The Impact of the Affordable Care Act on Chiropractic Public Health Prevention Literature; a Review

By

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Date

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Date
Abstract

Purpose: Examine whether chiropractic contributions to public health prevention literature have increased in response to the passage of the Patient Protection and Affordable Care Act (ACA).

Method: A systematic review of the literature through PubMed and Ovid searches performed on the key words; chiropractic, public health, and prevention in the U.S. Works were captured 5 years prior to, and 5 years after the passage of the ACA using set inclusion criteria.

Results: 100 abstracts and 24 full-length articles were reviewed. The rate of publications meeting selection criteria ranged from 0.22 articles per preceding passage of the ACA, to 0.17 articles per following passage. A diverse group of article topics were captured. Despite chiropractic’s historical foundation in treating the spine, this review did not capture a concentration of articles exploring low back pain prevention at a community level.

Conclusion: The chiropractic contributions to the literature do not appear to have been greatly influenced by the ACA. Based upon the expected course of future public health direction, it appears that there is a role for leaders in public health and chiropractic to facilitate additional contributions to the public health prevention literature.
Introduction

Chiropractic care is often thought of as only related to the spine, as an alternative treatment, or exclusively associated with one-on-one care. However, the American Chiropractic Association, the largest U.S. chiropractic professional association, and a member of the Healthy People 2020 consortium¹, states on their website:

“As a profession, the primary belief is in natural and conservative methods of health care. Doctors of chiropractic have a deep respect for the human body's ability to heal itself without the use of surgery or medication. These doctors devote careful attention to the biomechanics, structure and function of the spine, its effects on the musculoskeletal and neurological systems, and the role played by the proper function of these systems in the preservation and restoration of health. A Doctor of chiropractic is one who is involved in the treatment and prevention of disease, as well as the promotion of public health, and a wellness approach to patient healthcare.”² (Emphasis added)

The American Public Health Association (APHA) defines Public Health as Prevention on their website:

“Public health is the practice of preventing disease and promoting good health within groups of people, from small communities to entire countries. Public Health is Policy Development and Population Health Surveillance. Public health professionals rely on policy and research strategies to understand issues such as infant mortality and chronic disease in particular populations.”³ (Emphasis added)

It appears that these professional organizations share a common goal in the prevention of disease, and the promotion of health. A relationship between public health and chiropractic has existed in the form of an APHA chiropractic health special interest group since 1983, and a full APHA section since 1995.⁴ Many of the people working toward advancements in chiropractic public health prevention are active members of this group, and authors of several articles captured in this review.
The passage of the Patient Protection and Affordable Care Act was a monumental change for all of health care, and reactions to the new rules and regulations from traditional medicine, complementary care providers, and public health officials were expected and are still occurring. In addition to impacts on the way clinical care is provided, one would expect a shift by researchers and authors due to the new direction provided by the ACA. As a legislative effort unique to the United States, the ACA is most likely to impact those interested in authoring works that impact this country. Because publications targeting populations outside the U.S. will not readily shed light on prevention initiatives affected by the ACA’s passage, this review targeted published works that focused on U.S. citizens only.

A portion of the ACA that is likely to influence authors interested in prevention is found in “Sec. 2713, Coverage of preventive health services”. This provision promotes the coverage of preventive services recommended by the United States Preventive Service Task Force (USPSTF). This task force is charged with grading the evidence that supports prevention initiatives. Any author interested in studying or implementing a preventive service would be advised to be familiar with the methods applied by this government group, and what elements are necessary to garner an “A or B” grade.

Areas of most immediate interest to chiropractic that have already been graded by the USPSTF include; obesity screening and counseling, osteoporosis screening, healthy diet and physical activity counseling to prevent cardiovascular disease, and falls prevention. The task force invites comments on existing work, and suggestions for additional consideration. Articles published by the chiropractic
profession that address prevention in these areas are apt to receive greater consideration by the USPSTF, and as chiropractors aspire to promote healthy living, it follows that research that couples these prevention topics to actual chiropractic practice may be the most beneficial to the chiropractic patient population.

The Healthy People 2010 goal for activity limitation due to back pain was to reduce 30.7 to 27.6 activity limitations per thousand in 2020. The Healthy People 2020 goal was an exact carryover from the 2010 goal, and represents a recognition by the group that there was no progress with regard to back pain’s impact on activity limitation in 10 years. In fact, as of 2013, the last year reported, the number had risen to 33.5 per thousand. This should be a concern and may require a change in perspective from one-on-one treatment to community prevention. Population level thinking may take some effort to realize, but the potential to change the course of low back pain’s disabling impact on society may exist in the exploration of a chiropractic/public health solution.

The disability numbers of back pain are rising, and so are the costs of treating back pain. Martin et al report expenditures among U.S. adults with spine problems increasing from $19.4 billion in 1997 to $35.1 billion in 2006, an 82% increase. The costs of back conditions not only present a real concern to individuals struggling to pay their medical bills, but when costs are at this magnitude, they may also have a negative impact on the nation’s economy.

Low back pain has been associated with preventable risk factors, one of which is body fat composition, so it follows that chiropractors should seek avenues of prevention with established evidence in the literature. Fortunately, the
application of prevention principles to all health disciplines has been steadily growing, and this was highlighted in the Patient Protection and Affordable Care Act (ACA) of March 2010. This support of prevention may signal a new future for all health care. Based upon this current trend, it is reasonable to examine the current state of the chiropractic public health prevention literature in order to assess areas of greatest need.

The prevention of illness and injury can be promoted through several different avenues and to various populations such as at-risk workers or people who seek chiropractic care. Based upon Chiropractic’s historical concentration on spinal conditions and that low back pain is a serious public health problem, there is a rationale to concentrate efforts upon the prevention of this disabling condition.

Barriers to chiropractic prevention efforts do exist. The chiropractic profession is relatively small with just 29,830 practicing members in comparison to the traditional medical community with 361,520 members, and this does not include a considerably larger support system of physician assistants, nurses, paraprofessionals, nor the PhD’s that concentrate their efforts on medical advancements. Additionally, there are relatively few accredited chiropractic schools in the U.S. in comparison to the 172 accredited osteopathic and medical schools. It is therefore not surprising that the volume of research produced is considerably smaller.

