

Does Adherence to the Guideline Recommendation for Active Treatments Improve the Quality of Care for Patients With Acute Low Back Pain Delivered by Physical Therapists?

Julie M. Fritz, PhD, PT, ATC,*† Joshua A. Cleland, PhD, DPT, FAAOMPT,‡
and Gerard P. Brennan, PhD, PT*

Background: Numerous practice guidelines have been developed for patients with low back pain in an attempt to reduce inappropriate variations and improve the cost-effectiveness of care. Guideline implementation has received more research attention than the impact of adherence to guideline recommendations on outcomes and costs of care.

Objective: Examine the association between adherence to the guideline recommendation to use active versus passive treatments with clinical outcomes and costs for patients with acute low back pain receiving physical therapy.

Research Design: Retrospective review of patients with acute low back pain receiving physical therapy in 2004–2005. Adherence to the recommendation for active treatment was determined from billing records. Clinical and financial outcomes were compared between patients receiving adherent or nonadherent care.

Subjects: A total of 1190 patients age 18–60 years old with low back pain of less than 90 days duration in 10 clinics in 1 geographic region.

Measures: Clinical outcomes included the numeric pain rating and Oswestry disability questionnaire taken initially and at the completion of treatment. Financial outcomes included the number of sessions and charges for physical therapy care.

Results: Adherence rate was 40.4%. Adherence was greater for patients receiving workers' compensation ($P < 0.05$). Patients receiving adherent care had fewer visits and lower charges ($P < 0.05$), and showed more improvement in disability [adjusted mean difference for percentage improvement 25.8%, 95% confidence interval (CI): 21.3–30.4, $P < 0.001$] and pain (adjusted mean difference for percentage improvement 22.4%, 95% CI: 17.5–27.3, $P < 0.001$). Patients receiving adherent care were more likely to have a successful physical therapy outcome (64.7% vs. 36.5%, $P < 0.001$).

Conclusions: Adherence to the guideline recommendation for active care was associated with better clinical outcomes and reduced cost.

Key Words: low back pain, clinical practice guidelines, physical therapy, cost of care

(*Med Care* 2007;45: 973–980)

Clinical practice guidelines have proliferated in recent decades as an attempt to improve the effectiveness and efficiency of health care.¹ Emphasis on the development and implementation of guidelines has been fueled by research documenting high rates of inappropriate care and wide variations in clinical practice for common health care conditions.^{2,3} Adherence to clinical practice guidelines is advocated as a method to decrease utilization of ineffective therapies, increase adoption of evidence-based practices, ultimately resulting in improved patient outcomes and more cost-effective care.⁴ Belief in the ability of guidelines to improve the quality of care has led to a rapid proliferation in the number of guidelines available for a wide variety of clinical conditions.⁵ Although the primary goal of clinical practice guidelines is to improve quality, little research has actually examined the impact of adherence to guideline recommendations on clinical outcomes and costs of care.⁶

Low back pain (LBP) is a common and costly disorder identified as a top 15 priority condition in the United States by the Institute of Medicine.⁷ In 1998, total health care expenditures in the United States for the management of LBP was over \$90 billion, with the majority of costs related to outpatient and office-based services, as well as prescription medication.⁸ Like other common conditions, inappropriate variations in care and unacceptably high use of ineffective therapies have been documented in the management of LBP,^{9–11} leading to calls for increased adherence to clinical practice guidelines.¹²

Most individuals who seek care for acute LBP are managed in primary care,¹³ and many receive physical therapy.¹⁴ Numerous clinical practice guidelines have been developed to direct primary care providers towards more evidence-based management.^{15,16} A consistent recommendation in these guidelines is the need for an active versus a passive approach.^{16,17} Guidelines developed to more specifically guide physical therapy specify further that useful interventions are exercise and patient education in self-

From the *Rehabilitation Agency, Intermountain Healthcare, Salt Lake City, Utah; †Division of Physical Therapy, University of Utah, Salt Lake City, Utah; and ‡Department of Physical Therapy, Franklin Pierce College, Concord, New Hampshire.

Reprints: Julie Fritz, PhD, PT, ATC, 520 Wakara Way, Salt Lake City, UT 84108. E-mail: julie.fritz@hsc.utah.edu.

Copyright © 2007 by Lippincott Williams & Wilkins
ISSN: 0025-7079/07/4510-0973

management, whereas passive treatments such as electrotherapy, ultrasound, massage, etc, should be minimized.^{18,19} Similar to other health care conditions, adherence to guidelines by clinicians managing individuals with LBP has been problematic.^{20–23}

Research exploring the relationship between adherence to guideline recommendations and quality of care for individuals with LBP is sparse, and focused mostly on primary care. Most studies have examined the impact of adherence on costs and process-related variables (eg, rate of specialist referrals, prescription medication, imaging).^{24–26} Few studies have considered both patient-specific clinical outcomes (eg, pain, disability) and costs in relation to guideline adherence. The purpose of this study was to examine the relationship between adherence to the guideline recommendation for an active treatment approach and both the clinical outcomes and costs of care provided by physical therapists to individuals with acute LBP.

