Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society

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Recommendation 1: Clinicians should conduct a focused history and physical examination to help place patients with low back pain into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis, or back pain potentially associated with another specific spinal cause. The history should include assessment of psychosocial risk factors, which predict risk for chronic disabling back pain (strong recommendation, moderate-quality evidence).

Recommendation 2: Clinicians should not routinely obtain imaging or other diagnostic tests in patients with nonspecific low back pain (strong recommendation, moderate-quality evidence).

Recommendation 3: Clinicians should perform diagnostic imaging and testing for patients with low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical examination (strong recommendation, moderate-quality evidence).

Recommendation 4: Clinicians should evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis with magnetic resonance imaging (preferred) or computed tomography only if they are potential candidates for surgery or epidural steroid injection (for suspected radiculopathy) (strong recommendation, moderate-quality evidence).

Recommendation 5: Clinicians should provide patients with evidence-based information on low back pain with regard to their expected course, advise patients to remain active, and provide information about effective self-care options (strong recommendation, moderate-quality evidence).

Recommendation 6: For patients with low back pain, clinicians should consider the use of medications with proven benefits in conjunction with back care information and self-care. Clinicians should assess severity of baseline pain and functional deficits, potential benefits, risks, and relative lack of long-term efficacy and safety data before initiating therapy (strong recommendation, moderate-quality evidence). For most patients, first-line medication options are acetaminophen or nonsteroidal anti-inflammatory drugs.

Recommendation 7: For patients who do not improve with self-care options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits—for acute low back pain, spinal manipulation; for chronic or subacute low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate-quality evidence).

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Low back pain is the fifth most common reason for all physician visits in the United States (1, 2). Approximately one quarter of U.S. adults reported having low back pain lasting at least 1 whole day in the past 3 months (2), and 7.6% reported at least 1 episode of severe acute low back pain (see Glossary) within a 1-year period (3). Low back pain is also very costly: Total incremental direct health care costs attributable to low back pain in the U.S. were estimated at $26.3 billion in 1998 (4). In addition, indirect costs related to days lost from work are substantial, with approximately 2% of the U.S. work force compensated for back injuries each year (5).

Many patients have self-limited episodes of acute low back pain and do not seek medical care (3). Among those who do seek medical care, pain, disability, and return to work typically improve rapidly in the first month (6). However, up to one third of patients report persistent back pain of at least moderate intensity 1 year after an acute episode, and 1 in 5 report substantial limitations in activity

See also:

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* This paper, written by Roger Chou, MD; Amir Qaseem, MD, PhD, MHA; Vincenza Snow, MD; Donald Casey, MD, MPH, MBA; J. Thomas Cross Jr., MD, MPH; Paul Shekelle, MD, PhD; and Douglas K. Owens, MD, MS, was developed for the American College of Physicians' Clinical Efficacy Assessment Subcommittee and the American College of Physicians/American Pain Society Low Back Pain Guidelines Panel. For members of these groups, see end of text. Approved by the American College of Physicians Board of Regents on 14 July 2007. Approved by the American Pain Society Board Executive Committee on 18 July 2007.

(7). Approximately 5% of the people with back pain disability account for 75% of the costs associated with low back pain (8).

Many options are available for evaluation and management of low back pain. However, there has been little consensus, either within or between specialties, on appropriate clinical evaluation (9) and management (10) of low back pain. Numerous studies show unexplained, large variations in use of diagnostic tests and treatments (11, 12). Despite wide variations in practice, patients seem to experience broadly similar outcomes, although costs of care can differ substantially among and within specialties (13, 14).

The purpose of this guideline is to present the available evidence for evaluation and management of acute and chronic low back pain (see Glossary) in primary care settings. The target audience for this guideline is all clinicians caring for patients with low (lumbar) back pain of any duration, either with or without leg pain. The target patient population is adults with acute and chronic low back pain not associated with major trauma. Children or adolescents with low back pain; pregnant women; and patients with low back pain from sources outside the back (nonspinal low back pain), fibromyalgia or other myofascial pain syndromes, and thoracic or cervical back pain are not included. These recommendations are based on a systematic evidence review summarized in 2 background papers by Chou and colleagues in this issue (15, 16) from an evidence report by the American Pain Society (17). The evidence report (17) discusses the evidence for the evaluation, and the 2 background papers (15, 16) summarize the evidence for management.

Methods

The literature search for this guideline included studies from MEDLINE (1966 through November 2006), the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, and EMBASE. The literature search included all English-language articles reporting on randomized, controlled trials of nonpregnant adults (age >18 years) with low back pain (alone or with leg pain) of any duration that evaluated a target medication and reported at least 1 of the following outcomes: back-specific function, generic health status, pain, work disability, or patient satisfaction. The American College of Physicians (ACP) and the American Pain Society (APS) convened a multidisciplinary panel of experts to develop the key questions and scope used to guide the evidence report, review its results, and formulate recommendations. The background papers by Chou and colleagues (15, 16) provide details about the methods used for the systematic evidence review.

This guideline grades its recommendations by using the ACP's clinical practice guidelines grading system, adapted from the classification developed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) work group (**Appendix Table 1**, available at www.annals.org) (18). The evidence in this guideline was first evaluated by the ACP/APS panel by using a system adopted from the U.S. Preventive Services Task Force for grading strength of evidence, estimating magnitude of benefits, and assigning summary ratings (**Appendix Tables 2**, **3**, and **4**, all available at www.annals.org) (19). The evidence was independently reviewed by the ACP's Clinical Efficacy Assessment Subcommittee. The ratings for individual low back pain interventions discussed in this guideline are summarized in **Appendix Table 5** (available at www.annals.org) for acute low back pain (<4 weeks' duration) and in **Appendix Table 6** (available at www.annals.org) for chronic/subacute low back pain (>4 weeks' duration). This guideline considered interventions to have "proven" benefits only when they were supported by at least fair-quality evidence and were associated with at least moderate benefits (or small benefits but no significant harms, costs, or burdens). **Figures 1** and **2** present an accompanying algorithm.

Recommendations: Evaluation of Low Back Pain

Recommendation 1: Clinicians should conduct a focused history and physical examination to help place patients with low back pain into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis, or back pain potentially associated with another specific spinal cause. The history should include assessment of psychosocial risk factors, which predict risk for chronic disabling back pain (strong recommendation, moderate-quality evidence).

