

Estimating Cost of Care for Patients With Acute Low Back Pain: A Retrospective Review of Patient Records

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Context: Low back pain (LBP) has a major economic impact in the United States, with total costs related to this condition exceeding \$100 billion per year.

Objective: To estimate the cost of standard care compared to standard care plus osteopathic manipulative treatment (OMT) for acute LBP of less than 6 months' duration.

Methods: A retrospective review of electronic medical records from patients who visited Florida Hospital East Orlando in Orlando. All patients had LBP of less than 6 months' duration and had received care between January 1, 2002, and December 31, 2005. The control group comprised patients who received standard care; the study group consisted of patients who received OMT in addition to standard care. Healthcare utilization (eg, radiologic scans, prescriptions) was determined by "episodes of care," and costs were averaged per patient.

Results: A total of 1556 patients and 2030 episodes of care met inclusion criteria. Compared with subjects in the control group, individuals in the OMT group had an average of 0.5 more office visits per EOC, resulting in 38% more office visits. However, OMT patients had 18.5% fewer prescriptions written, 74.2% fewer radiographs, 76.9% fewer referrals, and 90% fewer magnetic resonance imaging scans. In the OMT group, total average costs were \$38.26 lower ($P=.02$), and average prescription costs were \$19.53 lower ($P<.001$). Patients in the OMT group also had \$63.81 less average radiologic costs ($P<.0001$).

Conclusion: Osteopathic manipulative treatment may reduce costs for the management of acute LBP. Further research in a prospective study is needed.

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The cost of treatment for patients with low back pain (LBP) has a major economic impact worldwide.¹⁻⁵ In the United States, patients with musculoskeletal conditions incur total annual medical care costs of approximately \$240 billion, of which \$77 billion is related to musculoskeletal conditions.² According to a 2006 review,⁶ total costs associated with LBP in the United States exceed \$100 billion per year, two-thirds of which are a result of lost wages and reduced productivity.

A brief review of the literature⁷⁻⁹ indicates that patients with LBP who receive osteopathic manipulative treatment (OMT) are equally satisfied with outcomes compared with those who receive standard care. In many cases, patients who received OMT had shorter hospital stays,⁷ less physical therapy,⁸ and a statistically significant lower amount of pain medication.⁸

Most reviews and meta-analyses of spinal manipulation for LBP do not specifically address OMT. Instead, they focus on spinal manipulation as an alternative to conventional treatment. Licciardone et al¹⁰ used computerized bibliographic and manual searches of the literature and concluded that OMT reduced back pain and that this improvement lasted for at least 3 months.

Cost-effectiveness studies have found encouraging results for OMT. Gamber et al⁷ reviewed worker's compensation studies for LBP and found that overall costs for osteopathic physicians (DOs) were less for patients who received OMT. In 2002, a US Navy study¹¹ evaluated the cost-effectiveness of using OMT versus standard of care and found that the latter was up to 20 times more expensive in patients' lost work productivity.

However, not all studies conclude that manual medicine is the most cost-effective treatment option for this population. One randomized controlled trial¹² evaluated outpatient costs (excluding pharmacologic costs) for four LBP care options. Average patient costs for the four groups were as follows: \$369 for standard medical care only, \$560 for chiropractic care only, \$579 for chiropractic care with physical modalities, and \$760 for medical care with physical therapy.

The goal of the current study was to evaluate the cost of care for acute LBP of less than 6 months' duration. We hypothesized that patients who received OMT in addition to standard care had a lower cost of care than those who received standard medical care alone.¹²

Materials and Methods

We reviewed electronic medical records (EPIC Systems Corporation, Verona, Wis) of patients who received care for acute LBP between January 1, 2002, through December 31, 2005, at the Family Practice Residency Clinic at Florida Hospital East Orlando in Orlando. The study protocol was approved by the institutional review board at Florida Hospital System in Orlando, Fla.

During this time, physicians at the clinic totaled 55 osteopathic residents in family practice and 10 faculty members (nine DOs and one allopathic physician). No allopathic residents were in the program. In any year, there were an average of 30 residents and six faculty members.

