use and abuse of opioid prescription drugs.[92] This finding is important given that back pain is a major contributor to the prescribing and use of opioids in America.[91]

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 DCs. Couple these trends with decades of outcomes research demonstrating effectiveness, value and cost savings of chiropractic care, the profession is well positioned as a healthcare authority for safe and conservative, first-contact, primary spine care for structural health and well-being.[93]

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,[58-85] safe,[138-146] and cost-effective.[88-93] 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.[1]

ACUTE, SUBACUTE AND CHRONIC BACK AND NECK PAIN

The National Institute of Neurological Disorders and Stroke (NIH 2021) describes pain as a signal in your nervous system that something may be wrong, and may be experienced as an unpleasant feeling, such as a prick, tingle, sting, burn, or ache. Pain may be sharp or dull and may be felt in one area of your body, or all over. Acute pain is pain that has been present for less than 3 months.[94, 95] Subacute pain is a subset of acute pain being pain that has been present for at least 6 weeks but less than 3 months.[96, 97] Chronic pain is pain that has been present for more than 3 months.[94,95] According to *NIH Medline Plus*, a publication of the National Institutes of Health, *"chronic pain usually cannot be cured, but it can be managed."* [97]

Herman, et al., from the Rand Corporation examined data from a large sample of patients with Chronic Low Back Pain (CLBP) and/or Chronic Neck Pain (CNP) to observe how real-world patients used chiropractic care over time to manage their pain. The study assessed the relationships between frequency of visits and outcomes for patients using ongoing chiropractic care (average for 11 years) for chronic spinal pain. Over a three-month trial period patients showed improvement in back and neck pain, and improvement in function, and certain patients may have reached maximum therapeutic improvement, and with the possibility of successfully managing their chronic pain while using a variety of chiropractic visit frequencies. The researchers observed that patients with worse baseline pain and function used more chiropractic visits, but only visits more than once per week for those with CLBP were associated with significantly better improvement. The authors concluded that chiropractic patients with CLBP and CNP manage their pain using a range of visit frequencies and the predictors of these frequencies could be useful to inform payers when developing policies for ongoing provider-based care.[98]

Herman et al. (2021) *Pain Physician*

The 2020 North American Spine Society (NASS) Clinical Guideline provides the highest quality clinical evidence available for the diagnosis and contemporary treatment of low back pain in the adult patient, as current as 2016. The goals of the guideline recommendations are to assist in delivering optimum, efficacious treatment and functional recovery from nonspecific low back pain. The guidelines reflect that spinal manipulation therapy (SMT) alone was found to be as good as SMT with exercise, and is indicated as a "suggested" as treatment.[99]

North American Spine Society. Diagnosis and Treatment of Low Back Pain (2020)

The results of a clinical trial showed that chiropractic care combined with usual medical care for low back pain provides greater pain relief and a greater reduction in disability than medical care alone. This study featured 750 active-duty members of the military represents one of the largest comparative effectiveness trials between usual medical care and chiropractic care.[100] This trial provides additional support for the inclusion of chiropractic care as a component of multidisciplinary health care for low back pain, as currently recommended in existing guidelines.[100]

Goertz et al. (2018) *JAMA Open Network*

The American College of Physicians (2017) Guidelines published in the *Annals of Internal Medicine*, 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."* [59]

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).[101]

Busse et al. (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 manipulative 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.[102]

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 SMT 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, SMT was associated with modest improvements in pain and function at up to 6 weeks, with transient minor musculoskeletal harms.[103]

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 non-pharmacologic 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 chiropractic. Further the document states that healthcare 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.[104]

U.S. Food and Drug Administration (2017)

"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 state, *"Surgery is not usually needed but may be considered if other therapies have failed."*[60]

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." [61]

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.[62]

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.[63]

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 DC, a group receiving pain medication (over-the-counter pain relievers, narcotics and muscle relaxants), and another received exercise recommendations. After 12 weeks, approximately 57% of those under chiropractic treatment, and 48% of the subjects that exercised reported at least a 75% reduction in pain, compared to 33% of the subjects in the medication group.[64]

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%) and pain (58.5%) 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.[65]

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

HEADACHES

The global prevalence of tension-type headache and migraine in adults is reported to be approximately 40% and 10%, respectively.[105, 106, 107, 108] These headaches constitute a significant burden on the personal health and productivity[109, 110] and represent a substantial drain on healthcare resources.[111, 112, 113] Migraine is the third leading cause of disability for those under the age of fifty.[114] Headache is third among the reasons for seeking chiropractic care in North America[115] and clinical practice guidelines now call for non-pharmacological management for headache and neck pain[116] as evidence suggests that chiropractic care improves cervicogenic and migraine headaches.[67]

A 2020 updated systematic review (original 2018) on chronic pain for common conditions published by the Agency for Healthcare Research and Quality assessed the effectiveness of a non-pharmacological approach. They found spinal manipulation slightly improved function and moderately improved pain in the short term (4.5 months) when compared to usual care for tension type headaches.[117 118]

Skelly et al. (2020) *Agency for Health Care Research and Quality*

A 2019 systematic review and meta-analysis of randomized controlled trials assessed the effectiveness of manual therapy on the health-related quality of life in patients with tension-type headaches (TTH), migraine headaches and cervicogenic headaches. Seven studies were included in the meta-analysis. The Headache Disability Inventory showed a statistically significant difference in favor of manual therapy as an effective approach in improving the quality of life in patients with tension-type headaches and migraine headache.[119]

Falsiroli et al. (2019) *Current Pain Headache Reports*

In a study of 256 adult cervicogenic headache patients, Haas and associates found a trial of 18 chiropractic visits for spinal manipulation to represent highest and most effective treatment plan, reducing the days with cervicogenic headache by half. This was about three more days per month when compared to the light-massage control.[120]

Haas et al. (2018) *Spine Journal*

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 six to eight sessions of upper cervical and upper thoracic manipulations were more effective than mobilization and exercise in patients with cervicogenic headache, significantly reducing the duration and frequency of headaches, with the effects maintained at three months. These findings suggest that high-velocity low-amplitude manipulation was more effective in the treatment of cervicogenic headache than the slow mobilization technique intervention.[66]

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.[67]

Bryans et al. (2011) *JMPT*

Haas et al. in a randomized study looking at pain intensity, and frequency of cervicogenic headache found spinal manipulative 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.[68]

Haas et al. (2010) *Spine Journal*

A report issued by the Duke University Evidence-Based Practice Center,[69] 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."*

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

CHIROPRACTIC AND FIBROMYALGIA

The Centers for Disease Control and Prevention 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.[121] 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.[121] 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.[123]

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.[124] For people with severe symptoms, FM can be extremely debilitating and interfere with basic activities of daily living. The cause of FM remains uncertain.

Schneider,[125] in a systematic review of the literature, concluded that several non-pharmacologic 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).