More than 85% of patients who present to primary care have low back pain that cannot reliably be attributed to a specific disease or spinal abnormality (nonspecific low back pain [see Glossary]) (20). Attempts to identify specific anatomical sources of low back pain in such patients have not been validated in rigorous studies, and classification schemes frequently conflict with one another (21). Moreover, no evidence suggests that labeling most patients with low back pain by using specific anatomical diagnoses improves outcomes. In a minority of patients presenting for initial evaluation in a primary care setting, low back pain is caused by a specific disorder, such as cancer (approximately 0.7% of cases), compression fracture (4%), or spinal infection (0.01%) (22). Estimates for prevalence of ankylosing spondylitis in primary care patients range from 0.3% (22) to 5% (23). Spinal stenosis (see Glossary) and symptomatic herniated disc (see Glossary) are present in about 3% and 4% of patients, respectively. The cauda equina syndrome (see Glossary) is most commonly associated with massive midline disc herniation but is rare, with an estimated prevalence of 0.04% among patients with low back pain (24).

A practical approach to assessment is to do a focused history and physical examination to determine the likelihood of specific underlying conditions and measure the

presence and level of neurologic involvement (24, 25). Such an approach facilitates classification of patients into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy (see Glossary) or spinal stenosis (suggested by the presence of sciatica [see Glossary] or pseudoclaudication), and back pain potentially associated with another specific spinal cause. The latter category includes the small proportion of patients with serious or progressive neurologic deficits or underlying conditions requiring prompt evaluation (such as tumor, infection, or the cauda equina syndrome), as well as patients with other conditions that may respond to specific treatments (such as ankylosing spondylitis or vertebral compression fracture).

Diagnostic triage into 1 of these 3 categories helps guide subsequent decision making. Clinicians should inquire about the location of pain, frequency of symptoms, and duration of pain, as well as any history of previous symptoms, treatment, and response to treatment. The possibility of low back pain due to problems outside the back, such as pancreatitis, nephrolithiasis, or aortic aneurysm, or systemic illnesses, such as endocarditis or viral syndromes, should be considered. All patients should be evaluated for the presence of rapidly progressive or severe neurologic deficits, including motor deficits at more than 1 level, fecal incontinence, and bladder dysfunction. The most frequent finding in the cauda equina syndrome is urinary retention (90% sensitivity) (24). In patients without urinary retention, the probability of the cauda equina syndrome is approximately 1 in 10 000.

Clinicians should also ask about risk factors for cancer and infection. In a large, prospective study from a primary care setting, a history of cancer (positive likelihood ratio, 14.7), unexplained weight loss (positive likelihood ratio, 2.7), failure to improve after 1 month (positive likelihood ratio, 3.0), and age older than 50 years (positive likelihood ratio, 2.7) were each associated with a higher likelihood for cancer (26). The posttest probability of cancer in patients presenting with back pain increases from approximately 0.7% to 9% in patients with a history of cancer (not including nonmelanoma skin cancer). In patients with any 1 of the other 3 risk factors, the likelihood of cancer only increases to approximately 1.2% (26). Features predicting the presence of vertebral infection have not been well studied but may include fever, intravenous drug use, or recent infection (22). Clinicians should also consider risk factors for vertebral compression fracture, such as older age, history of osteoporosis, and steroid use, and ankylosing spondylitis, such as younger age, morning stiffness, improvement with exercise (see Glossary), alternating buttock pain, and awakening due to back pain during the second part of the night only (27), as specific treatments are available for these conditions. Clinicians should be aware that criteria for diagnosing early ankylosing spondylitis (before the development of radiographic abnormalities) are evolving (28).

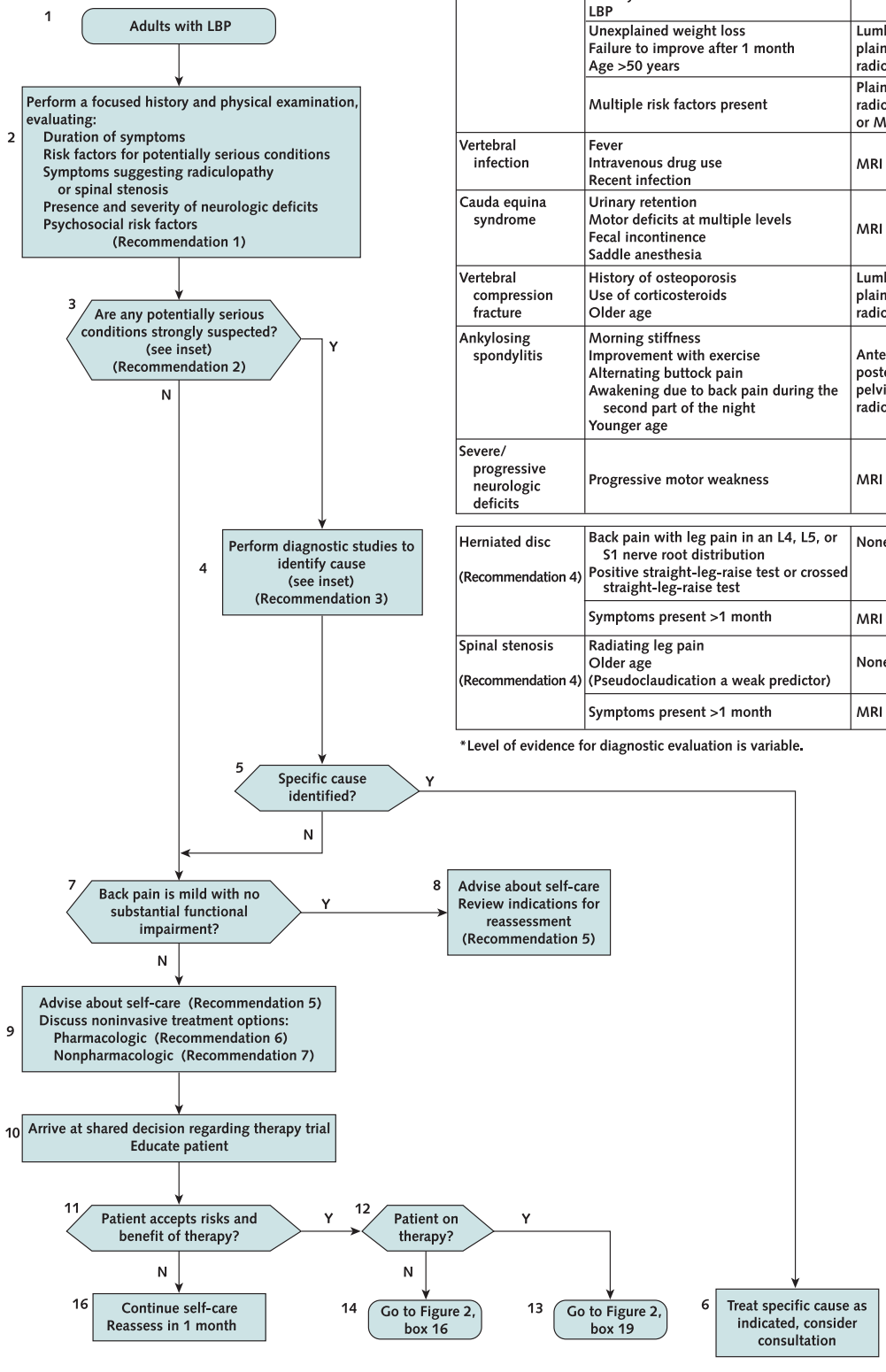
In patients with back and leg pain, a typical history for sciatica (back and leg pain in a typical lumbar nerve root distribution) has a fairly high sensitivity but uncertain specificity for herniated disc (29, 30). More than 90% of symptomatic lumbar disc herniations (back and leg pain due to a prolapsed lumbar disc compressing a nerve root) occur at the L4/L5 and L5/S1 levels. A focused examination that includes straight-leg-raise testing (see Glossary) and a neurologic examination that includes evaluation of knee strength and reflexes (L4 nerve root), great toe and foot dorsiflexion strength (L5 nerve root), foot plantarflexion and ankle reflexes (S1 nerve root), and distribution of sensory symptoms should be done to assess the presence and severity of nerve root dysfunction. A positive result on the straight-leg-raise test (defined as reproduction of the patient's sciatica between 30 and 70 degrees of leg elevation) (24) has a relatively high sensitivity (91% [95% CI, 82% to 94%]) but modest specificity (26% [CI, 16% to 38%]) for diagnosing herniated disc (31). By contrast, the crossed straight-leg-raise test is more specific (88% [CI, 86% to 90%]) but less sensitive (29% [CI, 24% to 34%]).

