ORIGINAL ARTICLES

COST-EFFECTIVENESS OF MEDICAL AND CHIROPRACTIC CARE FOR ACUTE AND CHRONIC LOW BACK PAIN

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ABSTRACT

Objectives: To identify relative provider costs, clinical outcomes, and patient satisfaction for the treatment of low back pain (LBP).

Methods: This was a practice-based, nonrandomized, comparative study of patients self-referring to 60 doctors of chiropractic and 111 medical doctors in 51 chiropractic and 14 general practice community clinics over a 2-year period. Patients were included if they were at least 18 years old, ambulatory, and had low back pain of mechanical origin (n = 2780). Outcomes were (standardized) office costs, office costs plus referral costs for office-based care and advanced imaging, pain, functional disability, patient satisfaction, physical health, and mental health evaluated at 3 and 12 months after the start of care. Multiple regression analysis was used to correct for baseline differences between provider types.

Results: Chiropractic office costs were higher for both acute and chronic patients ($P < .01$). When referrals were included, there were no significant differences in either group between provider types ($P > .20$). Acute and chronic chiropractic patients experienced better outcomes in pain, functional disability, and patient satisfaction ($P < .01$); clinically important differences in pain and disability improvement were found for chronic patients only.

Conclusions: Chiropractic care appeared relatively cost-effective for the treatment of chronic LBP. Chiropractic and medical care performed comparably for acute patients. Practice-based clinical outcomes were consistent with systematic reviews of spinal manipulation efficacy: manipulation-based therapy is at least as good as and, in some cases, better than other therapeusis. This evidence can guide physicians, payers, and policy makers in evaluating chiropractic as a treatment option for low back pain. (J Manipulative Physiol Ther 2005;28:555-563)

Key Indexing Terms: *Low Back Pain; Chiropractic Care; Medical Care; Cost-Effectiveness*

Healthcare costs for the treatment of back pain are substantial. A recent incremental spending model for the United States indicates that the additional costs associated with back pain patients represent 2.5% of national health care expenditures[1] (a value expected to reach to $48 billion for 2005). With wide variations in spending patterns across patients with different clinical, socioeconomic, and demographic characteristics, the authors concluded that more cost-effective and targeted treatments could produce significant health care savings.[1] With most adults experiencing back pain at some point in their lives,[2,3] such treatments would represent an important public health improvement.

Because nonmedical providers, most notably chiropractors, provide a substantial portion of care for patients with low back pain (LBP),[4-7] the relative efficacy and cost-effectiveness of chiropractic and medical care have emerged as important issues in the broader debate on evidence-based medicine. The growth of managed care and other gatekeeper mechanisms that restrict patient access to both medical

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specialists and nonmedical providers have heightened the need for additional evidence that could be used to better allocate health care dollars.

There is a considerable body of randomized trials on the efficacy of spinal manipulation for the treatment of LBP; this evidence is summarized in the most recent systematic reviews.[8,9] Assendelft et al[8] concluded that manipulation is superior to placebo and sham procedures but no better than other commonly used therapies. In a companion review, Cherkin et al[10] concluded that manipulation is at least as effective as other therapies. Bronfort et al[9] found no treatment superior to manipulation and concluded that manipulation is a viable treatment option for acute and chronic LBP. More recent trials have also supported efficacy of spinal manipulation.[11-14] Our practice-based, nonrandomized comparative study showed a clinically important advantage for chiropractic care over medical care for chronic patients and a marginal advantage for acute patients.[15]

Early cost studies showed both lower[16-18] and higher[19-21] costs for chiropractic care than for other interventions. These studies had diverse designs, payment types, and analytic methods. In a comprehensive literature review of occupational LBP, Baldwin et al[22] concluded that chiropractic and medical care are equally effective, but because of conflicting evidence and methodologic shortcomings, evidence for relative cost-effectiveness is inconclusive. No studies combined sufficient sample size, confounder controls, and high-quality cost data.[22] Solomon et al[23] were similarly critical of study methodology.

