

Value of Chiropractic Services at an On-Site Health Center

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Objective: Chiropractic care offered at an on-site health center could reduce the economic and clinical burden of musculoskeletal conditions.

Methods: A retrospective claims analysis and clinical evaluation were performed to assess the influence of on-site chiropractic services on health care utilization and outcomes. **Results:** Patients treated off-site were significantly more likely to have physical therapy ($P < 0.0001$) and outpatient visits ($P < 0.0001$). In addition, the average total number of health care visits, radiology procedures, and musculoskeletal medication use per patient with each event were significantly higher for the off-site group (all $P < 0.0001$). Last, headache, neck pain, and low back pain–functional status improved significantly (all $P < 0.0001$). **Conclusions:** These results suggest that chiropractic services offered at on-site health centers may promote lower utilization of certain health care services, while improving musculoskeletal function.

Back and neck pain and severe headache or migraine comprise several of the most prevalent chronic medical problems. Back and neck pain are found among approximately a quarter of the US population aged 18 to 44 years and a third of the US population aged 45 to 64 years; whereas 20% of the population aged 18 to 44 years and 15% aged 45 to 64 years experience severe headaches or migraines.¹ Moreover, these musculoskeletal problems have considerable and increasing economic burden. Direct costs in the United States for back and neck pain were \$86 billion in 2005; a 65% total cost increase since 1997, including 25%, 74%, 46%, and 171% increases in inpatient, outpatient, emergency department, and pharmacy costs, respectively.² In addition, in 2005, back problems comprised the second most common cause of disability and accounted for approximately \$14 billion in lost wages annually between 2002 and 2004.^{3,4} In 2007, musculoskeletal cases tended to involve higher percentages of long-term work loss as compared with all nonfatal injuries and illnesses.⁵

Chiropractic care has been demonstrated to be an effective treatment for back pain, neck pain, and headache. For example, Hoiriis et al⁶ performed a randomized double-blinded clinical trial of patients with subacute low back pain. The authors reported that those receiving chiropractic adjustments experienced significantly more pain relief and decreased scores on the Global Impression of Severity Scale, compared with those receiving sham adjustments and either muscle relaxants or placebo. A comprehensive literature review by Vernon et al⁷ found evidence that spinal manipulation was beneficial for patients with chronic mechanical neck pain at 6, 12, and up to 104 weeks after treatment. Bryans et al⁸ performed a systematic literature review of controlled clinical trials and found evidence supporting the use of spinal manipulation for migraine and cervicogenic headache.

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Learning Objectives

- Become familiar with data on the benefits of chiropractic care for common pain problems and the rationale for offering chiropractic services in occupational health settings.
- Discuss the authors' experience with offering chiropractic care at onsite health centers and their approach to assessing the value of onsite chiropractic services.
- Summarize the findings on how chiropractic care affected utilization of healthcare services and its impact on functional status in patients with musculoskeletal conditions.

Previous research has described the benefit of chiropractic care in the occupational setting.⁹ Baldwin et al¹⁰ performed a review of the literature and found that effectiveness of physician and chiropractic care for occupational lower back pain was similar, although chiropractic patients were more satisfied with treatment. Likewise, a retrospective analysis⁹ of patients with work-related spinal injuries found lower subjective pain scores and improved tolerance for work-related activities after chiropractic care. Moreover, functional scores after treatment were significantly improved among patients with either an acute or a subacute injury.

Cerner Corporation, a health care company with 8500 associates and 11,600 lives (5530 associates, 6070 dependents) covered under its health benefits plan, hosts two on-site health centers designed to provide a range of worksite health care benefits for Cerner associates and their dependents, including chiropractic care. The on-site health centers offer convenience over off-site medical facilities through reductions in time spent away from work and waiting for appointments, as well as longer patient–doctor consultations. The services offered on-site include primary medical care, pharmacy services, health coaching, and condition management counseling; and in 2010, chiropractic services were introduced. It is hypothesized that, like the other services offered on-site, this chiropractic care will offer patients more convenient and quality care than they would receive off-site.

This study had two objectives. The first was to determine whether providing chiropractic care at the on-site health centers versus care performed off-site by private practitioners was associated with lower utilization of health care visits (eg, inpatient, outpatient, and physical therapy), radiology procedures, and pain-related medication use. The second was to assess the effectiveness of on-site care through functional outcomes. Evaluating these endpoints will improve understanding of the value of on-site chiropractic care, specifically how it may contribute to the clinical and/or financial benefits provided by on-site health centers by providing effective and cost-effective care. Recognizing the benefits of on-site chiropractic care may facilitate increased utilization of these services.