Evidence on the utility of history and examination for identifying lumbar spinal stenosis is sparse (32). High-quality studies showed a trade-off between sensitivities and specificities, resulting in modest or poor positive likelihood ratios (1.2 for pseudoclaudication and 2.2 for radiating leg pain) (32). Changing symptoms on downhill treadmill testing are associated with the highest positive likelihood ratio (3.1). The usefulness of pain relieved by sitting for predicting presence of spinal stenosis ranges from poor to high (32). Age older than 65 years was associated with a positive likelihood ratio of 2.5 and a negative likelihood ratio of 0.33 in 1 lower-quality study (33). Other findings have only been evaluated in lower-quality studies or are poorly predictive for lumbar spinal stenosis.

Psychosocial factors and emotional distress should be assessed because they are stronger predictors of low back pain outcomes than either physical examination findings or severity and duration of pain (6, 34, 35). Assessment of psychosocial factors identifies patients who may have delayed recovery and could help target interventions, as 1 trial in a referral setting found intensive multidisciplinary rehabilitation more effective than usual care in patients with acute or subacute low back pain identified as having risk factors for chronic back pain disability (36). Direct evidence on effective primary care interventions for identifying and treating such factors in patients with acute low back pain is lacking (37, 38), although this is an area of active research. Evidence is currently insufficient to recommend optimal methods for assessing psychosocial factors and emotional distress. However, psychosocial factors that may predict poorer low back pain outcomes include presence of depression, passive coping strategies, job dissatisfaction, higher disability levels, disputed compensation claims, or somatization (34, 35, 39).

