# Evaluating and Managing the Patient with Back Pain

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**KEYWORDS**

• Outpatient • Nontraumatic • Red flags • Diagnostics • Therapy • Prognosis

**KEY POINTS**

- The history and physical examination should be used to direct any diagnostic testing in the evaluation of low back pain (LBP) in adults.
- The presence of red flags on history or physical examination should trigger early ordering of imaging studies.
- Use of a diagnostic algorithm can direct which imaging tests should be part of the initial evaluation.
- Most acute back pain will resolve without therapeutic intervention.
- In care of the patient with LBP, adherence to high-value principles and evidenced-based practice will help control cost and lead to improved outcomes.

## LOW BACK PAIN

### *Case Study*

A 62-year-old woman with history of chronic kidney disease, hypertension, and depression presents with 2 weeks of acute worsening of her chronic low back pain (LBP). Previous radiographic imaging showed degenerative joint disease with joint space narrowing in the L4-L5 region. She denies leg weakness or falls but does have occasional radiation of sharp pain down her right posterior leg, without associated saddle anesthesia or incontinence of urine or feces. She denies recent trauma or injuries and notes that the pain is worse with walking and improved with sitting and leaning forward while walking. She has tried acetaminophen and a lumbar back support with minimal relief.

Review of systems is negative for weight loss, night sweats, fevers, or fatigue. Medications are amlodipine and losartan. She works in a warehouse, but had difficulty completing her tasks and requested light duty in order to avoid increased activity and pain. She does not use tobacco, alcohol, or illicit drugs.

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Examination is remarkable for a positive straight-leg raise on the right, 5/5 strength in the bilateral upper and lower extremities with intact sensation to light touch throughout, 2+ patellar and Achilles reflexes on the right, 3+ on the left, with downgoing Babinski bilaterally.

Although she has had this pain for several years, she has never completed physical therapy or undergone any invasive interventions. She is frustrated and states that her pain and disability affect her mood. She would like to "know what's causing this" and "fix it" so that she can return to working without restrictions.

### *Background/Epidemiology*

Back pain is one of the most common complaints seen in the United States. In estimates from 2 national surveys conducted by the National Center for Health Statistics in 2002, back pain was the most frequent type of pain reported by civilian, noninstitutionalized adult respondents. More than 25% of respondents reported having LBP within the prior 3 months, corresponding to an estimated 54 million adults, and a reported lifetime prevalence of nearly 80%. LBP accounted for approximately 2.3% of all office visits, and it is the fifth most common reason for all physician visits in the United States.[1]

Back pain has imposed significant costs on the US health care system. Using data from the 1998 Medical Expenditure Panel Survey, it was found that health care expenditures on back pain were approximately $91 billion, with $28 billion for inpatient care and $23.6 billion for office-based visits. Other costs included prescription drugs, outpatient service, emergency department visits, and home health services. These expenditures do not include indirect costs from lost work, which are estimated to be substantial. Individuals with back pain were found to incur total health expenditures about 1.6-fold more than individuals without back pain. Among patients with a primary diagnosis of LBP, 10% of individuals accounted for close to 100% of the inpatient expenditures, 90% of emergency department visits, and 87% of outpatient services.[2]

This review focuses on the target population of adults with LBP that is nontraumatic in nature.

### *Definitions*

In evaluation and treatment of LBP, categorizing and identifying the chronicity is most important in guiding decision making, including the appropriate diagnostic workup and the most effective management. LBP can be sorted into 3 categories: acute, LBP being present for less than 4 weeks; subacute, present for anywhere from 4 weeks to 3 months; or chronic/persistent LBP.[3] Recurrent back pain has variable definitions in the literature, taking into account number of episodes, frequency, duration, and severity. Most commonly included is frequency of previous episodes, although that might range anywhere from pain at least once a year to pain twice over a lifetime.[4] As such, in discussing management of recurrent LBP, it should be treated as chronic.

### *History and Physical Examination*

There are 2 key questions that the history and physical examination can help assess: (a) Is there a serious systemic disease causing the pain? and (b) Is there neurologic compromise that might require surgical evaluation? A focused and well-performed history and physical examination can help triage whether further imaging and diagnostics are needed. The presence of any of the red flags listed in **Table 1** on history or physical examination would indicate the need for further diagnostic evaluation.

