

# The Influence of an Active Treatment Approach in Patients With Low Back Pain: A Systematic Review

**Abstract:** Introduction. *Low back pain (LBP) is one of the most common medical conditions in the United States. Clinical practice guidelines recommend active treatment approaches; however, there continues to be a significant disparity in how patients with LBP are treated. Therefore, the purpose of this systematic review is to evaluate the reported efficacy of active treatment approaches as recommended by clinical practice guidelines on LBP treatment on patient outcomes.* Methods. *Between the months of June and August 2015, a comprehensive search of the PubMed, Medline (EBSCO Host), and CINAHL (EBSCO Host) databases was performed. The search was restricted to articles that were published in a peer-reviewed journal, published in the English language, examined patient outcomes with a determined scale, determined the usage of an established clinical practice guideline for LBP treatment, reported at least one outcome measure, and specified either nonspecific or acute LBP.* Results. *Fifty-three articles were*

*initially identified, with 4 articles ultimately meeting the criteria after screening. Articles scored between 17 and 20 points based on a maximum total score of 26 on the modified Downs and Black checklist.* Conclusion. *Studies identified in this review indicate that adherence to an active treatment approach as recommended by clinical practice guidelines may result in improved patient outcomes.*

**Keywords:** clinical practice guidelines; low back pain; physical therapy; patient outcomes

It is considered to be one of the most common disabilities in American adults younger than 45 years of age.<sup>1</sup> Estimates suggest that up to 84% of adults may be affected by LBP at some point during their lifetime.<sup>2</sup> According to the Institute of Medicine, LBP is among the top 15 priority conditions, further signifying its increasing incidence in health care.<sup>3</sup> LBP is of significance not only for patient disability but also for escalating health care costs. The condition contributes to numerous work-related disability cases and consequently places strain on both

 Estimates suggest that up to 84% of adults may be affected by LBP [low back pain] at some point during their lifetime. 

The prevalence of low back pain (LBP) in the United States is a significant issue facing the American health care system.

employers and workers in determining effective and fair compensation.<sup>4</sup> The condition further imposes great

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economic burden due to the lost work days faced by employees suffering from the condition, and accounts for an estimated 149 million work days lost leading to total costs between \$7.4 billion and \$28 billion.<sup>1,5</sup> Services such as primary care visits to physicians, invasive therapies, pharmacological agents, and nonpharmacologic treatments utilized in the management of LBP further contribute to the overall direct costs.<sup>5</sup> Moreover, increased usage of these treatment methods that may include surgery contribute to the rising cost of LBP.<sup>1</sup>

Recommendations for guidance in utilizing different evidence-based treatment approaches have been proposed in an attempt to curtail the increasing health care costs due to LBP. Evidence-based guidelines are common in medicine and used to guide health care practitioners toward the most efficacious and cost-effective patient care pathways and management strategies. One such approach that has been proposed in the management of acute, nonspecific LBP is the use of clinical practice guidelines that suggest a more active lifestyle that incorporates exercise and physical activity. These clinical practice guidelines are thought to affect patient outcomes by standardizing care and decreasing use of inappropriate treatments, which ultimately assists in controlling overall health care expenses of LBP management.<sup>6</sup> Referring to a set of guidelines can aid clinicians in choosing the most appropriate treatments for their patients, while allowing patients to remain as active as tolerated throughout the course of treatment.<sup>7</sup> Using clinical practice guidelines in the treatment of acute, nonspecific LBP in the field of physical therapy has shown improved patient outcomes, specifically increased patient satisfaction scores, higher adherence rates, lower costs of treatments, and measurable changes in pain and disability before and after treatment.<sup>8</sup> However, the reported evidence supporting the use of clinical practice guidelines must be interpreted with caution, as the methodology of many of the studies may be of concern. Errors in study methodology may ultimately

affect the reported statistical significance. Such factors include unmeasured heterogeneity between subjects adhering to the guidelines and those who did not, attrition, and varying study durations that may or may not represent true outcome values. Despite this lack of statistical significance, the trend toward improved patient outcomes with the use of clinical practice guidelines for acute, nonspecific LBP treatment remain consistent in the literature. Hence, further evaluation of the research on patient outcomes while using clinical practice guidelines for acute, nonspecific LBP treatment is warranted.

LBP is reported to be the second most common reason for patient visits to primary care physicians.<sup>9</sup> Primary care providers have the option to recommend a plethora of treatment options including pharmaceuticals, spinal injections, physical therapy, and surgery. The variance of treatments for LBP may lead to selection of inappropriate interventions and overuse of ineffective therapies.<sup>8</sup> The various treatment options used by the clinician may further affect the course of treatment for LBP. In practice, selection of interventions is may often be based on the clinician's personal opinions and beliefs rather than evidence-based practices shown to result in better patient outcomes.<sup>7</sup> The reluctance to adhere to evidence-based practices has led to the term "Know-do Gap," which describes the gap between what the clinician knows and what the clinician actually does in practice.<sup>7</sup> This situation often occurs when managing conditions that have uncertain responses to various treatment approaches, such as LBP.<sup>7</sup> The "Know-do Gap" issue can also be seen in the public health discipline, where there are several factors being studied that affect the link between the research and practice, specifically, in the example of the healthy communities' approach that requires changes in the ways neighborhoods are built to promote health and safety among the community. There is still a lack of implementation of these communities, even with the research and evidence of its benefits.<sup>10</sup>