A more pragmatic barrier to chiropractic involvement in public health prevention centers on reimbursement. Although chiropractic scope of practice may allow and/or require participation in public health activities, chiropractors have
been impacted by their exclusion from the traditional medical reimbursement scheme since at least 1995. Medicare does not reimburse chiropractors for prevention services under its current regulations; it only covers the cost of spinal manipulation.

Additional issues that may influence chiropractic contributions to public health include a much greater emphasis on training students for practice, a much smaller financial base to endow research, and a prevailing view that chiropractors are best suited for clinical practice. The number of viable career opportunities in chiropractic research is very low and as such the total number of chiropractic authors is limited.

Chiropractic institutions have a vested interest in focusing their limited budgets in support of research and publication of work that is most likely to support the continuation of currently accepted chiropractic areas of expertise. It is reasonable to assume the works concerning spinal manipulation, its effectiveness, and any additional treatments that support chiropractic clinical practices will receive the lion’s share of chiropractic university research dollars.

Despite the barriers to producing public health prevention research there is a need for chiropractors to take a greater role in public health prevention. The public has come to expect more than just good care, but quality evidence to support that care. Chiropractors can continue to utilize the literature produced in the medical setting, but it may not be appropriate to generalize this work into the chiropractic practice. It should be recognized that there are differences between those seeking traditional care and the population served by chiropractic. It is not unreasonable to
assume that those who seek chiropractic care may differ in their views on prevention, healthy lifestyle, and more specific issues such as the risks and benefits of immunization, \(^6\) and it is incumbent on the chiropractic profession to explore the ramifications of these differences.

There is a role for studying this unique group separately from the general populace.

If chiropractors are going to make community health efforts, they are dependent upon the literature to guide appropriate efforts, as evidenced based care has become the standard. This places pressure on chiropractic institutions to increase the availability of funds for public health prevention studies, but to date; financial support for chiropractic prevention has been limited.

A journal dedicated to chiropractic public health does not currently exist, however the Journal of Chiropractic Medicine (JCM) and the Journal of Manipulative and Physiological Therapeutics, (JMPT), two journals well known to the chiropractic profession, have frequent calls for papers dedicated to public health. They have published special issues dedicated to population level manuscripts.

**Method**

A systematic review of the literature that captured articles from the U.S. from 2005 to 2015, and was performed to answer the following **Research question:** “Have chiropractic contributions to the literature concerning public health prevention increased since the passage of the Affordable Care Act of 2010?”

Two separate searches for the primary dataset were performed. The initial search used PubMed and was conducted using the key words “(public health) or (community health) or (population health) and chiropractic, and prevention, and
U.S.” The search was limited in time from 1 March 2005 until 1 June 2015. The PubMed and Ovid primary dataset searches captured content in the title, the abstract, and the author information section. Two additional articles were obtained from the reference sections of a reviewed paper. Articles captured from abstract review were obtained in their full-length and included references.

Full-length articles were read and the details were tabulated in chronological order. Works were summarized by “Article Title, First author/Year, Type of article/design, Journal/Impact factor, Public health condition studied, Target population, and Study Question”. The elements of these articles that reviewed back pain were of particular interest, and a separate category was considered, but the small amount of data available did not appear to warrant a separate entry.

Impact factor represents an attempt to measure the average readership of a journal’s articles by counting the times the articles are cited and dividing by the number of articles. This metric changes from year to year and may be an imperfect measure, but does suggest that articles from a given journal have been useful to other authors in some way. The website Citefactor.org was consulted for each journal captured in the full-length review, and the appropriate value for the year of publication was included in Table 1.18

The VA Medical Center Cincinnati librarian was consulted following the initial PubMed search for an evaluation of key words and the search method was expanded.19 Duplicates of the PubMed search were removed. A flow chart describes the data collection process from search of abstracts to full-length review in Figure1. The second search used the Ovid database and was structured as follows:
1) An “exploded” search on each of the following terms – health promotion or community health services or preventive health services or rural population;

2) An “exploded” search on each of the following terms - costs and costs analysis or health care economics and organizations or cost-benefit analysis or health expenditures;

3) A “focused” search on the terms chiropractic or manipulation,

4) Results from terms in search statements 1 AND 3;

5) Results from terms in search statements 2 AND 3;

6) Results from search statements 4 OR 5;

7) Limited the above results to the last 10 years.

**Inclusion criteria:** Manuscripts needed to meet all of the criteria for inclusion:

1. At least one of the article authors had to be linked with the chiropractic profession in some readily identifiable way. An author’s affiliation with a US Chiropractic College was the clearest indication of a relationship with the profession. Authors listing a relationship with a chiropractic clinic were also found as acceptable. The rationale for this particular criterion stems from the idea that the contribution must come from the profession, as opposed to a work done by an outside researcher using chiropractors or their activities as the subject of research. Author information and abstract were reviewed to determine whether an author was associated with a chiropractic school or other chiropractic entity.
2. The subject of the author's work must be based in the U.S. The impact of the ACA on the chiropractic prevention literature should be most noticeable if U.S. communities are targeted.

3. The work should be able to be linked to population health in some meaningful way to be considered public health. The article's intent needed to demonstrate a broader benefit than just to an individual patient. Articles that determined the prevalence of illness or methods of reducing the incidence of injury were therefore sought.

4. The work should be useful to improving prevention efforts in some meaningful way. Work that decreased nosocomial infection, reduced the occurrence of future injury, or prepared chiropractors on how best to advise patients on how to avoid injury or illness were examples of prevention that were included.

Full-length articles were read and scrutinized for appropriateness according to the predetermined inclusion criteria. The articles were grouped into timelines from 1 March 2005 to 1 March 2010 (60 months) and from 1 March 2010 to 1 June 2015 (63 months). These time periods were used to calculate the average rate of publications per month by dividing the total number of publications in the timeline by the number of months in the period. Categorical information was extracted for comparison between the timelines and tabulated.

A separate PubMed search was performed on individual keywords with and without limiting to the U.S., in order to gain perspective on the overall trends in the
fields under study. This search established the gross volume of work in and outside of chiropractic. The searches captured the total number of abstracts caught by the key words only, but did not include review for criteria appropriate to this study, nor were full length articles obtained. This search established the magnitude of the work in public health and relative change over time.