> In a 2019 publication, Mohabbat et al. surveyed 310 FM patients that were referred to the Mayo Clinic fibromyalgia treatment program about their use of complementary and integrative medicine (CIM) therapies in the past. Of these, 98% reported using some form of CIM. Chiropractic was one of the most frequently used (39%). The results indicate a rising trend in the use of some CIM therapies among patients with FM. The authors suggest healthcare professionals be knowledgeable about these various modalities and their potential incorporation into a multifaceted FM treatment regimen.[124]
>
> ***Mohabbat et al. (2019)*** *Mayo Clinical Proceedings*

CHIROPRACTIC FOR CHILDREN

Chiropractic care is among the most common complementary and integrative healthcare practice used by children in the U.S., according to the U.S. National Center for Health Statistics Report (2015),[126] and is frequently used internationally for the treatment of children.[127, 128, 129, 130, 131, 132,133]

Manual therapy provided by DCs has been found effective in treating the musculoskeletal imbalances of infants,[134, 135] with modified treatments appropriate for the size and age of the child.[136] 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.[137]

Over recent years a number of authors have investigated the safety of chiropractic care for children and infants.[132, 138, 139, 140, 141, 142, 143] These studies overwhelmingly suggest that chiropractic care can be safely provided to even the youngest members of society.

> In a study in the United Kingdom to investigate maternal report of infants' condition before and after a trial of chiropractic care demonstrated statistically significant improvements across several common complaints, including crying, problematic feeding, sleeping and pain. The mothers in this study reported definite improvement following chiropractic care, with the data supporting the notion that chiropractic care is effective, safe, and cost-effective.[144]
> ***Miller et al. (2019)*** *Journal of Manipulative and Physiological Therapeutics*

> Driehuis et al, in a systematic review and meta-analysis of 26 studies eligible studies related to evidence for effectiveness and harms of specific spinal manipulation techniques for conditions in infants and children/adolescents, concluded that severe harms were relatively scarce and that gentle, low-velocity spinal mobilizations seem to be safe treatment techniques in infants, children and adolescents.[145]
> ***Driehuis et al. (2019)*** *PloS One.*

> Carnes et al. in a systematic review and meta-analyses to assess the effect of manual therapy interventions for healthy but unsettled, distressed and excessively crying infants found moderate strength evidence for the effectiveness of manual therapy on reduction in crying time

(−1.27 hours per day). The risk of reported adverse events was low: seven non-serious events per 1000 infants exposed to manual therapy. The authors concluded that manual therapy for infants appears relatively safe.[146]

Carnes et al. (2018) *BMJ Open*

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.[139]

Doyle et al. (2011) *Clinical Chiropractic*

A survey of almost 5.5k 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 care, 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.[130]

Alcantara et al. (2009) *Explore*

Infantile Colic

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.[136]

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

In 2011, a systematic review was published on chiropractic care for infants with colic.[147] 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 treatment approach for the child with infantile colic.

Alcantara et al. (2011) *Explore*

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 46 children (31 treatment and 15 control group). The 10-week trial was preceded by and followed by a two-week no treatment 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 non-tension 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.[148]

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

COMPARING CHIROPRACTIC TO OTHER TREATMENTS

Low back and neck pain imposes a costly burden upon patients, healthcare insurers and society overall.[9] Spinal manipulation as practiced by chiropractors has been found be cost-effective for treatment of back and neck pain[149] and examples of evidence of cost comparisons between chiropractic and other treatment approaches for managing musculoskeletal conditions appears in the excerpts in that follow.

Khodakarami conducted a cost-effectiveness comparison between physical therapy and chiropractic manipulation for the treatment of patients in the U.S. with low back pain. The findings demonstrated that the total average cost in the chiropractic group was $48.56 lower than the physical therapy group, with the author concluding that chiropractic represents a cost-effective option compared with physical therapy for adults with at least three weeks of low back pain over six months.[150]

Khodakarami N. (2020) *Healthcare*

In a randomized clinical trial, Schneider and colleagues, compared the clinical effectiveness of nonsurgical treatment methods in patients with lumbar spinal stenosis. Older adults (259 participants) with anatomical and clinical evidence of stenosis were randomly assigned to either medical care (medication and/or epidural injections), supervised group exercise, or manual therapy (spinal mobilization, stretches and strength training) provided by chiropractors and physical therapists, combined with individualized exercise. The relevant conclusion demonstrated that a combination of manual therapy and individualized exercise provides greater short-term improvement in symptoms and physical function and walking capacity than medical care or group exercises, although all three interventions were associated with improvements in long-term walking capacity.[151]

Schneider et al. (2019) *JAMA Open Network*

Andronis et al. conducted a systematic review to identify, document and appraise studies reporting on the cost effectiveness of non-invasive and non-pharmacological treatment options for low back pain. Thirty-three studies were identified and interventions were categorized as: (1) combined physical exercise and psychological therapy (2) physical exercise therapy only (3) information and education, and (4) manual therapy. The authors identified evidence suggesting that combined physical and psychological treatments, medical yoga, information and education programs, spinal manipulation and acupuncture are likely to be cost-effective options for treatment of low back pain.[152]

Andronis et al. (2017) *Applied Health Economics and Health Policy*

Manual-thrust manipulation provides greater short-term reductions in self-reported disability and pain compared with usual medical care. In a randomized controlled trial with six-month follow up, **94% of manual-thrust manipulation recipients under chiropractic care had a**

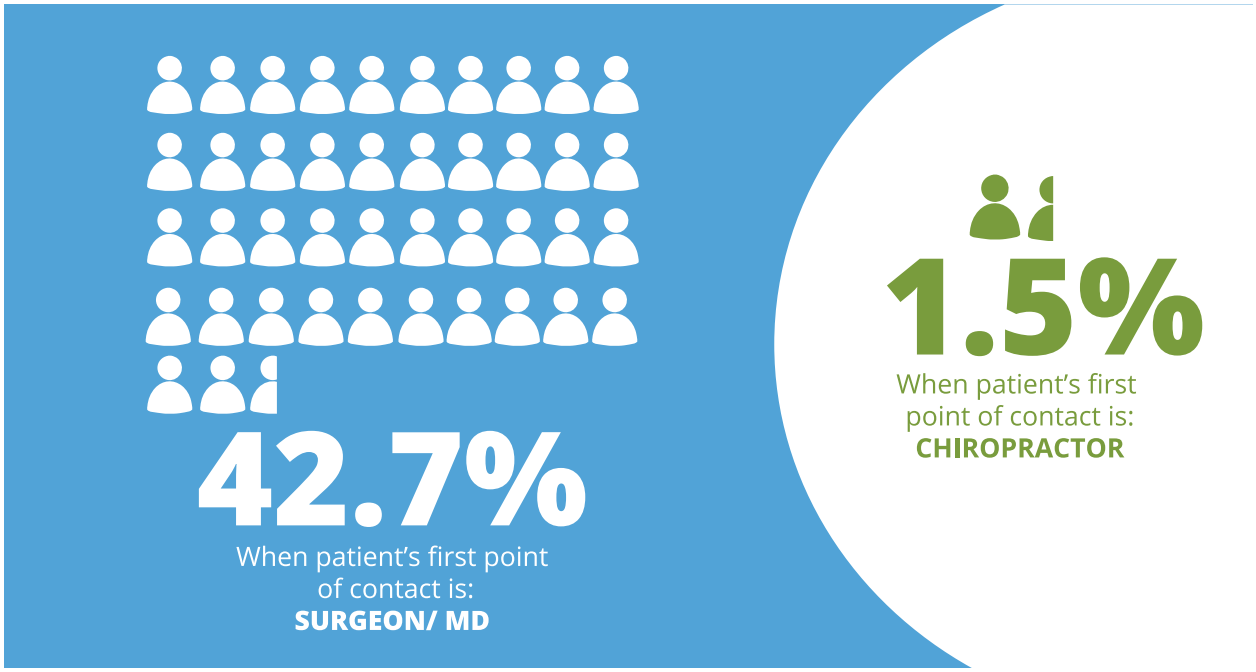
30% reduction in low back pain at week four while only 56% of medical care recipients had a 30% reduction in low back pain at week four. This represents a 38% increase in effectiveness by seeing a DC first. The study also determined that patients are best served when informed of non-pharmacological therapies for low back pain before electing riskier, less effective treatments. Manual-thrust manipulation, performed by DCs, achieves a greater short-term reduction in pain compared with common medical treatments.[153]

