



Published in final edited form as:

*J Evid Based Complementary Altern Med.* 2012 December 28; 18(1): 75–79. doi:  
10.1177/2156587212458435.

## Evidence-Based Practice and Chiropractic Care

Ron LeFebvre, MA, DC<sup>1</sup>, David Peterson, DC<sup>1</sup>, and Mitchell Haas, MA, DC<sup>1</sup>

<sup>1</sup>University of Western States, Portland, OR, USA

### Abstract

Evidence-based practice has had a growing impact on chiropractic education and the delivery of chiropractic care. For evidence-based practice to penetrate and transform a profession, the penetration must occur at 2 levels. One level is the degree to which individual practitioners possess the willingness and basic skills to search and assess the literature. Chiropractic education received a significant boost in this realm in 2005 when the National Center for Complementary and Alternative Medicine awarded 4 chiropractic institutions R25 education grants to strengthen their research/evidence-based practice curricula. The second level relates to whether the therapeutic interventions commonly employed by a particular health care discipline are supported by clinical research. A growing body of randomized controlled trials provides evidence of the effectiveness and safety of manual therapies.

### Keywords

evidence-based; evidence-based practice; evidence-based medicine; chiropractic; curriculum; effectiveness

---

The use of complementary and alternative medicine has increased dramatically during the past several decades.<sup>1,2</sup> Estimates based on the 2002 National Health Interview Survey reveal that 62.1% of US adults used complementary and alternative medicine therapies during the previous year.<sup>3</sup> Chiropractic is the largest complementary and alternative medicine profession in the United States, with approximately 70 000 members,<sup>4</sup> and chiropractic services account for the greatest number of complementary and alternative medicine visits.<sup>1</sup> In 2002, approximately 7.4% of Americans consulted a chiropractor for treatment.<sup>2</sup> Chiropractic is a well-established part of the health care delivery system, included under Medicare and Medicaid laws, with worker's compensation coverage in all 50 states. Insurance coverage for chiropractic is also quite extensive. Approximately 50% of health maintenance organizations and 75% of private health insurance plans cover chiropractic care.

Over the past 10 to 15 years, evidence-based practice has had increasing influence on the chiropractic profession.<sup>5</sup> A number of events and trends have converged to account for this

---

© The Author(s) 2013

Corresponding Author: David Peterson, DC, University of Western States, 2900 NE 132nd, Portland, OR 97230, USA, dpeterson@uws.edu.

Reprints and permission: [sagepub.com/journalsPermissions.nav](http://sagepub.com/journalsPermissions.nav)

### Authors' Contribution

All authors wrote significant sections of the first rough draft. Each reviewed and made content and editorial modifications to the original draft content of the others.

### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

phenomenon. Starting in the 1990s, a growing body of clinical research has offered support for the application of manual therapy for various musculoskeletal conditions, particularly low back pain. Consequently, manipulation has been included as an effective care option in a number of national and international guidelines on low back pain.<sup>6,7</sup> Additional research in related fields such as orthopedic assessment of the spine and extremities, exercise therapy, and biomechanics of the adult spine has also affected the profession. As outcomes research has steadily increased, it has become more common for individual chiropractors to use evidence-based outcome measures such as validated questionnaires to measure activity limitations. In a cross-discipline study, chiropractors (along with physical therapists) were more likely than general medical practitioners to use Roland Morris or Oswestry Disability Questionnaires in assessing low back pain.<sup>8</sup>

At the same time, larger events, such as inclusion of chiropractic services in the Veterans' Health Administration, Defense Department, and hospitals throughout the United States, have sparked a need to encourage cooperation between the medical and chiropractic professions.<sup>4</sup> Nearly all chiropractors report that they refer patients to other health care providers.<sup>9</sup> They also report receiving referrals from medical physicians. Family practitioners were the most likely physicians to refer to a chiropractor, followed by family nurse practitioners, internists, neurologists, neurosurgeons, gynecologists, and general surgeons.<sup>9</sup>

The primary purpose of this article is to provide an overview of the growing impact of evidence-based practice in chiropractic care. Arguably, for evidence-based practice to penetrate a profession, the penetration must occur at 2 levels. One level is the degree to which individual practitioners possess the willingness and basic skills to search and assess the literature. The second level relates to the degree to which research evidence supports the therapeutic interventions commonly employed by a particular health care discipline.