Initial history questions should include pain location, associated symptoms, character of the pain, alleviating (including over-the-counter medications) and aggravating

**Table 1**
**RED FLAGS requiring further diagnostics**

| History Red Flags | Physical Examination Red Flags |
|---|---|
| • History of cancer (+LR 14.7 for cancer)<br>• Corticosteroid use<br>• History of osteoporosis<br>• Abnormal neurologic history, new falls, ataxia, >3 wk of midline pain, nocturnal pain, sphincter incontinence or urinary urgency, bilateral leg symptoms<br>• Anticoagulant use<br>• Intravenous drug use<br>• Fever<br>• Immunocompromised<br>• Unexplained weight loss (+LR 2.7)<br>• Recent spinal anesthesia<br>• Failure to improve after 1 mo (+LR 3.0)<br>• Age >70 | • Fever<br>• Motor weakness in legs<br>• Sensory level or saddle anesthesia<br>• Diminished or abnormal reflexes, including positive Babinski<br>• Fecal incontinence<br>• Urinary retention |

factors, timing and duration of symptoms, pain severity, history of similar symptoms, and past treatments used. It is also important to consider psychosocial factors (so-called yellow flags): presence of depression, passive coping strategies, job dissatisfaction, higher disability levels, disputed compensation claims, and somatization. The focused physical examination should begin with inspection of the back with attention to the area of discomfort, followed by direct palpation of the spine and paraspinal muscles. Assessment of range of motion (flexion/extension, rotation, lateral bend) and gait is helpful for impact on daily activities. These factors may have an impact on likelihood and time to recovery.

Risk factors for potential serious conditions that would require further diagnostic evaluation are outlined in **Table 1** and should be assessed in all patients. Historically, isolated age greater than 50 without other risk factors has been identified as a red flag requiring further diagnostics despite the lack of evidence supporting this recommendation. In 2015, a prospective study of 5239 patients with LBP older than the age of 65 was conducted, evaluating differences in outcomes at 1 year. They found no difference in reports of disability, but marked differences in cost and resource use. In addition, there were no significant differences seen in missed diagnoses, such as malignancy or infection.[5]

### *Differential Diagnoses*

Most LBP is due to nonspecific musculoskeletal strain, and episodes generally resolve within days to a few weeks with self-care. Up to one-third of patients report persistent back pain of at least moderate intensity 1 year after an acute episode.[6] In considering the differential for LBP, a focused history and physical examination will help to categorize patients into one of the groupings listed in **Table 2**.

More than 90% of symptomatic lumbar disc herniations occur at the L4/L5 and L5/S1 levels. History that supports disc herniation includes worsened pain with maneuvers that increase intraabdominal pressure, including coughing, sneezing, or straining, along with pain and numbness in the corresponding nerve distribution. On physical examination, assessment of L4-L5 and L5-S1 motor strength is assessed by squatting and rising (L4) and walking on heels (L5) and toes (S1). Loss of patellar (L4) and Achilles

**Table 2**
**Differential diagnosis, low back pain**

| | |
|---|---|
| • Nonspecific LBP | 1. Degenerative spine disease<br>2. Muscular or ligamentous injury |
| • Back pain with radiculopathy or spinal stenosis | 1. Acute disc herniation<br>2. Spinal stenosis |
| • Other spinal pathologic condition | 1. Metastatic epidural tumor<br>2. Spinal epidural abscess<br>3. Osteomyelitis<br>4. Infectious discitis<br>5. Epidural hematoma<br>6. Central disc herniation with cauda equina syndrome<br>7. Compression fracture<br>8. Ankylosing spondylitis |
| • Extraspinal pathologic conditions | 1. Aortic aneurysm<br>2. Cholangitis<br>3. Shingles<br>4. Pneumonia<br>5. Pancreatitis<br>6. Nephrolithiasis |

(S1) reflexes also points toward disc herniation. The straight-leg raise test can assess for nerve-root compression at these levels. It is described as positive when passive elevation of the leg by cupping the heel reproduces pain radiating down the posterior leg below the knee at between 30° and 70°. A positive ipsilateral straight-leg-raise test has a sensitivity of 64% and specificity of 57%, whereas a crossed straight-leg-raise test has a sensitivity of 28% and specificity of 90%.[7]

Spinal stenosis is a common source of LBP and impaired walking in patients older than 65 years old. The most common cause is related to age-associated degeneration of the lumbar disks and facet joints, leading to disk height loss and associated disk bulging. Patients present with symptoms of pseudo-claudication or neurogenic claudication, defined as leg pain that radiates into the buttocks and/or the thigh and lower leg, worsened with prolonged walking and improved with sitting. Pain is exacerbated by lumbar extension and improved with lumbar flexion.[8]

