

# EFFECTS OF A MANAGED CHIROPRACTIC BENEFIT ON THE USE OF SPECIFIC DIAGNOSTIC AND THERAPEUTIC PROCEDURES IN THE TREATMENT OF LOW BACK AND NECK PAIN

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## ABSTRACT

**Objective:** The aim of this study was to measure the effects of a managed chiropractic benefit on the rates of specific diagnostic and therapeutic procedures for the treatment of back pain and neck pain.

**Design:** This study is a retrospective analysis of claims data from a managed-care health plan over a 4-year period. The use rates of advanced imaging, surgery, inpatient care, and plain-film radiographs were compared between employer groups with and without a chiropractic benefit.

**Results:** For patients with low back pain, the use rates of all 4 studied procedures were lower in the group with chiropractic coverage. On a per-episode basis, the rates in the group with coverage were reduced by the following: surgery (−32.1%); computed tomography (CT)/magnetic resonance imaging (MRI) (−37.2%); plain-film radiography (−23.1%); and inpatient care (−40.1%). On a per-patient basis, the rates were reduced by the following: surgery (−13.7%); CT/MRI (−20.3%); plain-film radiography (−2.2%); and inpatient care (−24.8%). For patients with neck pain, the use rates were reduced per episode in the group with chiropractic coverage as follows: surgery (−49.4%); CT/MRI (−45.6%); plain-film radiography (−36.0%); and inpatient care (−49.5%). Per patient, the rates were surgery (−31.1%); CT/MRI (−25.7%); plain-film radiography (−12.5%); and inpatient care (31.1%). All group differences were statistically significant.

**Conclusion:** For the treatment of low back and neck pain, the inclusion of a chiropractic benefit resulted in a reduction in the rates of surgery, advanced imaging, inpatient care, and plain-film radiographs. This effect was greater on a per-episode basis than on a per-patient basis. (*J Manipulative Physiol Ther* 2005;28:564-569)

**Key Indexing Terms:** *Chiropractic Benefit; Low Back Pain; Neck Pain*

**A** growing body of clinical evidence and expert opinion indicates that a more conservative approach to the treatment of low back pain and cervical spine pain is appropriate.<sup>1-7</sup> The evidence indicates that procedures and practices such as inpatient care, advanced imaging, surgery, and even plain-film radiographs

are only infrequently necessary for the successful treatment of most cases of low back pain and neck pain.<sup>8-17</sup>

In spite of the evidence, these procedures and practices continue to be used at rates in excess of that which the published literature defines as clinically indicated.<sup>18-22</sup> With the exception of plain-film radiographs, chiropractors do not directly administer any of these invasive and high-cost procedures, and the rates of those procedures under chiropractic care is essentially zero. However, there are no published data to date that indicate whether the use of chiropractic care affects the overall use rate of these procedures in a given population. This study evaluates the effects of the presence of a chiropractic benefit (and thus, the increased use of chiropractic management) on the rates of these procedures in the treatment of low back pain and neck pain.

## METHODS

Using administrative data, this study evaluates the treatment of patients with low back pain and neck pain conditions who are enrolled in a managed-care health plan.

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The study period covers April 1, 1997, through March 30, 2001. Individual employers had the option of selecting a health plan medical benefit with or without the addition of a benefit for chiropractic care. Individual health plan members did not make this selection. The study compares those employer groups with and without a chiropractic benefit. The study cohorts are thus:

- Cohort A Patients enrolled in medical health plans that also have a chiropractic benefit;
- Cohort A1 Patients enrolled in medical health plans that also have a chiropractic benefit who received treatment for low back pain or neck pain conditions;
- Cohort B Patients enrolled in medical health plans that do not have a chiropractic benefit;
- Cohort B1 Patients in medical health plans that do not have a chiropractic benefit who received treatment for low back pain or neck pain conditions.

#### Identification and Definition of Low Back Pain and Neck Pain Patients and Episodes of Care

The identification of low back pain and neck pain episodes of care was made by the use of *International Classification of Diseases, Ninth Revision (ICD-9)*, codes that are a part of all administrative data (claims data). A total of 32 ICD-9 codes for neck pain and 41 codes for low back pain were identified as representing these two groups of conditions. An expert panel of chiropractors and medical physicians evaluated this list for appropriateness and completeness.