## Model of Chiropractic Care

Chiropractors are licensed as primary-contact, portal of entry providers in all 50 states and are trained to triage, differentially diagnose, and refer cases not amenable to chiropractic care. The current model of chiropractic health care is holistic with a focus on the evaluation and conservative treatment of musculoskeletal disorders. Although there is significant variation in scope of practice from state to state, nearly all chiropractors use a variety of manual therapies with an emphasis on spinal and extremity joint manipulative procedures. Patients with musculoskeletal complaints are assessed using standard history and physical examination procedures. Special consideration is directed to the orthopedic and neurological components of the physical examination, incorporating direct assessment of articular soft tissues and joint play in order to determine whether the patient is a candidate for manual therapies.

For basic musculoskeletal injuries and postural syndromes, chiropractors use 4 broad categories of therapeutic interventions: (a) joint manipulation and mobilization, (b) soft tissue manipulation and massage, (c) exercise and physical rehabilitation prescription, and (d) home care and activity modification advice. In addition, nutritional and dietary counseling, physical therapy modalities (eg, heat, ice, ultrasound, electromodalities), and taping/bracing are also used as adjunct procedures. A 2003 survey of US chiropractors by the National Board of Chiropractic Examiners reported that spinal complaints were the most common conditions seen (53.8%), followed by extremity complaints (17.1%) and headaches or facial pain (12%).<sup>10</sup>

## Chiropractic Education

Chiropractic education is regulated by the Council on Chiropractic Education (CCE) under the US Office of the US Department of Education. Entrance requirements for accredited institutions require a minimum of 3 years of college credits. Prerequisite coursework includes 24 semester hours in basic sciences, including biology, chemistry, and physics, and 24 semester hours in humanities and social science.

The chiropractic educational program is a minimum of 4 years. All Council on Chiropractic Education-accredited institutions provide a curriculum incorporating elements of basic science (eg, physiology, anatomy, and biochemistry), clinical science (eg, laboratory diagnosis, radiographic diagnosis, orthopedics, neurology, and nutrition), and clinical intern experience. In the clinical arena, chiropractic students have very limited training in pharmacology and critical care, but have significant training in clinical biomechanics, neuromusculoskeletal diagnosis, manual therapy, nutrition, and exercise rehabilitation.

There is a growing recognition within the profession that the practicing chiropractor must be able to do the following: formulate a searchable clinical question, rapidly access the best evidence available, assess the quality of that evidence, determine if it is applicable to a particular patient or group of patients, and decide if and how to incorporate the evidence into the care being offered. This approach received a significant boost in 2005 when R25 education grants were awarded by the National Center for Complementary and Alternative Medicine at the National Institutes of Health to the University of Western States (formerly Western States Chiropractic College) and 3 other chiropractic universities (National University of Health Sciences, Northwestern Health Sciences University, and Palmer College of Chiropractic) to strengthen their research/evidence-based practice curricula. The grants required that complementary and alternative medicine institutions pair with a research-intensive medical institution with a goal of improving complementary and alternative medicine students' evidence-based practice skills. These 4 institutions represent nearly 25% of the chiropractic colleges in the United States and consequently have the potential for significant impact on the profession.

## Evidence-Based Practice Skills

Although all 4 institutions have followed different approaches to implementation, the overall strategies share some common principles. (a) Course work should incorporate journal club formats, checklist reviews of current studies, and student construction of critical appraised topics. (b) Informational literacy assignments should span all 4 years, be relevant, and relate to other course content. (c) The language and concepts of evidence-based practice must permeate all diagnosis and management courses and, where feasible, basic science courses as well. (d) Focused and ongoing training must target a large proportion of classroom and clinical faculty across the entire school curriculum. (e) Application of these skills must be patient based and become part of the clinic culture as opposed to an endeavor segregated to a journal club activity.

## Effectiveness of Manual Therapies

The goal of evidence-based practice is to incorporate the best-quality evidence into the clinical decision-making process to provide timely, appropriate care.<sup>11,12</sup> The results of randomized controlled trials (RCTs) on manual therapies have been published in more than 200 peer-reviewed articles, and many of these have been synthesized in systematic reviews and evidence-based guidelines.<sup>13</sup>

Below we present a brief evidence synthesis based predominantly on the United Kingdom Evidence Report by Bronfort et al,<sup>13</sup> currently the most comprehensive review of the evidence for the efficacy of manual therapies.<sup>14</sup> The report was commissioned by the UK General Chiropractic Council in response to media concerns about scope of practice and claims of effectiveness in advertising. The report summarized the scientific evidence regarding the effectiveness of manual treatment as a therapeutic option of the management of 26 musculoskeletal and nonmusculoskeletal conditions. The authors based their conclusions on the results of systematic reviews of randomized controlled trials, widely accepted evidence-based guidelines, and randomized controlled trials not yet included in the former.