Clinicians generally take 1 of 2 approaches in the management of

nonspecific LBP: active or passive.<sup>8</sup> The active approach typically includes recommendation and instruction of exercises by a physical therapist or a general practitioner with the end goal of independent performance by the patient.<sup>8</sup> The passive approach usually involves treatment methods such as electrotherapy, ultrasound, massage, and other interventions in which the patient receives treatment rather than actively participating.<sup>8</sup> Manual therapy and stabilization exercises are also noted as recommendations for rehabilitation of patients with nonspecific LBP, but definitive efficacy has yet to be determined.<sup>11</sup> Over the past decade, treatments used by physical therapists have evolved to include evidence-based practice principles.<sup>12</sup> The variety of treatment options leading to wide-ranging patient outcomes has led to the development of clinical practice guidelines.

Studies have examined the use of LBP guidelines and have evaluated their effectiveness with measures including pain and disability scores, perceived patient outcomes, adherence rates, and the total amount of treatment. Fritz et al<sup>8</sup> reported that 23% of patients in the study "experienced improvement in pain and disability" with "fewer visits, in a shorter time frame, and with lower charges" when the patients received LBP treatment according to the clinical practice guidelines. Additionally, Bekkering et al<sup>13</sup> concluded that the implementation of a clinical practice guideline in care for patients with LBP resulted in significant improvements in function and pain.

Clinical practice guidelines in physical therapy may incorporate an active treatment approach for LBP management. There is a paucity of evidence investigating patient outcomes when the clinical practice guideline specifically recommends an active treatment approach. Therefore, the purpose of this systematic literature review is to analyze previous studies that have examined patient outcomes when adhering to

**Table 1.**

Database Search Strategies.

Database	Search Strategy	Results
Medline (EBSCO host)	Patient Outcomes (Select a Field (optional)) AND Low Back Pain Treatment (Select a Field (optional)) AND Physical Therapy (Select a Field (optional)) AND Clinical Practice Guidelines (Select a Field (optional))	11
CINAHL (EBSCO host)	Patient outcomes (Select a Field (optional)) AND low back pain treatment (Select a Field (optional)) AND physical therapy (Select a Field (optional)) AND clinical practice guidelines (Select a Field (optional))	14
PubMed	Patient Outcomes AND Low Back Pain Treatment AND Physical Therapy AND Clinical Practice Guidelines	28

clinical practice guidelines in the physical therapy setting that recommend an active treatment approach for nonspecific LBP.

## Methods

### Data Sources and Searches

A literature search was conducted in the electronic databases Medline (EBSCO host), CINAHL (EBSCO host), and PubMed between June and August 2015 to identify studies that examined patient outcomes following use of clinical practice guidelines for active LBP treatment in physical therapy. The database search for these articles went as far back from the years 2000 up until the most current literature. A medical librarian was not consulted however, the authors (WJH and MJK) have considerable experience with systematic literature reviews and were in agreement with the search methods used. The following keywords were used in combination: *clinical practice guidelines*, *patient outcomes*, *low back pain*, *treatment*, and *physical therapy*. The search was restricted to articles that were published in a peer-reviewed journal, published in the English language, examined patient outcomes with a validated scale, reported adherence rates with at least one other outcome measure, and specified either nonspecific or acute LBP. Specific search strategies are outline in Table 1.

### Study Selection

Studies were initially included if the keywords were found in the title or abstract and the article met the inclusion criteria. Criteria for final selection included a reporting of adherence rates to clinical practice guidelines, plus a reporting of at least one of the following outcome variables: pain, disability, patient perception, patient satisfaction, and number of treatments performed in total treatment timespan. These outcome variables were the most common variables that were reported between each of the articles and were the variables most agreed upon by the 2 primary authors (EGL and WJH) that would demonstrate patient outcomes. Diagnostic criteria for those subjects included in the identified studies utilized predetermined CPT codes to ensure homogeneity of the samples.<sup>8</sup>

A consensus meeting between the 2 reviewers was held to determine whether the study met the required criteria. One reviewer (EGL) examined all titles and abstracts independently to determine initial study eligibility. Full-text articles were then reevaluated to determine specific inclusion criteria by a second reviewer (WJH). If there were any discrepancies between these 2 reviewers, a third author reviewer was consulted (MJK) to determine final eligibility. Patient outcomes were the primary variables of interest and included the following: clinical practice guideline

adherence rate, number of physical therapy visits, Quebec Back Pain Disability Score (QBPDS), patient satisfaction and perception, Modified Oswestry Disability questionnaire score, Medical Outcomes Survey Short Form (SF-36), Physical Component Summary (PCS), Mental Component Summary (MCS), Numerical Rating Scale for pain intensity, Roland Disability Questionnaire, Visual Analog Scale, and a Pain Coping and Cognition list.

### Quality Assessment

The methodological quality of each study was independently assessed by the reviewers using a modified version of the Downs and Black checklist.<sup>14</sup> The Downs and Black checklist is a tool utilized in quality assessment of both randomized and nonrandomized studies. The checklist includes 4 different categories of assessment: reporting, external validity, internal validity/bias, and internal validity/confounding (See Appendix A).<sup>14</sup> The Downs and Black checklist has been found to have a high internal consistency (KR-20 = .89), a high test-retest reliability ( $r = .88$ ), and good interrater reliability ( $r = .75$ ).