Evidence is also insufficient to guide appropriate inter-

Figure 1. **Initial evaluation of low back pain (*LBP*).**



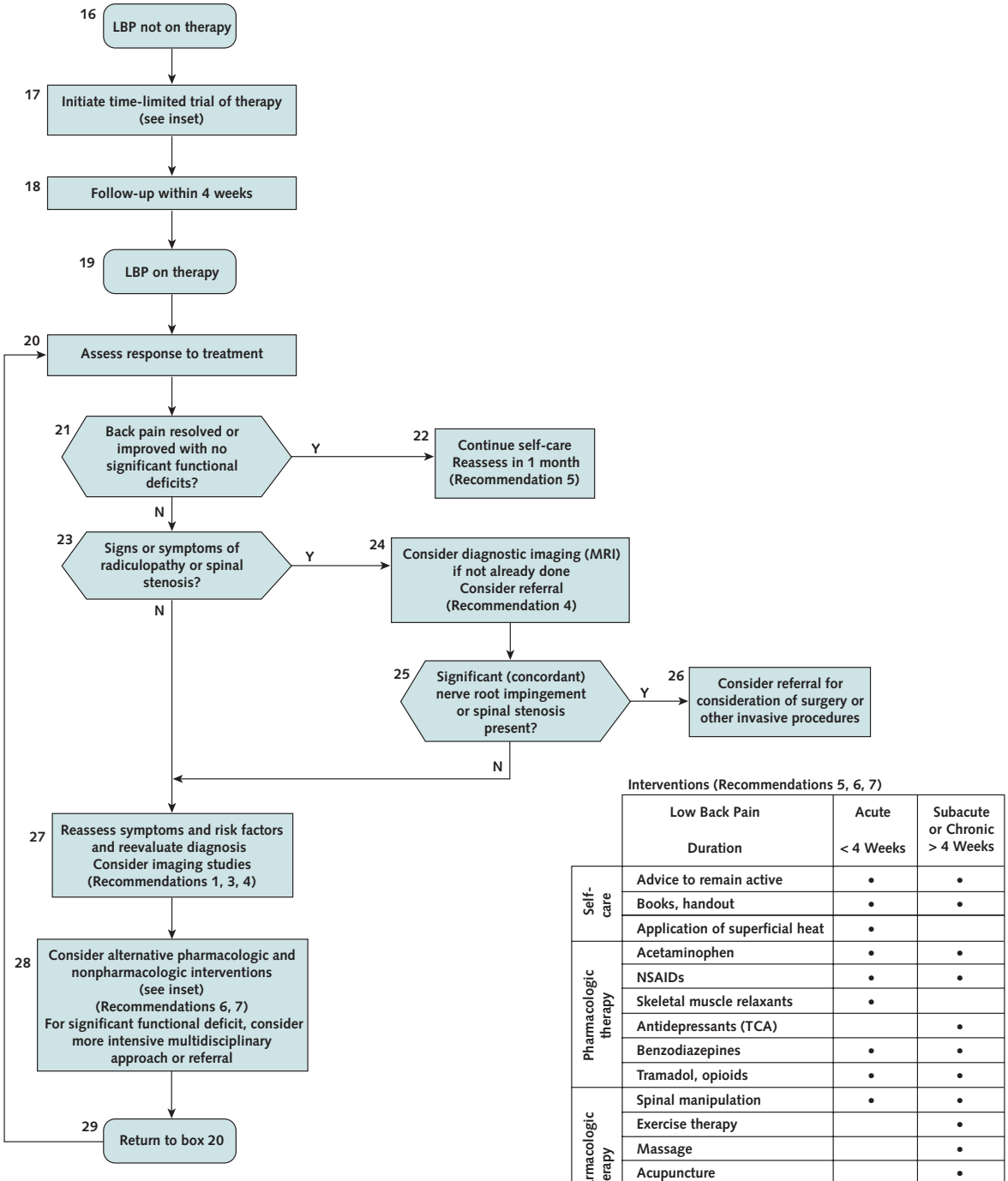
Diagnostic Work-up

Possible cause	Key features on history or physical examination	Imaging*	Additional studies*
Cancer	History of cancer with new onset of LBP	MRI	ESR
	Unexplained weight loss Failure to improve after 1 month Age >50 years	Lumbosacral plain radiography	
	Multiple risk factors present	Plain radiography or MRI	
Vertebral infection	Fever Intravenous drug use Recent infection	MRI	ESR and/or CRP
Cauda equina syndrome	Urinary retention Motor deficits at multiple levels Fecal incontinence Saddle anesthesia	MRI	None
Vertebral compression fracture	History of osteoporosis Use of corticosteroids Older age	Lumbosacral plain radiography	None
Ankylosing spondylitis	Morning stiffness Improvement with exercise Alternating buttock pain Awakening due to back pain during the second part of the night Younger age	Anterior-posterior pelvis plain radiography	ESR and/or CRP, HLA-B27
Severe/progressive neurologic deficits	Progressive motor weakness	MRI	Consider EMG/NCV
Herniated disc (Recommendation 4)	Back pain with leg pain in an L4, L5, or S1 nerve root distribution Positive straight-leg-raise test or crossed straight-leg-raise test	None	None
	Symptoms present >1 month	MRI	Consider EMG/NCV
Spinal stenosis (Recommendation 4)	Radiating leg pain Older age (Pseudoclaudication a weak predictor)	None	None
	Symptoms present >1 month	MRI	Consider EMG/NCV

*Level of evidence for diagnostic evaluation is variable.

Do not use this algorithm for back pain associated with major trauma, nonspinal back pain, or back pain due to systemic illness. CRP = C-reactive protein; EMG = electromyography; ESR = erythrocyte sedimentation rate; MRI = magnetic resonance imaging; NCV = nerve conduction velocity.

Figure 2. **Management of low back pain (*LBP*).**



Interventions (Recommendations 5, 6, 7)

	Low Back Pain Duration	Acute < 4 Weeks	Subacute or Chronic > 4 Weeks
Self-care	Advice to remain active	•	•
	Books, handout	•	•
	Application of superficial heat	•	
Pharmacologic therapy	Acetaminophen	•	•
	NSAIDs	•	•
	Skeletal muscle relaxants	•	
	Antidepressants (TCA)		•
	Benzodiazepines	•	•
	Tramadol, opioids	•	•
Nonpharmacologic therapy	Spinal manipulation	•	•
	Exercise therapy		•
	Massage		•
	Acupuncture		•
	Yoga		•
	Cognitive-behavioral therapy		•
	Progressive relaxation		•
	Intensive interdisciplinary rehabilitation		•

• Interventions supported by grade B evidence (at least fair-quality evidence of moderate benefit, or small benefit but no significant harms, costs, or burdens). No intervention was supported by grade A evidence (good-quality evidence of substantial benefit).

MRI = magnetic resonance imaging; NSAIDs = nonsteroidal anti-inflammatory drugs; TCA = tricyclic antidepressants.

vals or methods (such as office visit vs. telephone follow-up) for reassessment of history, physical examination, or psychosocial factors. However, patients with acute low back pain generally experience substantial improvement in the first month after initial presentation (6, 40), suggesting that a reasonable approach is to reevaluate patients with persistent, unimproved symptoms after 1 month. In patients with severe pain or functional deficits, older patients, or patients with signs of radiculopathy or spinal stenosis (see recommendation 4), earlier or more frequent reevaluation may also be appropriate.

Recommendation 2: Clinicians should not routinely obtain imaging or other diagnostic tests in patients with nonspecific low back pain (strong recommendation, moderate-quality evidence).

There is no evidence that routine plain radiography in patients with nonspecific low back pain is associated with a greater improvement in patient outcomes than selective imaging (41–43). In addition, exposure to unnecessary ionizing radiation should be avoided. This issue is of particular concern in young women because the amount of gonadal radiation from obtaining a single plain radiograph (2 views) of the lumbar spine is equivalent to being exposed to a daily chest radiograph for more than 1 year (44). Routine advanced imaging (computed tomography [CT] or magnetic resonance imaging [MRI]) is also not associated with improved patient outcomes (45) and identifies many radiographic abnormalities that are poorly correlated with symptoms (22) but could lead to additional, possibly unnecessary interventions (46, 47).

Plain radiography is recommended for initial evaluation of possible vertebral compression fracture in selected higher-risk patients, such as those with a history of osteoporosis or steroid use (22). Evidence to guide optimal imaging strategies is not available for low back pain that persists for more than 1 to 2 months despite standard therapies if there are no symptoms suggesting radiculopathy or spinal stenosis, although plain radiography may be a reasonable initial option (see recommendation 4 for imaging recommendations in patients with symptoms suggesting radiculopathy or spinal stenosis). Thermography and electrophysiologic testing are not recommended for evaluation of nonspecific low back pain.

Recommendation 3: Clinicians should perform diagnostic imaging and testing for patients with low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical examination (strong recommendation, moderate-quality evidence).

Prompt work-up with MRI or CT is recommended in patients who have severe or progressive neurologic deficits or are suspected of having a serious underlying condition (such as vertebral infection, the cauda equina syndrome, or cancer with impending spinal cord compression) because delayed diagnosis and treatment are associated with poorer outcomes (48–50). Magnetic resonance imaging is generally preferred over CT if available because it does not use ionizing radiation and provides better visualization of soft tissue, vertebral marrow, and the spinal canal (22). There is insufficient evidence to guide precise recommendations on diagnostic strategies in patients who have risk factors for cancer but no signs of spinal cord compression. Several strategies have been proposed for such patients (22, 51), but none have been prospectively evaluated. Proposed strategies generally recommend plain radiography or measurement of erythrocyte sedimentation rate (a rate $\geq$20 mm/h is associated with 78% sensitivity and 67% specificity for cancer [29]), with MRI reserved for patients with abnormalities on initial testing (22, 51). An alternative strategy is to directly perform MRI in patients with a history of cancer, the strongest predictor of vertebral cancer (51). For patients older than 50 years of age without other risk factors for cancer, delaying imaging while offering standard treatments and reevaluating within 1 month may also be a reasonable option (52).

Recommendation 4: Clinicians should evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis with MRI (preferred) or CT only if they are potential candidates for surgery or epidural steroid injection (for suspected radiculopathy) (strong recommendation, moderate-quality evidence).