Patients were required to have LBP of less than 6 months' duration for inclusion. Inclusion criteria also specified the following ICD-9-CM 2007 codes associated with LBP:

- 724.5, Backache unspecified
- 724.6, Disorders of sacrum
- 742.2, Lumbago
- 846.9, Unspecified site of sacroiliac region sprain
- 847.2, Lumbar sprain

Patients with diabetic neuropathy, congenital lumbar or sacral abnormalities, lumbar herniated discs or radiculopathies, nerve root compression, neurovascular disease, spondylolysis, spondylolisthesis, or pain lasting longer than 6 months were excluded from the present investigation.

All patients received standard medical care, which comprised radiologic studies (ie, magnetic resonance imaging [MRI] scans and radiographs), prescriptions for narcotic pain medication and nonsteroidal anti-inflammatory drugs, and referrals to specialists or physical therapists. In addition to standard care, some patients received OMT for LBP. No specific OMT techniques were required to have been used for inclusion in the present study.

Patients were assigned to groups according to whether or not they received OMT. In other words, patients who did not receive OMT comprised the control group, and those who did receive OMT consisted of the OMT group.

Some patients had more than one occurrence of LBP between January 1, 2002, and December 31, 2005. During their first episode of LBP (eg, in 2002), these patients may have received standard medical care without OMT, but during a second episode of LBP (eg, in 2004), they may have received OMT in addition to standard medical care. Therefore, when we analyze our findings, these patients were included in both groups.

The Current Procedural Terminology (CPT) codes for visits, prescriptions written, and number of pills prescribed were collected. Osteopathic manipulative treatment costs were also based on CPT criteria. All nonrelated charges, such as medications for unrelated conditions (eg, diabetes, hypertension) were excluded. Magnetic resonance imaging (MRI) scans

were checked for body region and results. If the results revealed a diagnosis that met exclusion criteria, then the patient and his or her record were excluded.

Average healthcare utilization rates (ie, office visits, prescriptions, referrals, MRIs, and radiographs) were calculated by 90-day episodes of care (EOCs) because patients who have back pain may require more than one office visit and because treatment length varies for patients. One EOC was defined as all office visits within 3 months of the last office visit. For the same patient to have a second EOC for the same occurrence of LBP, at least 91 days had to pass since the last office visit. This defined time between EOCs was used because the normal healing process for a soft tissue injury usually takes 90 days.

Because patients could have visited the clinic for LBP twice more than 6 months apart, they could have had 2 EOCs. However, in this scenario, each office visit was considered a single EOC for each occurrence of LBP.

Average costs were calculated per patient. The CPT codes were matched to the 2006 Medicare fee schedule for the Orlando, Fla, region. Medication costs were based on December 2006 prices provided to us by a national drugstore—Walgreen Co—at the average wholesale cost. Medications that could have been filled as generic brands were calculated at that lower cost. Physical therapy costs were based on 4 weeks of therapy (12 visits in the Florida Hospital Physical Therapy Clinic) using the CPTs for their LBP protocol.

A sample of the consultations patients received for orthopedics, neurosurgery, physical medicine, and neurology were reviewed and determined to have been coded as level IV consultations. Therefore, all consultation charges were initially determined for level IV visits. However, we recalculated the data using level III consultation to ensure that our findings were not overstated. The data remained statistically significant ($P=.02$ vs $P=.03$) after this conversion.

Statistical analysis was done using factorial analysis and one-way analysis of variance (ANOVA) on dependent variables using SPSS statistical software (version 14.0 for Windows; SPSS Inc, Chicago, Ill).

Results

A total of 1810 patient records were reviewed and were found to comprise 4099 office visits and 2415 episodes of care. After examining reports, 254 patient records, which included 612 office visits and 385 EOCs, were excluded from the study because they met exclusion criteria—specifically, LBP lasted longer than 6 months or the patient had an exclusionary diagnosis. Therefore, the total number of patients analyzed for the present study was 1556; office visits, 3487; and EOCs, 2030. A total of 145 patients met inclusion criteria for both groups, contributing 154 EOCs to the control group and 145 EOCs to the OMT group.