METHODS

Data Extraction

Data were collected from clinical outcomes and financial databases maintained by the Rehabilitation Agency of Intermountain Healthcare (IHC), a private, nonprofit, integrated health care delivery system. The study was approved by the Institutional Review Board of IHC. Data for this study were gathered from 10 outpatient physical therapy clinics located in the Salt Lake City region. All physical therapists working in these clinics were salaried employees of IHC who did not receive financial incentives based on the number or type of billing codes used per patient visit. Reimbursement was based on fee-for-service for all patients in this analysis.

Beginning in 2002, all outpatient physical therapy clinics in the Rehabilitation Agency of IHC began tracking clinical outcomes for all patients receiving physical therapy. In the clinical outcomes database, each new patient is entered using a web-based application. At each visit patients complete a condition-specific disability outcome score and 0 to 10 numeric pain rating,²⁷ and the scores are entered into the database. The Modified Oswestry Disability Questionnaire (OSW)²⁸ is the condition-specific disability scale used for patients with a chief complaint of LBP. Also included is the patient's age, sex, symptom duration, and date of surgery (if applicable). A separate electronic database is maintained containing the Current Procedural Terminology (CPT) codes billed by the treating physical therapist for each patient visit. The number of visits and duration of physical therapy services, standard costs billed for physical therapy, and insurance provider are also obtainable from the billing database.

The sample for this study was drawn from the clinical outcomes database. All patients undergoing an episode of care for treatment of LBP between January 1, 2004 and December 31, 2005 entered into the database from the 10 clinics were extracted. Patients receiving treatment for LBP were identified as those for whom the OSW was used as the condition-specific disability scale. An episode of care was defined as time from the date of the initial evaluation to the last visit. If no visits occurred for more than 45 days, the

episode of care was considered complete. Records were examined, and all patients meeting the following inclusion criteria were retained for analysis: 18–60 years old, duration of symptoms <90 days, at least 3 physical therapy visits, duration of physical therapy at least 10 days, initial OSW score >10%, no surgery date recorded.

We chose to exclude patients receiving care for less than 10 days or those who had had less than 3 visits in an attempt to limit our analysis to those patients for whom the therapist was able to establish and carry out a plan of care.

Records from the clinical outcomes database of included patients were then linked to the billing database using the enterprise master patient index number. The CPT codes billed for each visit were extracted. The insurance provider was extracted and categorized as private, nonemployment insurance; private, employment insurance (ie, workers' compensation); government insurance (ie, Medicare or Medicaid); or self-pay (ie, no insurance).

Determining Guideline Adherence

The episode of care was divided into 2 phases. Phase I included treatment received during the first 2 weeks. Phase II included treatments from day 14 through the end of the episode of care. Guideline recommendation adherence was determined separately for each phase. Overall adherence required adherence in both phases. If the patient did not enter phase II (ie, the episode of care was less than 14 days), adherence in phase I determined overall guideline recommendation adherence.

To determine adherence, CPT codes billed for visits occurring in each phase were examined and categorized as active, passive, or allowed (Table 1). Active codes included those indicating active treatment procedures consistent with guideline recommendations. Passive codes were those indicating procedures during which the patient had a passive role, inconsistent with guideline recommendations. Allowed codes included codes that could not be adequately categorized based on their guideline adherence, including evaluation, testing, and equipment codes. The evidence regarding manual therapy for patients with acute LBP is somewhat contradictory^{29,30}; however, based on studies indicating that some patients with acute LBP benefit from manual therapy received early in the course of physical therapy,^{31,32} billed codes for manual therapy were considered allowed during phase I, but passive during phase II.

Clinical practice guidelines for physical therapy recommend that every session should include active treatment, and the overall proportion of active treatments should be greater than passive treatments.³³ The number of active and passive codes received at each visit was recorded. For each phase, the percentage of active to passive codes was calculated as [number of active codes/(number of active codes + number of passive codes) × 100%]. Adherent care for each phase was defined as occurring when the percentage of active to passive codes within the phase was at least 75%, and each visit included at least 1 active code.