The natural history of lumbar disc herniation with radiculopathy in most patients is for improvement within the first 4 weeks with noninvasive management (53, 54). There is no compelling evidence that routine imaging affects treatment decisions or improves outcomes (55). For prolapsed lumbar disc with persistent radicular symptoms despite noninvasive therapy, discectomy or epidural steroids are potential treatment options (56–60). Surgery is also a treatment option for persistent symptoms associated with spinal stenosis (61–64).

Magnetic resonance imaging (preferred if available) or CT is recommended for evaluating patients with persistent back and leg pain who are potential candidates for invasive interventions—plain radiography cannot visualize discs or accurately evaluate the degree of spinal stenosis (22). However, clinicians should be aware that findings on MRI or CT (such as bulging disc without nerve root impingement) are often nonspecific. Recommendations for specific invasive interventions, interpretation of radiographic findings, and additional work-up (such as electrophysiologic testing) are beyond the scope of this guideline, but decisions should be based on the clinical correlation between symptoms and radiographic findings, severity of symptoms, patient preferences, surgical risks (including the patient's comorbid conditions), and costs and will generally require specialist input.

Recommendations: Treatment of Low Back Pain

Recommendation 5: Clinicians should provide patients with evidence-based information on low back pain with regard to their expected course, advise patients to remain active,

and provide information about effective self-care options (strong recommendation, moderate-quality evidence).

Clinicians should inform all patients of the generally favorable prognosis of acute low back pain with or without sciatica, including a high likelihood for substantial improvement in the first month (6, 40). Clinicians should explain that early, routine imaging and other tests usually cannot identify a precise cause, do not improve patient outcomes, and incur additional expenses. Clinicians should also review indications for reassessment and diagnostic testing (see recommendations 1 and 4). General advice on self-management for nonspecific low back pain should include recommendations to remain active, which is more effective than resting in bed for patients with acute or subacute low back pain (65, 66). If patients require periods of bed rest to relieve severe symptoms, they should be encouraged to return to normal activities as soon as possible. Self-care education books (see Glossary) based on evidence-based guidelines, such as *The Back Book* (67), are recommended because they are an inexpensive and efficient method for supplementing clinician-provided back information and advice and are similar or only slightly inferior in effectiveness to such costlier interventions as supervised exercise therapy, acupuncture (see Glossary), massage (see Glossary), and spinal manipulation (see Glossary) (65, 66, 68–70). Other methods for providing self-care education, such as e-mail discussion groups, layperson-led groups, videos, and group classes, are not as well studied.

Factors to consider when giving advice about activity limitations to workers with low back pain are the patient's age and general health and the physical demands of required job tasks. However, evidence is insufficient to guide specific recommendations about the utility of modified work for facilitating return to work (71). For worker's compensation claims, clinicians should refer to specific regulations for their area of practice, as rules vary substantially from state to state. Brief individualized educational interventions (defined as a detailed clinical examination and advice, typically lasting several hours over 1 to 2 sessions) (see Glossary) can reduce sick leave in workers with subacute low back pain (72–74).

Application of heat by heating pads or heated blankets is a self-care option (see Glossary) for short-term relief of acute low back pain (75). In patients with chronic low back pain, firm mattresses are less likely than a medium-firm mattress to lead to improvement (76). There is insufficient evidence to recommend lumbar supports (77) or the application of cold packs (75) as self-care options.

Although evidence is insufficient to guide specific self-management recommendations for patients with acute radiculopathy or spinal stenosis, some trials enrolled mixed populations of patients with and without sciatica, suggesting that applying principles similar to those used for nonspecific low back pain is a reasonable approach (see also recommendation 4).

Recommendation 6: For patients with low back pain, clinicians should consider the use of medications with proven benefits in conjunction with back care information and self-care. Clinicians should assess severity of baseline pain and functional deficits, potential benefits, risks, and relative lack of long-term efficacy and safety data before initiating therapy (strong recommendation, moderate-quality evidence). For most patients, first-line medication options are acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs).

Medications in several classes have been shown to have moderate, primarily short-term benefits for patients with low back pain. Each class of medication is associated with unique trade-offs involving benefits, risks, and costs. For example, acetaminophen is a slightly weaker analgesic than NSAIDs (<10 points on a 100-point visual analogue pain scale) (78–82) but is a reasonable first-line option for treatment of acute or chronic low back pain because of a more favorable safety profile and low cost (79, 82–84). However, acetaminophen is associated with asymptomatic elevations of aminotransferase levels at dosages of 4 g/d (the upper limit of U.S. Food and Drug Administration–[FDA] approved dosing) even in healthy adults, although the clinical significance of these findings are uncertain (85). Nonselective NSAIDs are more effective for pain relief than is acetaminophen (80), but they are associated with well-known gastrointestinal and renovascular risks (83). In addition, there is an association between exposure to cyclooxygenase-2–selective or most nonselective NSAIDs and increased risk for myocardial infarction (86). Clinicians should therefore assess cardiovascular and gastrointestinal risk factors before prescribing NSAIDs and recommend the lowest effective doses for the shortest periods necessary. Clinicians should also remain alert for new evidence about which NSAIDs are safest and consider strategies for minimizing adverse events in higher-risk patients who are prescribed NSAIDs (such as co-administration with a proton-pump inhibitor) (87). There is insufficient evidence to recommend for or against analgesic doses of aspirin in patients with low back pain (88).

Opioid analgesics or tramadol are an option when used judiciously in patients with acute or chronic low back pain who have severe, disabling pain that is not controlled (or is unlikely to be controlled) with acetaminophen and NSAIDs. Because of substantial risks, including aberrant drug-related behaviors with long-term use in patients vulnerable or potentially vulnerable to abuse or addiction, potential benefits and harms of opioid analgesics should be carefully weighed before starting therapy (89–91). Failure to respond to a time-limited course of opioids should lead to reassessment and consideration of alternative therapies or referral for further evaluation (92–94). Evidence is insufficient to recommend one opioid over another (95).