**Results**

The initial PubMed search resulted in 59 articles, Ovid added 39, and 2 came from the reference section of a full-length review for a total of 100 abstracts. After reviewing titles, abstracts, and author information for inclusion criteria, 20 articles were selected for full-length manuscript review from the PubMed search, 3 from the Ovid search, and 1 from the reference additions for a total of 24.

The abstracts were culled for these reasons: Foreign study subjects (21), not population level work (11), no chiropractic affiliation (26), and not related to prevention (18), and are depicted by category in Figure 1. Further details on the elimination category of each individual reference are found in Appendix 1. In total, 100 abstracts were reviewed and 26 full-length articles were obtained. Full-length review resulted in 2 articles culled, 1 due to its foreign status and the other as a result of its lack of chiropractic affiliation. Twenty-four articles were accepted for final review and tabulation.
Eleven articles that met the selection criteria were published from the March 2010 passage of the ACA until 1 June 2015 (63 months). Thirteen manuscripts meeting the selection criteria were published between 1 March 2005 and the end of February 2010 (60 months). This created two sample groups of similar size for comparison. The process of capturing abstracts and reviewing full-length articles for tabulation of data is outlined in Figure 2.
Figure 2 Method of obtaining full-length articles

The rate of publication of articles meeting this paper’s criteria for chiropractic public health prevention contributions was 0.17 articles per month after the ACA and 0.22 per month before the passage of the ACA. The 24 full-length articles were tabulated in chronological order, and “Article Title, First author/Year, Type of article/design, Journal/Impact factor, public health condition studied, Target population, and Study Question” were captured and summarized in Table 1. More detailed information on each study was captured in Appendix 2.
### Table 1
Chiropractic Public Health Prevention articles 2005 through 1 JUNE 2015

<table>
<thead>
<tr>
<th>Article Titles</th>
<th>1st Author/Year</th>
<th>Type of article/design</th>
<th>Journal/Impact Factor</th>
<th>Public Health Condition Studied</th>
<th>Target Population</th>
<th>Study question</th>
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<tbody>
<tr>
<td>Improving preventive health services training in chiropractic colleges: a pilot impact evaluation of the introduction of a model public health curriculum</td>
<td>Globe GA/2005</td>
<td>Observational retrospective pilot study</td>
<td>JMPT/1.248</td>
<td>Chiropractic student behavior</td>
<td>Chiropractic students</td>
<td>Has there been an observable impact on intern behavior toward educating patients in preventive health services since the dissemination of the model public health curriculum at one U.S. chiropractic college?</td>
</tr>
<tr>
<td>Mercury rising: warnings in pregnancy &amp; infancy</td>
<td>Ohm J/2005</td>
<td>Commentary</td>
<td>JMPT/1.248</td>
<td>Vaccination risks</td>
<td>Children with parents concerned about vaccinations</td>
<td>Are their concerns regarding childhood vaccination?</td>
</tr>
<tr>
<td>Work-related injuries of doctors of chiropractic in the United States</td>
<td>Holm SM/2006</td>
<td>Prevalence Survey</td>
<td>JMPT/1.248</td>
<td>Upper extremity injuries</td>
<td>Chiropractors</td>
<td>What is the prevalence and what are the types of work-related injuries among a nationwide sample of chiropractors?</td>
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<tr>
<td>Association of relative backpack weight with reported pain, pain sites, medical utilization, and lost school time in children and adolescents</td>
<td>Moore MJ/2007</td>
<td>Observational Case control study</td>
<td>JMPT/1.248</td>
<td>Childhood back pain</td>
<td>California school children</td>
<td>Can relative backpack weight be a useful tool in predicting physical problems in children?</td>
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<tr>
<td>Nutrition and youth soccer for childhood overweight: a pilot novel chiropractic health education intervention</td>
<td>Leach RA/2008</td>
<td>Randomized Clinical Trial</td>
<td>JMPT/1.248</td>
<td>Obesity</td>
<td>Fourth and fifth grade girls in Mississippi</td>
<td>Is recreational youth soccer and nutrition education beneficial to overweight female children?</td>
</tr>
<tr>
<td>Public Health, Wellness, Prevention, and Health Promotion: Considering the Role of Chiropractic and Determinants of Health</td>
<td>Johnson C/2009</td>
<td>Editorial</td>
<td>JMPT/1.248</td>
<td>Chiropractic education</td>
<td>Chiropractic patients</td>
<td>Can chiropractors incorporate the determinants into their practice?</td>
</tr>
<tr>
<td>Article Titles</td>
<td>Hand hygiene and treatment table sanitizing in chiropractic teaching institutions: results of an education intervention to increase compliance&lt;sup&gt;26&lt;/sup&gt;</td>
<td>The impact of microbial surveys on disinfection protocols in a chiropractic college environment&lt;sup&gt;27&lt;/sup&gt;</td>
<td>Survey of health attitudes and behaviors of a chiropractic college population&lt;sup&gt;28&lt;/sup&gt;</td>
<td>Improving preventive health services training in chiropractic colleges part II: enhancing outcomes through improved training and accountability processes&lt;sup&gt;17&lt;/sup&gt;</td>
<td>Characterization of health status and modifiable risk behavior among United States adults using chiropractic care as compared with general medical care&lt;sup&gt;29&lt;/sup&gt;</td>
<td>Prevalence of musculoskeletal injuries sustained by students while attending a chiropractic college&lt;sup&gt;30&lt;/sup&gt;</td>
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<tr>
<td>Type of article/Design</td>
<td>Educational Intervention</td>
<td>Prospective Case control with time delay</td>
<td>Survey</td>
<td>Retrospective case control</td>
<td>Secondary Analysis</td>
<td>Survey</td>
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<td>Journal / Impact Factor</td>
<td>JMPT / 1.248</td>
<td>JMPT / 1.248</td>
<td>JMPT / 1.248</td>
<td>JMPT / 1.248</td>
<td>JMPT / 1.248</td>
<td>JMPT / 1.248</td>
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<tr>
<td>Public Health Condition Studied</td>
<td>Chiropractic clinical hygiene</td>
<td>Nosocomial infection</td>
<td>Health Behaviors</td>
<td>Chiropractic education</td>
<td>Low back pain and health promotion</td>
<td>Musculoskeletal Injury</td>
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<tr>
<td>Target Population</td>
<td>Chiropractic students and faculty</td>
<td>Chiropractic students and faculty</td>
<td>Chiropractic student, faculty and staff in CA</td>
<td>Chiropractic students</td>
<td>National sample of US adults</td>
<td>Chiropractic students</td>
</tr>
<tr>
<td>Study Question</td>
<td>Can hand and equipment sanitization be improved in chiropractic schools?</td>
<td>Are changes to disinfection protocols effective at a chiropractic college?</td>
<td>What are the beliefs and behaviors of chiropractic students and faculty with regard to healthy behaviors?</td>
<td>Did chiropractic students change their public health education efforts following a change in the chiropractic curriculum?</td>
<td>How do medical and chiropractic patients differ when characterizing typical conditions, modifiable risk behaviors, and perceived changes in overall general health?</td>
<td>What is the prevalence of musculoskeletal injury while providing and receiving care during chiropractic student training?</td>
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# Table of Articles