Since these reviews, a large managed care network in California found that members who received chiropractic coverage had 12% lower annual health care expenditures (1.6% lower after adjusting for member risk characteristics) than members without the coverage.[24] Patients with the chiropractic benefit had lower back pain cost per episode of back pain, as well as lower rates of surgery and hospitalization. A randomized trial in the United Kingdom found that spinal manipulation alone or with exercise can be the best strategy, so long as a quality-adjusted life-year is valued above £3800 (then approximately US $5700).[25] Another randomized trial in Sweden reported that costs and outcomes were generally similar for physiotherapy and chiropractic.[26,27] The authors concluded that the therapies were equivalent from a cost-effectiveness perspective.

A preliminary report from our study indicated that mean direct in-office costs of patients treated by chiropractors were 74% higher (median, 39% higher) than those treated by medical physicians.[28] However, the report did not distinguish acute from chronic patients, and cost and outcomes comparisons were unadjusted for baseline group differences. A potentially more important limitation was the exclusion of referral and advanced imaging costs.

This report fills these gaps by applying multiple regression analysis to cost as well as outcomes data. It contrasts analysis of office costs with and without costs of referral and advance imaging. Analysis was conducted separately for acute and chronic patients with LBP, in accordance with the original study design. It also includes a more extensive set of patient outcomes measures that permit estimation of incremental cost-effectiveness ratios. Analysis was conducted for one short-term and one long-term time point; 3 and 12 months were chosen a priori for this report.

Methods

Design

Data were from a prospective, longitudinal, practice-based, nonrandomized comparative study of self-referring patients with chronic and acute LBP treated by doctors of chiropractic (DCs) and primary-care medical doctors (MDs).[15,29,30] This comparative study design is considered appropriate for cost-effectiveness analysis, although it does not yield the level of evidence of a randomized trial.[31-33] The study enrolled 2872 patients over a 2-year period (1994-1996) from the practices of 60 DCs and 111 MDs in 51 DC and 14 general practice community clinics. Except for one medical clinic located in Vancouver, Washington, all medical and chiropractic clinics were located in Oregon. Patient data were obtained through self-administered questionnaires at the initial visit and mailed follow-up questionnaires. Practitioners were not asked to alter their usual management of LBP for the study.

Participants

Patients with the primary complaint of acute or chronic LBP were eligible to participate if they were at least 18 years old, ambulatory, and English literate. Pain had to be of mechanical origin (ie, not due to tumors, inflammatory disease, or organic referred pain). Patients were excluded if they had received care from a provider of the same type as the enrolling clinician within the previous 6 weeks, were pregnant, or had contraindications to spinal manipulation. All participants signed a consent form that explained the study and the participant's rights. The study was approved for protection of human subjects by the Western States Chiropractic College Institutional Review Board.

Treatment

The study clinicians provided a variety of health services.[28,29] The salient features of chiropractic care were spinal manipulation, physical modalities, exercise plan, and self-care education. Medical patients received prescription drugs, exercise plan, and self-care advice; approximately 25% were referred for physical therapy.

Outcome and Baseline Measures

Information collected at the baseline included history of LBP before the baseline episode, duration and severity of current episode, as well as comorbidities (arthritis, respiratory conditions, gastrointestinal problems, gynecologic problems, hypertension, and other chronic conditions), physical and mental health status, demographics, insurance characteristics, confidence in successful treatment outcome, and a depression screen.[15] Severity of pain and disability were measured 7 times after the baseline visit, only two of which are included in this report. Physical/mental health and patient satisfaction were measured at 12 months. Clinical and satisfaction outcomes were evaluated on 100-point scales. Pain severity, a primary clinical outcome, was measured on a 100-mm Visual Analogue Scale (VAS): "no pain" (0) to "excruciating pain" (100). The VAS is a commonly used, validated pain measure.[34] Functional disability, the other primary clinical outcome, was measured with the Revised Oswestry Disability Questionnaire, a 10-item, 100-point scale assessing pain and daily activities. A higher score on this valid[35] and responsive[36,37] instrument indicates greater disability. Physical and mental health were evaluated with subscales of the Short Form (SF)-12 questionnaire, a validated short version of the Medical Outcomes Study SF-36.[38,39] A 3-item depression questionnaire appended to the SF-12 was used to screen for major depression/dysthymia.[40] Two questions measured trust of the provider types, and one question evaluated confidence in treatment success.[41] These 3 were measured on 6-point Likert scales dichotomized for the analysis. Chronic LBP was defined as an episode of at least 7 weeks duration at enrollment.[42] Patient data were obtained using self-administered questionnaires.