The modified version of the Downs and Black scale described by Ojha et al<sup>14</sup> was used for quality assessment and omitted items 17 and 27. Item 17 was omitted since it could influence one of the primary outcome measures (number of physical therapy visits).<sup>14</sup> Item 27 was omitted due to reports suggesting post

hoc power analysis should not influence significance.<sup>14</sup> The identified studies were scored using this modified Downs and Black Scale by 2 independent reviewers (EGL and WJH) and then synthesized by the primary author (EGL). If there were any discrepancies between the 2 authors, a third author (MJK) determined final scoring.

### Data Synthesis and Analysis

The method of data analysis was based on a previous systematic literature review published by Hanney et al<sup>15</sup> that used a modified Downs and Black checklist to score article quality. A modified Downs and Black score of 20 to 26 was considered excellent, 15 to 19 good, 10 to 14 fair, and anything  $\leq 9$  was considered poor.<sup>15</sup> The authors of this study chose to implement this method because its availability in a peer-reviewed journal to provide a reliable tool of measurement. A variable was deemed favoring guideline adherence if  $\geq 50\%$  of the studies scoring between 15 and 26 revealed statistically significant differences.<sup>15</sup> A variable was considered favoring guideline nonadherent if  $< 50\%$  of the studies that scored between 15 and 26 revealed statistically significant differences.<sup>15</sup> If there was no statistically significant difference between guideline adherence and guideline nonadherence, no difference is supported.<sup>15</sup> One primary author (EGL) extracted the data from the literature searches and recorded the Downs and Black scores in Table 3. A second primary author verified and confirmed the data (WJH). The outcome variables on guideline adherence and the other primary outcome variables listed in the study selection section were extracted by one primary author (EGL) and inputted in Table 2. In order to mitigate the potential influence of bias, a second author (WJH) verified and confirmed the data. If there were any discrepancies between the 2 authors, a third author (MJK) determined final eligibility.

## Results

The initial results of each database were as follows: Medline (EBSCO Host),

11; CINAHL (EBSCO host), 14; and PubMed, 28. In total, 53 results were identified (Figure 1). After applying inclusion criteria and omitting duplicates, 4 articles remained included in this systematic review. Table 2 summarizes the primary characteristics of each of the studies identified. Considering a maximum total score of 26 points on the modified Downs and Black checklist, all articles scored between 17 and 20 points (Table 3).

### Adherence to Active Approach Practice Guidelines

Reported adherence to guidelines recommending an active approach for LBP treatment was varied across the 4 studies in this review. In an analysis of 500 patients receiving physical therapy for LBP, Bekkering et al<sup>13</sup> reported that 247 (49.4%) received adherent care, while 253 (50.6%) received nonadherent care. In this study, the control group was the physiotherapist who only received information about the clinical guidelines for LBP treatment by the Royal Dutch Society for Physiotherapy via mail.<sup>13</sup> The intervention group consisted of physiotherapists that received the same information as the control group, along with additional training and information about active strategy implementation in LBP treatment.<sup>13</sup> Adherence rates within the intervention group and the control group were 42% and 30%, respectively. Fritz et al<sup>16</sup> reported that of 76 patients treated with physical therapy, 37 (48%) received adherent care while 41 patients received care according to a classification-based system of treatment. Another study by Fritz et al<sup>8</sup> looked at adherence rates in 1190 patients with LBP, concluding that 481 (40%) received adherent care and 709 (60%) received nonadherent care. Finally, Rutten et al<sup>17</sup> reported an overall guideline adherence of 67.2% in a group of 145 patients.

### Pain and Disability Scores

Pain and disability scores were reported in 3 of the reviewed studies. Patients who participated in an adherent physical therapy treatment program that incorporated an active approach for LBP

were more likely to experience less pain and disability after adherent treatment. Fritz et al<sup>8</sup> reported a 59.4% decrease in Modified Oswestry Disability scores in patients that followed adherent care, compared to a decrease of only 35.1% in patients who received nonadherent care. The Modified Oswestry Disability Scores is a scale consisting of 10 items, and ranging from scores of 0 to 100, with higher numbers being indicative of greater disability.<sup>8</sup> When looking at pain, the adherent group reported a 60.5% decrease in pain rating while the nonadherent group had only a 38.0% decrease in pain rating.<sup>2</sup> Furthermore, 64.7% of patients in the adherent group reported successful outcomes in physical therapy versus only 36.5% in the nonadherent group.<sup>8</sup> Another study by Fritz et al<sup>16</sup> examined differences in pain and disability scores between baseline and after 4 weeks of adherent intervention. The average scores for the Modified Oswestry Disability questionnaire at baseline and after 4 weeks were 42.8 and 32.4, respectively, which reflects an overall decrease in disability over course of adherence treatment. In the same study, physical impairment scores between baseline and after 4 weeks were 5 and 4, respectively, indicating a decrease in perceived physical impairment following adherent treatment.<sup>16</sup> A limitation on this Fritz study was that the sample size was relatively small, affecting the power of longer term outcomes of the clinical practice guidelines.<sup>16</sup> This can influence the determination if the implementation of the clinical practice guidelines is actually effective for the patient after longer periods of time, versus just short-term results. Rutten et al<sup>17</sup> also examined baseline and posttreatment scores of pain and disability using the QBPDS. QBPDS measures pain and disability using a 20-item self-report questionnaire ranging from scores of 0 to 100—higher the scores reflective of greater the limitations in physical functioning.<sup>17</sup> Subjects reported scores of 40.5 for baseline and 21.3 for posttreatment, indicative of a decrease in pain and improvement in function following