<table>
<thead>
<tr>
<th>Article Titles</th>
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<th>Study question</th>
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</thead>
<tbody>
<tr>
<td>Chiropractic and medical use of health promotion in the management of arthritis: analysis of the 2006 National Health Interview survey</td>
<td>Ndetan H / 2010</td>
<td>Retrospective comparative analysis</td>
<td>JMPT / 1.248</td>
<td>Arthritis</td>
<td>US national cohort of adults</td>
<td>Is there a difference between the education provided on arthritis presented by medical doctors and chiropractors?</td>
</tr>
<tr>
<td>The health care provider’s role and patient compliance to health promotion advice from the user’s perspective: analysis of the 2006 National Health Interview survey data</td>
<td>Ndetan H / 2010</td>
<td>Retrospective analysis</td>
<td>JMPT / 1.248</td>
<td>Health Promotion</td>
<td>US national cohort of adults</td>
<td>Is there a difference between the health promotional advice given by chiropractors and medical doctors?</td>
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<tr>
<td>Patients with symptoms and signs of stroke presenting to a rural chiropractic practice</td>
<td>Leach RA / 2010</td>
<td>Retrospective Case Series</td>
<td>JMPT / 1.248</td>
<td>Stroke</td>
<td>Chiropractic patients</td>
<td>Can chiropractors reduce the risk of stroke injury through health education?</td>
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<tr>
<td>Could chiropractors screen for adverse drug events in the community? Survey of US chiropractors</td>
<td>Smith M / 2010</td>
<td>Survey</td>
<td>Chiropr Osteopat / 0.000</td>
<td>Adverse drug events</td>
<td>Chiropractors</td>
<td>Do chiropractors report that they detect adverse drug events in their patient population?</td>
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<tr>
<td>Immunization status of adult chiropractic patients in analyses of national health interview survey</td>
<td>Smith M / 2011</td>
<td>Secondary analysis</td>
<td>JMPT / 1.248</td>
<td>Vaccination</td>
<td>US national cohort of adults</td>
<td>What is the propensity of adult chiropractic users to receive seasonal immunization against influenza and pneumococcal disease?</td>
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<tr>
<td>Evaluation of a standardized wellness protocol to improve anthropometric and physiologic function and to reduce health risk factors: a retrospective analysis of outcome</td>
<td>McCoy M / 2011</td>
<td>Retrospective Cohort</td>
<td>J Altern Complement Med. / 1.518</td>
<td>General health risk</td>
<td>Clients of a commercial weight loss program</td>
<td>Does a commercial “wellness program” improve anthropometric and physiologic function and reduce health risk factors?</td>
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<tr>
<td>Article Titles</td>
<td>1st Author / Year</td>
<td>Type of article/design</td>
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<td>Knowledge, perceptions, and practices of chiropractic interns in the early detection of atypical moles</td>
<td>Ramcharan M / 2011</td>
<td>Cross Sectional Study</td>
<td>JCM / 0.0 Evaluation pending 2015</td>
<td>Atypical moles</td>
<td>Chiropractic students</td>
<td>Do chiropractic students possess the knowledge, practice skills, and perceptions on how to recognize and refer cases of atypical moles and skin cancer?</td>
</tr>
<tr>
<td>Chiropractic Care and Public Health: Answering Difficult Questions about Safety, Care through the lifespan, and Community Action</td>
<td>Johnson C / 2012</td>
<td>Editorial Collaborative Summary</td>
<td>JMPT / 1.248</td>
<td>Safety and community health issues</td>
<td>Chiropractic patients</td>
<td>How does chiropractic contribute to the current public health topics of: safety, health issues through the lifespan, and effective participation in community health issues?</td>
</tr>
<tr>
<td>Potential role of complementary and alternative health care providers in chronic disease prevention and health promotion: an analysis of National Health Interview Survey data</td>
<td>Hawk C / 2012</td>
<td>Secondary analysis</td>
<td>Prev Med. / 2.932</td>
<td>Public health training</td>
<td>U.S. adults</td>
<td>What is the potential role for complementary and alternative medicine (CAM) providers in chronic disease prevention and health promotion?</td>
</tr>
<tr>
<td>Influenza vaccination among chiropractic patients and other users of complementary and alternative medicine: are chiropractic patients really different</td>
<td>Davis MA / 2012</td>
<td>Secondary analysis</td>
<td>Prev Med. / 2.932</td>
<td>Immunization</td>
<td>U.S. adults</td>
<td>Are there differences in influenza immunization rates between chiropractic and non-chiropractic users?</td>
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<td>Consensus process to develop a best-practice document on the role of chiropractic care in health promotion, disease prevention, and wellness</td>
<td>Hawk C / 2012</td>
<td>Delphi Consensus statement</td>
<td>JMPT / 1.248</td>
<td>Wellness</td>
<td>Chiropractors</td>
<td>How can chiropractors best provide wellness and prevention care for their patients?</td>
</tr>
<tr>
<td>Weight gain as a consequence of living a modern lifestyle: a discussion of barriers to effective weight control and how to overcome them</td>
<td>Seaman DR / 2013</td>
<td>Commentary</td>
<td>J Chiropr Humanit</td>
<td>Weight control</td>
<td>Chiropractic patients</td>
<td>Is there a need for obesity education in chiropractic patients?</td>
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The overall impact factor of any of the journals publishing works captured by this review ranged from 0.000 (NA) to 3.496, with a mean of 1.086. Sixteen different first authors were responsible for the 24 articles spanning the 123 months covered. Secondary/retrospective analysis was the most frequently found type of type of study and 6 of these studies utilized the National Health Interview Survey data for the source of this analysis.