METHODS

A retrospective claims analysis was performed to evaluate health care utilization trends of patients who received chiropractic care at an on-site health center (“on-site group”) compared with those treated at off-site community-based chiropractic offices (“off-site group”) at least once during 2010 (January 1, 2010, to December 25, 2010). Specifically, the number of health care visits, radiologic

procedures, and use of musculoskeletal medications were compared between groups. Patients who received chiropractic services at both on-site and off-site offices in 2010 were excluded from the analysis.

Patients referred to chiropractic care by another provider or self-referral have the option of seeking care from chiropractors in the community or at the on-site health center. The on-site health centers' mission is to enhance patients' health, promote patient satisfaction, increase productivity, and decrease absenteeism or presenteeism by delivering convenient, evidence-based, and superior care in an innovative and high-tech environment. The experience at the on-site health centers is meant to be patient-centric and mimics the service model often found in the high-end retail industry, while leveraging the latest technology to deliver a new method of care. For chiropractic patients treated on-site, their first visit is scheduled for 45 minutes. Typical elements of the first examination include a history of present illness, functional assessment, any regional physical examination that may have been indicated, orthopedic and neuromuscular examinations, report of findings, and, if consent is given, treatment. For subsequent visits, a brief history is taken of condition and symptoms since the patient's last visit, followed by the chiropractic examination and, if appropriate, treatment.

In addition, to determine the effectiveness of the on-site chiropractic care provided, patients treated at the on-site health center were asked to complete functional-assessment questionnaires appropriate to their care at each visit: the Headache Disability Index (HADI),¹¹ the Neck Pain Disability Index (NPDI),¹² and the Oswestry Low Back Pain Questionnaire (OLBQ).¹³ Each of these questionnaires is used to assess changes in a patient's ability to function (eg, activities of daily living) resulting from headache, neck pain, and back pain, respectively. Higher scores on these questionnaires represent decreasing functional status, whereas decreasing scores represent improvement. To be included in the subanalysis of on-site chiropractic care efficacy, patients had to complete a functional assessment questionnaire at least twice during the study period. For included patients, a comparison of their first and last questionnaire scores in 2010 was made to assess functional changes associated with receiving chiropractic care on-site.

For demographic and outcome variables of interest, descriptive statistics were calculated for each group. The utilization outcomes between groups (ie, health care visits, radiology procedures, and medication use) were compared using the Poisson regression model and, where appropriate, the zero-inflated Poisson regression model. The zero-inflated Poisson regression indicated whether the odds of having a particular event (ie, health care visit, radiology procedure, musculoskeletal medication use) differed significantly between the groups, whereas the Poisson regression assessed whether the number of events per patients with events differed between the groups. The patient-level before-treatment vs after-treatment differences in functional status related to low back pain (OLBQ), neck pain (NPDI), and headache (HADI) were compared using paired *t* tests and then cross-checked with Wilcoxon signed rank tests. Penalties were not assigned for multiple statistical comparisons.

The Western Institutional Review Board determined that this protocol for this study qualified for an exception because no protected health information was included in the data set.

RESULTS

In 2010, 309 and 858 patients had at least one chiropractic visit at the on-site health center ("on-site group") or community office ("off-site group"), respectively. The mean age of those who sought care on-site was significantly less than that of those who went off-site (34.9 [SD, 10.36] vs 37.1 years [SD, 13.54]; $P < 0.005$). In addition, the proportion of women was lower in the on-site group (50% vs 57%; $P < 0.05$).

Health care utilization differences between groups, for both the zero-inflated Poisson and Poisson models, are presented in

Table 1. As indicated from zero-inflated Poisson regression analyses, patients in the off-site group were significantly more likely to have at least one physical therapy visit ($P < 0.0001$) and outpatient visit ($P < 0.0001$). The likelihood of patients having other health care events, including chiropractic visits, radiology procedures, and medication use, was similar between groups. All patients had at least one health care visit (physician visit) and musculoskeletal medication use; therefore, zero-inflated Poisson analyses could not be performed for these events.

Additional statistical differences between groups were found in the Poisson regression analyses of the number of health care events (ie, health care visits, radiology procedures, musculoskeletal medication use) per patient with a particular event. The average total numbers of health care visits, radiology procedures, and musculoskeletal medication use per patient with each event were significantly higher for the off-site group (all $P < 0.0001$).

Comparisons between the zero-inflated Poisson and Poisson model results reveal health care utilization trends. For example, although patients in the off-site group were more likely to have an outpatient visit ($P < 0.0001$), the average number of outpatient visits was similar between groups for those who had at least one visit. In contrast, the average number of x-ray films per patient with an x-ray was significantly higher among those in the off-site group ($P < 0.001$), but the likelihood of having a radiograph taken was similar between groups. Physical therapy visits yielded significant differences between groups for both the zero-inflated Poisson and Poisson models (both $P < 0.0001$). This finding indicates that patients in the on-site group not only had lower odds of having a physical therapy visit but also that the average number of visits was lower among those who had a visit.