Provider practice activities and referrals used in the cost analysis were identified by chart audit for a period of 12 months after baseline. The computation of office-based costs, including x-ray and prescribed medication, have been described elsewhere.[28] Estimates of office costs were based on Medicare/ChiroCode relative value units and Medicare conversion factors. This methodology, increasingly common in economic analyses,[43] provides a standardized measure of costs that does not depend either on the charges, which often do not reflect transaction prices or on the specific amounts collected by the providers in the study.

Estimated total costs for this study included office-based costs plus the estimated costs of advanced imaging, surgical consultation, and referrals to physical therapists. We imputed $600 for advanced imaging costs using data found in Mosely.[16] Our study did not permit us to determine the actual services patients received when referred. We therefore imputed $450 for evaluation by a surgeon to any patient with one or more surgical referrals. This was based on charges data per claimant found in Mushinski,[44] adjusted for the proportion of provider charges that are actually reimbursed. We also imputed $220 to any patient with one or more referrals to a physical therapist, based on Cherkin et al[21] All costs are in constant 1995 US dollars.

Statistical Analysis

The analysis consisted of forced-entry, multiple regression models conducted separately for each cost and clinical outcome at 3 and 12 months after the initial study visit. Acute and chronic LBP were analyzed separately because of the long recognized distinction between these conditions[42]; 2780 patients who could be identified as acute or chronic were included in the analysis. We examined the impact of provider type on total costs (primary cost analysis) and office costs defined above. The effects of provider type on the primary clinical outcomes, pain and disability, have been reported for all follow-up.[15] Summary scores for patient satisfaction and improvement in physical and mental health at 12 months were secondary outcomes not analyzed previously.

The effects of provider type were adjusted for all independent variables in the models. The variables entered in the models were selected a priori based on general interest in research studies (eg, age and sex) or because they have been previously reported to affect low back outcomes.[45] An additional variable was added to help control for desirability of physician type. This consisted of the difference in trust in chiropractors and MDs, measured on 6-point Likert scales, that we found to be predictive of choice of type of doctor.[30] For clinical outcomes, independent variables consisted of baseline severity, LBP history, referred pain above knee, referred pain below knee, depression, comorbidity, sex, age, smoking, a measure of relative desirability of care type, and interaction effects.[15] Independent variables for cost analysis additionally included variables that were not found previously to be predictors of clinical outcomes: health insurance, marital status, and income. The incremental cost of additional clinical improvements associated with treatment by chiropractors rather than MDs was then computed.

As a secondary analysis, a natural log transformation was applied to total and office cost variables used in the regressions to take into account skewness of these variables. Incremental log costs and associated cost ratios were computed.

Statistical significance was set as $P < .01$, and a clinical important difference between groups for the primary outcomes was set at 10 points a priori.[15] Analyses were performed using SAS Version 8.2 (SAS Institute Inc, Cary, NC).[46]

Results

Response rates for the clinical outcomes questionnaires were 66.0% at 3 months and 62.6% at 12 months; these were uniform across groups. Sensitivity analyses revealed no effect of missing data on adjusted group differences. There were very small differences in primary outcomes