The most common manifestation of osteoporosis is vertebral fractures, seen with increasing prevalence and incidence with advanced age, and in white women over black women, Asian women, or men. Most vertebral fractures are incidentally identified on radiographs without accompanying clinical symptoms. In premenopausal women who present with incident vertebral fracture, it is important to assess for other clinical risk factors, such as prior fracture, fall, inactivity, tobacco use, systemic glucocorticoid use, low body mass index, or medical history of chronic obstructive pulmonary disease, seropositive rheumatoid arthritis, and Crohn disease.[9]

Infections of the spine include epidural abscess, discitis, and osteomyelitis. Infections are usually blood-borne, a result of direct inoculation at the time of spinal surgery, or contiguous spread from adjacent soft tissue that is infected.[10] The authors have seen increasing incidence of spinal infections over the last 30 years with an aging population, higher numbers of immunocompromised hosts and intravenous drug users, and increased spinal procedures. In the primary care setting, outside of localized back pain, the presenting signs and symptoms of spinal infection are nonspecific and limited to fever and decreased range of motion.[11]

### *Imaging and Additional Testing*

Further diagnostic workup of LBP is often not indicated, nor supported by evidence because acute to subacute nonspecific LBP will resolve spontaneously in two-thirds of cases.[12] High-value care supports the use of historical and physical examination findings to guide treatment and management of LBP, with low yield in pursuing further diagnostic workup in the absence of clinical red flags or suspicion of serious pathologic condition in the first 4 to 6 weeks of symptoms.[13] Routine imaging without evidence of progressive neurologic deficits or signs and symptoms of a serious or specific underlying condition, such as malignancy, inflammation, or infection, does not contribute clinically beneficial information and can lead to unnecessary harm.[14] In considering whether and which type of imaging may be indicated in the acute setting, the authors recommend use of the Appropriateness Criteria, an imaging guideline compiled by the American College of Radiology in coordination with other society experts, which provides recommendations that balance imaging utility, harms, and costs.[12]

Radiography has a high rate of false positives in testing and overall is more difficult to interpret. Degenerative changes are often evident on plain film, particularly with advancing age, but these findings are not clinically significant in most situations because they are reported equally in both symptomatic and asymptomatic persons.[15] As detailed in **Fig. 1**, radiography is recommended in the initial evaluation if the patient has a history of low-velocity trauma, osteoporosis, or chronic steroid use along with workup of LBP in younger patients with suspicion for spondylolysis or inflammatory arthritis.[12] Radiography should not be used for evaluation of red flags given its poor sensitivity.[12]

Computed tomography (CT) is not as sensitive for soft tissue concerns, such as discitis or myelopathy, but is more useful in the diagnosis of fractures, dislocations, spondylolisthesis, scoliosis, stenosis, and tumors.[15] In patients who have contraindications to MRI imaging, CT with myelography is an alternative for spinal canal imaging in cases of myelopathies with progressively worsening neurologic function or concern for cauda equine syndrome (CES).[12] For patients who meet high-risk criteria for cervical vertebral injury as defined by the Canadian Cervical Rules, particularly in the posterior column where x-ray has low sensitivity, CT without contrast is the preferred imaging modality in order to properly evaluate fractures.[12] No validated tools exist to guide decision making for further imaging of suspected thoracolumbar spinal injuries; therefore, there should be a low threshold to obtain imaging, given the low sensitivity of physical examination to detect spinal injuries[16] (**Table 3**).

MRI is the most sensitive and specific imaging modality of choice for diagnosing neurologic conditions causing LBP because of the ability to delineate the relationship of disc to nerve, along with the visualization of soft tissue and bony structures. Because of its high sensitivity, MRI often detects asymptomatic disc herniations and protrusions.[15] MRI remains the recommended imaging of choice per the Appropriateness Criteria in the workup for red flags and in the evaluation of persistent or progressive symptoms following 6 weeks of conservative therapy whereby there remains diagnostic uncertainty. MRI is also recommended to evaluate the anatomy for potential invasive interventions to treat radicular pain.[12] Depending on the red flag, contrast may or may not be needed, as detailed in **Fig. 1**. It is more sensitive and specific than CT in detecting spinal pathologic conditions, such as inflammation, infection, and tumors, allowing for earlier detection of osteomyelitis, discitis, epidural infections, and hematomas. MRI with contrast can detect both malignant bone lesions and infection before bone erosion is detectable on either CT or radiography.[12] In cases of suspected