**Table 2.**  
Study Detail.

Study	Data Source	Patients Included	Definition of Guideline Adherence	Adherent Care	Nonadherent Care	% Adherence Reported	Outcome Measures	Pain/Disability Scores Identified	P Values	Patient Outcomes
Bekker et al <sup>13</sup>	Clinical outcomes recorded by physical therapists in 325 practices in the Netherlands	500	KNMF Clinical Practice Guideline for Physical Therapy in patients with low back pain <sup>16</sup> —Avoiding recommendations for passive strategy, promote physically active lifestyle during treatment	247	253	42	<ul style="list-style-type: none"> <li># of sessions in normal course</li> <li>low back pain</li> <li>Duration of current episode</li> </ul>	<ul style="list-style-type: none"> <li>Quebec Back Pain and Disability Score (OBPDS)</li> <li>Numerical Rating Scale for Pain Intensity</li> </ul>	NR	OBPDS scores lowered, meaning patients had less disability
Fritz et al <sup>16</sup>	Clinical outcomes maintained by Employee Health Services Outpatient Clinics at the University of Pittsburgh Medical Center	78	<ul style="list-style-type: none"> <li>Active within limitations of pain, within 4 weeks of pain onset</li> <li>Exercise activities include low-stress aerobic activities, with more specific interventions recommended after 4 weeks</li> </ul>	37	41	28	<ul style="list-style-type: none"> <li># of PT visits</li> <li>Duration of PT episode of care</li> <li>Patient satisfaction interview</li> </ul>	<ul style="list-style-type: none"> <li>Modified Oswestry Disability Questionnaire</li> <li>Numerical Pain Rating Scale</li> <li>Medical Outcomes Survey Short Form (SF-36)</li> <li>Mental Component Summary (MCS)</li> <li>Physical Component Summary (PCS)</li> </ul>	$P < .018$	Both classification-based groups, and guideline adherent groups had better pain and disability scores after treatment; classification-based group scored better
Fritz et al <sup>8</sup>	Clinical outcomes maintained by the Rehabilitation Agency of Intermountain Health Care	1190	Active to Passive codes $\geq 75\%$ and each visit included at least 1 active code	481	709	40	<ul style="list-style-type: none"> <li># of PT visits</li> </ul>	<ul style="list-style-type: none"> <li>Modified Oswestry Disability Questionnaire</li> <li>Numerical Rating Scale for Pain Intensity</li> </ul>	$P < .001$	Adherent group—60.5% decrease in pain rating, and also had better health outcomes; nonadherent group had only a 38.0% decrease in pain rating
Rutten et al <sup>17</sup>	Clinical outcomes maintained by the CZ, health insurance company in New Zealand	145	Dutch Physical and Manual Therapy Guidelines	145	—	67.2	<ul style="list-style-type: none"> <li># of physical therapy visits</li> </ul>	<ul style="list-style-type: none"> <li>Quebec Back Pain and Disability Score (OBPDS)</li> <li>Pain Coping and Cognition List</li> <li>Roland Disability Questionnaire</li> <li>Visual Analog Scale (VAS)</li> </ul>	OBPDS: $P < .05$ VAS scores: $P < .01$	Subjects reported scores of 40.5 for baseline and 21.3 for posttreatment, indicative of a decrease in pain and improvement in function following adherent care

Note. P value ( $P < .018$ ) is favoring the classification based system. They don't report a specific P value for the guideline adherent group.