TABLE 1. Categories Used for Billing Codes Received During Phase I and Phase II of Physical Therapy Treatment

Active Codes		Passive Codes		Allowed Codes	
PHASE I					
97110	Therapeutic exercise	97035	Ultrasound	97001	PT evaluation
97350	Therapeutic activity	97010	Hot or cold pack	97002	PT re-evaluation
97535	Self care management training	G0283, 97032	Electrical stimulation	99070	Miscellaneous supplies
97112	Neuromuscular re-education	97012	Mechanical traction	97750	Physical performance test/measure
97150	Group therapeutic procedures	97124	Massage therapy	97140	Manual therapy
				97113	Aquatic therapy with exercise
				97116	Gait training therapy
PHASE II					
97110	Therapeutic exercise	97140	Manual therapy	97001	PT evaluation
97350	Therapeutic activity	97035	Ultrasound	97002	PT re-evaluation
97535	Self care management training	97010	Hot or cold pack	99070	Miscellaneous supplies
97112	Neuromuscular re-education	G0283, 97032	Electrical stimulation	97750	Physical performance test/measure
97150	Group therapeutic procedures	97012	Mechanical traction	97113	Aquatic therapy with exercise
		97124	Massage therapy	97116	Gait training therapy

Guideline Dissemination

Physical therapists contributing data to this analysis were not trained in the criteria for guideline adherence used in this study. A clinical practice guideline for primary care management of patients with LBP was developed at IHC in 2004. This guideline was directed towards physicians and promoted an active approach to management in primary care as well as physical therapy. The guideline was available to physical therapists employed by IHC, but no explicit attempt at dissemination had been undertaken.

Outcome Measures

Clinical Outcomes

Clinical outcomes were assessed using the OSW and pain rating. The OSW questionnaire includes 10 items, each scored 0 to 5, related to LBP and tolerance to daily activities. The total score summed and expressed as a percentage of disability. The OSW has high levels of test–retest reliability and is responsive to change in patients with LBP.²⁸ The numeric pain rating asks patients to rate their pain from 0 (no pain) to 10 (worst imaginable pain).³⁴ Pain rating scales have been shown to have concurrent and predictive validity as measures of pain intensity as well as responsiveness to change among patients with LBP.²⁷

Pain rating and OSW scores were extracted for the initial and final physical therapy visit for each patient. Change scores were calculated by subtracting the final score from the initial score. Percentage change was calculated as [(initial score–final score)/final score × 100%]. Percentage change in OSW was also used to categorize each patient’s outcome as successful or unsuccessful using a threshold of at least 50% improvement to define success. This threshold has been used in previous studies examining the outcomes of patients with LBP receiving physical therapy.^{35,36} The minimum clinically important difference (MCID) for the OSW has been defined as 6 points.²⁸ Because we included only patients with an initial OSW of at least 10 points, a criterion of at least 50% improvement to define success assures that

nearly all patients achieving success would also exceed the MCID for the OSW. To achieve success most patients had to exceed the MCID value. We chose to use a more conservative threshold to define success than the MCID due to the favorable natural history of acute LBP.³⁷

Financial Outcomes

The number of physical therapy visits and the charges for care provided during the episode of care were obtained from the billing database. Charges represented the standard billed charges of physical therapy services. Charges from 2004 were adjusted to 2005 values to reflect a 4% increase.

Data Analysis

Baseline characteristics were compared between patients receiving guideline-adherent versus nonadherent care using independent-group *t* tests. Differences for sex, year of admission, and insurance type were examined using χ^2 tests. We also categorized patients’ baseline OSW and pain rating scores as high or low based on a median split and compared the proportion of adherent cases within strata of these variables using χ^2 tests. We compared care process variables (number of visits and duration of episode of care) between patients receiving guideline-adherent or nonadherent care using nonparametric Mann–Whitney tests due to violations of the assumption of normality for these variables.

Linear mixed model analyses were used to examine the relationship between receiving adherent care and outcomes (percentage change in pain and disability, and charges for physical therapy) controlling for symptom duration, age, sex, year of admission, insurance type, and baseline pain and disability. Charge data underwent square root transformation before analysis to reduce positive skewness. The mixed model was used because independence across observations is not an assumption, and the model can account for the positive correlation among patients nested within physical therapy clinics.

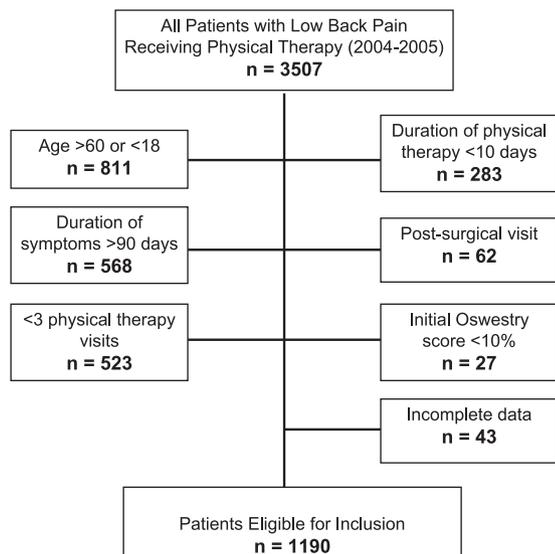


FIGURE 1. Reasons for exclusion of patients from the study.