Obesity and healthy diet and physical activity were the only topics covered in the review that are graded by the USPSTF. Three articles captured in this review addressed obesity or weight loss. Patient populations studied were predominantly chiropractic patients, chiropractic students and a national study of adults with 6 articles each. The study of back pain at the population level was the primary purpose of only one study reviewing an association with backpack use in children. In an attempt to provide context to the rate of chiropractic public health prevention publication, a separate search was collected on the total number of manuscripts available under each individual component of the original keyword search string. PubMed was again used to perform searches on the keywords with and without limiting location to the US resulted in Table 2.
**Table 2**

**Total volumes of abstracts when individual keywords were searched**  
**Growth compares 2005-2010 to 2010-2015**

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<tr>
<td>Chiropractic only</td>
<td>2540</td>
<td>1340</td>
<td>1200</td>
<td>12%</td>
</tr>
<tr>
<td>Prevention only</td>
<td>601,015</td>
<td>321,125</td>
<td>279,890</td>
<td>15%</td>
</tr>
<tr>
<td>Public Health only</td>
<td>2,780,856</td>
<td>1,455,742</td>
<td>1,325,114</td>
<td>10%</td>
</tr>
<tr>
<td>Chiropractic and U.S.</td>
<td>797</td>
<td>409</td>
<td>388</td>
<td>5%</td>
</tr>
<tr>
<td>Prevention and U.S.</td>
<td>287,973</td>
<td>161,770</td>
<td>126,203</td>
<td>28%</td>
</tr>
<tr>
<td>Public Health and U.S.</td>
<td>1,445,954</td>
<td>798,965</td>
<td>646,989</td>
<td>23%</td>
</tr>
<tr>
<td>Criteria limited</td>
<td>24</td>
<td>11</td>
<td>13</td>
<td>(-15%)</td>
</tr>
</tbody>
</table>

Chiropractic research grew at a faster rate (12%) globally than it has in the U.S. alone (5%). However, Prevention (28%) and Public Health (23%) grew at faster rates in the U.S. than global Prevention (15%) and Public Health (10%). All of these individual categories show some degree of growth after the passage of the ACA, but when combined to examine chiropractic, public health, and prevention literature in the U.S. for the 123 months between 2005 and 2015 with inclusion criteria applied, the rate of growth actually decreased by 15%.
**Discussion**

The rate of publication in the area of chiropractic public health prevention, as captured by this paper’s search and inclusion criteria, has not increased, but has, in fact decreased from 0.22 to 0.17 articles per month in the five years following passage of the bill.

The vast majority of articles meeting the criteria for this review were published in the traditional chiropractic literature. The lion’s share, 17 articles, was found in a single journal, the JMPT. Only 3 articles were published outside of the traditional chiropractic literature. In 2014, according to citefactor.org the impact factor of the JMPT was 1.248, the APHA journal was 4.552, the American Journal of Preventive Medicine was 4.527, Prevention Research Journal was 5.269, and the New England Journal of Medicine was 55.83.\(^{18}\)

Much of the published work in this area is not original research, and provides commentary from the author(s) with some support from the literature, but generally calls upon the chiropractic profession to improve the manner in which it conducts public health outreach to the community it serves. This suggests that there is interest in improving the amount of public health research, but as yet funding for large, costly, community based intervention studies has not been readily available or pursued to date.

The articles reviewed tended to utilize chiropractic students, faculty, and patients as study participants, and in general did not extend into the broader community. The study questions in general focused on how chiropractic and public health intersect.
Central to the idea that the ACA may prompt additional works in the U.S., the articles published in Public Health and Prevention rose at a much higher rate following passage of the ACA. The rate of growth for chiropractic publications in the U.S. lagged behind all other areas examined, and the total number of articles found in PubMed for chiropractic is orders of magnitude lower.

**Limitations**

The body of literature from 2005 to 2015 represents a reasonable window in which to examine public health literature immediately prior to the passage of the ACA, and to compare these articles to works published in the early first years afterward. An argument can certainly be made that the considerable time that it takes to prepare, conduct, and reach final publication makes this examination of the literature slightly premature. However, the advancements in which the Internet brings manuscripts to print, and the speed at which one can access the latest works, even before official publication, may act as a counterbalance to the early examination of these ideas.

The search categories were broad in scope and intended to capture a complete sample of the literature germane to the research question, but it is quite reasonable to assume that articles could be missed due to alternate phrasing. In general, the papers had less emphasis on broad questions of health in the community under study, and this may be a function of the search term requirements.

Additionally, misclassification may have occurred due to an author having chiropractic affiliation that wasn’t readily apparent during review of the abstracts.
These types of misclassification would most likely have been non-differential, in that they would not have occurred at any greater rate to articles captured before or after the passage of the ACA, and as such, would not have skewed the conclusions in a meaningful way.

**Conclusions**

The passage of the ACA did not appear to result in an increase in publication of chiropractic public health prevention literature. Factors that drive the publication of these kinds of articles seem to be independent of those that influence the mainstream public health community.

A broad range of article topics were captured, and given the limited resources available for research, there may be a rationale for concentrating efforts on a few high impact public health prevention efforts. Collaboration and coordination of public health prevention studies between the schools could be formally initiated at the annual Association of Chiropractic Colleges Research Agenda Conference and linked to public health professionals at the APHA in order to get the greatest amount of support for a profession wide effort.

There appears to be an opportunity for additional research in the area of low back pain prevention work at the community level. Chiropractors could consider applying the research of healthy lifestyle demonstrated in the general population of other countries,\(^\text{42}\) to special populations that are at-risk of back pain. For instance, providers working in the veteran community may wish to study how healthy lifestyles can be best applied to this population using chiropractic’s unique
perspective on back pain. Interventions that reduce the effects of low back pain have been identified as an area of need, but concentration on additional evidence in the prevention literature may result in greater support by the USPSTF for this approach.