The control group ($n=1120$) comprised 714 female patients (63.75%) and 406 male patients (36.25%). The average age (range) was 44.8 years (10-89 y). Subjects in the control group

had 1776 office visits resulting in 1327 EOCs. The OMT group (n=581) was smaller, consisting of 384 female patients (66.09%) and 197 male patients (33.91%). The average age (range) for the OMT group was 42.97 years (11-90 y). In the OMT group, there were 1711 office visits, which resulted in 703 EOCs.

The majority of EOCs (1469 [72.36%]) consisted of one office visit. Another 286 EOCs (14.09%) comprised two or more office visits within 30 days; 113 (5.57%) had two or more office visits within 60 days; 87 (4.29%), 90 days; 42 (2.07%), 120 days; and 33 (1.62%), 180 days.

The control group had an average of 1.3 office visits per EOC while the OMT group had 1.8 office visits per EOC—38% more office visits than the control group (Table 1). However, the OMT group had 76.9% fewer referrals for specialty care (eg, neurology, neurosurgery, orthopedics, pain management, physical medicine, physical therapy). For example, there were 146 referrals related to LBP for the control group vs 18 for the OMT group (Table 2). In addition, the OMT group had 90% fewer MRI scans, 74.2% fewer radiographs of the lumbar spine, and 18.5% fewer prescriptions written.

These differences resulted in an overall lower cost per patient for those in the OMT group (Table 3). Patients in the OMT group had \$38.26 less average total costs than the control group, which is 14.4% less costly ($P=.02$). This lower total cost was a result of \$63.81 (85.7%) less average radiology costs ($P<.0001$) and \$19.53 (26.6%) less average prescription costs ($P<.001$).

When comparing data by 30-day intervals, average total costs and prescription costs per patient were closest for the OMT and control groups at 60 days (Figure).

Comment

The present study suggests that the use of OMT in combination with standard medical treatment lowers healthcare costs for patients with LBP. As shown in the Figure, total costs and prescription costs are similar at 60 days but are very different at 90 days. At 120 days, the costs begin to approximate each other again. This trend likely occurred because DOs using OMT became more aggressive in their management of LBP. In talking with residents, DOs who used OMT to treat patients felt more confident in their physical diagnosis skills. Therefore, they prescribed fewer medications and ordered fewer radiographs. These residents also stated that the patients often felt better posttreatment and did not require a prescription for their pain. However, the longer the patient had LBP, the physicians using OMT felt the need to add medications for pain control.

To verify that the discrepancy in prescribing practices was not a result of some physicians using more expensive medications or technologies, we reviewed patient records accordingly. The medications used in both groups were approximately the same costs and type. There was no outlier of one physician prescribing more costly drugs or ordering more imaging in the non-OMT group. Therefore, the medication cost difference comes from the fewer number of pre-

Table 1
Estimating Cost of Care for Patients With Low Back Pain:
Healthcare Utilization Rate per Episodes of Care, No.*

Healthcare Utilization	Episodes of Care	
	Control Group (n=1327)	OMT Group (n=703)
Office visits	1.3	1.81
Prescriptions	1.24	1.01
Referrals	0.13	0.03
MRI scans	0.026	0.0028
Radiographs	0.62	0.16

* One episode of care (EOC) was defined as all office visits within 3 months of the last office visit. For the same patient to have a second EOC, at least 91 days had to pass since the last office visit. The control group had 1120 patients, while the osteopathic manipulative treatment (OMT) group had 581 patients. A total of 299 EOCs were from the 145 patients who were in both groups, contributing 154 EOCs to the control group and 145 EOCs to the OMT group. All comparisons between the control group and the OMT group were statistically significant ($P<.0001$).

Abbreviation: MRI, magnetic resonance imaging.

Table 2
Estimating Cost of Care for Patients With Low Back Pain:
Total Healthcare Utilization per Episodes of Care, No.*

Healthcare Utilization	Episodes of Care	
	Control Group (n=1327)	OMT Group (n=703)
Office visits	1776	1711
Prescriptions	1646	710
Referrals	146	18
MRI scans	35	2
Radiographs	882	113

* One episode of care (EOC) was defined as all office visits within 3 months of the last office visit. For the same patient to have a second EOC, at least 91 days had to pass since the last office visit. The control group had 1120 patients, while the osteopathic manipulative treatment (OMT) group had 581 patients. A total of 299 EOCs were from the 145 patients who were in both groups, contributing 154 EOCs to the control group and 145 EOCs to the OMT group. All comparisons between the control group and the OMT group were statistically significant ($P<.0001$).