To further elucidate the impact of guideline recommendation adherence on clinical outcomes, we examined the proportion of patients achieving a successful outcome (at least 50% improvement in disability) in each group. Proportions were compared using a χ^2 test. The number needed to treat with associated 95% CI was calculated to examine the relationship between guideline-adherent treatment and achieving a successful physical therapy outcome.³⁸

RESULTS

During the study period, 93.1% of patients receiving physical therapy in the included clinics were entered into the

clinical outcomes database. A total of 3507 patients with LBP were entered during this period, of which 1190 (33.9%) fit the inclusion criteria. Reasons for exclusion are outlined in Figure 1. Of included patients, 513 (43.1%) were admitted during 2004. Overall, 481 patients (40.4%) received guideline-adherent care. Care was guideline-adherent for 55.5% and 52.2% of patients in phase I and II, respectively. Of the 10 clinics included in the analysis, adherence rates ranged from 9.4% to 86.8% (mean = 33.7%, SD = 22.5). A total of 33 physical therapists (21 men, 12 women) provided the treatment for included patients. Of the 26 providing care for at least 10 patients, mean adherence rate was 38.3% (SD = 22.8, range, 0–87.3%).

Baseline characteristics for patients receiving adherent or nonadherent care are listed in Table 2. Patients with private, employment insurance had a higher adherence rate (61.3%) than other insurance groups. Patients receiving adherent care had shorter symptom duration (mean difference 4.7 days, 95% CI: 2.1–7.2). Adherence was greater for male patients (47.2% vs. 33.4%, $P < 0.001$). Patients receiving adherent care were also younger with lower initial pain ratings; however, the magnitude of these differences were small and of questionable clinical impact. Adherence was greater among patients with low (45.7%) instead of high (37.1%) initial pain ratings ($P = 0.003$).

Patients receiving guideline-adherent care had fewer visits ($P = 0.02$) and a shorter episode of care ($P < 0.001$) than patients receiving nonadherent care (Table 3). Mean and percentage improvement in pain and disability before adjustment for covariates are provided in Table 3. After statistical adjustment, the mean difference for OSW percentage improvement favoring the adherent care group was 25.8% (95% CI: 21.3–30.4, $P < 0.001$). The mean difference for percent-

TABLE 2. Comparison of Baseline Characteristics Between Patients Receiving Guideline-Adherent or Nonadherent Care

	All Patients (n = 1190)	Patients Receiving Adherent Care (n = 481)	Patients Receiving Nonadherent Care (n = 709)	Sig.
Year of admission [n (%)]				
Admitted 2004	513 (43.1%)	219 (45.5%)	294 (41.5%)	0.17
Admitted 2005	677 (56.9%)	262 (54.5%)	415 (58.5%)	
Type of insurance [n (%)]				
Private, nonemployment	647 (54.4%)	171 (35.6%)	476 (67.1%)	
Private, employment	486 (40.8%)	298 (62.0%)	188 (26.5%)	<0.001
Government	45 (3.8%)	10 (2.1%)	35 (4.9%)	
Self-pay	12 (1.0%)	2 (0.4%)	10 (1.4%)	
Age	39.0 (11.7)	38.1 (11.3)	39.6 (12.0)	0.04
Sex [n (%) female]	586 (49.2%)	196 (40.7%)	390 (55.0%)	<0.001
Duration of symptoms (d)	22.5 (22.1)	19.7 (20.5)	24.3 (23.0)	<0.001
Initial Oswestry score	44.2 (15.8)	43.1 (15.4)	44.9 (16.0)	0.06
Low disability (11–41)	540 (45.4%)	224 (41.5%)	316 (58.5%)	0.50
High disability (42–100)	650 (54.6%)	257 (39.5%)	393 (60.5%)	
Initial pain rating	6.1 (2.2)	5.8 (2.3)	6.2 (2.1)	0.003
Low pain intensity (0–5)	455 (38.2%)	208 (45.7%)	247 (54.3%)	
High pain intensity (6–10)	735 (61.8%)	273 (37.1%)	462 (62.9%)	0.003

Values represent mean (SD) unless otherwise indicated.

TABLE 3. Comparison of Financial and Clinical Outcomes Between Patients Receiving Guideline-Adherent or Nonadherent Care

	All Patients (n = 1190)	Patients Receiving Adherent Care (n = 481)	Patients Receiving Nonadherent Care (n = 709)
No. physical therapy visits* (median, range)	6 (3–35)	5 (3–21)	6 (3–35)
Duration of episode of physical therapy care* (median, range)	22 (10–250)	20 (10–124)	26 (10–250)
Charge for physical therapy*	\$869.01 (\$494.89)	\$845.57 (\$449.14)	\$884.91 (\$523.37)
Change in Oswestry score*	19.8 (18.3)	25.1 (18.3)	16.3 (17.5)
Percentage change in Oswestry*	44.9% (37.7)	59.4% (35.2)	35.1% (36.1)
Change in pain rating*	3.0 (2.7)	3.6 (2.8)	2.6 (2.7)
Percentage change in pain rating*	47.1% (43.5)	60.5% (39.1)	38.0% (44.1)
Successful outcome of physical therapy* [n (%)]	620 (52.1%)	311 (64.7%)	259 (36.5%)

Values represent mean (SD) unless otherwise indicated.
*Indicates a statistically significant difference between adherent and nonadherent care groups.

age improvement in pain was 22.4% (95% CI: 17.5–27.3, $P < 0.001$). Physical therapy charges were also less in the guideline-adherent group ($P < 0.001$).