### Low Back Pain

Spinal manipulation is an effective care option for acute, subacute, and chronic low back pain. Massage was also found to be effective for chronic low back pain.<sup>13</sup> Notably, these findings were based, in part, on the clinical practice guidelines developed for the American Pain Society and the American College of Physicians. Chou et al<sup>15,16</sup> recommended these treatments in addition to medical care. The most recent meta-analysis was supportive in finding clinically meaningful differences in aggregate between manipulation and other treatment alternatives.<sup>17</sup> A 2010 Cochrane review suggested that there is moderate evidence that exercise can prevent recurrences of back pain, although there was conflicting evidence as to its effectiveness as a primary treatment.<sup>18</sup> Based on fewer studies than on exercise or manipulation, a Cochrane systematic review found benefit of massage for patients with subacute and chronic nonspecific low back pain, especially when combined with exercise and education.<sup>19</sup> Research on most conservative treatments for low back pain, including drug therapy, have reported only modest benefits.<sup>20</sup> It remains to be seen whether this is due to the limited effectiveness of the interventions or the heterogeneity of patient populations. Research continues in an attempt to identify potential responder and nonresponder subgroups currently under the generic label of nonspecific low back pain. Potentially better results can also be linked to combination therapies and interdisciplinary approaches.

### Neck Pain

Spinal manipulation was found to be effective for acute and subacute neck pain. Effectiveness was also found for acute whiplash when spinal manipulation is combined with exercise. Spinal manipulation was shown to be effective for chronic neck pain when combined with exercise.<sup>13</sup> However, a new study suggests the efficacy of spinal manipulation alone in patients with associated cervicogenic headache.<sup>21</sup> Massage is also effective for chronic neck pain. An influential systematic review on this topic was conducted by the Bone and Joint Decade 2000–2010 Task Force on Neck Pain.<sup>22</sup>

### Mid Back Pain

The evidence to date is inconclusive in a favorable direction for the use of thoracic spinal manipulation for mid back pain. This is because there has been only 1 small placebo-controlled trial to date. On the other hand, thoracic spinal manipulation has been shown to be efficacious for the care of neck pain.<sup>13</sup> The trends in the data thus suggest spinal manipulation for mid back pain is a promising therapy requiring further trials.

### Headaches

Spinal manipulation is an effective option for migraine and cervicogenic headaches. The evidence was found inconclusive for tension-type headaches.<sup>13</sup> There is little information available on other types of headache. A Cochrane systematic review by Bronfort et al is notable.<sup>23</sup>

## Extremity Conditions

Manipulation of extremity joints is used for a variety of conditions. However, there are fewer trials than for back pain, neck pain, and headaches. Effectiveness was found for shoulder girdle pain, adhesive capsulitis, lateral epicondylitis, hip and knee osteoarthritis, patellofemoral pain syndrome, and plantar fasciitis. Inconclusive evidence in a favorable direction was observed for rotator cuff pain, shoulder pain, carpal tunnel syndrome, ankle sprains, Morton's neuroma, hallux limitus, and hallux abductor valgus. The only definitive negative finding was for ankle fracture rehabilitation, while several other forms of post surgical rehabilitation had inconclusive evidence leaning in the negative direction.<sup>13</sup>

## Nonmusculoskeletal Conditions

There was positive evidence for spinal manipulation for only 1 nonmusculoskeletal condition, cervicogenic dizziness. The evidence for the effectiveness of spinal manipulation was negative for asthma and dysmenorrhea; the addition of spinal manipulation to diet was also ineffective for hypertension. Evidence was inconclusive for pneumonia, stage 1 hypertension, pre-menstrual syndrome, nocturnal enuresis, and otitis media.<sup>13</sup>