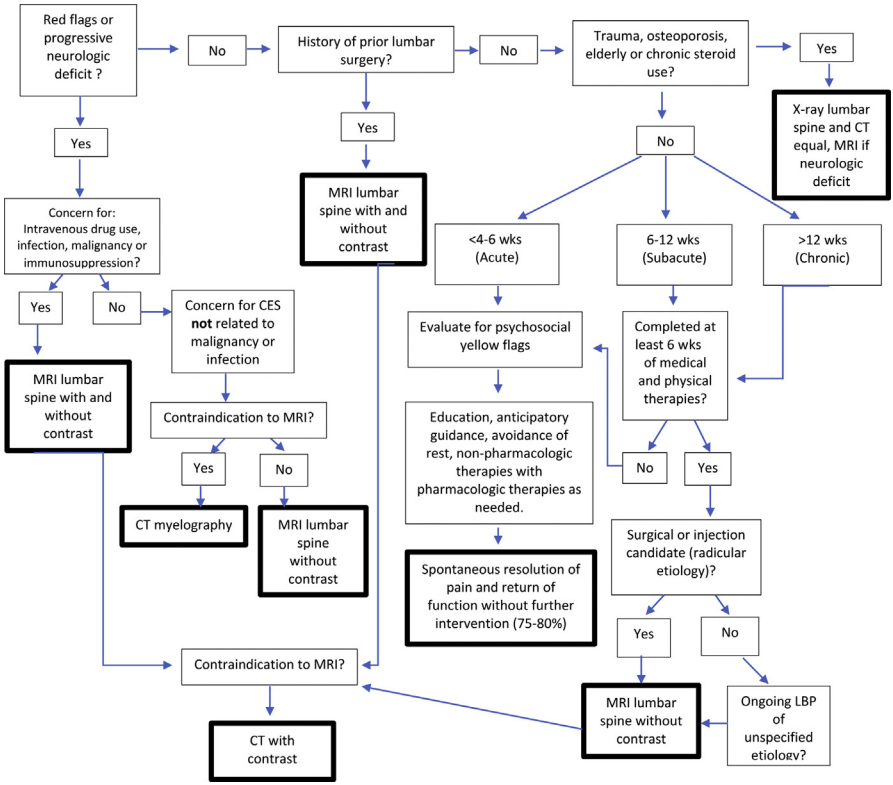


**Fig. 1.** Diagnostic imaging algorithm for evaluation of LBP.

**Table 3**
**Canadian cervical rules for suspected cervical spine injury**

| High-Risk Factors | Low-Risk Factors |
|---|---|
| Presence of 1 high-risk criterion indicates need for automatic imaging of cervical spine and immobilization of the cervical spine until completed | Presence of 1 or more low-risk factors allows for deferment of screening imaging. Completion of examination with rotation of head 45° past midline in both directions clears patient of cervical spinal injury and need for imaging |
| • Age>65 y<br>• Paresthesias in extremities<br>• Dangerous mechanism:<br>  ○ Fall from >3 ft/5 stairs<br>  ○ Axial load to head<br>  ○ Motor vehicle crash with high speed, rollover, or ejection<br>  ○ Bicycle collision<br>  ○ Motorized recreational vehicle accident | • Simple rear-end motor vehicle crash<br>• Patient in sitting position on examination<br>• Patient ambulatory any time after trauma<br>• Delayed onset of pain<br>• Absence of midline cervical spine tenderness |

CES or progressive neurologic decline, it is more appropriate to use MRI without contrast rather than with contrast.[12]

There is no utility of imaging studies in the workup of uncomplicated, nonspecific, chronic LBP unless there remains diagnostic uncertainty. Repeat imaging is also not likely to detect changes in disc disease and should not be done unless there is a concerning new red flag or neurologic change on physical examination.[12]

### *Serum Studies/Other Workup*

Laboratory assessment should be guided by history and physical examination findings that raise diagnostic concern for systemic pathologic conditions as the cause of LBP, both intraspinal and extraspinal. Serum studies, such as erythrocyte sedimentation rate, C-reactive protein, and complete blood count, can aid in evaluating for inflammatory or infectious processes. Studies, such as urinalysis, liver function tests, and lipase, can be helpful for assessing extraspinal sources of back pain. Evaluating calcium and alkaline phosphatase levels may be useful in the diagnosis of spinal malignancies.[17]