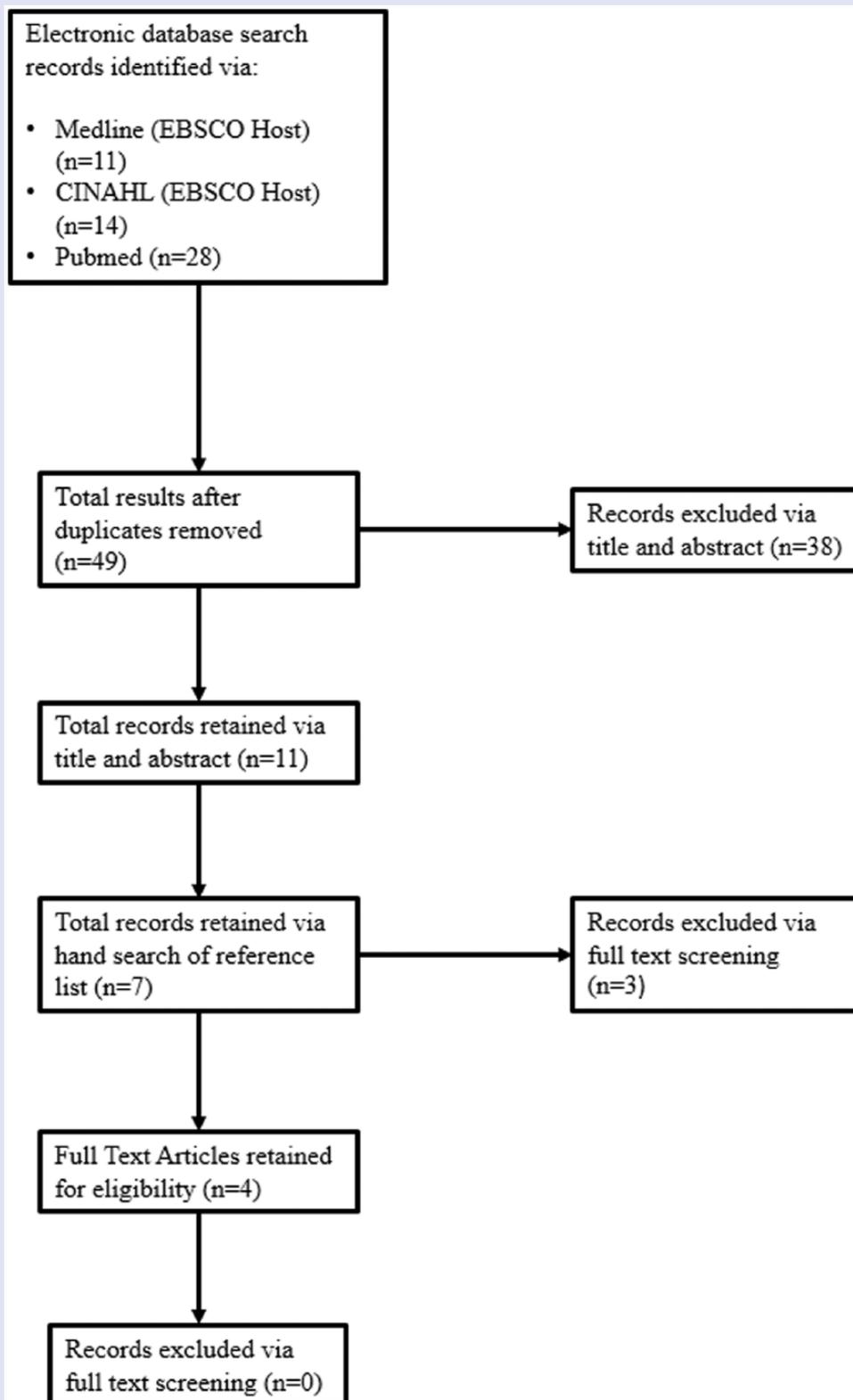
**Table 3.**  
Methodological Quality.

Study	Downs and Black Literature Review																	Score											
	Reporting							External Validity					Internal Validity—Bias						Internal Validity—Confounding										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		
Bekkering et al <sup>13</sup>	1	1	1	1	2	0	1	1	0	1	1	0	1	1	1	1	—	1	1	1	1	0	0	0	0	0	0	—	17/26
Fritz et al <sup>16</sup>	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	—	1	1	1	1	1	0	0	1	0	—	19/26	
Fritz et al <sup>8</sup>	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	—	1	0	1	0	1	1	0	1	1	—	20/26	
Rutten et al <sup>17</sup>	1	1	1	1	2	0	1	1	0	1	1	1	1	0	0	1	—	1	1	1	1	0	0	1	0	1	—	18/26	

Note. Criterion is based off modified Downs and Black checklist: 1 points = yes, 2 points\* in 5 is yes, 1 is partial\*. 0 is either no or unable to determine.  
<sup>a</sup>For the purpose of the review, 17 and 27 have been omitted.

**Figure 1.**

Study selection flow diagram.



adherent care.<sup>17</sup> This study also used the Visual Analog Scale, which measures the level of pain in millimeters, 0 mm being no pain and 100 mm meaning unbearable pain.<sup>17</sup> For baseline measurements, patients reported a VAS average score of 56.9 and for posttreatment an average score of 22.9, also indicative of a decrease in pain and improvement of function following adherent care.<sup>17</sup> A limitation of the Rutten study is a small sample size that can affect the external validity of the results, and may not be representative of patient outcomes in longer terms.<sup>17</sup>

### Total Number of Treatments

Reporting of the total number of treatments completed by patients in the studies was another important outcome variable of interest. Duration of physical therapy treatment for LBP is variable and dependent on various factors that can affect patient outcomes.<sup>18</sup> Bekkering et al<sup>15</sup> reported that physical therapists were more likely to limit the number of therapy sessions with the active intervention group (n = 247) in 27% of the patients in that group. In the passive control group (n = 253), the physical therapists were able to limit the amount of therapy sessions in only 13% of the patients.<sup>13</sup> Fritz et al<sup>16</sup> reported an average of 6.7 therapy sessions annually in the adherent group. Fritz et al<sup>8</sup> further compared adherent and nonadherent groups by categorizing patients by insurance payer. Patients who had private, nonemployment insurance and followed adherent care had a median of 4 treatment sessions with a range between 3 and 21, while those who had nonadherent care had a median of 5 treatments and a range between 3 and 35.<sup>8</sup> When looking at patients with private, employment insurance the median number of treatments when following adherent care was 6 (range 3-21) versus a median of 8 treatments (range 3-25) in patients not receiving adherent care.<sup>8</sup>

### Discussion

LBP is one of the most common conditions treated in the physical

therapy profession, accounting for nearly 25% of physical therapy cases.<sup>12</sup> Recommendations for increased physical activity are common for many musculoskeletal disorders.<sup>19-22</sup> While there are many conditions treated in physical therapy such as shoulder disorders,<sup>23-26</sup> a recent study estimated that 29.7% of the patients receiving physical therapy had spinal disorders including LBP.<sup>27</sup> Adherence to an established clinical practice guideline for LBP treatment may have an influence on overall patient outcomes and treatment success. The studies analyzed in this review showed a general trend of reduced disability and improved patient outcomes when adhering to an active approach practice guideline.