Table 1. *Baseline characteristics*

	Chronic patients		Acute patients	
	DC (n = 527)	MD (n = 310)	DC (n = 1328)	MD (n = 615)
Demographic characteristics				
Age	42.2 (14.4)	39.4 (12.7)*	42.1 (12.9)	38.5 (12.1)*
Sex: female (%)	55.4	52.6	47.7	46.7
Race: white non-Hispanic (%)	91.8	88.7	91.6	92.1
Marital status: married (%)	60.2	53.6	63.3	60.7
Education: college degree (%)	28.5	25.9	33.8	33.6
Income: <$12 000 (%)	9.5	26.5*	7.1	11.7
Payment Characteristics				
Out of pocket/no insurance (%)	47.0	5.5*	41.5	8.2*
Health insurance (%)	38.8	76.8*	41.8	75.7*
Workers' compensation (%)	5.9	6.8	6.7	9.7
Medicaid/Oregon Health Plan (%)	2.6	20.1*	1.2	10.5*
Complaint characteristics				
Pain intensity (100-point VAS)	47.8 (24.5)	54.0 (24.0)*	52.0 (24.2)	58.7 (24.1)*
Functional disability (100-point RODQ)	38.5 (15.6)	49.7 (17.9)*	41.8 (18.0)	48.6 (17.9)*
Pain location (%)		*		
Back pain only	40.8	27.2	50.8	48.0
Pain radiating above knee	30.7	32.6	29.1	31.6
Pain radiating below knee	28.5	40.2	20.0	20.5
Previous history of LBP (%)	89.2	84.5	90.5	84.2*
Health Status Characteristics				
General Health Status (SF-12)				
Physical health	56.0 (18.4)	43.7 (20.0)*	58.7 (18.9)	54.6 (19.0)*
Mental health	63.5 (18.9)	58.0 (21.1)*	68.6 (18.2)	66.1 (19.0)*
Present comorbidity (any of 8)[a] (%)	54.4	61.5	50.7	43.5*
Depression: yes (%)	38.8	45.4	34.0	39.1
Smoking: yes (%)	22.0	31.4*	23.0	26.7
Stress: high (5 or 6 on 6-point Likert scale) (%)				
Physical	25.7	41.8*	23.7	30.4*
At work	27.8	31.1	28.5	31.5
At home	14.6	21.5*	11.8	13.4
Financial	22.4	35.0*	16.8	21.1
Health care attitudes (4-6 on 6-point Likert scale) (%)				
Trust MDs	79.7	90.0*	84.8	95.4*
Trust DCs	94.4	58.8*	95.5	63.9*
Confidence in chosen provider	83.5	61.3*	93.0	74.6*

Values are presented as mean (SD) or percentages. Comparisons are made between chronic DC and MD patients and between acute DC and MD patients with a 2-tailed t test for continuous data or χ^2 for categorical data. RODQ, Revised Oswestry Disability Questionnaire.

[a] Comorbidity: headaches, arthritis, asthma/allergies, GI problems, gynecologic problems, hypertension, and/or other chronic conditions.

* $P < .01$.

between the results from the subsample of patients with complete data over 4 years and the entire sample.[15] In addition, predictive models showed no effect of missing data on the primary outcomes at 12 months.[47] Complete data for all variables included in cost analyses were available for 38% of chronic and 50% of acute patients. Most data were available for almost all patients, so we were able to accurately profile costs incurred by those excluded because of missing data. The costs incurred by such patients differed little from costs of patients with complete data.[15]

Patient Characteristics

The demographic, payment, complaint, general health, and psychosocial characteristics for the 4 cohorts are presented in Table 1. Most differences between MD and DC cohorts were statistically significant. However, only a few of these differences were clinically important and emerged as predictors of clinical or cost outcomes. For chronic patients, MD patients had greater disability, poorer physical health, and greater prevalence of pain radiating below the knee. For the acute cohorts, less than 10% of MD patients and more than 40% of DC patients paid for care out of pocket.

Cost Outcomes

Table 2 summarizes unadjusted costs. The impact of the inclusion of costs incurred outside clinicians' offices on the costliness of MD and DC treatment is notable. Patients

Table 2. *Cost and clinical outcomes*

	Chronic DC		Chronic MD		Acute DC		Acute MD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
3 months								
Office costs	$174	$195	$107	$75	$161	$183	$90	$66
Median	$104		$84		$101		$69	
Total costs	$180	$209	$212	$253	$171	$202	$141	$183
Median	$108		$103		$102		$70	
Pain	22.8	25.4	16.7	29.9	39.9	27.3	41.8	30.3
Disability	15.3	16.1	12.5	17.7	28.3	20.4	30.0	21.3
12 mo								
Office costs	$222	$288	$146	$153	$206	$284	$113	$117
Median	$116		$103		$121		$82	
Total costs	$232	$311	$281	$355	$218	$305	$176	$245
Median	$123		$135		$124		$89	
Pain	23.9	27.0	18.9	31.8	40.9	27.0	41.9	28.5
Disability	16.1	17.1	14.4	19.4	29.4	20.6	31.0	21.0
Physical health	14.7	18.3	15.8	20.8	20.3	19.9	20.5	19.6
Mental health	4.9	20.5	4.9	19.5	6.7	18.9	4.9	18.4
Satisfaction	86.4	19.9	71.3	22.7	90.2	16.4	76.0	22.6

All clinical outcomes were normalized to a 100-point scale. A higher value denotes greater satisfaction or greater improvement in pain, disability, physical health, and mental health. All improvement scores were statistically significant ($P < .01$).