### *Evidence-Based Therapeutic Options*

Regardless of acuity and duration, nonpharmacologic approaches should be prioritized over pharmacologic and invasive treatment modalities,[18] but particularly in the case of chronic pain.[13] Most clinical guidelines agree that nonpharmacologic interventions, such as maintaining activity, education/reassurance, exercise therapy, and cognitive behavioral therapy, should be first-line treatments, over pharmacologic and invasive therapies, such as spinal injections, radiofrequency denervation, or surgery.[19] In systematic reviews and guidelines on treatment of LBP that have examined outcomes on pain and function related to interventions, no one individual modality shows large, long-term effects to decrease pain or improve function and reduce disability with any of the commonly recommended pharmacologic and nonpharmacologic therapies used for management.[18]

#### *Nonpharmacologic interventions*

**Acute back pain** Most episodes of acute back pain will resolve spontaneously within 1 month, with most patients not seeking medical care. For those who present for care, guidelines agree that acute, nonspecific LBP should first be treated with reassurance of a favorable prognosis. Recommendations should focus on minimal interventions and resumption of normal activities, with the avoidance of bed rest.[13]

Nonpharmacologic interventions, such as superficial heat and massage, acupuncture, or spinal manipulation, should be used first if choosing a treatment. Comparisons of efficacy of pain reduction, functional improvement, and strength of evidence of various nonpharmacologic interventions are listed in **Table 4**.[18]

**Chronic back pain** As with acute LBP, nonpharmacologic treatment options should be offered first in chronic back pain, along with recommendations to avoid bedrest and limits to normal activities.[13] Nonpharmacologic treatments that should be offered include exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography (EMG) biofeedback, cognitive-based therapy (CBT), or spinal manipulation.[18] Therapies with no benefit in pain reduction or improvement in function with chronic LBP include massage, ultrasound, transcutaneous electrical nerve stimulation (TENS), lumbar support, or taping.[18]

Most guidelines recommend the use of psychological therapies, particularly in the case of chronic LBP and in cases where psychosocial "yellow flags" are identified.[13]

**Table 4**
**Comparisons of nonpharmacologic treatments and their use in acute-subacute low back pain with reduction in pain, disability, and associated harm as rated by quality of evidence**

| Therapy Type | Magnitude of Pain Reduction | Magnitude of Functional Improvement | Harm Associated with Treatment | Strength of Evidence | Notes |
|---|---|---|---|---|---|
| Superficial heat therapy | ** | ** | Increased skin flushing | ** | Exceeds NSAIDs, acetaminophen for pain |
| Acupuncture | * | — | None | * | Exceeds NSAIDs for pain |
| Massage | ** | ** | Soreness during or after | * | Short-term (1 wk) effects |
| Chiropractic spinal manipulation | — | * | Muscle soreness, increase in pain | * | Short-term (1 wk) effects |
| Lumbar support | — | — | None | * | |
| Exercise therapy | — | — | Muscle soreness, increased pain | * | |

Ordered from highest quality evidence, most difference to lowest.
***,high; **, moderate; *, small; —, no effect.

Comparison of evidence supporting the efficacy of various nonpharmacologic interventions in the treatment of chronic LBP is listed in **Table 5**.[20]

### *Pharmacologic interventions*

**Acute back pain** In the acute phase of LBP if pharmacologic treatments are desired, the lowest effective dose of short-course nonsteroidal anti-inflammatory drugs (NSAIDs) or skeletal muscle relaxants (SMRs) should be chosen as first-line therapy.[18] Acetaminophen has been previously recommended as first-line pharmacologic treatment of LBP, but recent evidence shows no benefit over placebo or when compared with NSAIDs.[18] Other therapies, such as antidepressants, benzodiazepines, anticonvulsants, and opioids, have insufficient evidence to support their use[18] (**Table 6**).

**Chronic back pain** In evaluating treatments for chronic back pain, pharmacologic options for treatment provide moderate at best, and often only small improvements in pain for short amounts of time, with minimal effects on function and disability. In addition, it is unclear if pain reduction using these medications provides a clinically significant difference in outcome. Furthermore, the combination of therapies or sequence of their use has not been well studied.[21] Studies on pharmacologic treatment of radicular back pain have not had sufficient evidence to suggest 1 therapy over another, including evaluation of NSAIDs, anticonvulsants, and serotonin and norepinehprine reuptake inhibitors (SNRIs).