The definition of an active treatment approach in the clinical practice guidelines for LBP in physical therapy are varied among the articles, as both national and international practice guidelines were assessed. Even the articles originating in the United States had different criteria for active treatment. Clinical practice guidelines are thought to improve overall patient outcomes, lessen pain and disability, serve as guidelines for implementing evidence-based practices, and effectively decrease treatment time.<sup>15</sup> The guidelines function as a model for clinical decision making, but they do not necessarily mandate specific applications. Hence, variability in which clinicians follow clinical practice guidelines creates difficulty for researchers in identifying what is considered to be an adherent intervention. Most clinical practice guidelines have similar foundations in that they focus more on active approaches and attempt to limit passive treatments. The articles analyzed in this review had variances in what was considered to be adherent treatment, but all were in agreement of using a more active approach versus a passive approach in the treatment of LBP.

Bekkering et al<sup>13,28</sup> defined adherence to clinical practice guidelines according

to those set by the Royal Dutch Society for Physiotherapy. The Royal Dutch Society for Physiotherapy clinical practice guidelines emphasize an active treatment approach and advises physical therapists and patients to avoid passive treatments for LBP during any of the 3 different courses of LBP as outlined in the guidelines.<sup>29</sup> These courses of LBP include “nonspecific LBP with normal course of recovery,” “nonspecific LBP with an abnormal course, without dominant presence of psychosocial factors impeding recovery”, and “nonspecific LBP with an abnormal course, with dominant presence of psychosocial factors impeding recovery.”<sup>29</sup> These guidelines also emphasize the role of the physical therapists in educating patients about the mechanics of LBP and reassuring them that staying active is the correct course of treatment.<sup>29</sup>

In contrast, Fritz et al<sup>8</sup> investigated adherence to clinical practice guidelines during different phases of treatment and measured outcomes more quantitatively. Treatment was separated into 2 phases: phase I was treatment received in the first 2 weeks while phase II was treatment received from day 14 until care ended.<sup>8</sup> Guideline adherence for both phases was determined by categorizing procedural codes (CPT) codes used for billing into active, passive, or allowed treatment.<sup>8</sup> During each phase of treatment, the percentage of active treatment codes used must have been at least 75% in comparison to passive treatment codes, and at least one active treatment code must have been used per visit.<sup>8</sup>

Fritz et al<sup>16</sup> considered guideline adherence in accordance to the Agency for Health Care Policy and Research’s recommendation for patients with LBP to remain active within pain limits.<sup>16</sup> Specific interventions for LBP were not recommended until after 4 weeks of “watchful waiting” while remaining active within limits.<sup>16</sup> This study does not identify effective treatment methods within the clinical practice

guidelines but rather suggests that treatment should be based more on a classification system that groups patients into different treatment categories based on clinical assessment and self-reported signs and symptoms.<sup>16</sup> The classification system would allow for adjustments of treatment based on the changes in signs and symptoms, while the clinical practice guidelines remain consistent throughout treatment.<sup>16</sup> The treatment-based classification system separated subjects into 4 different treatment classifications: mobilization, specific exercise, immobilization, and traction.<sup>16</sup> The patients were examined at the beginning of each treatment by testing lumbar range of motion and special tests, and if signs and symptoms changed, the patients would be placed in a new classification.<sup>16</sup> The main difference between this approach and just consistently following the active approach as outline in the clinical practice guidelines is the ability to reassess and adjust treatment as necessary.<sup>16</sup> Both methods do suggest a more active approach when it comes to LBP treatment, but one does allow for more assessments and readjustments as tailored for the patient's needs. This study compared both approaches in the treatment of care and found that both methods improve pain and disability scores; however, the classification-based guidelines resulted in greater improvement in scores than the clinical practice guidelines.<sup>16</sup>

Rutten et al<sup>17</sup> defined guideline adherence according to the “Flow Chart of the Dutch Manual Therapy Guideline for LBP—Diagnostic and Treatment Process,” which resembled the guidelines established by the Royal Dutch Society for Physiotherapy utilized by Bekkering

et al.<sup>17,28</sup> All patients meeting general inclusion criteria of nonspecific LBP received treatment and reported scores at pretreatment and posttreatment. Patients were then further categorized into the type of nonspecific LBP based on duration: acute, subacute, and chronic.<sup>17</sup> Overall, higher adherence rates led to fewer functional limitations posttreatment.<sup>17</sup> Further analysis of the 3 categories of nonspecific LBP found the most significant negative correlations between guideline adherence and functional limitations in patients with chronic LBP.<sup>17</sup> The patients experiencing acute LBP experience a medium negative correlation and no significant correlation was found in patient with acute and subacute LBP.<sup>17</sup> In this review, negative correlations suggest that higher percentages of adherence are associated with fewer functional limitations, less pain, and fewer treatment visits.<sup>17</sup>