Schneider et al. (2015) *Spine Journal*

Reduced odds of surgery were observed for… those whose first provider was a DC. In a prospective population-based study to identify early predictors of the likelihood of spine surgery for workers with back injuries, Keeney, from the Department of Orthopedics at Dartmouth Medical School found that *"…42.7% of workers [with back injuries] who first saw a surgeon had surgery, in contrast to only 1.5% of those who saw a chiropractor."* [154]

Keeney et al. (2013) *Spine Journal*

Likelihood of Surgery for Workers with Back Injuries



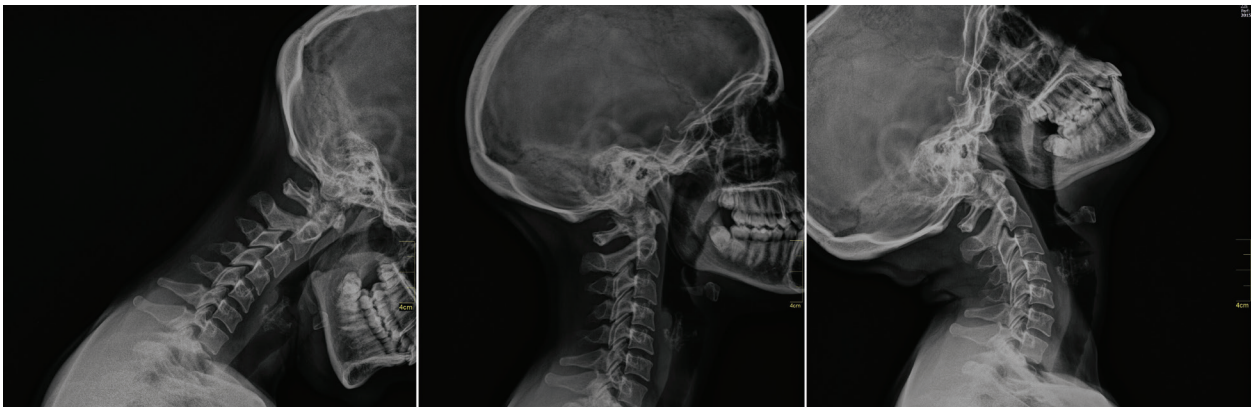
Source:

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

Infographic created by Cleveland University-Kansas City 2017

A randomized controlled trial of 169 women reported in the American Journal of Obstetrics and Gynecology concluded that a combination of chiropractic spinal manipulative 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.[72]
George et al. (2013) *American Journal of Obstetrics and Gynecology*

A 2013 analysis of Medicare data through 2008[155] 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*



CONSERVATIVE COST-EFFECTIVE SPINE CARE

A growing list of research studies and reviews demonstrate that chiropractic services are not only clinically effective and safe but also a cost-effective healthcare option. Over the past few years there has been a push towards conservative spine care as it has become clear that interventions like surgery should only be a last resort.[156]

Excerpts and summaries from studies provide evidence and support for the non-drug approach of chiropractic for a variety of conditions.

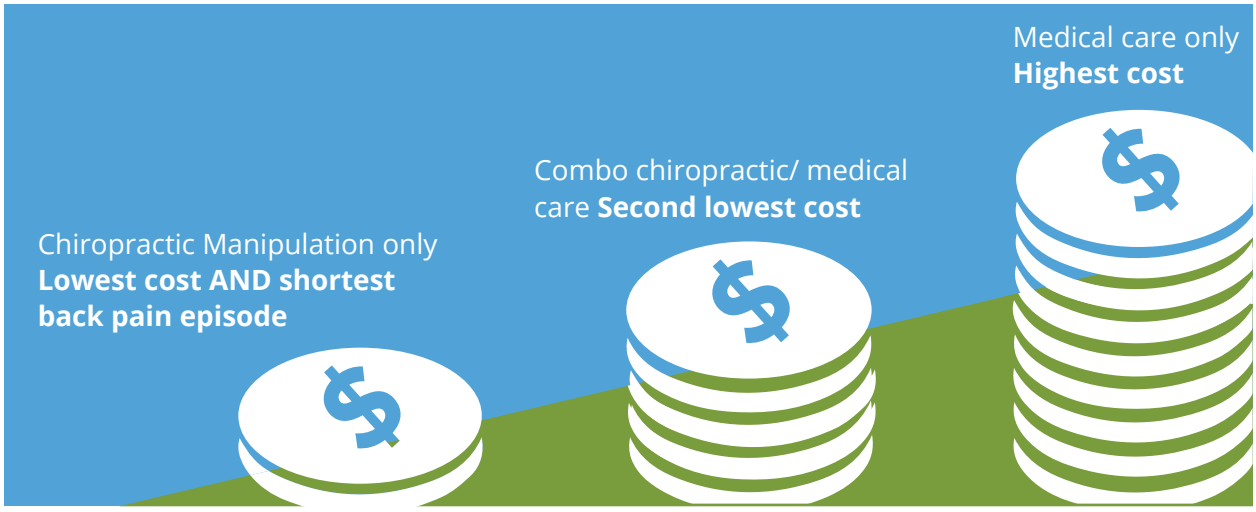
As part of an effort to improve the clinical effectiveness and value of spine care, Excellus BlueCross BlueShield, headquartered in Rochester, NY, introduced a Conservative Spine Care Pathway that incorporated manual care (primarily physiotherapy and chiropractic care) in one primary care clinic site (the intervention group) but not in another (the control). Each year, for each site, calculations of per-member-per-month (PMPM) spine care costs were recorded in of four categories: (1) all spine care (2) spine surgery care (3) opioid care, and (4) manual care (physical therapy or chiropractic spinal manipulation) for each attributed patient. Over the four years of the study, researchers recorded a 28% reduction in costs using a conservative approach compared to a 7% reduction in the standard approach. The authors stated that most of the reduction in cost was attributed to reduced spine surgery cost.[156]
Weeks et al. (2019) *Journal of General Internal Medicine*

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.[157]
Hurwitz et al. (2016) *Journal of Manipulative and Physiological Therapeutics*

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.[23]
Leininger et al. (2016) *Spine Journal*

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.[158]
Weeks et al. (2016) *Journal of Manipulative and Physiological Therapeutics*

Chiropractic for Medicare patients saves money, shortens back pain episodes



Patients with chronic low back pain and other medical problems received three different types of care. The results are in.