It is no accident that many of the articles found in this literature search were published in the same journals, as the community is quite small the inter-professional network has not been fully developed as of yet. If chiropractic public health research reaches a large enough volume, there may be a rationale for expansion in this area. Collaboration with the traditional medically based public health journals may currently be the best method of disseminating chiropractic contributions more widely.

Despite some training in population health during chiropractic school, there appears to have been a problem with how chiropractors self-identify as important contributors to their community's health. In 2005, Globe, Azen, and Valente found that chiropractic interns failed to change their approach to health education of patients, despite a change in a didactic part of the chiropractic curriculum that targeted improvements in public health. The original effort to reform the curriculum was spearheaded by a committee of the APHA chiropractic section. In 2009, Globe et al followed up on efforts to improve clinical preventive services in a more clinically relevant way, and found interns had significantly improved. So it seems that efforts to dispel the notion that chiropractors aren’t involved in public health can make a difference.
Creating publishable work takes appropriate training, mentorship, time and considerable effort. New authors need to understand how the Institutional Review Board process works, accept criticism through peer review, experience rejection from publishers, and remain patient through a long and complicated publishing process. However, once a greater number of providers master this process, and it is promoted as important to the profession, it may become more likely that quality public health prevention efforts will flourish in chiropractic. Facilitating research and authorship expertise is likely to be a significant hurdle, but enticing chiropractors to focus these skills on public health prevention in particular may also present its own challenges.

When similar beliefs, regarding chiropractic’s limited role in public health prevention, are held by practitioners, the community, and public health officials, it is unlikely that the training and talents of chiropractors will be put to good use without some effort to change the status quo. Research contributions to the literature, engagement in community health efforts, and additional public health training are ways that the chiropractic profession can contribute to population level health. Quality articles published in the larger public health literature are likely to result in greater acceptance by public health professionals and those who finance interventional studies.

Aligning chiropractic research methods to standards proposed by other groups pursuing prevention work, such as pain physicians may add value to chiropractic efforts. One of the greatest benefits of being considered an “alternative care option” is the ability to view problems from a different perspective.
that is not constrained to traditional medical opinion. The potential for novel thought on health and “outsider thinking” should be recognized, and capitalized upon by groups such as the pain physicians for the benefit of patients.

Based upon the findings of this review, there appears to be opportunity for the chiropractic profession to increase its contribution to the literature in the area of public health prevention. In the landmark legislation of the ACA, there is an avenue to pursue additional efforts in prevention, and based upon the very high costs associated with treating spinal degeneration⁹, it seems that there should be a concentrated effort to apply chiropractic talents to the areas addressed by the USPSTF.

Chiropractic prevention research could focus upon just one USPSTF goal such as obesity screening and counseling, each year.⁶ A concentrated effort by the chiropractic profession that is aligned with the public health professional community could result in unique research on the problem of back pain. It appears that a change in approach to back pain is needed in the U.S., and increasing the amount of chiropractic public health prevention literature may be a way to deliver a new direction.

**Leadership**

Based upon some of the traditional public health activities such as immunization, prevention of communicable disease, and the provision of care for at risk sub-populations in the community, it would not be surprising that chiropractors are not viewed as important contributors by public health professionals. Fortunately, the roles of public health and chiropractic continue to evolve and chronic disease has
become much more prominent in both population health and individual care modes of care. Some of the older views may continue, and result in the self-perpetuation of the idea that chiropractors are neither capable nor welcome to add value beyond the treatment of individual patients within their communities. One method to change this perception may include increasing the amount of chiropractic public health research readily available to the mainstream public health community.

Once a concern such as a low volume of relevant chiropractic publications in an important area of health is identified, it is important to do something about it. As such, leadership in the area of public health prevention should come from within the profession, from the larger public health community, and most importantly from those who have expertise in both communities. Chiropractors who also hold a degree in public health are uniquely positioned to advance the literature in chiropractic public health prevention, and should consider their role as leaders through publication efforts themselves, through advocacy to the chiropractic community and by networking in the larger public health community. Efforts may differ based upon whether a particular effort is directed at the local, regional, or national level.

Barriers may be related to the historical role of chiropractic care in which one-on-one individual care is provided in a single provider practice. The degree to which the chiropractor engaged his or her community has been largely been dependent upon self-initiative, as chiropractors generally do not have institutional support of public health activities from a hospital or university. There are few pre-defined expectations, opportunities, or financial enticements for chiropractors to
engage in community health activities, so it is not surprising that public health may not become a high priority when setting up an individual practice.

The University of North Carolina Chapel Hill Public Health Leadership Program has been structured around fulfilling the fundamental MPH curriculum and engaging its students into an evidence-based leadership track that spends some time on identifying self-limiting behaviors. Additional efforts are made to gain mastery of the methods of overcoming the natural resistance to change found in most organizations. Regularly applying these techniques is an important component to making the concepts useful, and many chiropractors in the field may find this challenging. Never the less, pursuing an MPH through a program like this may be of significant value to an individual interested in improving one’s understanding of the ever-evolving field of public health.

Chiropractors that are involved in academia and/or hospital based practice are more apt to have greater opportunity to put leadership training into action, but these individuals are in the minority, as chiropractic is currently structured. Field doctors are often isolated to a single provider practice, and have little to no contact with their alma maters after graduation. In order to apply key concepts of systems thinking, the system must have some continuity. A lack of unity and structured interaction between chiropractors presents a significant leadership challenge. Therefore, it is incumbent upon those in a position to improve the communication lines within the profession to proactively engage providers.

Increasing the number of chiropractors that complete an MPH program would likely result in a greater focus on public health activities, but this may prove
difficult to accomplish based upon the economic and financial barriers, unless the current chiropractic schools engage schools of public health to facilitate an easier pathway. Creating these types of relationships requires engagement from both sides, and overtures from public health schools to chiropractic would need to be welcomed as well.

Chiropractors holding an MPH degree may be find greater success engaging public health professionals, and acting as a conduit to the chiropractic community. Additionally, individual MPH organizational skills can be applied to furthering community public health efforts through chiropractic practices. Benefit can come from organizing local chiropractors to sponsor health events that are only designed to increase awareness of community health centers, and may demonstrate chiropractic’s interest in more than just marketing and promotion of individual practices. If public health officials come to view chiropractors as important contributors to their goals for the community, it is more likely to result in a self-sustaining relationship.