### Limitations

Clinical practice guidelines are developed with the best available evidence; however, they generally fail to identify specific interventions that physical therapists may have utilized in clinical practice. The definition of “active” may vary significantly among therapists and patients; therefore, it is unclear which interventions may have the greatest influences on patient outcomes. A patient's baseline level of function may also affect how outcomes change when adhering to clinical practice guidelines. Patients that have fewer functional limitations may be more likely to follow the guideline of remaining active than those with greater functional limitations. Hence, patients with higher function may be more likely to demonstrate reduced pain and disability scores, improved adherence, and greater satisfaction within their

treatment course. The studies in this review did not specifically mention what interventions were used for LBP treatment. CPT billing codes were used to determine if active or passive treatment but failed to further describe the actual procedures done; nevertheless, these codes can certainly identify passive interventions.<sup>8</sup> The treatment interventions were ultimately chosen by the physical therapists in the studies who may have been subject to other personal factors affecting their decisions. Furthermore, each of the studies had varied treatment durations, which may affect the overall interpretation of patient outcomes.

While there are no specific cut points to define “favoring guideline treatment,” we utilized information gleaned from a previously published systematic review.<sup>15</sup> While it appears this criterion can be subjective, further criteria should be considered in order to be more specific.

### Conclusion

Adherence to clinical practice guidelines in the treatment of LBP may result in improved patient outcomes. Clinical practice guidelines tend to favor a more active treatment approach; however, specific treatment interventions that maximize patient outcomes have not yet been conclusively identified. Patient outcomes that may be improved by adherence to clinical practice guidelines include decreased pain, improved function, and decreased total number of treatment visits. Future research should investigate patient outcomes and adherence to clinical practice guidelines with larger samples of greater quality in order to determine more conclusive associations between these 2 variables (See Appendix A).

## Appendix A

### Modified Downs and Black Scale.

Number	Criteria	Scoring Criteria	Score
1	Is the hypothesis/aim/objective of the study clearly described?	A point was given if the hypothesis aim or objective of the study was implicitly or explicitly indicated anywhere in the article.	0 = No; 1 = Yes
2	Are the main outcomes to be measured clearly described in the "Introduction" or "Methods" section?	A point was given if the main outcomes to be measured were clearly described in the "Introduction" or "Methods" section.	0 = No; 1 = Yes
3	Are the characteristics of the patients included in the study clearly described?	A point was given if the inclusion or exclusion criteria, or both, were indicated.	0 = No; 1 = Yes
4	Are the interventions of interest clearly described?	A point was given if the criteria for guideline adherence were described in detail.	0 = No; 1 = Yes
5	Are the distributions of principal confounders for each group of participants to be compared clearly described?	Two points were awarded if a study reported any possible confounders (eg, sex ratios, age, comorbidities, and severity of injury) that might account for differences between groups clearly in table format. One point was awarded if the study indicated that groups were matched for any such demographical variables or if potential confounders were mentioned in the text of the article but not clearly listed in table format. No points were awarded if the study did not report any confounders.	0 = No; 1 = Partially; 2 = Yes
6	Are the main findings of the study clearly described?	A point was awarded if quantitative data were reported for all of the main outcome measures indicated in the "Introduction" or "Methods" section.	0 = No; 1 = Yes
7	Does the study provide estimates of the random variability in the data for the main outcomes?	A point was awarded if the interquartile range (for nonnormally distributed data), standard error, standard deviation, or confidence intervals (for normally distributed data) were reported. If the distribution of the data was not described, we assumed that the estimates used were appropriate, and we answered "yes" (1 point).	0 = No; 1 = Yes
8	Have all of the important adverse events that may be a consequence of the intervention been reported?	A point was awarded if any adverse events, unwanted side effects, or lack thereof were explicitly indicated from either adherence or failure to adhere to recommended guidelines. A point was not awarded if the study made no mention of the presence or absence of adverse events.	0 = No; 1 = Yes
9	Have the characteristics of patients lost to follow-up been describe?	The authors of this tool indicated that this question should be answered "yes" when clear reasons for exclusion were described. For the purposes of this review, a point was awarded if a study explicitly reported the number and reason for patient exclusion. No point was awarded if the study did not report the number AND reason for patients excluded or this information could not be obtained from the tables, figures, or text of the study.	0 = No; 1 = Yes
10	Have actual probability values been reported (eg, .035 rather than <.05) for the main outcomes except where the probability value is less than .001?	A point was awarded if the exact <i>P</i> value was provided for both statistically significant and nonsignificant results for at least the main outcome measures. A point was not awarded if a study simply indicated that the results for the main outcome measures were not significant without providing the exact <i>P</i> value.	0 = No; 1 = Yes

(continued)