Source:

Weeks et. al (2016) J Man Physiol Ther.

Infographic created by Cleveland University-Kansas City 2017

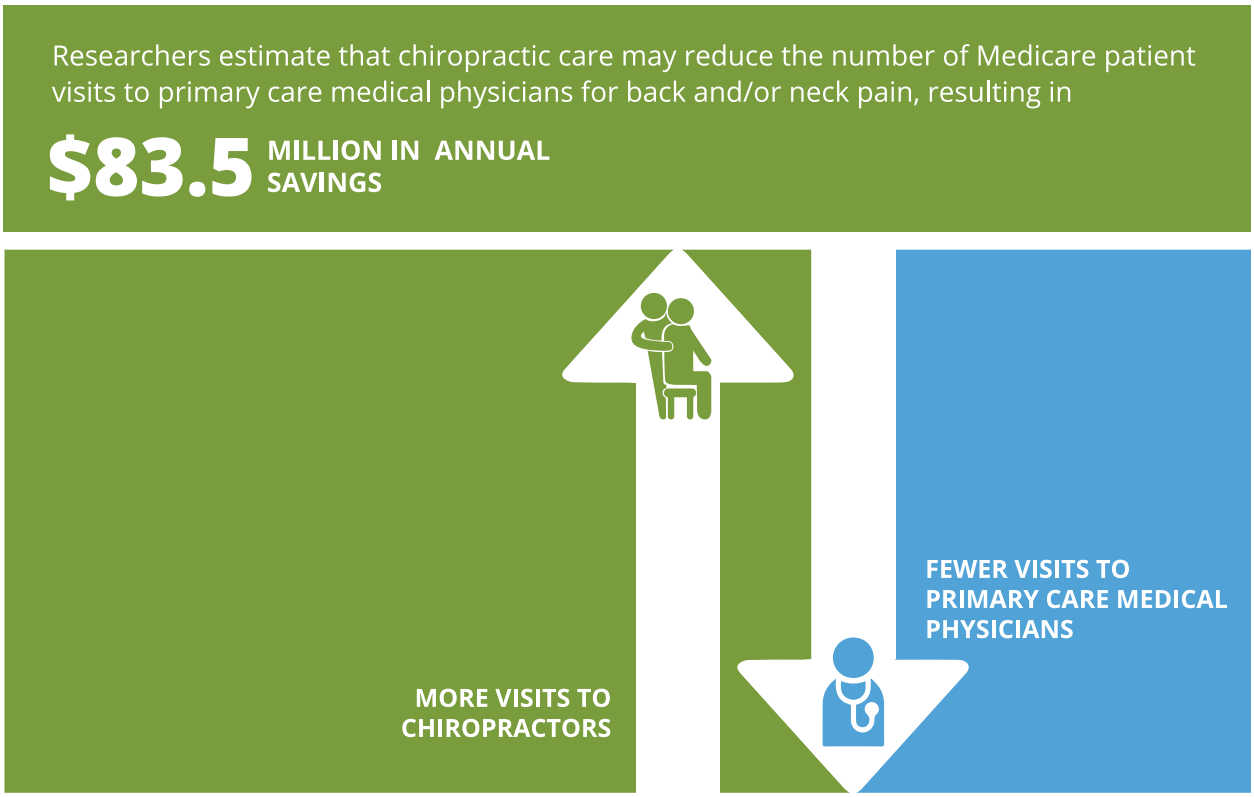
In a 2016 systematic review of the interventions that are cost-effective for management of whiplash-associated and neck pain-associated disorders, the authors found that structured education is cost-effective for whiplash-associated disorder and that for neck pain and associated disorders, advice, exercise and multimodal care including manual therapy are cost effective.[159]

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.[160]

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

Reduced Medicare Cost With Chiropractic



Source:

Davis et al (2015) *J Am Board Fam Med.*

Infographic created by Cleveland University-Kansas City 2017

Houweling et al., in a study to identify outcomes, patient satisfaction and related healthcare 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 healthcare 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).[161]

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

An analysis of healthcare 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

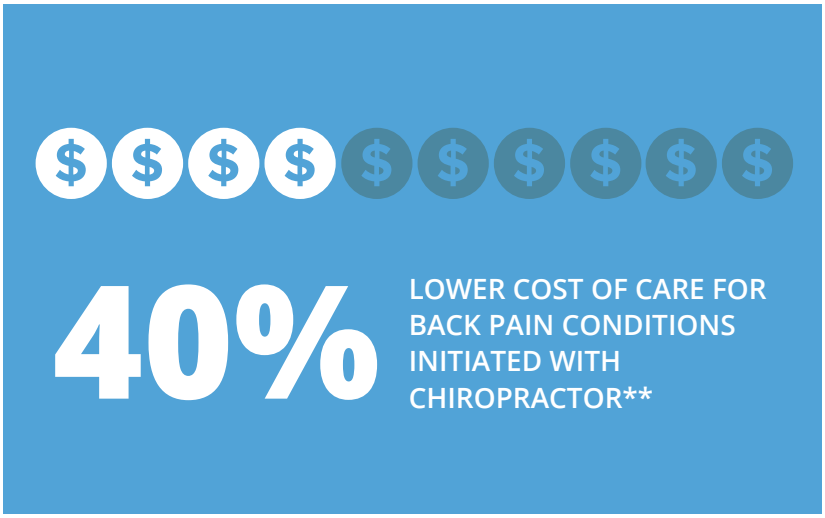
alternative providers, including doctors of chiropractic, had significantly lower hospitalization expenditures.[162]

Martin et al. (2012) *Medical Care*

Low back pain initiated with a **DC saves 40% on healthcare 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.[163]

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

Consulting a Chiropractor FIRST Saves Money



*Mean cost over four months was significantly lower for patients initially consulting chiropractors.

**One Tennessee Health Insurer notes: Costs of care for patients seeing a chiropractor first was almost 40% less than patients seeing an MD first. Even after risk-adjusting each patients costs, the study found that episodes of care initiated with a chiropractor were 20% less expensive than episodes initiated with an MD.