Leadership may also be demonstrated by making an effort to persuade those in a position to fund research to make use of the talents of chiropractors and access the special populations that they serve. Approaching public health service leaders at conferences by asking how chiropractic might support national goals may be an effective approach. The APHA annual conference presents an opportunity for this type of networking.

The Association of Chiropractic Colleges Research Agenda (ACC RAC) is an annual conference dedicated to uniting chiropractic authors and the academic
institutions most likely to embrace and facilitate public health prevention initiatives.

Participation in this conference results in access to decision makers within the profession and others dedicated to the advancement of the profession. Networking is a first step to building support for new ideas and understanding how personality type influences the manner, in which others listen to, accept, and take action is an advantage to a public health leader.
Appendix 1
Reasons for exclusion of each individual abstract reference

References eliminated due to work on subjects foreign to the U.S., by country (21)

Canadian 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55
Swedish 56
Chinese 57
Australian 58, 59
Denmark 60, 61, 62, **62
English 63

References eliminated due to work that was not population level (11)
64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74

References eliminated due to no chiropractic affiliation (26)
75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, **100

References eliminated due to subject not relatable to prevention (18)

Retained references (24)
41, 37, 40, 36, 34, 38, 39, 35, 33, 28, 26, 27, 17, 29, 30, 24, 23, 22, 20, 21, 25, 31, 32, 117

** Article initially appeared appropriate for full-length review and was obtained, but was culled after review disclosed that it did not in fact meet the inclusion criteria.
### Appendix 2

**Chiropractic Public Health Prevention articles 2005 through 1 JUNE 2015**

**Data capture A**

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of article design</strong></td>
<td>Observational retrospective pilot study</td>
<td>Commentary</td>
<td>Prevalence Survey</td>
<td>Observationa l Case control study</td>
<td>Randomized Clinical Trial</td>
</tr>
<tr>
<td><strong>Contribution to the Literature</strong></td>
<td>Reports that chiropractic students have not changed their patient public health education behavior, despite the addition of public health education training</td>
<td>Alert to review the evidence on vaccinations</td>
<td>Suggests a relationship between upper extremity injuries to new chiropractic doctors and the techniques utilized</td>
<td>Suggests a relationship between a child's backpack weight and back pain</td>
<td>Established no relationship between a nutritional education intervention and decreased BMI</td>
</tr>
<tr>
<td><strong>Concerns</strong></td>
<td>Retrospective data</td>
<td>No new evidence added to the public health literature</td>
<td>Potential for recall bias of self-report</td>
<td>States that study involving children had no IRB approval</td>
<td>Quiz was not validated externally and prior to study onset</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Introduces the idea of applying the Determinants of Health to the Chiropractic profession*
<table>
<thead>
<tr>
<th>Population</th>
<th>Chiropractic students</th>
<th>Children with parents concerned about vaccinations</th>
<th>Chiropractors</th>
<th>California school children</th>
<th>Fourth and fifth grade girls in Mississippi</th>
<th>Chiropractic patients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study question</strong></td>
<td>Has there been an observable impact on intern behaviors toward educating patients in preventive health services since the dissemination of the model public health curriculum at one of the chiropractic colleges in the United States?</td>
<td>Are there concerns regarding childhood vaccination?</td>
<td>What is the prevalence and what are the types of work-related injuries among a nationwide sample of chiropractors?</td>
<td>Can relative backpack weight be a useful tool in predicting physical problems in children?</td>
<td>Is recreational youth soccer and nutrition education beneficial to overweight female children?</td>
<td>Can chiropractors incorporate the determinants into their practice?</td>
</tr>
</tbody>
</table>

### Article Titles

<table>
<thead>
<tr>
<th>Article Titles</th>
<th>1st Author / Year</th>
<th>Type of article/Design</th>
<th>Journal / Impact Factor</th>
<th>Contribution to the Literature</th>
<th>Concerns</th>
<th>Population</th>
<th>Study Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand hygiene and treatment table sanitizing in chiropractic teaching institutions: results of an education intervention to increase compliance</td>
<td>Evans MW /2009</td>
<td>Educational Intervention</td>
<td>JMPT / 1.059</td>
<td>Highlights an effective method to improve practice hygiene in chiropractic students</td>
<td>Unknown whether this transfers to actual practice.</td>
<td>Chiropractic students and faculty</td>
<td>Can hand and equipment sanitation be improved</td>
</tr>
<tr>
<td>The impact of microbial surveys on disinfection protocols in a chiropractic college environment</td>
<td>Burnham K /2009</td>
<td>Prospective Case control with time delay</td>
<td>JMPT / 1.059</td>
<td>Suggests that disinfection protocol changes were effective.</td>
<td>Is this generalizable to other schools or clinical practice?</td>
<td>Chiropractic students and faculty</td>
<td>Are changes to disinfection protocols</td>
</tr>
<tr>
<td>Survey of health attitudes and behaviors of a chiropractic college population</td>
<td>DuMonthier WN /2009</td>
<td>Survey</td>
<td>JMPT / 1.059</td>
<td>Suggests that healthy behaviors are found at his CA chiropractic school.</td>
<td>May not be generalizable to other locations</td>
<td>Chiropractic student, faculty and staff in CA</td>
<td>What are the beliefs and behaviors of chiropractic</td>
</tr>
<tr>
<td>Improving preventive health services training in chiropractic colleges part II: enhancing outcomes through improved training and accountability processes</td>
<td>Globe G /2009</td>
<td>Retrospective case control</td>
<td>JMPT / 1.059</td>
<td>Suggests a need to improve preventive health education to chiropractic students</td>
<td>Difficult to generalize beyond this single institution</td>
<td>Chiropractic students</td>
<td>Did chiropractic students change their</td>
</tr>
<tr>
<td>Characterization of health status and modifiable risk behavior among United States adults using chiropractic care as compared with general medical care</td>
<td>Ndetan /2009</td>
<td>Secondary Analysis</td>
<td>JMPT / 1.059</td>
<td>There are no significant differences in the health promotion habits of chiropractic and medical patients.</td>
<td>NA</td>
<td>National sample of US adults</td>
<td>How do medical and chiropractic patients differ when</td>
</tr>
<tr>
<td>Prevalence of musculoskeletal injuries sustained by students while attending a chiropractic college</td>
<td>Ndetan /2009</td>
<td>Survey</td>
<td>JMPT / 1.059</td>
<td>Suggests a significant degree of risk of injury during chiropractic training</td>
<td>May not be generalizable to other schools or clinical practice.</td>
<td>Chiropractic students</td>
<td>What is the prevalence of musculoskeletal injury</td>
</tr>
<tr>
<td>in chiropractic schools?</td>
<td>effective at a chiropractic college?</td>
<td>students and faculty with regard to healthy behaviors?</td>
<td>public health education efforts following a change in the chiropractic curriculum?</td>
<td>characterizing typical conditions, modifiable risk behaviors, and perceived changes in overall general health?</td>
<td>while providing and receiving care during chiropractic student training?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Article Titles

