



# Clinical Decision Support and Acute Low Back Pain: Evidence-Based Order Sets

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Low back pain is one of the most common reasons for visits to physicians in the ambulatory care setting. Estimated medical expenditures related to low back pain have increased disproportionately relative to the more modest increase in the prevalence of self-reported low back pain in the past decade. The increase in spine care expenditures has not been associated with improved patient outcomes. Evidence-based order templates presented in this article are designed to assist practitioners through the process of managing patients with acute low back pain. A logical method of choosing, developing, and implementing clinical decision support interventions is presented that is based on the best available scientific evidence. These templates may be reasonably expected to improve patient care, decrease inappropriate imaging utilization, reduce the inappropriate use of steroids and narcotics, and potentially decrease the number of inappropriate invasive procedures.

**Key Words:** Acute low back pain, computerized decision support, clinical practice guidelines, imaging utilization, computerized order entry systems

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## BACKGROUND

Low back pain is one of the most common reasons for visits to physicians in the ambulatory care setting [1]. In one study, 26.4% of adults reported episodes of acute low back pain within the past 3 months [2]. Although the prevalence of self-reported low back pain has increased only modestly in the past decade, estimated medical expenditures related to back pain have increased substantially [3]. Increased utilization of medical imaging is one component of this cost increase [4,5]. The total costs related to back pain, both direct and indirect, are estimated to be >\$100 billion per year in the United States [6]. Despite the increase in overall spine care expenditures associated with medical imaging, there has not been an incremental improvement in patient outcomes [3,7].

The approach to the workup and management of low back pain by physicians and other practitioners is inconsistent. There is significant variability in the diagnostic workup of back pain among physicians within and be-

tween specialties [8,9]. Survey data indicate that there is little consensus among physicians regarding what treatments are effective for low back pain [10]. Despite mixed evidence for the efficacy of surgical intervention in different types of low back pain, rates of back surgery in the United States have been estimated to be >40% higher than in other developed countries [11]. Furthermore, there seems to be a relationship between the increasing use of advanced imaging and accelerating rates of surgical intervention [12].

## EVIDENCE-BASED CLINICAL PRACTICE GUIDELINES

Recent efforts have been made to synthesize and summarize the extensive and sometimes confusing literature on the evaluation and management of low back pain [7,13-15]. Clinical practice guidelines have been published in the United States [16,17] and abroad [18], with the aim of decreasing variability, improving the quality of care, increasing patient safety, and encouraging medical care that is based on the best available scientific evidence. Despite differences in culture, local regional trends, and health care systems, there is remarkable similarity in the various low back pain clinical practice guidelines [18]. Although there is seemingly a broad international consensus among the authors of clinical practice guidelines, significant gaps exist between current clinical practices and evidence-based recommendations.

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There are well-known barriers to the widespread implementation of evidence-based clinical practice guidelines [19-21]. Common barriers include lack of awareness of the guidelines, belief that the guidelines will not produce the desired results, disagreement with the guidelines, belief that guidelines cannot be effectively implemented, and the inability to overcome the inertia of previous practice. In the case of low back pain, patient expectations, miscommunication, and factual inaccuracies held by physicians have been reported as reasons for deviation from clinical practice guidelines [22,23]. Even when practice guidelines are well understood and generally followed, there are certain situations in which practitioners deviate from the recommendations. For instance, the presence of sciatica has been associated with divergence from low back pain practice guidelines [24]. Most of the efforts to better align everyday practice with evidence-based low back pain guidelines have focused on educational outreach [25,26]. More recent efforts in this regard are taking place at the point of care with the use of technology.

## CLINICAL DECISION SUPPORT AND MEANINGFUL USE

Clinical decision support (CDS) systems, in general terms, are software applications designed to assist health care providers in decision making throughout the health care process. When used at the order entry stage, these applications provide a unique opportunity to marry evidence-based clinical guidelines with computerized physician order entry systems. Clinical decision support interventions have been in existence for decades, yet there is a lack of widespread adoption in the United States. Recently, the federal government has provided monetary incentives for the implementation of CDS systems.

The Health Information Technology for Economic and Clinical Health Act of the American Recovery and Reinvestment Act of 2009 outlines a set of incentive payments for physicians and hospitals that demonstrate meaningful use of health IT. At the outset, the meaningful use incentive rule requires the implementation of one CDS system “relevant to specialty or high clinical priority, including for diagnostic test ordering, along with the ability to track compliance” [27]. In the wake of this legislation, providers have been slowly mobilizing to meet meaningful use standards.