The aggregation of claims into discrete episodes of care was made on the basis of both a “clean period” of 45 days with no claims as well as the diagnostic category that defines the type of episode. Each episode was initiated by one of the low back pain or neck pain codes in the diagnostic list. All services using a back pain or neck pain code and with a maximum gap of 45 days between claims were aggregated into one episode of care. Thus, a new episode was created if a new diagnostic category was used or encounters were separated by more than 45 days. A claim-free 45-day window was applied to the start and end points of the 4-year study period to identify and include members with nontruncated episodes. For any episode that began during this period but extended beyond March 30, 2001, all services related to that episode (within the 45-day limit) were treated as if they fell within the 4-year period. Similarly, any episode that began within 45 days before April 1, 1997, but extended into the 4-year period was considered to have occurred totally outside the study period and was not used in the analysis. The clean period of 45 days is consistent with previous studies using administrative data.<sup>23-26</sup>

In addition to evaluating use rates on a per-episode basis, these rates were also measured on a per-patient basis. For each individual who had one or more episodes of low back

pain or neck pain, all encounters and services from these episodes were aggregated into one low back pain or neck pain unit of analysis. Thus, an individual might be counted multiple times in the episode analysis but only once in the patient analysis. The per-patient rate represents the overall probability that any individual with a low back or neck pain complaint during the study period would receive the procedures under investigation.

#### Data Preparation and Merge

The data preparation included transfer of all relevant claims data from the two different data sources (see hereinafter), loading of the data onto a common server, and filtering by health member continuous enrollment to ready the data for analysis. Data relevant to patient enrollment (insurance coverage information), health service encounters (ie, dates of service, diagnoses, procedures, costs, and so on), and pharmacy claims were loaded onto the server. SAS version 6.12 (SAS Institute, Cary, NC) was used for all data programming. Before the analysis, the data were validated as follows: verify receipt of correct data (names, number of files, number of records contained in each file with each respective data source); validate the format of the data (character, numeric, and length); identify key variables in the data sets (age, diagnosis codes, and others); produce frequency reports of the data and validate the variable’s contents, again working with each respective data source; run algorithms (computer programs designed to detect implausible data) to ensure the integrity of key variables (eg, International Classification of Diseases [ICD-9] and Current Procedural Terminology [CPT-4] codes); and send reports produced from previous to each respective company for verification.

For patients with chiropractic coverage, there is an entirely separate and distinct treatment and storage of claims data for their chiropractic care than for their medical care. For this study, a patient’s chiropractic claims must be merged with their medical claims producing a single claims file for each covered patient. Merging of the data sets was accomplished using one of the following methods. Each health plan member was assigned a unique identification number that is used for both the medical and chiropractic claims. This number was used to link a patient’s chiropractic claims with their medical claims. Should there be no common unique member identifier (because of data entry errors), the data were linked using both member social security number and date of birth. Once the data were linked, a unique identifier was created, and name, address, and social security number was purged from the data set to assure patient confidentiality. Any data not linked by these two methods were eliminated from the study.

#### Data Analysis

Use rates for the following procedures were measured in the two cohorts: inpatient care for back pain and neck pain;

**Table 1.** Demographic characteristics of cohort A and cohort B (observation period from January 2000-December 2000)

	Patients with chiropractic coverage (A)	Patients without chiropractic coverage (B)
Demographics		
n	707690	1 001 995
Female (%)	51.6	52.1
Mean age (SD)	32.9 (20.9)	35.5 (21.6)
Age groups (%)		
0-17	31.9	26.2
18-21	5.1	4.3
22-35	14.6	18.4
36-55	33.7	33.2
56-65	8.2	8.2
>65	6.5	9.6

**Table 2.** Age adjusted comorbidity: cohort A and cohort B (observation period from January 2000-December 2000)

Comorbid conditions	Cohort A	Cohort B	Cohort A (adjusted)
Congestive heart failure	0.60	0.90	0.72
Cardiac arrhythmia	1.60	2.00	1.88
Hypertension	6.60	7.30	7.37
Diabetes	2.80	3.00	3.12
Hypothyroidism	1.50	1.50	1.70
Nutritional/metabolic disorder	1.60	1.70	1.71
Psychosis	1.10	0.90	1.14
Depression	1.90	1.60	2.00

Values are percentages.

computed tomography/magnetic resonance imaging use related to back pain and neck pain; surgeries for back pain and neck pain; and plain-film radiographs for back pain and neck pain.