**Appendix. (continued)**

Number	Criteria	Scoring Criteria	Score
<i>External Validity</i>			
11	Were the subjects asked to participate in the study representative of the entire population from which they were recruited?	A point was awarded if the study identified the source population for patients and described how the patients were selected. Patients were determined to be representative if they comprised the entire source population, an unselected sample of consecutive patients, or a random sample (only feasible where a list of all members of the relevant population exists). Where a study did not report the proportion of the source population from which the patients are derived, the question was answered as unable to determine.	1 = Yes; 0 = No; 0 = Unable to determine
12	Were those subjects who were prepared to participate representative of the entire population from which they were recruited?	The proportion of patients included in the study were representative of the population. Those asked who agreed to participate or responded should be stated. Validation that the sample was representative would include demonstrating that the distribution of the main confounding factors was the same in the study sample and the source population. No point was awarded if the proportion of those asked who agreed to participate or responded was not stated.	1 = Yes; 0 = No; 0 = Unable to determine
13	Were the staff, places, and facilities where the patients were treated representative of the treatment the majority of patients receive?	A point was awarded unless the study specifically stated that patients were treated by a therapist who received specialized training relative to guideline recommendations.	1 = Yes; 0 = No; 0 = Unable to determine
<i>Internal Validity—Bias</i>			
14	Was an attempt made to blind study subjects to the intervention they have received?	A point was awarded if the patients were not aware of, or would have no way of knowing (as in the case of retrospective studies), which intervention they received. The study was not awarded a point if it was prospective and failed to mention whether the patients had knowledge of whether they were assigned to the guideline adherence group.	1 = Yes; 0 = No; 0 = Unable to determine
15	Was an attempt made to blind those measuring the main outcomes of the intervention?	A point was awarded if the study specifically stated that those assessing the outcome measures were unaware of (or would have no way of knowing) whether the patients were in the guideline adherence group.	1 = Yes; 0 = No; 0 = Unable to determine
16	If any of the results of the study were based on “data dredging,” was this made clear?	A point was awarded if no retrospective unplanned (at the outset of the study) subgroup analyses were reported.	1 = Yes; 0 = No; 0 = Unable to determine
17	In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?	For the purposes of this review, this question was omitted due to reasons previously stated.	Not applicable in this study

(continued)

**Appendix. (continued)**

Number	Criteria	Scoring Criteria	Score
18	Were the statistical tests used to assess the main outcomes appropriate?	If the distribution of the data (normal or not) was not described, it was assumed that the estimates used were appropriate, and a point was awarded. No point was awarded for studies that reported qualitative or quantitative data without any form of statistical comparisons or if the statistical tests reported were not appropriate.	1 = Yes; 0 = No; 0 = Unable to determine
19	Was compliance with the intervention/s reliable?	If the authors in prospective studies reported nonadherence to physical therapy intervention or adherence could not be determined, the study was not awarded a point. In retrospective studies, data were collected only for those patients who completed their episode of care (adherence to physical therapy assumed), and a point was awarded. For studies where the effect of any nonadherence was likely to bias any association to the null, the study was not awarded a point.	1 = Yes; 0 = No; 0 = Unable to determine
20	Were the main outcomes measures used accurate (valid and reliable)?	A point was awarded if the primary outcome measures were thought to be valid and reliable (eg, number of physical therapy visits per chart report), regardless of whether reliability or validity was reported. A point was not awarded if at least one of the primary outcome measures in the study was not valid or reliable or if this information was not reported or could not be determined (ie, a questionnaire without reported validity or reliability).	1 = Yes; 0 = No; 0 = Unable to determine
<i>Internal Validity—Confounding (Selection Bias)</i>			
21	Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?	A point was awarded when participants from both adherence and nonadherence groups were recruited from the same population. Otherwise, a point was not awarded (eg, a point was not awarded when all participants from the adherence group received care at clinic A and all participants in the nonadherence group received care at clinic B, because they could have represented 2 distinct populations).	1 = Yes; 0 = No; 0 = Unable to determine
22	Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time?	A point was awarded when the study provided a specific time line for patient recruitment (prospective studies) or when data were collected between reported dates of patient care (retrospective studies).	1 = Yes; 0 = No; 0 = Unable to determine
23	Were study subjects randomized to intervention groups?	A point for random allocation was awarded if random allocation of patients was stated in the "Method" section of the article. The precise method of randomization need not be specified. Quasi-randomization allocation procedures, such as allocation by bed availability, did not satisfy this criterion. For crossover study designs, a point was awarded when participants were randomly allocated in the order in which treatments were received.	1 = Yes; 0 = No; 0 = Unable to determine
24	Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?	The study did not receive a point unless the participants were randomly allocated and the methods for ensuring random allocation were specified.	1 = Yes; 0 = No; 0 = Unable to determine

*(continued)*

**Appendix. (continued)**

Number	Criteria	Scoring Criteria	Score
25	Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?	A point was awarded unless the effect of the main confounders was not investigated or confounding was demonstrated, but no adjustment was made in the final analyses.	1 = Yes; 0 = No; 0 = Unable to determine
26	Were losses of patients to follow-up taken into account?	A point was awarded as long as the number of dropouts lost to follow-up accounted for less than 10% of the initial number of total participants or a maximum of 5% from each group. The question was answered with “unable to determine” if the number of patients lost to follow-up were not reported or could not be deduced from the outcome data (ie, initial and final sample sizes not indicated).	1 = Yes; 0 = No; 0 = Unable to determine
<i>Power</i>			
27	Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%?	For the purposes of this evidence-based review, this question was omitted.	Not applicable in this study
<i>Overall Max Possible Score</i>			

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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**Ethical Approval**

This research protocol was approved by the Ohio University Institutional Research Board.

**Informed Consent**

Not applicable, because this article does not contain any studies with human or animal subjects.

**Trial Registration**

Not applicable, because this article does not contain any clinical trials. 

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