In total, 12 patients in the on-site group completed the HADI, 40 completed the NPDI, and 74 completed the OLBQ at least twice in 2010 and were included in the subanalysis of on-site chiropractic care efficacy. The results of this subanalysis are presented in Table 2. Overall, significant reductions in all functional assessment measures were observed, suggesting that the cohort experienced substantial improved functional status for all the three musculoskeletal conditions (all $P < 0.001$).

LIMITATIONS

This analysis has some limitations that should be addressed. First, patients were not assigned to receive care on or off-site and instead had the option of being treated at either location. Therefore, the association between on-site chiropractic care and reduced health care utilization may be due to underlying characteristics of the groups, not necessarily treatment differences. In particular, the on-site group was significantly younger, which may have contributed to the group having different health care needs or motivations. For example, the on-site group may have had fewer health care problems or was less likely to seek treatment in general. Those who were treated off-site, in contrast, could have had chronic pain conditions and were accustomed to seeking health care services. In addition, off-site chiropractic care may be more convenient for some, especially those who are away from work because of injury.

Second, the difference in health care utilization between the groups may be due to conditions that cannot be treated by chiropractors. It is therefore expected that the most significant differences between groups were observed for physician, outpatient, and physician therapy visits—health care services that are most likely to be substituted for chiropractic care. Despite these differences, the full benefit of offering chiropractic services on-site may have been obscured for other measures, such as radiologic procedures and medications.

Third, the study duration spanned the first year that chiropractic care was offered at the on-site health center. Given that musculoskeletal pain can be a chronic and long-term condition, an extended follow-up duration may further distinguish utilization differences be-

TABLE 1. Health Care Utilization Differences Between On- and Off-Site Groups

	Off-Site Group Mean (n = 858)	On-Site Group Mean (n = 309)	Zero-Inflated Poisson P *	Poisson P †
Total health care visits	37.3	21.5	NA	<0.0001
Chiropractic visits	8.9	8.5	0.0760	0.0845
Emergency department visits	0.1	0.1	0.6599	0.5154
Physical therapy visits	13.6	1.5	<0.0001	<0.0001
Inpatient visits	0.1	0.1	0.2655	0.4991
Outpatient visits	0.6	0.8	<0.0001	0.5374
Physician visits	23.0	19.1	NA	<0.0001
Total radiology procedures	2.6	1.9	0.2433	<0.0001
Radiography	0.9	0.7	0.9348	0.0007
MRIs	0.2	0.2	0.5926	0.9797
Ultrasounds	0.3	0.2	0.1072	0.6037
CT scans	0.3	0.2	0.4052	0.1236
Total musculoskeletal medication use	2.4	2.0	NA	<0.0001
Muscle relaxant use	0.8	0.5	0.1722	0.0312
Pain medication use	1.6	1.5	0.1157	0.0208

*Zero-inflated Poisson model used to assess whether there was a difference between the groups in the odds of having an event (ie, health care visit, radiology procedure, musculoskeletal medication use).

†Poisson model used to assess whether there was a difference between the groups in the number of health care events (ie, health care visit, radiology procedure, musculoskeletal medication use) per patient with an event.

CT, computed tomography; MRI, magnetic resonance imaging; NA, not applicable, because all patients had at least one event (ie, health care visit, radiology procedure, musculoskeletal medication use).

TABLE 2. Changes in Questionnaire Scores During the Study Period

Questionnaire	Mean No. On-Site Chiropractic Visits	Mean Score Change (SD; 95% CI)	P
HADI (n = 12)	11	- 19% (10.32%; 12.24%–25.56%)	<0.001
NPDI (n = 40)	9	- 14.6% (7.85%; 12.06%–17.09%)	<0.001
OLBQ (n = 74)	8	- 14.5% (11.1%; 11.92%–17.05%)	<0.001

CI, confidence interval; HADI, Headache Disability Index; NPDI, Neck Pain Disability Index; OLBQ, Oswestry Low Back Pain Questionnaire.

tween the on-site and off-site groups. In addition, approximately 3 times as many associates received off-site chiropractic services than on-site services during the study period. The relatively small sample size of the on-site group limited the ability to stratify the results by factors such as baseline functional assessments and reason for health care visits. Over time, it is expected that on-site chiropractic services will become more widely used and a greater pool of data will be available for more granular analyses.

Last, functional assessments (eg, HADI, NPDI, and OLBQ) were administered during associates' on-site chiropractic visits and, consequently, were not available for associates who received off-site care. Therefore, comparisons in the associate-reported efficacy of on-site and off-site chiropractic services were not performed. Similarly, associates who received on-site care during the study period may have received off-site care during the previous year. Thus, the first functional assessment available for analysis may not have been a baseline measurement.