## Safety

Manual therapies including spinal manipulation are generally safe. Side effects tend to be benign: minor and self-limiting with short duration (eg, mild postmanipulation soreness).<sup>24–26</sup> Severe complications have been associated with spinal manipulation but are extremely rare.<sup>25</sup> For example, cauda equina syndrome can be as rare as 1 in 100 million following lumbar manipulations.<sup>27</sup> Cassidy et al<sup>28</sup> reviewed approximately 100 million person-years of records to evaluate stroke risk associated with cervical spinal manipulation and medical care. The authors concluded that the risk was extremely small and there was no excess risk from chiropractic care compared with medical care for neck pain and headaches. They hypothesized that the equivalent risk for chiropractic and medical care suggests that a stroke prodrome can lead to care seeking for these conditions. It is unlikely that manipulation of the neck is causally related to stroke.

## Other Interventions

Other interventions commonly employed by the chiropractic profession have a similar evidenced-based foundation. A 2010 Cochrane review suggested that there is moderate evidence that exercise can help prevent recurrences of back pain, although there was conflicting evidence as to its effectiveness as a primary treatment.<sup>18</sup> Based on fewer studies than on exercise or manipulation, a Cochrane systematic review found benefit of massage for patients with subacute and chronic nonspecific low back pain, especially when combined with exercise and education.<sup>19</sup>

Research on most conservative treatments for low back pain, including drug therapy, have reported only modest benefits.<sup>20</sup> It remains to be seen whether this is due to the limited effectiveness of the interventions or the heterogeneity of patient populations. Research continues in an attempt to identify potential responder and nonresponder subgroups currently under the generic label of nonspecific low back pain. Potentially better results can also be linked to combination therapies and interdisciplinary approaches.

## Conclusion

Evidence-based practice has made significant inroads into the chiropractic profession by expanding clinical research into interventions commonly employed by chiropractors and by graduating more Evidence-based practice savvy practitioners. The most common conditions

treated by chiropractors are back pain, neck pain, and headaches.<sup>9</sup> The best available evidence supports manipulative therapy as a reasonable option for many of these complaints. Manipulative therapy also holds potential value for the treatment of a variety of extremity conditions. Chiropractic practice is far broader than spinal manipulation alone, typically including other evidenced-based interventions such as massage, exercise therapy, and activity modification advice. Chiropractic education, with the help of federal grants and partners in established medical schools, is aggressively addressing the need to create more Evidence-based practice savvy graduates. These efforts will hopefully lead to improved patient outcomes and offer a common language and perspective to facilitate greater interprofessional cooperation.

## Acknowledgments

### Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The preparation of this article was funded under a grant from the National Center of Complementary and Alternative Medicine of the National Institutes of Health under the U.S. Department of Health and Human Service (R25 ATOO2880).

## References

1. Eisenberg DM, Kessler RC, Foster C, Norlock FE, Calkins DR, Delbanco TL. Unconventional medicine in the United States. Prevalence, costs, and patterns of use. *N Engl J Med*. 1993; 328:246–252. [PubMed: 8418405]
2. Tindle HA, Davis RB, Phillips RS, Eisenberg DM. Trends in use of complementary and alternative medicine by US adults: 1997–2002. *Altern Ther Health Med*. 2005; 11:42–49. [PubMed: 15712765]
3. Kreitzer MJ, Mann D. CAM competencies for the health professions. *Complement Health Pract Rev*. 2008; 13:63.
4. Chapman-Smith D. The chiropractic profession: Basic facts, independent evaluations, common questions. *Chiropract Rep*. 2010; 24:1–8.
5. Delaney PM, Fernandez CE. Toward an evidence-based model for chiropractic education and practice. *J Manipulative Physiol Ther*. 1999; 22:114–118. [PubMed: 10073628]
6. Dagenais S, Tricco AC, Haldeman S. Synthesis of recommendations for the assessment and management of low back pain from recent clinical practice guidelines. *Spine J*. 2010; 10:514–529. [PubMed: 20494814]
7. Koes BW, van Tulder M, Lin CW, Macedo LG, McAuley J, Maher C. An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. *Eur Spine J*. 2010; 19:2075–2094. [PubMed: 20602122]
8. Kent PM, Keating JL, Taylor NF. Primary care clinicians use variable methods to assess acute nonspecific low back pain and usually focus on impairments. *Man Ther*. 2009; 14:88–100. [PubMed: 18316237]
9. Christensen, MG.; Kollasch, MW.; Hyland, JK. Practice Analysis of Chiropractic, 2010: A Project Report, Survey Analysis, and Summary of the Practice of Chiropractic Within the United States. Greeley, CO: National Board of Chiropractic Examiners; 2010.
10. Christensen, MG.; Kollasch, MW. Job Analysis of Chiropractic, 2005: A Project Report, Survey Analysis and Summary of the Practice of Chiropractic Within the United States. Greeley, CO: National Board of Chiropractic Examiners; 2005.
11. Muir Gray, JA. Evidence-Based Health Care: How to Make Health Policy and Management Decisions. 2. Edinburgh, Scotland: Churchill Livingstone; 2001.
12. Guyatt G, Cook D, Haynes B. Evidence based medicine has come a long way. *BMJ*. 2004; 329:990–991. [PubMed: 15514320]
13. Bronfort G, Haas M, Evans R, Leiniger B, Triano J. Effectiveness of manual therapies: the UK evidence report. *Chiropr Osteopat*. 2010; 18:3. [PubMed: 20184717]