The term *skeletal muscle relaxants* refers to a diverse group of medications, some with unclear mechanisms of action, grouped together because they carry FDA-approved indications for treatment of musculoskeletal conditions or spasticity. Although the antispasticity drug tizanidine has

Glossary

General

Acute low back pain	Low back pain present for fewer than 4 weeks, sometimes grouped with subacute low back pain as symptoms present for fewer than 3 months.
Cauda equina syndrome	Compression on nerve roots from the lower cord segments, usually due to a massive, centrally herniated disc, which can result in urinary retention or incontinence from loss of sphincter function, bilateral motor weakness of the lower extremities, and saddle anesthesia.
Chronic low back pain	Low back pain present for more than 3 months.
Herniated disc	Herniation of the nucleus pulposus of an intervertebral disc through its fibrous outer covering, which can result in compression of adjacent nerve roots or other structures.
Neurogenic claudication	Symptoms of leg pain (and occasionally weakness) on walking or standing, relieved by sitting or spinal flexion, associated with spinal stenosis.
Nonspecific low back pain	Pain occurring primarily in the back with no signs of a serious underlying condition (such as cancer, infection, or cauda equina syndrome), spinal stenosis or radiculopathy, or another specific spinal cause (such as vertebral compression fracture or ankylosing spondylitis). Degenerative changes on lumbar imaging are usually considered nonspecific, as they correlate poorly with symptoms.
Radiculopathy	Dysfunction of a nerve root associated with pain, sensory impairment, weakness, or diminished deep tendon reflexes in a nerve root distribution.
Sciatica	Pain radiating down the leg below the knee in the distribution of the sciatic nerve, suggesting nerve root compromise due to mechanical pressure or inflammation. Sciatica is the most common symptom of lumbar radiculopathy.
Spinal stenosis	Narrowing of the spinal canal that may result in bony constriction of the cauda equina and the emerging nerve roots.
Straight-leg-raise test	A procedure in which the hip is flexed with the knee extended in order to passively stretch the sciatic nerve and elicit symptoms suggesting nerve root tension. A positive test is usually considered reproduction of the patient's sciatica when the leg is raised between 30 and 70 degrees. Reproduction of the patient's sciatica when the unaffected leg is lifted is referred to as a positive "crossed" straight-leg-raise test.

Interventions

Acupressure	An intervention consisting of manipulation with the fingers instead of needles at specific acupuncture points.
Acupuncture	An intervention consisting of the insertion of needles at specific acupuncture points.
Back school	An intervention consisting of education and a skills program, including exercise therapy, in which all lessons are given to groups of patients and supervised by a paramedical therapist or medical specialist.
Brief individualized educational interventions	Individualized assessment and education about low back pain problems without supervised exercise therapy or other specific interventions. As we defined them, brief educational interventions differ from back schools because they do not involve group education or supervised exercise.
Exercise	A supervised exercise program or formal home exercise regimen, ranging from programs aimed at general physical fitness or aerobic exercise to programs aimed at muscle strengthening, flexibility, stretching, or different combinations of these elements.
Functional restoration (also called *physical conditioning, work hardening,* or *work conditioning*)	An intervention that involves simulated or actual work tests in a supervised environment in order to enhance job performance skills and improve strength, endurance, flexibility, and cardiovascular fitness in injured workers.
Interdisciplinary rehabilitation (also called *multidisciplinary therapy*)	An intervention that combines and coordinates physical, vocational, and behavioral components and is provided by multiple health care professionals with different clinical backgrounds. The intensity and content of interdisciplinary therapy varies widely.
Interferential therapy	The superficial application of a medium-frequency alternating current modulated to produce low frequencies up to 150 Hz. It is thought to increase blood flow to tissues and provide pain relief and is considered more comfortable for patients than transcutaneous electrical nerve stimulation.
Low-level laser therapy	The superficial application of lasers at wavelengths between 632 and 904 nm to the skin in order to apply electromagnetic energy to soft tissue. Optimal treatment parameters (wavelength, dosage, dose-intensity, and type of laser) are uncertain.
Massage	Soft tissue manipulation using the hands or a mechanical device through a variety of specific methods. The pressure and intensity used in different massage techniques vary widely.
Neuroreflexotherapy	A technique from Spain characterized by the temporary implantation of staples superficially into the skin over trigger points in the back and referred tender points in the ear. Neuroreflexotherapy is believed to stimulate different zones of the skin than acupuncture.
Percutaneous electrical nerve stimulation (PENS)	An intervention that involves inserting acupuncture-like needles and applying low-level electrical stimulation. It differs from electroacupuncture in that the insertion points target dermatomal levels for local pathology, rather than acupuncture points. However, there is some uncertainty over whether PENS should be considered a novel therapy or a form of electroacupuncture.
Progressive relaxation	A technique which involves the deliberate tensing and relaxation of muscles, in order to facilitate the recognition and release of muscle tension.
Self-care options	Interventions that can be readily implemented by patients without seeing a clinician or that can be implemented on the basis of advice provided at a routine clinic visit.
Self-care education book	Reading material (books, booklets, or leaflets) that provide education and self-care advice for patients with low back pain. Although the specific content varies, self-care books are generally based on principles from published clinical practice guidelines and encourage a return to normal activity, adoption of a fitness program, and appropriate lifestyle modification, and they provide advice on coping strategies and managing flares.
Shortwave diathermy	Therapeutic elevation of the temperature of deep tissues by application of short-wave electromagnetic radiation with a frequency range from 10–100 MHz.

Continued on following page

Glossary—**Continued**

Spa therapy	An intervention involving several interventions, including mineral water bathing, usually with heated water, typically while staying at a spa resort.
Spinal manipulation	Manual therapy in which loads are applied to the spine by using short- or long-lever methods and high-velocity thrusts are applied to a spinal joint beyond its restricted range of movement. Spinal mobilization, or low-velocity, passive movements within or at the limit of joint range, is often used in conjunction with spinal manipulation.
Traction	An intervention involving drawing or pulling in order to stretch the lumbar spine. Various methods are used, usually involving a harness around the lower rib cage and the iliac crest, with the pulling action done by using free weights and a pulley, motorized equipment, inversion techniques, or an overhead harness.
Transcutaneous electrical nerve stimulation (TENS)	Use of a small, battery-operated device to provide continuous electrical impulses via surface electrodes, with the goal of providing symptomatic relief by modifying pain perception.
Yoga	An intervention distinguished from traditional exercise therapy by the use of specific body positions, breathing techniques, and an emphasis on mental focus. Many styles of yoga are practiced, each emphasizing different postures and techniques.

been well studied for low back pain, there is little evidence for the efficacy of baclofen or dantrolene, the other FDA-approved drugs for the treatment of spasticity (96). Other medications in the skeletal muscle relaxant class are an option for short-term relief of acute low back pain, but all are associated with central nervous system adverse effects (primarily sedation). There is no compelling evidence that skeletal muscle relaxants differ in efficacy or safety (96, 97). Because skeletal muscle relaxants are not pharmacologically related, however, risk–benefit profiles could in theory vary substantially. For example, carisoprodol is metabolized to meprobamate (a medication associated with risks for abuse and overdose), dantrolene carries a black box warning for potentially fatal hepatotoxicity, and both tizanidine and chlorzoxazone are associated with hepatotoxicity that is generally reversible and usually not serious.

Tricyclic antidepressants are an option for pain relief in patients with chronic low back pain and no contraindications to this class of medications (98, 99). Antidepressants in the selective serotonin reuptake inhibitor class and trazodone have not been shown to be effective for low back pain, and serotonin–norepineprhine reuptake inhibitors (duloxetine and venlafaxine) have not yet been evaluated for low back pain. Clinicians should bear in mind, however, that depression is common in patients with chronic low back pain and should be assessed and treated appropriately (100).