A total of 570 patients (47.9%) achieved at least 50% improvement in disability and were categorized as having a successful outcome. The percentage of successful outcome among patients receiving guideline-adherent care was significantly greater than among those receiving nonadherent care (Table 3) (64.7% vs. 36.5%, $P < 0.001$). The number needed to treat was 3.6 (95% CI: 3.0–4.5), indicating the treatment of approximately 4 patients with adherent (instead of nonad-

herent) care was associated with the prevention of 1 unsuccessful outcome.

Due to differences in adherence rates between patients with private employment versus nonemployment insurance, we explored differences in outcomes related to adherence in these groups separately (Table 4). Using mixed model analyses as previously described, adherent care was associated with greater percentage change in disability and pain, and lower physical therapy charges for both groups. For patients with nonemployment insurance, the difference in the adjusted mean percentage change between the patients receiving ad-

TABLE 4. Comparison of Financial and Clinical Outcomes Between Patients Receiving Guideline-Adherent or Nonadherent Care Based on Insurance Provider

	Patients With Private, Nonemployment Insurance		Patients With Private, Employment Insurance	
	Adherent Care (n = 171)	Nonadherent Care (n = 476)	Adherent Care (n = 298)	Nonadherent Care (n = 188)
Age	41.0 (12.0)	40.8 (11.6)	36.4 (10.5)	36.2 (12.3)
Sex [n (%) female]	85 (49.7%)	276 (58.0%)	103 (34.6%)	78 (41.5%)
Duration of symptoms (d)	31.9 (22.9)*	28.7 (24.6)*	12.5 (14.8)	12.0 (12.6)
Initial Oswestry score	37.4 (13.2)*	42.9 (15.5)*	46.4 (15.6)	47.2 (16.0)
Low disability (11–41)	108 (31.7%)	233 (68.3%)	74 (24.8%)	40 (21.3%)
High disability (42–100)	63 (20.6%)	243 (79.4%)	118 (39.6%)	75 (39.9%)
Initial pain rating	4.8 (2.4)*	5.9 (2.2)*	6.4 (2.1)	6.7 (2.1)
Low pain intensity (0–5)	103 (35.6%)*	186 (64.4%)*	111 (59.7%)	75 (40.3%)
High pain intensity (6–10)	68 (19.0%)*	290 (81.0%)*	187 (62.3%)	113 (37.7%)
No. physical therapy visits (median, range)	4* (3–21)	5* (3–35)	6* (3–21)	8* (3–25)
Duration of episode of physical therapy care (median, range)	21* (10–124)	24* (10–250)	20* (10–107)	27.5* (10–119)
Charges for physical therapy	\$588.28* (314.71)	\$795.99* (504.81)	\$996.36* (445.75)	\$1152.59* (501.68)
Change in Oswestry score	18.8 (13.6)*	15.9 (16.9)*	29.4 (19.2)*	18.5 (19.0)*
Percentage change in Oswestry	52.0% (32.5)*	35.1% (35.7)*	65.0% (35.0)*	38.8% (37.6)*
Change in pain rating	2.6 (2.3)	2.5 (2.5)	4.3 (2.8)*	3.0 (2.9)*
Percentage change in pain rating	52.4% (39.9)*	37.8% (45.6)*	66.6% (37.1)*	43.4% (41.0)*
Successful outcome of physical therapy [n (%)]	97 (56.7%)*	175 (36.8%)*	211 (70.8%)*	77 (41.0%)*

Values represent mean (SD) unless otherwise indicated.
*Indicates a statistically significant difference between adherent and nonadherent care groups.

herent or nonadherent care was 18.5% (95% CI: 12.2–24.7, $P < 0.001$) for OSW and 16.4% (95% CI: 8.8–24.2, $P < 0.001$) for pain intensity. For patients with employment insurance, the differences favoring adherent care were 35.3% (95% CI: 28.0–42.5, $P < 0.001$) for OSW and 31.2% (95% CI: 23.3–39.1, $P < 0.001$) for pain intensity. Adherent care was also associated with fewer visits, a shorter episode of care, and lower charges for both groups ($P < 0.05$). Among patients with nonemployment insurance, there was a higher adherence rate for patients with lower initial disability and pain scores (Table 4).