In chronic LBP, only those with an inadequate response to nonpharmacologic interventions should pursue pharmacologic treatment, with NSAIDs as first-line therapy and duloxetine or tramadol as second-line therapy.[21]

Opioids should only be used after a risk-benefit discussion with the patient and if all other treatments have failed.[18] There are no long-term evaluations on effectiveness and harm for the use of opioids in the treatment of chronic LBP.[21]

Other therapies found to be ineffective or insufficient evidence to support their use include tricyclic antidepressants, selective serotonin reuptake inhibitors (SSRIs), SMRs, systemic corticosteroids, or anticonvulsant medications.

Very little evidence exists to support specific treatments for radicular or intrinsic spinal-related LBP, including recommendations for systemic pharmacologic treatments. The only reliable recommendation based on evidence for improvement in pain related to radicular back pain is exercise therapy.[18]

### *Topical analgesics*

Topical analgesics for the management of LBP are lacking evidence, but may be of use with acute lumbar musculoskeletal strains. Topical NSAIDs when rubbed on skin can reduce pain by 50% in about a week in approximately 20% to 50% of patients with acute musculoskeletal strain. There is no evidence to support the use of other types of topical analgesics for other causes or durations of LBP.[22]

### *Invasive/interventional*

Most guidelines recommend against invasive measures, such as epidural steroid injections and surgery, for treatment of nonspecific LBP. There is limited comparison evidence looking at the use of nonpharmacologic interventions versus invasive and interventional methods.[21]

Epidural corticosteroid injections could be considered in cases of chronic radiculopathies and radicular pain that has not responded to conservative measures, as there is evidence supporting that they create immediate and short-term (<3 months) reductions in pain and improvement in function. Injections did not create a long-term reduction in risk for surgery, and they have not been shown to benefit patients with spinal

**Table 5**
**Comparisons of nonpharmacologic treatments and their use in chronic low back pain with reduction in pain, disability, and associated harm as rated by quality of evidence**

| Therapy Type | Magnitude of Pain Reduction | Magnitude of Functional Improvement | Harm Associated with Treatment | Strength of Evidence | Notes |
|---|---|---|---|---|---|
| Multidisciplinary rehabilitation | ** | * | None | ** | Long-term effects on pain small |
| Acupuncture | ** | ** | None | ** | Greater effect on pain, function than NSAIDs |
| Mindfulness-based stress reduction^ | * | * | None | ** | Easy to access, low cost |
| Exercise therapies | * | * | Muscle soreness, increased pain, injury | ** | All exercise therapies are equal |
| Progressive relaxation^ | ** | ** | None | * | Equal to CBT, mindfulness-based stress reduction |
| Yoga | ** | ** | Mild muscle soreness | * | Greater effects on pain than exercise |
| Tai chi | ** | * | None | * | Greater effects on pain than exercise |
| Motor control exercise | ** | * | None | * | Greater effects on pain, function than exercise or physical therapy |
| CBT^ | ** | — | None | * | Equal to mindfulness-based stress reduction |
| EMG biofeedback^ | ** | — | None | * | Equal to other psychological therapies |
| Spinal manipulation | * | — | Muscle soreness and increased pain, injury | * | |

***, high; **, moderate; *, small; —, no effect; ^, psychological therapy.
Ordered from highest-quality evidence, most difference to lowest.

**Table 6**
**Comparisons of systemic pharmacologic treatments and their use in acute low back pain with reduction in pain, disability, and associated harm as rated by quality of evidence**

| Therapy Type | Magnitude of Pain Reduction | Magnitude of Functional Improvement | Harm Associated with Treatment | Quality of Evidence |
|---|---|---|---|---|
| NSAIDs | * | * | More adverse events | ** |
| SMRs | * | — | Increased sedation, central nervous system events | ** |
| Systemic corticosteroids | — | — | Increased risk of insomnia, nervousness, increased appetite | * |
| Acetaminophen | — | — | No adverse events | * |
| Benzodiazepines | Unable to estimate | Unable to estimate | More frequent somnolence, fatigue, lightheadedness | Insufficient |
| Antiepileptics-gabapentin/pregabalin | No evidence | No evidence | No clear adverse events | |
| Opioids | No evidence | No evidence | Increased nausea, dizziness, constipation, vomiting, somnolence, dry mouth, dependence | |