14. Haldeman S, Underwood M. Commentary on the United Kingdom evidence report about the effectiveness of manual therapies. *Chiropr Osteopat*. 2010; 18:4. [PubMed: 20184721]
15. Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med*. 2007; 147:478–491. [PubMed: 17909209]
16. Chou R, Huffman LH. Nonpharmacologic therapies for acute and chronic low back pain: a review of the evidence for an American Pain Society/American College of Physicians clinical practice guideline. *Ann Intern Med*. 2007; 147:492–504. [PubMed: 17909210]
17. Rubinstein SM, van Middelkoop M, Assendelft WJ, de Boer MR, van Tulder MW. Spinal manipulative therapy for chronic low-back pain: an update of a Cochrane review. *Spine*. 2011; 36:E825–E846. [PubMed: 21593658]
18. Choi BK, Verbeek JH, Tam WW, Jiang JY. Exercises for prevention of recurrences of low-back pain. *Cochrane Database Syst Rev*. 2010; (1):CD006555. [PubMed: 20091596]
19. Furlan AD, Brosseau L, Imamura M, Irvin E. Massage for low back pain: a systematic review within the framework of the Cochrane Collaboration Back Review Group. *Spine*. 2002; 27:1896–1910. [PubMed: 12221356]
20. Keller A, Hayden J, Bombardier C, van Tulder M. Effect sizes of non-surgical treatments of non-specific low-back pain. *Eur Spine J*. 2007; 16:1776–1788. [PubMed: 17619914]
21. Haas M, Spegman A, Peterson DH, Aickin M, Vavrek D. Dose-response and efficacy of spinal manipulation for chronic cervicogenic headache: a pilot randomized controlled trial. *Spine J*. 2010; 10:117–128. [PubMed: 19837005]
22. Hurwitz EL, Carragee EJ, van der Velde G, et al. Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders. *Spine*. 2008; 33:S123–S152. [PubMed: 18204386]
23. Bronfort G, Nilsson N, Haas M, Evans R, Assendelft WJJ, Bouter LM. Noninvasive physical treatments for chronic/recurrent headache. *Cochrane Database Syst Rev*. 2004; (3):CD001878. [PubMed: 15266458]
24. Leboeuf-Yde C, Hennius B, Rudberg E, Leufvenmark P, Thunman M. Side effects of chiropractic treatment: a prospective study. *J Manipulative Physiol Ther*. 1997; 20:511–515. [PubMed: 9345679]
25. Rubinstein SM. Adverse events following chiropractic care for subjects with neck or low-back pain: do the benefits outweigh the risks? *J Manipulative Physiol Ther*. 2008; 31:461–464. [PubMed: 18722202]
26. Gouveia LO, Castanho P, Ferreira JJ. Safety of chiropractic interventions: a systematic review. *Spine*. 2009; 34:E405–E413. [PubMed: 19444054]
27. Haldeman S, Rubinstein SM. Cauda equina syndrome in patients undergoing manipulation of the lumbar spine. *Spine*. 1992; 17:1469–1473. [PubMed: 1471004]
28. Cassidy JD, Boyle E, Cote P, et al. Risk of vertebrobasilar stroke and chiropractic care: results of a population-based case-control and case-crossover study. *Spine*. 2008; 33:S176–S183. [PubMed: 18204390]