Gabapentin is associated with small, short-term benefits in patients with radiculopathy (101, 102) and has not been directly compared with other medications or treatments. There is insufficient evidence to recommend for or against other antiepileptic drugs for back pain with or without radiculopathy. For acute or chronic low back pain, benzodiazepines seem similarly effective to skeletal muscle relaxants for short-term pain relief (96) but are also associated with risks for abuse, addiction, and tolerance. Neither benzodiazepines nor gabapentin are FDA-approved for treatment of low back pain (with or without radiculopathy). If a benzodiazepine is used, a time-limited course of therapy is recommended.

Herbal therapies, such as devil's claw, willow bark, and capsicum, seem to be safe options for acute exacerbations of chronic low back pain, but benefits range from small to moderate. In addition, many of the published trials were led by the same investigator, which could limit applicability of findings to other settings (103).

Systemic corticosteroids are not recommended for treatment of low back pain with or without sciatica, because they have not been shown to be more effective than placebo (104–107).

Most medication trials evaluated patients with nonspecific low back pain or mixed populations with and without sciatica. There is little evidence to guide specific recommendations for medications (other than gabapentin) for patients with sciatica or spinal stenosis. Evidence is also limited on the benefits and risks associated with long-term use of medications for low back pain. Therefore, extended courses of medications should generally be reserved for patients clearly showing continued benefits from therapy without major adverse events.

Recommendation 7: For patients who do not improve with self-care options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits—for acute low back pain, spinal manipulation; for chronic or subacute low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate-quality evidence).

For acute low back pain (duration <4 weeks), spinal manipulation administered by providers with appropriate training is associated with small to moderate short-term benefits (108). Supervised exercise therapy and home exercise regimens are not effective for acute low back pain (109), and the optimal time to start exercise therapy after the onset of symptoms is unclear. Other guidelines suggest starting exercise after 2 to 6 weeks, but these recommendations seem to be based on poor-quality evidence (25, 110). Other nonpharmacologic treatments have not been proven to be effective for acute low back pain.

For subacute (duration >4 to 8 weeks) low back pain, intensive interdisciplinary rehabilitation (defined as an intervention that includes a physician consultation coordi-

nated with a psychological, physical therapy, social, or vocational intervention) (see Glossary) is moderately effective (111), and functional restoration (see Glossary) with a cognitive-behavioral component reduces work absenteeism due to low back pain in occupational settings (112). There is little evidence on effectiveness of other treatments specifically for subacute low back pain (113). However, many trials enrolled mixed populations of patients with chronic and subacute symptoms, suggesting that results may reasonably be applied to both situations.

For chronic low back pain, moderately effective nonpharmacologic therapies include acupuncture (114, 115), exercise therapy (109), massage therapy (116), Viniyoga-style yoga (see Glossary) (70), cognitive-behavioral therapy or progressive relaxation (see Glossary) (117, 118), spinal manipulation (108), and intensive interdisciplinary rehabilitation (119), although the level of supporting evidence for different therapies varies from fair to good (**Appendix Table 6**, available at www.annals.org). In meta-regression analyses, exercise programs that incorporate individual tailoring, supervision, stretching, and strengthening are associated with the best outcomes (109). The evidence is insufficient to conclude that benefits of manipulation vary according to the profession of the manipulator (chiropractor vs. other clinician trained in manipulation) or according to presence or absence of radiating pain (108). With the exception of continuous or intermittent traction (see Glossary), which has not been shown to be effective in patients with sciatica (120–122), few trials have evaluated the effectiveness of treatments specifically in patients with radicular pain (122) or symptoms of spinal stenosis. In addition, there is insufficient evidence to recommend any specific treatment as first-line therapy. Patient expectations of benefit from a treatment should be considered in choosing interventions because they seem to influence outcomes (123). Some interventions (such as intensive interdisciplinary rehabilitation) may not be available in all settings, and costs for similarly effective interventions can vary substantially. There is insufficient evidence to recommend the use of decision tools or other methods for tailoring therapy in primary care, although initial data are promising (124–126).

Transcutaneous electrical nerve stimulation (see Glossary) and intermittent or continuous traction (in patients with or without sciatica) have not been proven effective for chronic low back pain (**Appendix Table 6**, available at www.annals.org). Acupressure (see Glossary), neuroreflexotherapy (see Glossary), and spa therapy (see Glossary) have not been studied in the United States, and percutaneous electrical nerve stimulation (see Glossary) is not widely available. There is insufficient evidence to recommend interferential therapy (see Glossary), low-level laser therapy (see Glossary), shortwave diathermy (see Glossary), or ultrasonography. Evidence is inconsistent on back schools (see Glossary), which have primarily been evaluated in occupational settings, with some trials showing small, short-term benefits (127).

It may be appropriate to consider consultation with a back specialist when patients with nonspecific low back pain do not respond to standard noninvasive therapies. However, there is insufficient evidence to guide specific recommendations on the timing of or indications for referral, and expertise in management of low back pain varies substantially among clinicians from different disciplines (including primary care providers). In general, decisions about consultation should be individualized and based on assessments of patient symptoms and response to interventions, the experience and training of the primary care clinician, and the availability of specialists with relevant expertise. In considering referral for possible surgery or other invasive interventions, other published guidelines suggest referring patients with nonspecific low back pain after a minimum of 3 months (25) to 2 years (128) of failed nonsurgical interventions. Although specific suggestions about timing of referral are somewhat arbitrary, one factor to consider is that trials of surgery for nonspecific low back pain included only patients with at least 1 year of symptoms (129–131). Other recommendations for invasive interventions are addressed in a separate guideline from the APS (17).

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Note: Clinical practice guidelines are "guides" only and may not apply to all patients and all clinical situations. Thus, they are not intended to

override clinicians' judgment. All ACP clinical practice guidelines are considered automatically withdrawn or invalid 5 years after publication or once an update has been issued.

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Appendix Table 1. **The American College of Physicians Clinical Practice Guidelines Grading System***

Quality of Evidence	Strength of Recommendation	
	Benefits Do or Do Not Clearly Outweigh Risks	Benefits and Risks and Burdens are Finely Balanced
High	Strong	Weak
Moderate	Strong	Weak
Low	Strong	Weak
Insufficient evidence to determine net benefits or harms		I

* Adapted from the classification developed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) work group.

Appendix Table 2. **Methods for Grading the Strength of the Overall Evidence for an Intervention***

Grade	Definition
Good	Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes (at least 2 consistent, higher-quality trials).
Fair	Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, size, or consistency of included studies; generalizability to routine practice; or indirect nature of the evidence on health outcomes (at least 1 higher-quality trial of sufficient sample size; 2 or more higher-quality trials with some inconsistency; at least 2 consistent, lower-quality trials, or multiple consistent observational studies with no significant methodologic flaws).
Poor	Evidence is insufficient to assess effects on health outcomes because of limited number or power of studies, large and unexplained inconsistency between higher-quality trials, important flaws in trial design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.