DISCUSSION

Although previous research has demonstrated the benefits of chiropractic care, to the best of our knowledge this study is the first to evaluate its impact when offered at an on-site health center.^{6–10,14–17} Given the convenience and quality of care provided by on-site health centers, it was hypothesized that on-site chiropractic care would

be more beneficial than off-site clinic care. Despite some limitations that may have weakened the conclusions, the findings suggest on-site chiropractic services are associated with lower health care utilization of certain services and improved functional status of musculoskeletal conditions.

Specifically, patients receiving chiropractic care on-site were less likely to have a physical therapy visit ($P < 0.0001$) and outpatient visit ($P < 0.0001$). Moreover, the average total numbers of health care visits, radiology procedures, and musculoskeletal medication use per associate with each event were significantly lower for the on-site group (all $P < 0.0001$). Metz et al¹⁸ assessed health plan members with and without chiropractic coverage and found that patients were directly substituting chiropractic care for medical care when it was available. Although all patients in our study had access to chiropractic care, the convenience of having it on-site may have eliminated the access barriers for patients who may have received other types of medical care instead. This trend is most evident in the finding that the on-site group averaged significantly fewer physical therapy and physician visits compared with the off-site group (both $P < 0.0001$), given that chiropractic care is a common alternative for both of these services.^{18,19}

Lower health care utilization among the on-site group may also be related to the characteristics of effective chiropractic care. On the basis of a large claims analysis, Legorreta et al¹⁴ reported

that chiropractic services were associated with less invasive, more conservative treatments. That is, patients with chiropractic coverage seemed to be avoiding more surgeries, hospitalizations, and radiographic imaging procedures. Similarly, Phelan et al¹⁶ observed that chiropractic patients had lower utilization of ancillary medical services. In this study, associates who received care on-site were less likely to have an outpatient visit ($P < 0.0001$), but average utilization among associates who had a visit was similar between groups. This finding suggests that on-site chiropractic care may be lowering the occurrence of outpatient visits among associates on the cusp of requiring these services, but utilization is not affected for more serious cases.

Nonetheless, despite the reported benefits, in the literature there is also continued critique that chiropractic services can have variable quality and lack of adherence to evidence-based practice guidelines.^{20–25} In particular, several reviews have described how the profession is divided into two types of practices: one faction maintains the use of nonscientific supported techniques, whereas the other observes evidence-based guidelines.^{20,21,23} Those who conform to the evidence-based approach perform services that are perceived as being more effective, better able to integrate with other health care services, and less likely to result in complications.^{21–23} In addition, Hinton et al²⁵ performed a survey of chiropractors to assess their use of outcome measures in daily practice and found that the majority did not use psychosocial questionnaires or condition-specific disability indices to record changes in health status. Although this study did not measure the effectiveness or quality of chiropractic care off-site, given the on-site health center's focus on providing quality, effective, and holistic care, the lower health care utilization trends found in this study may be due to a greater adherence to evidence-based practices and integration with other health services on-site than off-site. Further investigation, however, is needed to fully understand the consistency and quality of off-site chiropractic care.

Further evidence of the on-site chiropractic care's effectiveness is the change in patient-reported functional status after treatment. That is, over the study period, there was a statistically significant decrease in the average HADI, NPDI, and OLBQ scores (all $P < 0.001$). Although a comparison with off-site cannot be made because the questionnaire data were not available for patients treated off-site, these findings confirm that on-site chiropractic care successfully improved patients' daily functioning. Previous research has shown that functional improvements resulting from chiropractic care increase the ability to perform work-related activities.⁹

The improved functional status found in this analysis indicates potential for reduced indirect costs, including absenteeism, presenteeism, and productivity losses, with on-site chiropractic services. Phelan et al¹⁶ reviewed claims for musculoskeletal injuries treated by medical doctors and chiropractors. Treatment performed by chiropractors, on average, resulted in fewer lost workdays and lower workers' compensation payment.

In addition, direct cost savings may result through lower rates of health care utilization. Compared with alternatives, including physician visits, hospitalizations, and surgery, chiropractic care is considered a cost-effective treatment.^{14–17} A retrospective analysis¹⁴ of administrative claims data compared health plan members with and without chiropractic coverage, and found that annual medical care costs were 12% lower among members with chiropractic coverage due to less utilization of high-cost services.

CONCLUSION

The results of this study support the value of chiropractic services offered at on-site health centers. Offering patients evidence-based, integrative, and convenient care, treatment at on-site chiropractic services was associated with lower utilization of certain health care services, as well as improved functional outcomes. Fu-

ture research into potential indirect and direct cost savings would supplement this study and further demonstrate the advantages of on-site chiropractic care.

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