Abbreviation: MRI, magnetic resonance imaging.

scriptions written. Likewise, the radiology costs result from fewer MRIs ordered.

However, when interpreting the data, certain limitations must be considered. For example, the current utilization study did not look at outcomes. Therefore, it is possible that patients' conditions worsened and they sought care elsewhere. However, as discussed earlier, Andersson et al⁸ showed that OMT and conventional medical care outcomes were equivalent based on patient evaluation of pain (eg, visual analog scales, Roland-Morris questionnaire) and function (eg, range-of-motion measurements). Likewise, the authors⁸ suggested that

Table 3
Estimating Cost of Care for Patients With Low Back Pain:
Cost Analysis per Episode of Care*

Cost Measure	US \$ per Episodes of Care (95% CI)			F Score [†]	P Value	Adjusted R ²
	Control Group (n=1327)	OMT Group (n=703)	Total (N=2030)			
Total	265.19 (245.91-285.48)	226.96 (202.01-251.90)	251.95 (236.66-267.34)	5.458	.02	0.16
Radiology	74.44 (65.95-80.94)	10.63 (6.26-15.00)	51.69 (46.40-65.98)	130.63	<.0001	0.129
Prescription	73.44 (65.95-80.94)	53.91 (45.78-62.94)	66.68 (66.68-72.34)	10.41	<.001	0.077

* One episode of care (EOC) was defined as all office visits within 3 months of the last office visit. For the same patient to have a second EOC, at least 91 days had to pass since the last office visit. The control group had 1120 patients, while the osteopathic manipulative treatment (OMT) group had 581 patients. A total of 299 EOCs were from the 145 patients who were in both groups, contributing 154 EOCs to the control group and 145 EOCs to the OMT group.

† For each of the comparisons made, the *df* was 1.

OMT with standard medical care is less costly in the treatment of LBP of less than 6 months' duration.

Other limitations to the present study are related to several "unknowns," which could affect total costs. For example, we do not know if patients were seen by other practitioners before or after the office visits that we have recorded, so the overall total costs may not be precise. Also, we calculated costs on the basis that all patients were seen by a neurologist, progressive muscle relaxation practitioner, or pain management consultant. However, not all consultants returned reports, and therefore, we do not know if some patients were seen or not.

Additional unknowns include whether any other interventions were used that would increase costs, how many prescriptions were actually filled, or whether patients were taking medications for pain from other prescribers. Likewise, we had no record of over-the-counter medications taken, and the institutional review board would not allow us to contact insurance companies to obtain CPT codes charged for patients' EOCs. Also, many of the patients had other complaints (eg, diabetes, hypertension) that could affect level-of-service billing. Another limitation is that LBP often resolves without intervention, but this possibility was not taken into account in the present study.

Data reported in the current investigation are different from those reported in other studies. For example, Monajati, et al¹³ reported an average of 2.5 office visits per EOC for primary care physicians and 3.5 for orthopedic office visits. By comparison, we found an average of 1.8 offices visits for the OMT group and 1.1 office visits for the standard care group.

The average number of prescriptions in the present study were also lower. Monajati et al¹³ had an average of 4.6 prescriptions, while Feuerstein et al¹⁴ investigated general trends and found an average of 2.0 prescriptions in 1987 and 3.9 prescriptions in 1997. By comparison, in the present study, we found 1.01 prescriptions for the OMT group and 1.24 for the control group.

Ritzwoller et al¹⁵ showed that 67% of patients had one LBP episode of care of 30 days or less as compared with more than

85% in the present study. Coste et al¹⁶ showed that 90% of patients' LBP resolved within 2 weeks without medical intervention. However, Croft et al¹⁷ showed 90% of patients stopped consulting their physician after 3 months even though they still had pain. Because the present study was retrospective in design, we do not know if any patients were still in pain but stopped coming to the office because they were dissatisfied with their care.