***,high; **, moderate; *, small; —, no effect.

stenosis.[23] Evaluation of injections as part of a broader pain management strategy has not been well studied, along with approaches, doses, and use in varying severities of radicular pain.[23] Similar to epidural injection, radiofrequency denervation has only small and short-term effects on pain and function. Facet joint injections and trigger point injections have no benefit.[24]

Discectomy should only be considered for severe chronic LBP owing to disk herniation that has failed conservative management. Spinal fusion surgeries should also be deferred to carefully selected cases of severe LBP that have failed 2 years of active rehabilitation programs. Surgical intervention for spinal stenosis has no benefits and should be avoided with the exception of severe stenosis with progressive neurologic deficits and neurogenic claudication.[24]

### *Risks for Development of Chronic Back Pain/Prognosis*

In managing both acute and chronic LBP, guidelines recommend that clinicians assess psychosocial factors, also referred to as "yellow flags" (**Table 7**), in order to appropriately counsel, reassure, and address factors that indicate a poor prognosis and may lead to the development of chronic LBP and long-term disability.[13] It is recommended that this be completed early in the evaluation of back pain, at either the first or second visit. Validated tools, such as STarT Back and Orebro, can be used to assess these psychosocial factors, although there is limited evidence on their ability to prevent disability when interventions are targeted toward their findings[17] (**Table 8**).[25]

In addition, Wadell signs, as outlined in **Table 9**, can be identified during physical examination in order to further guide prognostic outcomes of chronic LBP, but are not validated to predict future disability related to chronic LBP.[26]

### *Case Discussion*

Our patient's historical findings are consistent with radicular pain, possibly related to spinal stenosis, as evidenced by her pseudo-claudication and previous radiographic imaging with disc narrowing. Her history and review of systems do not reveal any red flags, but her social history has several yellow flags, including depression, fear avoidance, and baseline functional impairment, which are important to take note of before determining the best management. This is a recurrent presentation of LBP, but it is of the same characteristic and cause as previous episodes without progressive neurologic deficits, making the need for repeat imaging unnecessary at the time of her presentation.

Treatment regimens offered should prioritize nonpharmacologic therapies, with adjunct pharmacologic therapies if needed. Even in cases of recurrent, acute on chronic LBP, it is likely that her acute symptoms will resolve; thus, she should be counseled as such. Nonpharmacologic therapies should be tailored to her ability to both access and afford, along with personal preference and incorporation of mind-body–based therapies given her psychosocial yellow flags. Therapies that may be ideal here include multidisciplinary rehabilitation, mindfulness-based stress reduction, progressive relaxation, acupuncture, yoga, tai chi, and exercise therapies. If needed, NSAIDs can be used with caution given her history of chronic kidney disease, and hypertension. Although commonly used in clinical practice, evidence does not exist to support the use of anticonvulsants for her radicular pain. If her pain persists, second-line therapies, such as duloxetine, would be a favorable option, especially in the setting of her depression.

Following 6 weeks of management, she should be reevaluated for improvement. If symptoms persist, MRI could be pursued, along with referral to a pain specialist for

**Table 7**
**Comparisons of systemic pharmacologic treatments and their use in acute and chronic low back pain with reduction in pain, disability, and associated harm as rated by quality of evidence**

| Therapy Type | Magnitude of Pain Reduction | Magnitude of Functional Improvement | Harm Associated with Treatment | Quality of Evidence |
|---|---|---|---|---|
| Tramadol | ** | ** | Increased nausea, dizziness, constipation, vomiting, somnolence, dry mouth | Moderate |
| Duloxetine | * | ** | Increased risk for withdrawal due to adverse events, but none serious | Moderate |
| Opioids | * | * | As noted in Table 5 | Moderate |
| NSAIDs | * | * | As noted in Table 5 | Moderate-low |
| TCAs | — | — | Not studied | Moderate-low |
| SSRIs | — | No evidence | Increased risk of adverse events | Moderate |
| SMRs | Unable to estimate | No evidence | As noted in Table 5 | Insufficient |
| Gabapentin/pregabalin | Unable to estimate | Unable to estimate | No clear adverse events | Insufficient |
| Acetaminophen | No evidence | No evidence | None | |