Sources:

http://www.jmptonline.org/article/s0161-4754(10)00216-2/abstract

http://www.ncbi.nlm.nih.gov/pubmed/26288262

Infographic created by Cleveland University-Kansas City 2017

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.*[164] 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."[164]
>
> ***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,[36,40, 47, 165] 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.*[49, 166, 167]

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

Scientists have known for decades that neurons (nerve cells) continuously adapt in structure and function in response to stimuli from our ever-changing environment[168, 169, 170, 171, 172] 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.[40, 173, 174]

This ability of the nervous system to change, and to reorganize its response to stimuli has been termed neuroplasticity.**[170, 171, 173, 174] Other tissues of the body also adapt and change alongside neural plastic changes, which is referred to as bio-plasticity.[172] The process of neuroplasticity and bio-plasticity explains how individuals adapt and change following exercise[175, 176] or compensate and recover function after injury to the nervous system, as example, in recovery from the damage that occurs with strokes.[178, 177, 178, 179]

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.[47, 180, 181, 182, 183, 184] Spinal dysfunction, or subluxation, in neurophysiological terms represents a central nervous system segmental motor control problem.[175, 176, 185] This means that the brain is not able to control the movement of the vertebral column in an appropriate way.

The reasons for this is that an injury to the spine or following prolonged poor posture changes 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.[175, 176, 187]

Researchers have demonstrated that spinal adjustments can change various aspects of nervous system function.[46, 50, 167, 176, 181, 186, 187, 188, 189, 190, 191, 192, 193] 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.[175, 176]

For example, chiropractic spinal adjustments have been reported to improve or alter integration of visual and auditory information,[49] joint position sense accuracy,[47] cortical sensorimotor integration,[40, 48, 49, 50, 190, 191, 194, 234] whole body reaction times,[258] mental rotation speed,[226] motor learning,[182, 185] motor

**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.

control,[40, 48, 71, 167, 176, 182, 190, 191, 196, 195, 196, 229, 231] protective postural reflexes[197, 198] upper and lower limb muscle strength,[46, 51, 192, 195, 199, 200, 201, 223,224, 202, 203] jaw clenching force,[191] and prevention of fatigue during maximum muscle contractions.[46, 51, 192] Much of this evidence suggests a role for the DC 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.[175, 176]

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.[204] Inactivity is a fast-growing public health concern and contributes to a variety of chronic diseases and health complications.[205]

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.[36] Disturbed joint function alters the brain's ability to integrate multiple sensory stimuli and affect neural processing spatial judgement.[176]

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.[206, 207, 208] Therefore, spinal joint dysfunction is likely to result in reduced optimal performance and increased risk of injury.[209] Further, disturbed biomechanics accelerates joint degeneration [210, 211, 212] and results in pain.[213]

It is the role of the DC to identify dysfunctional 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,[214] and frequently present with pain and stiffness related to the spine and extremities.[215, 216] In the U.S. and across the globe, chronic back pain in the senior population (ages 65 and older) gives rise to increasing healthcare costs and is of increasing concern to third-party payers.[217]

The aging of the large baby-boom generation is leading to new opportunities for chiropractors because older adults are more likely to have neuromusculoskeletal and joint problems, and will likely continue to seek treatment for these conditions as they lead longer, more active lives.[217] As the healthcare of this aging population is covered by the U.S. federal government through Medicare, this underscores the importance of a 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.[160] The report findings suggest chiropractic as a first line approach for management of senior, comorbid, patients with chronic low back pain.

The DC 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 DC 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.[204]

Simply stated, a solution for the growing physical inactivity problem in America is movement. DCs are well positioned to include guidance for exercise and physical activity when designing care plans for patients,[63, 66] as it is well substantiated that exercise and mobility are integral to prevention and management of chronic disease.[49, 218]

In a qualitative study of chiropractic care combined with home exercise among older adults with spinal disability, Maiers and Salsbury reported that study participants described these interventions as complimentary to one another for spine-related disability. Chiropractic care was viewed as improving spinal pain and controlling symptoms, while exercise therapy was noted for its long-term impact on self-efficacy and self-management. The older adults valued non-pharmacological treatment options that aided them in controlling spine-related symptoms, while empowering them to maintain clinical benefit gained after a course of chiropractic spinal manipulation and exercise. These older adults considered changes in pain, a global sense of improvement, and improved biomechanical function as making treatment worthwhile.[219]

In a systematic literature review and a consensus process a multidisciplinary panel of experts with expertise in practice, research and teaching in a variety of health professions serving older adults, these reviewers rated the revised recommendations for DCs for the evaluation, management and manual treatment of older adult patients. In a summary of evidence-informed best practices the recommendations reinforce the safety of manipulation and for advising patients on exercise and that manipulation and mobilization contribute to the general positive outcomes for the aging patient beyond pain reduction only.[220]

CHIROPRACTIC AND SPORTS

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 injury prevention and treatment. All NFL teams and most professional sports teams have DCs as part of the medical staff.[4]

Competitive runners, cyclists, martial artists, skaters, and professional dancers frequently have a chiropractor available to help treat their athletic injuries and improve joint mobility and function. For decades DCs have been formal participants as part of Team USA and the Olympic Games.

> In a randomized trial performed with elite Tae Kwon Do athletes, researchers found an 8% increase in leg muscle 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 (i.e. The ability of the brain to effectively influence muscle movement). 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. This study suggests that chiropractic care has at least a short-term impact on muscle strength in elite level athletes.[46]

Christiansen et al. (2018) *European Journal of Applied Physiology*

Strength changes of the upper and lower limb have been documented following spinal adjustments.[46, 51, 195, 201, 202, 203, 204, 205, 221, 224] In a group of college students, one single session of **spinal adjustments increased the strength of their leg muscle by 16%.** 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.[222] **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*

Costa and colleagues, conducted a randomized controlled trial evaluating the effect of spinal manipulation by DCs on the performance of golf players. The golfers were randomized, with Group I (20 participants) receiving a supervised stretch program, and Group II (23 participants) receiving a stretch program in addition to spinal manipulation directed to dysfunctional spinal segments. Participants in both groups performed the same standardized stretching program. Each participant repeated these procedures for a four-week period. No improvement of full-swing performance was observed in at the fourth session in the group I (stretch only). An improvement of an average eight meters increase was observed at the fourth session of group II. The authors conclude that chiropractic manipulation in association with muscle stretching may be associated with improved full-swing performance when compared with muscle stretching alone.[223]

Costa et al. (2009) *J Chiropractic Medicine*

Other studies have shown that chiropractic adjustive intervention can improve various aspects of nervous system function, including brain reaction times,[49, 224] and joint position sense and motor (muscle) control of both the upper and lower limbs.[47, 48, 225, 226, 227, 228, 229, 230, 231, 232] Applying this observation to the athlete, it is hypothesized that chiropractic care may enhance sports 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. Further high-quality performance specific studies are required to confirm the role of chiropractic in sports performance and injury prevention.[233]

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 doctors of chiropractic, 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. **In 2000, President Clinton signed into law the act mandating that chiropractic care** be made available to active-duty personnel (Currently DC care is offered at 65 military clinics and hospitals in the U.S.[234]), and **in 2002, President Bush signed legislation establishing chiropractic as permanent benefit within the Department of Veterans Affairs health care system**.[235] Currently DC services are provided at 175 Veterans Administration hospitals throughout the country.[236]