DISCUSSION

Calls for increased adherence to the recommendations of clinical practice guidelines are based on the presumption that greater adherence will result in more cost-effective care, improving clinical outcomes, and reducing costs by directing clinicians toward the most effective management strategies.³⁹ Considerable research has been devoted to examining various methods for disseminating and implementing guidelines in clinical practice,⁴⁰ with appreciably less research studying the clinical outcomes and costs associated with adherence to guideline recommendations.^{5,41} Although the majority of studies that have been performed generally support the presumed link between adherence and quality, some studies have not concluded that guideline adherence equates to improved quality.^{42,43} With payment incentives to providers increasingly linked to adherence to performance on quality measures recommended by clinical practice guidelines,⁴⁴ there is a decided need for more studies examining the relationship between adherence to guideline recommendations and quality of care for common conditions.

Clinical practice guidelines for individuals with LBP cover several aspects of management including examination, medication, and imaging.¹⁶ This study focused on adherence in a physical therapy setting to the recommendation that treatment focus on active instead of passive interventions. We focused on this aspect of care because it is central to the role of physical therapy in the management of LBP, and previous studies on treatment choices by physical therapists for individuals with LBP suggest adherence may be deficient in this area.^{45,46} Similar to other studies examining the management of LBP,^{20,22,23,47} we found a generally low rate of adherence to guideline recommendations. The overall adherence rate in our study was 40.4%, a rate similar to those reported in other studies examining adherence to various guideline recommendations for physicians^{26,48} and physical therapists managing patients with LBP.^{22,23,49}

In this study, adherence to guideline recommendations had the anticipated relationship with clinical outcomes and costs. Adherent care was associated with improved clinical outcomes (ie, greater improvement in pain and disability) and lower charges. After adjusting for age, sex, symptom duration, and baseline clinical characteristics, patients receiving adherent care experienced 23% greater improvement in pain and disability over the course of physical therapy, and did so with fewer visits, in a shorter time frame, and with lower charges than patients receiving nonadherent care. The rate of

successful outcome of physical therapy was almost double among patients receiving adherent care. Although the retrospective nature of this study precludes conclusions about the cause of these differences, the results seem to endorse the guideline recommendation to focus on active treatments while minimizing passive interventions.

Few studies have examined both clinical outcomes and costs in relation to guideline adherence among patients with LBP. Studies examining primary care providers have supported guideline recommendations by showing lower costs, greater reductions in pain, and better general health when patients receive adherent care.²⁶ A guideline implementation project undertaken with Dutch physiotherapists failed to show anticipated improvements in patient outcomes, direct, or indirect costs.⁴⁹ This project examined adherence to several aspects of care including limiting the number of therapy sessions, having treatment goals aimed at improving function, providing adequate advice and education, as well as using predominately active interventions.^{33,50} Therapists receiving an active strategy for implementation of the guidelines increased their adherence to guideline recommendations, but patients managed by these therapists did not demonstrate improved clinical outcomes or reduced costs.³³ The differences between these results and our study may relate to our consideration of guideline adherence on an individual patient basis, or may indicate the primacy of the recommendation to use predominantly active interventions as a means to improve the cost-effectiveness of physical therapy. We based adherence criteria on billed codes, requiring active interventions at each session and an overall percentage of active to passive codes of 75%. The Dutch project required exercise or advice in every session, and within each session the percentage of active to passive interventions had to exceed 50%. Perhaps a higher threshold for use of active interventions by physical therapists is necessary to improve quality of care.

Although our data were limited to physical therapists working for a single employer in 1 geographic region, we observed large variations in adherence rates among different clinics and individual therapists. A primary determinant of adherence in this study seemed to be the insurance provider, with greater adherence to guideline recommendations observed among patients receiving workers' compensation compared with those receiving private insurance. Increased adherence for male patients seems to be explained by the greater number of men receiving workers' compensation. Increased adherence for patients receiving workers' compensation may reflect a greater tendency for the physical therapist to concentrate on function and return to work with these patients, and perhaps a propensity to focus on pain reduction with private insurance patients. Among patients with private insurance, adherence seemed to be related to initial levels of pain and disability. This relationship was not present for patients receiving workers' compensation. Patients with higher levels of pain and disability might have a preference for more passive care that therapists may respond to, even though the evidence would continue to support an active approach. This phenomenon may not occur if there is a focus on returning to work. Further research is required to deter-

mine if these observations reflect regional trends or a typical pattern among physical therapists.