Rates for the procedures were calculated both on a per-episode basis and a per-patient basis. Tests for group differences were done using Wilcoxon test.

## RESULTS

### Data Merging

Of the chiropractic claims, data files from April 1, 1997, through March 30, 2001, 98.3% were successfully merged with the managed-care organization's claims files. The balance (1.7% of claims) was eliminated from the analysis.

### Study Population Characteristics

An analysis was conducted on those patients who had changed their chiropractic coverage status during calendar year 2000. (The 4-year data contain a slightly greater number of total patients because it also includes those who did change their chiropractic coverage status at some point

**Table 3.** Back pain treatment profile

	Patients with low back pain with chiropractic coverage (A1)	Patients with low back pain without chiropractic coverage (B1)
Surgical rate		
Per 1000 patients	5.88*	6.81*
Per 1000 episodes	3.26*	4.80*
CT/MRI rate		
Per 1000 patients	77.95*	97.79*
Per 1000 episodes	43.19*	68.88*
Inpatient visits		
Per 1000 patients	16.71*	22.22*
Per 1000 episodes	9.26*	15.65*
Plain-film radiograph rate		
Per 1000 patients	315.80*	322.86*
Per 1000 episodes	174.96*	227.41*

CT indicates computed tomography; MRI, magnetic resonance imaging.  
\*  $P \leq .01$ .  $P$  values based on Wilcoxon tests of comparing A1 vs B1.

**Table 4.** Cervical spine pain treatment profile

	Patients with neck pain with chiropractic coverage (A1)	Patients with neck pain without chiropractic coverage (B1)
Surgical rate		
Per 1000 patients	7.01*	10.17*
Per 1000 episodes	3.87*	7.65*
CT/MRI rate		
Per 1000 patients	47.16*	63.48*
Per 1000 episodes	26.09*	47.98*
Inpatient visits		
Per 1000 patients	7.21*	10.47*
Per 1000 episodes	3.98*	7.88*
Plain-film radiograph rate		
Per 1000 patients	282.16*	322.49*
Per 1000 episodes	156.12*	243.74*

\*  $P \leq .01$ .  $P$  values based on Wilcoxon tests of comparing A1 vs B1.

during the study.) There were small differences in the rates of comorbid conditions and demographic characteristics, and in the study populations. The group with coverage had fewer comorbid conditions in most of the categories studied and was slightly younger. A summary of these findings is shown in Tables 1 and 2.

### Procedure Rates Among Low Back Pain Patients

Comparing the cohort with chiropractic coverage to cohort without coverage, the rates of surgery, advanced imaging, inpatient care, and plain-film radiographs were all lower in the cohort with chiropractic coverage. On a per-patient basis, the rates were lower in the chiropractic coverage cohort by the following amounts: surgery, 13.7%; advanced imaging, 20.3%; inpatient visits, 24.8%;

and plain-film radiographs, 2.2%. On a per-episode basis, the rates were reduced by the following amounts: surgery, 32.1%; advanced imaging, 37.2%; inpatient visits, 40.1%; and plain-film radiographs, 23.1%. Table 3 shows the actual rates of these procedures in the two cohorts. All differences were statistically significant ( $P < .01$ ).

### Procedure Rates Among Neck Pain Patients

Similarly, for neck pain, comparing the cohort with chiropractic coverage to cohort without chiropractic coverage, the rates of surgery, advanced imaging, inpatient care, and plain-film radiographs were all reduced in the cohort with chiropractic coverage. On a per-patient basis, the rates were reduced by the following amounts: surgery, 31.1%; advanced imaging, 25.7%; inpatient visits, 31.1%; and plain-film radiographs, 12.5%. On a per-episode basis, the rates were reduced by the following amounts: surgery, 49.4%; advanced imaging, 45.6%; inpatient visits, 49.5%; and plain-film radiographs, 36.0%. Table 4 shows the rates of these procedures in the two cohorts. All differences were statistically significant ( $P < .01$ ).