An Integrated Approach to Pain Management

The evidence demonstrates that where chiropractic services are included as part of an interdisciplinary approach to patient care this results in a shift in care away from a high cost, high tech, low patient satisfaction model to a low cost, low tech, high patient satisfaction model providing an evidence-based alternative to conventional pharmaceutically for the management of spine-related chronic pain.[61,160, 237]

> The results of a clinical trial showed that chiropractic care combined with usual medical care for low back pain provides greater pain relief and a greater reduction in disability than medical care alone. This study featured 750 active-duty members of the military represents one of the largest comparative effectiveness trials between usual medical care and chiropractic care.
> This trial provides additional support for the inclusion of chiropractic care as a component of multidisciplinary health care for low back pain, as currently recommended in existing guidelines.[100]
> ***Goertz et al. (2018)*** *JAMA Open Network*

> 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.[238]
> ***Donovan et al. (2017)*** *Pain Medicine*

> Authors Sarnat, Winterstein and Cambron, analyzed clinical and cost utilization data from the years 1999 to 2002 for an integrative medicine independent physician association (IPA) whose primary care physicians (PCPs) were exclusively doctors of chiropractic. Clinical and cost utilization based on 70,274 member-months over a seven-year period demonstrated decreases of 60.2% in-hospital admissions, 59.0% hospital days, 62.0% outpatient surgeries and procedures, and 85% pharmaceutical costs when compared with conventional medicine IPA performance for the same health maintenance organization product in the same geography and time frame.
> ***Sarnat et al. (2007)*** *Journal of Manipulative and Physiological Therapeutics*

THE GROWING ROLE IN OCCUPATIONAL HEALTH AND ONSITE WORKPLACE HEALTH CLINICS

Employers across the country are taking a more direct approach to improving the health and well-being of their employees onsite corporate health clinics, and the inclusion of DCs as part of the onsite corporate health clinic services has become increasingly popular among employers.[240] Employer funded onsite care programs that provide chiropractic services include companies such as Google, Cisco Systems Inc.,[242] Cerner Corporation,[77] Facebook[241] and Amazon.[242] 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 neuromusculoskeletal conditions that represent a common cause of long-term pain and physical

disability in the workplace today. Chiropractic worksite services have been shown to reduce overall healthcare utilization, radiology procedures and musculoskeletal medications in companies.[77, 78] Key findings from the non-profit National Association of Worksite Health Centers (NAWHC) in an initiative examining existing and future use and value of doctors of chiropractic as part of corporate onsite health and wellness centers for covered employees and family members report:[243]

- **80%** indicated that musculoskeletal issues are among their top cost drivers, a primary reason for considering or offering chiropractic services
- Over half of employers **(55%**) said their employees have expressed interest in chiropractic services at their clinics
- Employers who have DCs on their staff have found that the visits and costs are lower for DCs than for other health providers who treat the same condition
- Patient satisfaction with chiropractic care offered at worksite clinics is very high

"As employer-managed health care becomes more prevalent with onsite health and wellness centers, we are seeing a greater interest by employers in expanding the service line to include chiropractic care to address musculoskeletal conditions and reduce the use and cost of unnecessary opioids and surgeries."

Larry Boress, Executive Director
National Association of Worksite Health Centers (NAWHC)

"As part of NAWHC's objectives to identify and promote areas where worksite clinics can reduce costs and improve the quality and satisfaction of care, there appears to be great potential by having a qualified chiropractor as part of a worksite center's care team, to reduce the use of drugs and surgeries for these conditions."

Carly Deer, Senior Benefits Leader
Target Corporation and NAWHC Chair

> **"At Cisco's LifeConnections' Health Center, having doctors of chiropractic working closely with the medical team has helped reduce our musculoskeletal spend, and patients consistently give high patient satisfaction scores. The integrated care team of chiropractors, acupuncturists, and physical therapists is critical to achieve our Patient Centered Medical Home model."** [243]
>
> **Katelyn Johnson, Integrated Health Manager**
> ***Cisco***

DCs are well trained to serve as a conservative, first contact, drug-free and non-invasive approach for care for neuromusculoskeletal care and pain management. Findings published in a 2012 issue of the *Journal of Occupational and Environmental Medicine* suggest that chiropractic services offered at onsite corporate health clinics, contrasted to off-site physical therapy services, result in lower costs of care, while improving neuromusculoskeletal function.[145] Further, onsite 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.[78]

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 onsite chiropractic care program at Friendship Homes, a Minnesota custom home builder. The evidence of value of onsite chiropractic care in year-over-year cost comparisons of workplace sprain-strain and cumulative trauma injuries, is demonstrated by a **63%** reduction in neuromusculoskeletal injuries, a **67%** reduction in average case cost, and an **88%** cost reduction associated with those injuries. Further, for every $1.00 invested to include onsite chiropractic services, this resulted in an $8.35 savings. Although employees had access to onsite chiropractic services during company business hours, Friendship Homes of Minnesota reported no negative effect on productivity.[81]

A key observation in this onsite chiropractic services model is that the employee is provided on-the-job access to chiropractic healthcare, 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 onsite chiropractic services model may be instituted at minimal capital expense, and at low liability risk. Further, this model eliminates a need for third-party reimbursement, and at a significantly reduced overhead.

DCs can be integrated within the onsite 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. Onsite 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.[241]

INTEGRATION OF CHIROPRACTIC SERVICES IN MILITARY AND VETERAN HEALTHCARE FACILITIES

Low back pain is one of the most common reasons service members seek medical care, and is a leading cause of medical evacuation from combat theaters,[244] and is a leading cause of disability in Veterans.[245] For military and Veteran populations, in 2016 the Joint Department of Health and Human Services/Department of Defense/Department of Veterans Affairs (VA) Pain Management Collaboratory identified non-pharmacological approaches to pain management as a national research priority.[246]

Today, chiropractic care is a well-integrated, non-pharmacological therapy in VA healthcare facilities, where DCs provide therapeutic interventions focused on the management of low back pain and other musculoskeletal conditions.[245]

> VA's Chiropractic Program exemplifies the Department's forward-looking approach to healthcare. Chiropractic services include evidence-based, patient-centered care options that are in high demand by Veterans and routinely requested by VA physicians. Use of VA chiropractic services continues to grow at a rapid rate particularly for Veterans from Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn, pain management, and older Veteran populations. VA's delivery of chiropractic care is the most comprehensive integration of these services into any major United States healthcare system. Chiropractic care is available to all eligible Veterans as part of the standard Medical Benefits Package. Services are provided

on-station at most major medical centers and some outpatient clinics. Chiropractic care is also provided through Care in the Community. A list of VA facilities with onsite chiropractic clinics is available at: www.rehab.va.gov/chiro/locations.asp[247]

In patients seen through the **Veterans Health Administration (VHA)**, the prevalence of low **back pain has been reported to range from 11% to 52%; almost 25% of patients who visit VA general medicine clinics suffer from chronic axial or spinal pain.** Chronic low back pain is categorized as the eighth most prevalent condition in VA clinics.[248]

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 as reported by Anthony J. Lisi, DC, Chiropractic Program Director for the Veterans Health Administration, today over 260 chiropractic practitioners serve at 175 Veterans Administration hospitals throughout the country.[249]

A 2016 study of the use of chiropractic in the Veterans Administration,[250] found that from 2004 to **2015 the annual number of patients seen in VA chiropractic clinics increased 822%.** The total number of VA chiropractic clinics grew from 27 to 65 (9.4% annually). The VA also purchased care from private sector DCs 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,[251] report that services are successfully integrated within the military and VA health systems with DCs 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.