Table 3. *Adjusted mean differences (DC-MD) in costs and outcomes improvement*

	Chronic patients					Acute patients				
	Mean	SE	*P*	CER1	CER2	Mean	SE	*P*	CER1	CER2
3 months										
Office costs	$142	$37	.000			$93	$25	.000		
Office costs (log)	0.69	0.22	.002			0.48	0.15	.002		
Total costs	$5	$52	.931			$42	$35	.224		
Total costs (log)	0.22	0.25	.379			0.18	0.17	.288		
Pain	10.5	2.0	.000	$13.5	$0.4	3.6	1.3	.005	$25.7	$11.7
Disability	8.8	1.6	.000	$16.1	$0.5	3.9	1.1	.000	$23.8	$10.8
12 months										
Office costs	$158	$60	.009			$112	$38	.003		
Office costs (log)	0.58	0.23	.014			0.39	0.16	.017		
Total costs	$1	$80	.993			$43	$47	.352		
Total costs (log)	0.10	0.26	.715			0.13	0.18	.453		
Pain	7.3	2.1	.000	$21.6	$0.1	3.6	1.3	.007	$31.2	$12.0
Disability	5.4	1.7	.001	$29.2	$0.1	2.7	1.1	.012	$41.7	$16.1
Physical health	3.0	3.6	.396	$52.2	$0.2	9.2	2.5	.000	$12.2	$4.7
Mental health	1.2	3.7	.757	$136.4	$0.7	5.4	2.5	.032	$20.8	$8.0
Satisfaction	18.1	4.9	.000	$8.7	$0.0	14.0	3.1	.000	$8.0	$3.1

Adjusted mean differences between DC and MD are the predicted mean differences from the regression models. Positive values indicate greater cost or greater improvement in outcomes for DC patients. CER indicates the incremental cost-effectiveness ratios: adjusted mean difference in cost divided by adjusted mean difference in outcomes. Office costs were used in the numerator of CER1, and total costs were used in the numerator of CER2.

treated by DCs were referred to outside providers infrequently. As a result, mean total costs for DC patients were a little higher than office costs ($6-$10 at 3 months and $10-$14 at 12 months). On the other hand, for patients treated by MDs, referral and advanced imaging accounted for a large fraction of mean total costs (acute, 24%-36% or $51-$105; chronic, 48%-50% or $63-$135).

Office costs for DC care were 78% to 82% higher than MD care for acute patients and 52% to 60% higher for chronic patients. In contrast, total costs of DC care were only 22% greater than MD care for acute patients and 16% less than MD care for chronic patients.

Table 3 reports adjusted differences in costs and outcomes. Office costs for chiropractic treatment had higher

costs for both chronic and acute patients at the 3- and 12-month intervals ($93-$158, $P < .01$). However, when costs of advanced imaging and referrals were included (primary analysis), costs of DC treatment were not significantly different from those of medical treatment at either the 3-month or the 12-month interval. Adjusted differences were $5 and $1 at the two intervals for chronic patients ($P > .90$) and $42 and $43 for acute patients ($P > .20$). The impact of chiropractic treatment on costs remained unchanged when a log transform of costs was used in the analysis. Adjusted DC office costs were 1.5 to 2.0 times greater ($P < .01$), whereas DC total costs were only 1.1 to 1.2 times greater and not statistically significant ($P > .25$).

The regression models not only adjusted outcomes for group differences in the independent variables listed under statistical analysis above, but also identified the contribution of predictor variables to the outcomes. The large volume of data necessitates that these results be published elsewhere.

Clinical Outcomes

Table 2 shows clinically important and statistically significant, within-group improvement in pain, functional disability, and general health outcomes for all 4 patient cohorts. Patient satisfaction can be considered high for DC patients and somewhat more moderate for MD patients.

Improvement in the pain and disability (primary) outcomes was significantly greater for DC care in both acute and chronic patients. Adjusted mean differences (AMD) in these outcomes were clinically important for chronic patients at 3 months (AMD, 10.5 and 8.8, $P < .0005$). The advantage for DC care in acute patients was small at both 3 and 12 months (AMD <4, $P < .01$). There was little difference in improvement between DC and MD patients in physical and mental health. One exception was physical health in acute patients (AMD, 9.2; $P < .0005$). Patient satisfaction favored DC care for acute and chronic patients (AMD, 14-18; $P < .0005$).