## DISCUSSION

In all study categories, there were statistically significant reductions in the rates of surgery, advanced imaging, inpatient care, and plain-film radiography. Previously published data from this study showed that chiropractic care was used almost entirely as a substitution for medical care for back pain and neck pain complaints.<sup>27,28</sup> The clinical treatment of back and neck pain complaints tends to be highly variable.<sup>29-33</sup> Specifically, the use rates of the procedures here under investigation tend to vary significantly in different care delivery systems, and these rates are not driven solely, or even principally, by clinical variables. Given the amount of discretion that is exercised in the use of these procedures, it is not surprising to find that when the option of accessing chiropractic care is provided, it would produce the reductions seen in this study.

The difference in rates is greater as measured on a per-episode basis than on a per-patient basis. Also, as demonstrated in a previous publication, chiropractic care (which is only present in cohort A1) tends to generate more episodes of care per patient than medical care and thus artificially further reduces the rate per episode. The per-patient comparison is the more valid and meaningful because it captures the actual probability of an individual patient's likelihood of receiving any of the specified interventions.

It is also notable that the rates of plain-film radiographs are lower in the group with chiropractic coverage. Unlike the other 3 procedure categories, chiropractors themselves provide plain-film radiographs. Previous studies have shown that chiropractors may use plain-film radiographs at a higher rate than medical physicians, and thus, the substitution phenomenon might produce an increase rather

than a decrease in these rates.<sup>32</sup> The reductions seen here are attributable to specific treatment policies designed to reduce the rates of use of radiographs in chiropractic care and may not reflect the rate of use in an unmanaged system.

Given the significant differences in the rates of procedures found in this study, it is important to consider which rates represent a more optimal level of care for back pain and neck pain. These differences exist within the same geographic area and between reasonably similar patient groups. It is a plausible assumption that if the same standard of care were to be applied to these two groups, very similar use rates would result. However, it is not possible to answer this question directly because there are simply no clinical outcomes measured in this study.

There are also no standard benchmarks for use rates against which these rates can be compared. However, there is a large body of scientific literature and guidelines on the treatment of back pain that provides some insight into this question. This body of evidence coalesces around 3 recurrent themes: (1) most back pain episodes are categorized as "mechanical" or "uncomplicated" and do not require aggressive interventions, (2) existing guidelines specify that less aggressive and invasive diagnostic and therapeutic treatment of back pain will lead to better clinical outcomes, and (3) there is poor compliance with these guidelines and departures from the guidelines are most likely in the direction of overuse of invasive procedures. Given these observations, it is probable that the rates of use of these procedures are greater than optimal in both groups and any change in the direction of decreased use may result in positive effects on health-care costs, outcomes, and patient safety. The literature on neck pain is less comprehensive than that on low back pain, but it also points in the same direction.<sup>34-37</sup> The conclusion that the presence of a chiropractic benefit results in more appropriate use diagnostic and therapeutic procedures is suggested but not proven by this study.

The cohort with chiropractic coverage was slightly younger with slightly fewer comorbidities than the cohort without chiropractic coverage. These differences may have contributed to the reductions in procedure rates. However, the magnitudes of these demographic and clinical differences are quite small compared with the magnitudes of the reductions, and it is unlikely that they account for more than a small percentage of the changes.

The results of this study cannot be generalized beyond the specific health care systems involved in the study. It is well understood that the use rates of specific diagnostic and therapeutic procedures are highly dependent upon variables such as local practice habits, economic incentives, and other health plan characteristics. A different set of these variables would undoubtedly produce a different result. However, the direction of these results (a reduction in rates among those with chiropractic coverage) might be more robust relative to these variables. As long as

chiropractic care is being used as a substitute for medical care and as long as chiropractors do not directly provide these procedures (with the exception of plain-film radiographs), it is likely that a reduction in advanced imaging, surgery, and inpatient care would be seen. Finally, there are no clinical outcomes measured in this investigation. No inferences can be made on the relative clinical benefits of the different procedure rates except as suggested by the existing literature on this subject.

## CONCLUSION

Among employer groups with chiropractic coverage compared with those without such coverage, there is a significant reduction in the use of high-cost and invasive procedures for the treatment of low back pain and neck pain. The presumed mechanism of this effect is the substitution of chiropractic care for medical care for the treatment of back and neck pain. The resultant chiropractic care is far less likely to lead to the use of these invasive procedures. This reduction is more pronounced when measured on a per-episode basis than on a per-patient basis.

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