DCs provide services to active-duty military personnel in 65 military clinics and hospitals in the U.S.[252] In addition, the Army and Air Force Exchange Service (AAFES) announced (February 2021) opening additional medical service centers on military installations in 2021, to include six chiropractic clinics providing services to active-duty members, retirees, family members and all disabled Veterans. These locations include Fort Campbell, Kentucky; Fort Carson, Colorado; Fort Stewart, Georgia; Joint Base Lewis-McChord, Washington; MacDill Air Force Base, Florida; and Nellis Air Force Base, Nevada.[253]

In a 2019 report on clinical trials sponsored by the U.S. Department of Defense researchers determined that chiropractic care combined with usual medical care improved pain and disability in active military personnel.[257] An additional trial demonstrated the effect of chiropractic care on reducing (improving) reflex and motor response times for asymptomatic Special Operations Forces as determined by performance on complex motor response tests.[254, 255]

Further, investigators found improved physical fitness measures among active duty service members with low back pain receiving chiropractic care,*[256] After eight chiropractic visits over a four-week period, the service members demonstrated a 5% increase in isometric strength, compared to a 6% decrease by the non-care control group. Balance increased 28% in the chiropractic group, compared to no change in the control group, with endurance increasing 14% in the chiropractic group, compared to a 10% decrease in the control group.

Based on the results, in addition to addressing pain and disability, chiropractic care improves key fitness characteristics among Active Duty Service members with LBP, and could lead to improved military readiness in such individuals.[257]

The findings from the Chiropractic Care Study[259] released by the U.S. Department of Defense (DoD) in 2009 following the introduction of DCs at selected TRICARE facilities, reported high satisfaction rates across all branches of the military citing:

- **94% (94.3)** satisfaction in the Army
- Twelve of 19 Air Force bases reported **100% satisfaction rates,** with the remaining seven sites reporting ratings higher than 90%
- Navy reported satisfaction ratings from **86 to 100%**
- TRICARE outpatient satisfaction surveys rated **chiropractic services at 88.54%,** representing a 10% *"higher than the overall satisfaction with all providers"* (All provider satisfaction was reported at 78.31%).

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 DC as much or more than a doctor of osteopathy or physical therapist."*[32]

*It is known that low back pain can negatively impact trunk muscle strength, balance, and endurance-factors that contribute to overall fitness and influence military readiness.[257]

Chiropractic VA Externship Programs

Since 2004, 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. According to Dr. Anthony Lisi, Chiropractic Program Director for the Veterans Health Administration, over 2000 chiropractic students have completed clinical rotations at VA facilities.[251]

Chiropractic VA Residency Programs

Graduate DCs are eligible to participate in VA resident training hospitals side by side with medical graduates receiving clinical training in these facilities. 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 healthcare professionals in team care, and prepare the resident for future positions in VA, other healthcare systems, and/or academic settings.

Residents provide diagnostic and management services of neuromusculoskeletal 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 healthcare 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.

SAFETY OF CHIROPRACTIC

Consistent with initiating an exercise regimen or undergoing any physical treatment of an injured or painful body part, the spinal adjustment or manipulation sometimes results in transitory soreness or a short-term increase in pain.[4] Serious adverse events associated with spinal manipulation are quite rare.[262-267] The summary of evidence that follows affirms that chiropractic care is safe and effective:

> Paige and colleagues, in the *Journal of the America Medical Association* (2017) in a systematic review of randomized controlled trials on the effectiveness and harms of spinal manipulative therapy for acute low back pain found chiropractic care to be both safe and effective, providing a clinical benefit equivalent to that of NSAIDs yet with no evidence of serious harms.[105]
> ***Paige et al. (2017)*** *Journal of the American Medical Association*

> 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.[261]
> ***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 neuromusculoskeletal problem, risk of injury to the head, neck, or trunk within seven days was 76% lower among subjects with a chiropractic office visit than among those who saw a primary care physician."* [262]
> ***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 DC and those who saw a primary care physician are probably not clinically significant."* [263]
> ***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."* [264]

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

A systematic review of the safety of chiropractic interventions found a low risk of serious adverse events, ranging from 1.56 to 2.68 events per 10,000,000 interventions.[265]

Gouveia et al. (2009) *Spine*

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 chiropractic care compared to primary care.[266]

Cassidy et al. (2008) *Spine Journal*

CHIROPRACTIC — A SAFER STRATEGY THAN OPIOIDS

Back pain is one of the most common pain conditions world-wide and is a major contributor to the prescribing and use of opioids in America.[91] A growing list of research studies and reviews [103, 267, 268] demonstrate that utilization of non-pharmacological pain management may prevent the unnecessary use of opioids. Studies demonstrate [269, 270, 271, 272] that the drug-free approach delivered by DCs is far safer and yields better outcomes than opioids for the management of chronic low back pain. Patients choosing using the services provided by DCs as a first-line treatment are less likely to use opioids for pain management. Excerpts and summaries from a few of those studies follow below.

Whedon et al., in the journal *Spine* (2021), reported that the initial choice of spinal manipulation for the treatment of chronic low back pain leads to reduced long-term risks of adverse drug events* among older Medicare beneficiaries. In a comparison of opioid analgesic therapy versus spinal manipulative therapy with regard to adverse drug events, the study found that harmful medication-related incidents occurred 42 times more often in patients who were first prescribed opioids as opposed to patients who first received spinal manipulative therapy.[272]
Whedon et al. (2021) *Spine*

Patients with spinal pain who saw a DC had half the risk of filling an opioid prescription. In study of the impact of chiropractic care on the use of prescription opioids in patients with spinal pain, Whedon and colleagues compared patients (*recipients*) receiving both primary medical care and chiropractic care, with and patients (*non-recipients*) receiving primary medical care but not chiropractic care. The authors concluded that patients with spinal pain who saw a DC had half the risk of filling an opioid prescription. Among those who saw a DC within 30 days of diagnosis, the reduction in risk was greater as compared with those with their first visit after the acute phase.[273]
Whedon et al. (2020) *Pain Medicine*

In a study of the current evidence to determine if there is an association between chiropractic use and opioid receipts among patients with spinal pain, the proportion of patients receiving an opioid prescription was lower for chiropractic users **(range = 12.3–57.6%)** than nonusers **(range = 31.2–65.9%)**. In a random-effects analysis, *"…chiropractic users had 64% lower odds of receiving an opioid prescription than nonusers."* This review demonstrated an inverse association between chiropractic use and opioid receipts among patients with spinal pain.[274]
Corcoran et al. (2020) *Pain Medicine*

* Adverse drug events can include medication errors, overdoses or other drug reactions that cause patient harm.