<table>
<thead>
<tr>
<th>Article Titles</th>
<th>Type of article / design</th>
<th>Journal / Impact Factor</th>
<th>Contribution to the Literature</th>
<th>Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiropractic and medical use of health promotion in the management of arthritis: analysis of the 2006 National Health Interview survey</td>
<td>Retrospective comparative analysis</td>
<td>JMPT / 1.418</td>
<td>Suggests that improvements in arthritis health promotion education is needed by both chiropractors and M.D.'s</td>
<td>Retrospective</td>
</tr>
<tr>
<td>The health care provider’s role and patient compliance to health promotion advice from the user's perspective: analysis of the 2006 National Health Interview survey data</td>
<td>Retrospective analysis</td>
<td>JMPT / 1.418</td>
<td>Suggests that chiropractors should increase the amount of health promotional advice they give patients</td>
<td>Very small sample in which to draw conclusions</td>
</tr>
<tr>
<td>Patients with symptoms and signs of stroke presenting to a rural chiropractic practice</td>
<td>Retrospective Case Series</td>
<td>JMPT / 1.418</td>
<td>Alerts chiropractors to stroke concerns and suggests education of patients as a method of prevention</td>
<td>Low response rate and potential self-selection bias</td>
</tr>
<tr>
<td>Could chiropractors screen for adverse drug events in the community? Survey of US chiropractors</td>
<td>Survey</td>
<td>JMPT / 1.418</td>
<td>Suggests that chiropractors can detect adverse drug events in their patient population</td>
<td>NA</td>
</tr>
<tr>
<td>Immunization status of adult chiropractic patients in analyses of national health interview survey</td>
<td>Secondary analysis</td>
<td>JMPT / 1.418</td>
<td>Suggests that chiropractic users are less likely to receive pneumococcal vaccination, and as likely to be vaccinated against influenza as non-chiropractic users.</td>
<td>Sample selection, retrospective, subjects are paying clients</td>
</tr>
<tr>
<td>Evaluation of a standardized wellness protocol to improve anthropometric and physiologic function and to reduce health risk factors: a retrospective analysis of outcome</td>
<td>Retrospective Cohort</td>
<td>J Altern Complement Med./1.585</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>US national cohort</td>
<td>US national cohort</td>
<td>Chiropractic patients</td>
<td>Chiropractors</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Study question</strong></td>
<td>Is there a difference between the education provided on arthritis presented by medical doctors and chiropractors?</td>
<td>Is there a difference between the health promotional advice given by chiropractors and medical doctors?</td>
<td>Can chiropractors reduce the risk of stroke injury through health education?</td>
<td>Do chiropractors report that they detect adverse drug events in their patient population</td>
</tr>
</tbody>
</table>

### Article Titles

| Knowledge, perceptions, and practices of chiropractic interns in the early detection of atypical moles | Chiropractic Care and Public Health: Answering Difficult Questions about Safety, Care through the lifespan, and Community Action | Potential role of complementary and alternative health care providers in chronic disease prevention and health promotion: an analysis of National Health Interview Survey data | Influenza vaccination among chiropractic patients and other users of complementary and alternative medicine: are chiropractic patients really different? | Consensus process to develop a best-practice document on the role of chiropractic care in health promotion, disease prevention, and wellness | Weight gain as a consequence of living a modern lifestyle: a discussion of barriers to effective weight control and how to overcome them |

### 1st Author / Year

| Ramcharan M / 2011 | Johnson C / 2012 | Hawk C / 2012 | Davis MA / 2012 | Hawk C / 2012 | Seaman DR / 2013 |

### Type of article/design

| Cross Sectional Study | Editorial Collaborative Summary | Secondary analysis | Secondary analysis | Delphi Consensus statement | Commentary |

### Journal / Impact Factor

| JCM / NA | JMPT / 1.647 | Prev Med. / 3.496 | Prev Med. / 3.496 | JMPT / 1.647 | J Chiropr Humanit/ NA |

### Contribution to the Literature

| Chiropractic students are able to successfully screen for atypical moles | Chiropractors engaged in Public Health activities contribute evidence from the literature to stimulate greater professional involvement | Provides a compelling rationale to increase chiropractic training in public health and prevention | Clarifies similarities and slight differences regarding immunization in the sub-population of chiropractic patients | Provides expert input and support from the literature regarding evidence based preventive and wellness care | Call to profession to consider patient weight control |

### Concerns

| May not be able to generalize students success to the field | No new evidence added to the public health literature | NA | NA | No new evidence | No new evidence |

### Population

| Chiropractic students | Chiropractic patients | U.S. adults | U.S. adults | Chiropractors | Chiropractic patients |

### Study question

| Do chiropractic students | How does chiropractic contribute to | What is the potential role for | Are there differences in influenza | How can chiropractors best provide | Is there a need for obesity |
| possess the knowledge, practice skills, and perceptions on how to recognize and refer cases of atypical moles and skin cancer? | chiropractic to the current public health topics of safety, health issues through the lifespan, and effective participation in community health issues? | complementary and alternative medicine (CAM) providers in chronic disease prevention and health promotion? | immunization rates between chiropractic and non-chiropractic users? | wellness and prevention care for their patients? | education in chiropractic patients |

References


19. Mason S. Reference Librarian, Personal correspondance. VA Medical Center Cincinnati. 1JUN15.