Limitations to this study need to be acknowledged. We based adherence on CPT codes billed. These codes are broad and do not completely reflect the procedures actually performed. For example, terms such as “therapeutic exercise” or “manual therapy” could cover a multitude of activities that might be judged differently with respect to guideline adherence. We did not control the interventions provided in this study. Treatment choices were based on the judgment of the therapist and were inevitably influenced by numerous therapist- and patient-related factors. We did not have the ability to measure all of these factors, and important variables that may help explain the relationship between adherence and outcomes may have been missing including psychosocial variables known to have prognostic importance. Although guideline adherence is conceptually a continuum, for the purposes of analysis we dichotomized adherence using a threshold of 75% active coding. The choice of 75% as the threshold was somewhat arbitrary and pragmatic, allowing for some passive codes while requiring an overall preponderance of active interventions. Despite these issues, the results of this study support further research examining the implementation of guidelines into clinical practice for patients with LBP, as these efforts seem likely to result in improved quality of care.

ACKNOWLEDGMENTS

The authors wish to acknowledge Michael Mundorff, Lee Pierce, and Stephen Hunter for their contributions to this project.

REFERENCES

- O'Connor PJ. Adding value to clinical practice guidelines. *JAMA*. 2005;294:741–743.
- McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Eng J Med*. 2003;348:2635–2645.
- O'Connor GT, Quinton HB, Traven ND, et al. Geographic variation in the treatment of acute myocardial infarction: the Cooperative Cardiovascular Project. *JAMA*. 1999;281:627–633.
- Grimshaw J, Eccles M, Russell I. Developing clinically valid practice guidelines. *J Eval Clin Pract*. 1995;1:37–48.
- Larson E. Status of practice guidelines in the United States: CDC guidelines as an example. *Prev Med*. 2003;36:519–524.
- Lesho EP, Myers CP, Ott M, et al. Do clinical practice guidelines improve processes or outcomes in primary care? *Mil Med*. 2005;170:243–246.
- Committee on Quality of Health Care in America IoM. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press; 2001.
- Luo X, Pietrobon R, Sun SX, et al. Estimates and patterns of direct health care expenditures among individuals with back pain in the United States. *Spine*. 2004;29:79–86.
- Luo X, Pietrobon R, Curtis LH, et al. Prescription of nonsteroidal anti-inflammatory drugs and muscle relaxants for back pain in the United States. *Spine*. 2004;29:E531–E537.
- Gandjour A, Telzrow A, Lauterbach KW. European comparison of costs and quality in the treatment of acute back pain. *Spine*. 2005;30:969–975.
- Weinstein JN, Lurie JD, Olson PR, et al. United States' trends and regional variations in lumbar spine surgery: 1992–2003. *Spine*. 2006;31:2707–2714.
- Breen AC, Van Tulder MW, Koes BW, et al. Mono-disciplinary or multidisciplinary back pain guidelines? How can we achieve a common message in primary care? *Eur Spine J*. 2006;15:641–647.
- Deyo RA, Phillips WR. Low back pain. A primary care challenge. *Spine*. 1996;21:2826–2832.
- Freburger JK, Carey TS, Holmes GM. Physician referrals to physical therapists for the treatment of spine disorders. *Spine J*. 2005;5:530–541.
- Arnau JM, Vallano A, Lopez A, et al. A critical review of guidelines for low back pain treatment. *Eur Spine J*. 2006;15:543–553.
- Koes BW, van Tulder MW, Ostelo R, et al. Clinical guidelines for the management of low back pain in primary care: an international comparison. *Spine*. 2001;26:2504–2513.
- Van Tulder MW, Becker A, Bekkering T, et al. European guidelines for the management of acute nonspecific low back pain in primary care. *Eur Spine J*. 2006;15(Suppl 2):S169–S191.
- Bekkering GE, Engers AJ, Wensing M, et al. Development of an implementation strategy for physiotherapy guidelines on low back pain. *Aust J Physiother*. 2003;49:208–214.
- The Norwegian Back Pain Network. The communication unit. Acute low back pain. Interdisciplinary clinical guidelines. Oslo: The Norwegian Back Pain Network; 2002.
- Gonzalez-Urzelai V, Palacio-Elua L, Lopez-de-Munain J. Routine primary care management of acute low back pain: adherence to clinical guidelines. *Eur Spine J*. 2003;12:589–594.
- Little P, Smith L, Cantrell T, et al. General practitioners' management of acute back pain: a survey of reported practice compared with clinical guidelines. *BMJ*. 1996;312:485–488.
- Strand LI, Kvale A, Raheim M, et al. Do Norwegian manual therapists provide management for patients with acute low back pain in accordance with clinical guidelines? *Man Ther*. 2005;10:38–43.
- Swinkels IC, van den Ende CH, van den Bosch W, et al. Physiotherapy management of low back pain: does practice match the Dutch guidelines? *Aust J Physiother*. 2005;51:35–41.
- Cretin S, Farley DO, Dolter KJ, et al. Evaluating an integrated approach to clinical quality improvement: clinical guidelines, quality measurement, and supportive system design. *Med Care*. 2001;39(Suppl 2):I170–I184.
- Engers AJ, Wensing M, Van Tulder MW, et al. Implementation of the Dutch low back pain guideline for general practitioners: a cluster randomized controlled trial. *Spine*. 2005;30:595–600.
- Feuerstein M, Hartzell M, Rogers HL, et al. Evidence-based practice for acute low back pain in primary care: patient outcomes and cost of care. *Pain*. 2006;124:140–149.
- Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine*. 2005;30:1331–1335.
- Fritz JM, Irrgang JJ. A comparison of a modified Oswestry disability questionnaire and the Quebec back pain disability scale. *Phys Ther*. 2001;81:776–788.
- Assendelft WJ, Morton SC, Yu EI, et al. Spinal manipulative therapy for low back pain: a meta-analysis of effectiveness relative to other therapies. *Ann Intern Med*. 2003;138:871–881.
- Cherkin DC, Sherman KJ, Deyo RA, et al. A review of the evidence for the effectiveness, safety, and cost of acupuncture, massage therapy, and spinal manipulation for back pain. *Ann Intern Med*. 2003;138:898–921.
- Childs JD, Fritz JM, Flynn TW, et al. Validation of a clinical prediction rule to identify patients with low back pain likely to benefit from spinal manipulation. *Ann Intern Med*. 2004;141:920–928.
- Fritz JM, Brennan GP, Leaman H. Does the evidence for spinal manipulation translate into better outcomes in routine clinical care for patients with occupational low back pain? A case-control study. *Spine J*. 2006;6:289–295.
- Bekkering GE, Hendriks HJM, Van Tulder MW, et al. Effect on the process of care of an active strategy to implement clinical guidelines on physiotherapy for low back pain: a cluster randomized trial. *Qual Saf Health Care*. 2005;14:107–112.
- Jensen MP, Turner JA, Romano JM. What is the maximum number of levels needed in pain intensity measurement? *Pain*. 1994;58:387–392.
- Flynn T, Fritz J, Whitman J, et al. A clinical prediction rule for classifying patients with low back pain who demonstrate short term improvement with spinal manipulation. *Spine*. 2002;27:2835–2843.
- Hicks GE, Fritz JM, Delitto A, et al. Preliminary development of a clinical prediction rule for determining which patients with low back pain will respond to a stabilization exercise program. *Arch Phys Med Rehabil*. 2005;86:1753–1762.