Lisi et al. completed a study examining opioid p***r***escription use in over 14,000 Veterans of the recent conflicts in Iraq and Afghanistan who received chiropractic care in VA facilities. Nearly one third of these Veterans receiving chiropractic care were also prescribed opioids. This work found the percentage of Veterans receiving opioid prescriptions was significantly higher in each of the three months immediately preceding the first chiropractic visit than compared in each of the three months immediately following the visit.[275]

Lisi et al. (2018) *Pain Medicine*

The Guidelines of the American College of Physicians (ACP) published in the *Annals of Internal Medicine*, February 2017, ACP 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."* [64]

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

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.

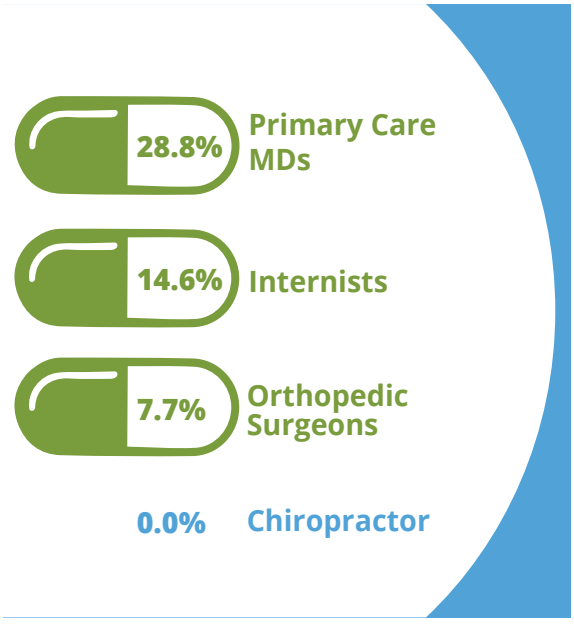
Carmella Bocchino
Executive Vice President at America's Health Insurance Plans (AHIP)
October 11, 2016

The cover of *Time Magazine,* June 15, 2015,[273] 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 U.S.

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,"*[274] 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 U.S., surpassing car crashes

Perscribers of Opioid Drugs in the U.S.



Chiropractors are skilled in the most conservative treatment methods to alleviate pain. They urge patients and health care providers to exhaust these options before resorting to riskier and more invasive treatments such as drugs and surgery.

Opioid drugs mask pain. They do not cure it. Opioids numb pain and may convince patients that a musculoskeletal condition is less severe than it is, or that it has healed. This can result in over-exertion, delay in healing process or even permanent injury.

Source:

Practice Analysis of Chiropractic 2015. NBCE. www. nbce.org/practiceanalysis J. Morris, H. R. Mir. The Opioid Epidemic: Impact on Orthopedic Surgery. Journal of the American Academy of Orthopedic Surgeons, 2015; 23 (5): 267 DOI: 10.5435/JAAOS-D-14-00613

Infographic created by Cleveland University-Kansas City 2017

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 healthcare 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 DCs.[277]

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.[278] In November 2014, The Joint Commission* revised its Pain Management Standard PC.01.02.0, providing guidance on the future direction of pain management, and use of non-pharmacologic strategies to include chiropractic and acupuncture among other physical modalities. In a 2017 update, The Joint Commission published new and revised pain assessment and management standards applicable to all Joint Commission-accredited hospitals effective January 1, 2018:

- **Requirement** | EP 2: The hospital provides non-pharmacologic pain treatment modalities.

- **Rationale** | While evidence for some non-pharmacologic modalities is mixed and/or limited, they may serve as a complementary approach for pain management and potentially reduce the need for opioid medications in some circumstances. The hospital should promote non-pharmacologic modalities by ensuring that patient preferences are discussed and, at a minimum, providing some non-pharmacologic treatment options relevant to their patient population. When a patient's preference for a safe non-pharmacologic therapy cannot be provided, hospitals should educate the patient on where the treatment may be accessed post-discharge. Non-pharmacologic strategies include, but are not limited to: physical modalities (for example, acupuncture therapy, chiropractic therapy, osteopathic manipulative treatment, massage therapy, and physical therapy), relaxation therapy, and cognitive behavioral therapy.

  The Joint Commission (2017)

  R3 Report Issue 11 | Requirement, Rationale, Reference[279]

*The Joint Commission is a United States-based nonprofit tax-exempt 501 organization that accredits more than 22,000 US health care organizations and programs.[280]

The American Society of Interventional Pain Physicians published that Americans constitute **4.6%** of the world population, yet consume 80% of the global opioid supply, and 99% of the global hydrocodone supply. At stake is the health and the lives of millions of Americans hanging in the balance.[281]

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 DCs as covered providers.

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

The data speaks for itself. Overdose deaths involving prescription opioids have quadrupled since 1999,[282] as have sales of these prescription drugs.[283] **From 1999 to 2019, nearly 247,000 people died in the United States from overdoses involving prescription opioids.**[284] 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 seventeen chiropractic degree programs offered

at nineteen 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-USA[285] 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 healthcare professionals, regulatory agencies, third-party payers, and others as appropriate
- Produce and maintain accurate patient records and documentation
- Be proficient in neuromusculoskeletal 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 healthcare 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.[4]

Requirements for licensure include successful completion of the examinations conducted by the National Board of Chiropractic Examiners (NBCE), 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.[4]

Chiropractic services are recognized and reimbursed through Medicare, and most state Medicaid acts include DCs as primary health providers. **286 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.[287]

Including the U.S., the practice of chiropractic is recognized and regulated by law in 48 countries.[288] 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, regulation and educational institutions 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 healthcare 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 nation[9] including the military,[289] the need for non-drug, non-surgical and effective spine care is paramount as part of healthcare reform. Rising to address this need, the chiropractic profession is widely regarded as a leading example of an emerging healthcare discipline reaching maturity and extending its role within mainstream healthcare.

Strengthened with the evidence gained through research and outcome-effectiveness studies, DCs are attuned to the increasing healthcare 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. These outcomes, along with the potential cost savings of integrating chiropractic services as part of today's healthcare system, have important implications for healthcare institutions and the patients they serve, as well as for policy decision makers and other health stakeholders.

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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RESOURCES: CHIROPRACTIC ORGANIZATIONS

American Black Chiropractic Association
www.abcachiro.com

American Chiropractic Association
www.acatoday.org

Association for the History of Chiropractic
www.historyofchiropractic.org

Association of Chiropractic Colleges
www.chirocolleges.org

Canadian Chiropractic Association
www.chiropractic.ca

Congress of Chiropractic State Associations
www.cocsa.org

Council on Chiropractic Education
www.cce-usa.org

Councils on Chiropractic Education International
www.cceintl.org

Federation of Chiropractic Licensing Boards
www.fclb.org

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International Chiropractors Association
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www.nbce.org

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