***, high; **, moderate; *, small; —, no effect.
*Abbreviation*: TCA's, tricyclic antidepressants.

**Table 8**
**The Keele STarT back prognostic screening tool**

| Patient Questions | Responses and Scoring |
|---|---|
| 1. My back pain has spread down my legs at some time in last 2 wk | Agree (1)<br>Disagree (0) |
| 2. Pain in shoulder or neck at some time in last 2 wk | |
| 3. Ability to walk only short distances because of back pain | |
| 4. Dressing more slowly than usual because of back pain | |
| 5. It's not really safe for a person with a condition like mine to be physically active | |
| 6. Worrying thoughts have been going through my mind a lot of the time | |
| 7. I feel that my back pain is terrible and it's never going to get any better | |
| 8. In general I have not enjoyed all the things I used to enjoy | |
| 9. Overall, how bothersome has your back pain been in the last 2 wk? | Not at all (0)<br>Slightly (0)<br>Moderately (0)<br>Very much (1)<br>Extremely (1) |
| **Scoring** | **Total (Q1–9): Subscore (Q5–9):** |

High risk: subscore 4–5; low risk: total score 0–3; medium risk: all other scores

*From* Hill, JC, Whitehurst DG, et al. (2011) Comparison of Stratified Primary Care Management for Low Back Pain with Current Best Practice (STarT Back): a randomized controlled trial. Lancet, 378 (9802), 1560-1571. Reprinted with permission from Elsevier.

**Table 9**
**Psychosocial factors ("yellow flags") and likelihood of predicting long-term disability related to chronic low back pain**

| Psychosocial Factors (Yellow Flags) | Wadell Physical Examination Findings: |
|---|---|
| • Belief that pain and activity are harmful (fear avoidance) (+LR 2.5)<br>• Pain somatization (+LR 3.0)<br>• Psychiatric comorbidities/maladaptive coping/catastrophizing (+LR 2.2)<br>• Baseline functional impairment (+LR 2.1)<br>• Higher physical work demands (+LR 1.4)<br>• Lack of work satisfaction (+LR 1.5)<br>• Already on/seeking disability compensation (+LR 1.4)<br>• Demographic factors (age, sex, race, education, smoking, weight, history of previous back pain) (+LR 0.84–1.3)<br>• Prior episodes of LBP (+LR 1.1) | • Superficial or nonanatomic tenderness<br>• Nonreproducibility of pain with distraction<br>• Regional weakness or sensory change<br>• Overreaction or exaggerated pain response |

consideration of epidural steroid injections. In the long term, the patient should be counseled that epidural injections may have only short but immediate benefits. In addition, pursuing surgical intervention would likely not improve her pain unless she began to experience more significant neurologic deficits. At every intervention along the cascade, ongoing patient counseling and education regarding expected outcomes should be discussed in order to set pain and function–related expectations for the patient and prevent setting of goals aimed at complete alleviation of pain and return to baseline function.

## CLINICS CARE POINTS

- Evaluating historical and physical examination red flags is key to guiding further workup.
- Evaluating psychosocial yellow flags helps determine prognosis and possibly prevent disability. Tools, such as the STaRT Back prognostic tool, can help focus psychosocial evaluation.
- Diagnostic workup and imaging should focus on high-value, low-cost, low-harm care. Early imaging will rarely change management and often reveals asymptomatic pathologic condition.
- Most episodes of acute and acute on chronic LBP resolve. Initial management should focus on reassurance, education, and avoidance of rest.
- Treatment of LBP often results in only small to moderate reduction in pain and improvement in function. Treatments chosen should be patient-centered, low cost, and low harm.
- Of the nonpharmacologic treatment options, it is best to choose multiple in adjunct, focusing on patient accessibility and preference, with a goal to address psychological factors in patients with psychosocial “yellow” flags.
- Pharmacologic therapies should be used in adjunct or after suboptimal reduction in pain with nonpharmacologic options, but never as solo or first-line therapy. Acetaminophen is no longer recommended as a first-line therapy. SMRs should be considered in treatment of acute LBP and duloxetine as second-line therapy for chronic LBP. Mild opioids, such as tramadol, may be useful in chronic LBP, but should be used in severe, refractory pain.
- Invasive and interventional methods should only be considered in cases of severe LBP that does not respond other treatments, usually after greater than 3 months to 2 years. Epidural steroid injections should not be used routinely for nonradicular chronic LBP.
- Long-term disability can be difficult to predict but can be costly as a result of repeat imaging, outpatient office visits, invasive interventions, and lost workdays.

## DISCLOSURE

The authors have nothing to disclose.

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