37. Coste J, Lefrancois G, Guillemin F, et al. Prognosis and quality of life in patients with acute low back pain: insights from a comprehensive inception cohort study. *Arthritis Rheum.* 2004;51:168–176.
38. McQuay HJ, Moore RA. Using numerical results from systematic reviews in clinical practice. *Ann Intern Med.* 1997;126:712–720.
39. Field M, Lohr K. *Clinical Practice Guidelines: Directions for a New Program.* Washington, DC: National Academy Press; 1990.
40. Grimshaw J, Eccles M, Thomas M, et al. Toward evidence-based quality improvement. Evidence (and its limitations) of the effectiveness of guideline dissemination and implementation strategies 1966–1998. *J Gen Intern Med.* 2006;21(Suppl 2):S14–S20.
41. Bahtsevani C, Uden G, Willman A. Outcomes of evidence-based clinical practice guidelines: a systematic review. *Int J Technol Assess Health Care.* 2004;20:427–433.
42. Boyd CM, Darer J, Boult C, et al. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases; implications for pay for performance. *JAMA.* 2005;294:716–724.
43. Siu AL, Boockvar KS, Penrod JD, et al. Effect of inpatient quality of care on functional outcomes in patients with hip fracture. *Med Care.* 2006;44:862–869.
44. Christensen JB, Knutson DJ, Mazze RS. Physician pay-for-performance: implementation and research issues. *J Gen Intern Med.* 2006;21(Suppl 2):S9–S13.
45. Mikhail C, Korner-Bitensky N, Rossignol M, et al. Physical therapists' use of interventions with high evidence of effectiveness in the management of a hypothetical typical patient with acute low back pain. *Phys Ther* 2005;85:1151–1167.
46. Poitras S, Blais R, Swaine B, et al. Management of work-related low back pain: a population-based survey of physical therapists. *Phys Ther* 2005;85:1168–1181.
47. Webster BS, Courtney TK, Huang YH, et al. Physicians' initial management of acute low back pain versus evidence-based guidelines. Influence of sciatica. *J Gen Intern Med.* 2005;20:1132–1135.
48. Bishop PB, Wing PC. Knowledge transfer in family physicians managing patients with acute low back pain: a prospective randomized clinical trial. *Spine J.* 2006;6:282–288.
49. Bekkering GE, van Tulder MW, Hendriks EJ, et al. Implementation of clinical guidelines on physical therapy for patients with low back pain: randomized trial comparing patient outcomes after a standard and active implementation strategy. *Phys Ther.* 2005;85:544–55.
50. Bekkering GE, Hendriks HJM, Koes BW, et al. Dutch physiotherapy guidelines for low back pain. *Physiotherapy.* 2003;89:82–96.