Adjusted Incremental Cost-Effectiveness Ratios

The additional costs per unit advantage in outcomes for DC care are presented in Table 3. Of note, ratios computed for office costs alone were considerably higher than ratios computed for total costs. For chronic patients, the total cost ratios ranged from approximately $0.1 to $0.5 per point advantage. Specifically, for the primary outcomes at 3 months, there was a $5 additional cost for a 10.5-point advantage in pain and an 8.8-point advantage in improvement. At 12 months, there was only a $1 additional cost but for more modest 7.3- and 5.4-point improvements in these outcomes. For acute patients, the cost ratios were between $24 and $25 per point at 3 months and $8 to $42 per point at 12 months. The cost ratios reflect greater cost and smaller advantage in primary outcomes than for chronic patients. Also notable are the small ratios for large differential satisfaction in both acute and chronic patients.

Discussion

Back pain is experienced by 80% of adults during their lives[2,3] and accounts for 2.5% of US health care expenditures.[1] Arguably, the relative cost-effectiveness of medical and chiropractic care is an urgent economic and health policy issue, one for which evidence is especially limited. Much of the recent work on cost-effectiveness has been conducted abroad.[25-27] With cost structures in the United States that are very different from other countries,[48,49] our work fills important information gaps that can help with policy and health plan decisions. We include a broad set of outcomes indicators as well as comprehensive cost data for large samples of patients. Furthermore, we have been able to adjust both costs and outcomes for a variety of confounding factors to provide clear relative cost indicators.

Our study had several important findings. First, office costs alone are not appropriate outcomes for a comparison of medical and chiropractic care. Medical office costs do not include physical therapy, whereas physical modalities are usually performed in chiropractic offices.[29] These and other referral costs (advanced imaging and other provider care) appear to be the great equalizers for medical and chiropractic care. The appropriateness of advanced imaging and referral were not investigated in this study. Clearly, over- and underuse could have a dramatic effect on relative cost-effectiveness.

Chiropractic appears relatively cost-effective compared with medical care for the treatment of chronic LBP in pain and functional disability improvement. This was evidenced by a relative clinical benefit, particularly in the short term, concomitant with no difference in total costs. The picture for acute patients is somewhat less clear. There was only a small advantage for chiropractic care in outcomes with additional but statistically insignificant costs.

Two recent randomized trials addressed cost-effectiveness of manipulation/chiropractic care. Using a formal analysis, a trial in the United Kingdom found that manipulation is cost-effective for back pain.[25] Kominski et al[50] found, at an 18-month follow-up, that chiropractic care was more expensive than medical care, but chiropractic care with physical modalities was less expensive than medical care with physical therapy. Outcomes were comparable across the 4 groups. This study supports our contention that ancillary care such as physical modalities need to be considered in cost-effectiveness studies. The absence of group differences in outcomes at 18 months is consistent with our study findings reported previously; chiropractic and medical care differences vanished between 12 and 24 months.[15]

Although most cost comparisons have been favorable to chiropractic, several studies for the United States have

reported that chiropractic care costs more than treatment provided by primary care physicians.[19,20] For example, general practitioners had the lowest charges over episodes of care, with DCs and orthopedists the highest, in a study using 1974 to 1982 data from the RAND Health Insurance Experiment.[19]

In particular, our findings were in contrast to the seminal, nonrandomized comparative study by Carey et al,[20] who found equivalent outcomes but the highest costs for urban DCs and orthopedists and the lowest for primary care and health maintenance organizations. However, their cost data reflected charges rather than payments, which are often much lower than charges. Their costs were also evaluated for a single episode, rather than a fixed period. Many investigators believe that the episode is the appropriate unit of analysis.[51] However, costs over a fixed period capture recurrences and, thus, may be the more practical approach from the perspective of payers and policy makers.

Our results were consistent with Carey et al[20] and a trial by Cherkin et al[21] in finding greater satisfaction with chiropractic care than with other interventions. We do not know how to value satisfaction against costs at this time but feel that satisfaction is an outcome that merits consideration in cost-effectiveness studies.