In Ritzwoller et al,¹⁵ 10.9% of patients had radiographs or MRIs within the first 30 days of treatment, compared to 7% in the OMT group and 26% in the control group in the present study. Total costs in the present study were considerably lower per EOC than reported by Kominski et al,¹² which is likely a result of differences in methodology. Kominski and colleagues¹² calculated costs using charges, not Medicare costs. If we had used Florida Hospital East Orlando charges, then the total costs would have been about 40% higher in both groups.

In 1995, Hart et al¹⁸ used the National Ambulatory Medical Care Survey to look at office visits for LBP and separated results for osteopathic family physicians. In that study,¹⁸ osteopathic family physicians ordered radiographs at the lowest rate (6%) and prescribed a lower percentage of medications (45.2%) compared with general internists (56.2%) and allopathic family physicians (60.2%).

Although certain findings of the present study differ in comparison to previous reports,¹³⁻¹⁸ the general trends are consistent in that OMT was found to minimize cost of care for LBP and reduce healthcare utilization rates (eg, medication, radiologic studies).

Conclusion

While further investigation is needed in the form of a prospective study, it appears that the use of OMT may be cost effective for the treatment of mechanical LBP with less medication and fewer radiology procedures, which is consistent with previously published studies.

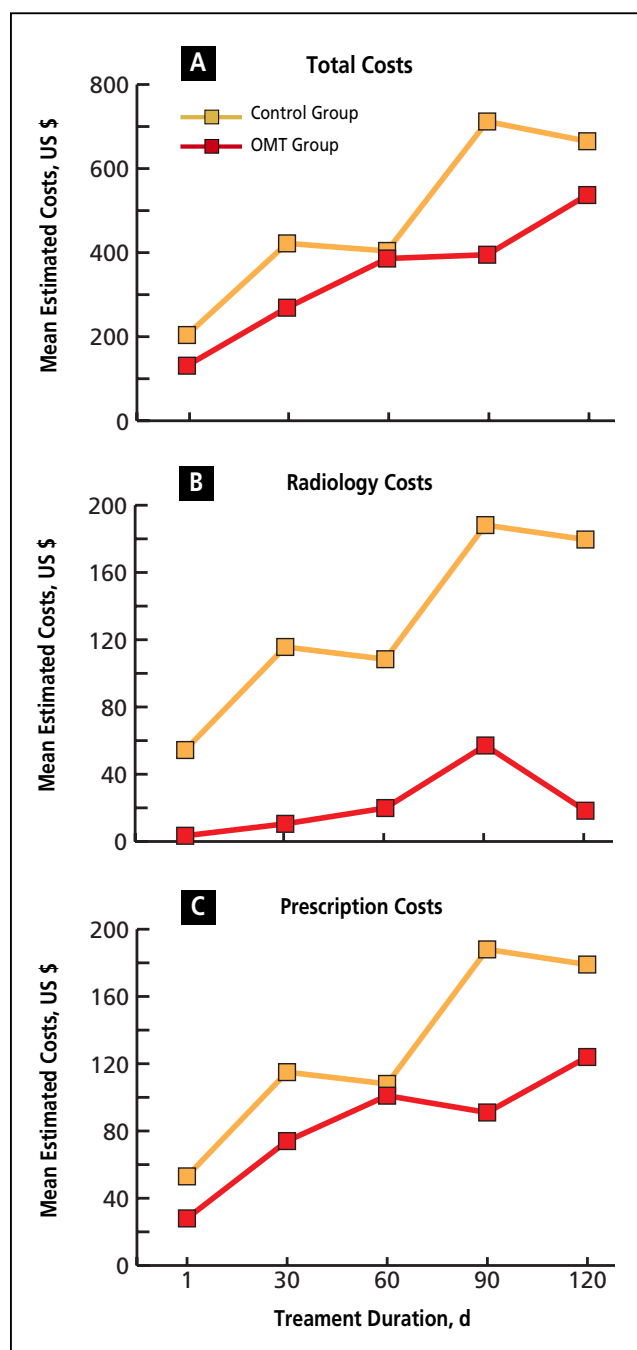


Figure. Estimated average total costs (A), radiology costs (B), and prescription costs (C) by duration of treatment per patient. **Abbreviation:** OMT, osteopathic manipulative treatment.

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