* Adapted from methods developed by the U.S. Preventive Services Task Force (19).

Appendix Table 3. Definitions for Estimating Magnitude of Effects*

Size of Effect	Definition
Small/slight	Pain scales: Mean 5- to 10-point improvement on a 100-point VAS or equivalent Back-specific functional status: Mean 5- to 10-point improvement on the ODI, 1–2 points on the RDQ, or equivalent All outcomes: SMD, 0.2–0.5
Moderate	Pain scales: Mean 10- to 20-point improvement on a 100-point VAS or equivalent Back-specific functional status: Mean 10- to 20-point improvement on the ODI, 2–5 points on the RDQ, or equivalent All outcomes: SMD, 0.5–0.8
Large/substantial	Pain scales: Mean >20-point improvement on a 100-point VAS or equivalent Back-specific functional status: Mean >20-point improvement on the ODI, >5 points on the RDQ, or equivalent All outcomes: SMD >0.8

* ODI = Oswestry Disability Index; RDQ = Roland–Morris Disability Questionnaire; SMD = standardized mean difference; VAS = visual analogue scale.

Appendix Table 4. Recommendations and Summary Ratings*

Grade	Recommendation
A	The panel strongly recommends that clinicians consider offering the intervention to eligible patients. *The panel found good evidence that the intervention improves health outcomes and concludes that benefits substantially outweigh harms.*
B	The panel recommends that clinicians consider offering the intervention to eligible patients. *The panel found at least fair evidence that the intervention improves health outcomes and concludes that benefits moderately outweigh harms, or that benefits are small but there are no significant harms, costs, or burdens associated with the intervention.*
C	The panel makes no recommendation for or against the intervention. *The panel found at least fair evidence that the intervention can improve health outcomes, but concludes that benefits only slightly outweigh harms, or the balance of benefits and harms is too close to justify a general recommendation.*
D	The panel recommends against offering the intervention. *The panel found at least fair evidence that the intervention is ineffective or that harms outweigh benefits.*
I	The panel found insufficient evidence to recommend for or against the intervention. *Evidence that the intervention is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.*

* Adapted from methods developed by the U.S. Preventive Services Task Force (19).

Appendix Table 5. Level of Evidence and Summary Grades for Noninvasive Interventions in Patients with Acute Low Back Pain*

Intervention	Level of Evidence	Net Benefit	Grade
Acetaminophen	Fair	Moderate	B
Nonsteroidal anti-inflammatory drugs	Good	Moderate	B
Skeletal muscle relaxants	Good	Moderate	B
Superficial heat	Good	Moderate	B
Advice to remain active	Good	Small (no significant harms)	B
Benzodiazepines	Fair	Moderate	B
Opioids and tramadol	Fair	Moderate	B
Self-care education books	Fair	Small (no significant harms)	B
Herbal therapies	Fair (devil's claw and white willow bark) to poor (cayenne)	Moderate (devil's claw and white willow bark), unable to estimate (cayenne)	B (devil's claw and white willow bark)
Spinal manipulation	Fair	Small to moderate	B/C
Advice to rest in bed	Good	No benefit	D
Exercise therapy	Good	No benefit	D
Systemic corticosteroids	Fair	No benefit	D
Aspirin	Poor	Unable to estimate	I
Acupuncture	Poor	Unable to estimate	I
Back schools	Poor	Unable to estimate	I
Interferential therapy	Poor	Unable to estimate	I
Low-level laser	Poor	Unable to estimate	I
Lumbar supports	Poor	Unable to estimate	I
Massage	Poor	Unable to estimate	I
Modified work	Poor	Unable to estimate	I
Shortwave diathermy	Poor	Unable to estimate	I
Transcutaneous electrical nerve stimulation	Poor	Unable to estimate	I
Superficial cold	Poor	Unable to estimate	I

* See **Appendix Tables 1**, **2**, and **3** for explanation of grades. Low back pain is considered acute if its duration is <4 weeks.

Appendix Table 6. **Level of Evidence and Summary Grades for Noninvasive Interventions in Patients with Chronic or Subacute Low Back Pain***

Intervention	Level of Evidence	Net Benefit	Grade
Acetaminophen	Fair	Small (no significant harms)	B
Acupuncture	Fair (some inconsistency vs. sham acupuncture)	Moderate	B
Psychological therapy (cognitive-behavioral therapy or progressive relaxation)	Good for cognitive-behavioral, fair for progressive relaxation	Moderate (cognitive-behavioral) to substantial (progressive relaxation)	B
Exercise therapy	Good	Moderate	B
Interdisciplinary rehabilitation	Good	Moderate	B
Nonsteroidal anti-inflammatory drugs	Good	Moderate	B
Spinal manipulation	Good	Moderate	B
Opioids and tramadol	Fair (primarily indirect evidence from trials of patients with other pain conditions)	Moderate	B
Brief individualized educational interventions	Fair	Moderate	B
Benzodiazepines	Fair	Moderate	B
Massage	Fair	Moderate	B
Yoga	Fair (for Viniyoga) to poor (for Hatha yoga)	Moderate (Viniyoga), unable to estimate (Hatha yoga)	B (Viniyoga)
Tricyclic antidepressants	Good	Small to moderate	B/C
Antiepileptic drugs	Fair (for gabapentin) to poor (for topiramate)	Small (gabapentin in patients with radiculopathy), unable to estimate (topiramate)	C (gabapentin), I (topiramate)
Back schools	Fair (some inconsistency)	Small	C
Firm mattresses	Fair	No benefit or harm	D
Traction	Fair	No benefit (continuous or intermittent traction), small to moderate (autotraction for sciatica)	D (continuous or intermittent traction), C (autotraction for sciatica)
Aspirin	Poor	Unable to estimate	I
Biofeedback†	Poor	Unable to estimate	I
Interferential therapy	Poor	Unable to estimate	I
Low-level laser	Poor	Unable to estimate	I
Lumbar supports	Poor	Unable to estimate	I
Shortwave diathermy	Poor	Unable to estimate	I
Skeletal muscle relaxants	Poor	Unable to estimate	I
Transcutaneous electrical nerve stimulation	Poor	Unable to estimate	I
Ultrasonography	Poor	Unable to estimate	I

* See **Appendix Tables 1, 2,** and **3** for explanation of grades. Low back pain is considered subacute at 1–3 months' duration and chronic at >3 months' duration.
† The use of auditory or visual signals reflecting muscle tension or activity to learn how to inhibit or reduce the muscle activity.