The RAND[19] study provides an example of cost-minimization analysis, a method that is,[31] "appropriate if the alternatives have identical consequences" including "side effects and adverse events." Despite these caveats, cost minimization has been the dominant methodology used in US cost analyses. In a subsequent example, patients with back and neck pain treated by chiropractors in one health maintenance organization had lower costs than those treated by other providers.[16] The authors recognized that they did not control for differences in comorbidities, chronic illnesses, or severity but only inferred from other data that there were no substantial differences in underlying illnesses.

A more widely cited study applied an incremental spending methodology to a large database of fee-for-service patients with LBP.[17,18] Chiropractic users had far lower outpatient and total costs for their episodes of care than nonusers. Although the analysis included controls for differences in patients' insurance and sociodemographic characteristics, controls for the severity of the condition and health status of the patient were limited. The study also did not include any patient outcomes measures. In the large managed care network study in California, where members with chiropractic coverage showed lower annual health care expenditures and lower use rates per episode of back pain than those without chiropractic coverage,[24] there were no patient outcomes measures that could lead to stronger evidence of chiropractic's relative cost-effectiveness. Our contribution examined both costs and outcomes to report results through easily understood incremental cost-effectiveness ratios.

Nevertheless, several limitations may have affected the study outcomes and generalization of findings. It is well-known that observational studies are more susceptible to bias than randomized controlled trials from unknown factors associated with patients and providers. Control for relevant confounding variables would have the greatest validity in inferring that the costs and outcomes are not attributable to other extraneous factors in observational studies.[32,33] Our study statistically controls for a broad set of potentially confounding variables to evaluate cost and effectiveness in actual practice when patients can select the providers of their choice. A well-designed observational study can thus overcome a major weakness of randomized trials, their artificial design and limited generalization to clinical practice.[52] Only large, pragmatic, randomized trials that do not control patient management can yield more accurate estimates of adjusted cost and outcomes differences between medical and chiropractic care.

Hospitalization/surgical costs were not available for our analysis. Because there was a greater referral rate for surgical evaluation from MDs and the hospitalization rate is known to be higher for medical patients,[19] it is likely that inclusion of hospitalization/surgery would have increased medical costs disproportionately.

Over-the-counter (OTC) drug costs were also excluded from the analysis. We found OTC drug costs difficult to estimate, because the data collected did not account for the large variation in drug type and pill dosage. Drug costs appeared to be relatively small compared to provider costs, so bias was probably small. It is unknown whether there was differential consumption of OTCs between chiropractic and medical patients.

Caution must be taken in generalizing study findings from a regional study to national practice. Chiropractic scope of practice varies from state to state,[53] permitting different modalities for the treatment of LBP. For example, Oregon's scope of practice included physical modalities, whereas neighboring Washington's did not. Caution must also be used in light of the continual evolution in health care financing and reimbursement mechanisms. The study controlled for some differences in patients' insurance characteristics, and these results will be reported elsewhere. However, the study design, conceived in the early 1990s, did not anticipate the extent of the shift toward managed care or of other developments such as consumer-driven health plans.

Conclusions

This study supports the generalizability of systematic reviews of the efficacy of spinal manipulation for pain and functional disability to the effectiveness of chiropractic care in clinical practice. Our findings are consistent with the review findings that spinal manipulation–centered therapy is

as least as good as, and in some cases, better than other treatments of LBP.[8-10] Although randomized trials found an advantage for chiropractic care in costs, our study leaned toward comparability.

Chiropractic patients with chronic LBP showed an advantage over medical patients in pain, disability, and satisfaction outcomes without additional costs. Chronic pain and disability outcomes were clinically important in the short term and of lesser magnitude in the long term. Satisfaction with chiropractic care was considerably greater for both acute and chronic patients at both time points. Although the advantages in pain and disability were small for acute patients with LBP, it is important to consider that these gains can be obtained with, at most, small increased costs. With their mission to increase value and respond to patient preferences, health care organizations and policy makers need to reevaluate the appropriateness of chiropractic as a treatment option for LBP.

Practical Application

- Chiropractic care is relatively cost-effective compared with primary medical care for the treatment of chronic LBP, particularly in the short term.
- Chiropractic and medical care are comparable in cost and effectiveness for acute LBP.
- Healthcare organizations and policy makers should consider the appropriateness of chiropractic as a treatment option for LBP.

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