In this article, we present a framework for the development of acute low back pain decision support tools with standardized order sets. This framework can be used by medical providers and systems designers to develop decision support applications that are customized to their unique practice setting. Order sets created using evidence-based best practices should improve clinical performance, establish a standard of care for an institution, streamline patient encounters, encourage regulatory

**Table 1. Adult with low back pain (acute)**

- History and physical key points
  - Duration and nature of symptoms
  - Presence of red flags (trauma history, unintentional weight loss, immunosuppression, history of cancer, intravenous drug use, steroid use, osteoporosis, age > 50 y, focal neurologic deficit, progression of symptoms)
  - Symptoms of spinal stenosis, radiculopathy
- Decision point (<4 weeks of symptoms)
  - No red flags, signs, or symptoms of spinal stenosis or radiculopathy
    - Go to order set for nonspecific acute low back pain
  - Signs or symptoms of spinal stenosis or radiculopathy
    - Go to order set for acute low back pain with radiculopathy or spinal stenosis
  - Red flags present
    - Go to order set for acute low back pain with red flags

compliance, and achieve the ultimate goals of better quality of care and outcomes.

Although the focus of this article is on developing CDS tools for use within the computerized physician order entry environment, this framework can also be used by providers that do not intend to meet new federal standards but have a desire to incorporate evidence-based low back pain order sets and evidence-based standards for imaging utilization into their clinical practice.

## CLINICAL DECISION SUPPORT TEMPLATES FOR ACUTE LOW BACK PAIN

Patients with acute low back pain (symptoms lasting <4 weeks) first undergo a thorough history and physical examination, after which they are placed into 1 of 3 broad clinical categories: nonspecific low back pain, low back pain potentially associated with radiculopathy or spinal stenosis, or low back pain potentially associated with a specific cause (Table 1). Order set templates have been devised for the initial visit and follow-up visits for patients falling into each of these clinical categories.

The reader will notice that the order sets do not contain specifics with regard to medication dose, route, or frequency. This is an intentional omission and is due to the number of variables that come into play when prescribing these medications, such as renal function, hepatic function, allergies, and so on. These data could be input manually, with the use of drop-down lists, or integrated into other medication-related decision support programs to aid clinicians in choosing the safest, most effective medication for each clinical scenario. The reader will also notice that each order set includes an input field titled “other.” These fields allow for template customization to incorporate local practice preferences.

The order sets provided herein are presented as one possible type of decision support tool among several possible tools that could be developed and used in this clinical setting. For instance, information buttons

could be used to provide real-time access to current clinical practice guidelines. Alerts and reminders during the order process may suggest alternative diagnostic or treatment modalities on the basis of patient-specific data. A more structured CDS system may be incorporated in which the end user is required to affirm the presence of certain criteria (ie, "red flags") before ordering an MRI examination or provide justification before prescribing steroids or narcotics. The order sets can be programmed to initiate the printout of patient handouts including information on low back pain, descriptions of self-care techniques, and the date and time of the follow-up visit.

Evidence-based practice guidelines for the evaluation and management of chronic low back pain (>3 months) overlap somewhat with acute low back pain guidelines. However, important differences exist that preclude adequate coverage of chronic low back pain evaluation and management in this paper.

### Nonspecific Low Back Pain

*Nonspecific low back pain* is predominantly localized to the back and is not associated with signs or symptoms of the entities found in the other two categories (ie, red flags, specific conditions, radiculopathy, or spinal stenosis). Nonspecific low back pain is not associated with significant functional impairment or rapidly progressive neurologic deficits.

Self-care techniques with established efficacy in this group include advising patients to remain active, the use of patient handouts, and the application of superficial heat [16]. There is good evidence that nonsteroidal anti-inflammatory drugs and skeletal muscle relaxants are effective for short-term pain relief. There is fair evidence that acetaminophen, tramadol, and benzodiazepines are effective for short-term pain relief. Although less effective, acetaminophen should be considered as a first-line medication because of its superior side effect profile. Opioids and tramadol may be prescribed for patients with severe, debilitating pain that is not responsive to acetaminophen or nonsteroidal anti-inflammatory drugs [16]. Referrals for physical or occupational therapy may also be considered. Imaging and invasive interventions are not recommended at this stage [7,14,16]. The evidence-based order form for this clinical pathway is found in Figure 1.

The patient is reassessed in 4 weeks. If there is improvement in the patient's symptoms at follow-up, educational materials are provided, and instructions on self-care are reinforced. Referrals for physical therapy, occupational therapy, or cognitive-behavioral therapy may be considered at this point, and further follow-up may be scheduled as is appropriate (Figure 2 online).

If there is no improvement in symptoms and there continues to be no evidence of red flags, radiculopathy, or spinal stenosis, referral for imaging may be considered. MRI is the preferred imaging modality, but CT may also provide useful information in those

situations in which MRI is not possible [14,16]. The order set for this clinical category is found in Figure 3 online.

If there are signs and symptoms of radiculopathy or spinal stenosis at the 4-week follow-up visit, imaging is considered only for those patients who are realistic candidates for invasive procedures. At this point, surgical and interventional pain management referrals may be considered. MRI is the modality of choice in this situation, with CT considered a viable option when MRI cannot be performed [14,16]. Figure 3 online contains a complete order set for this clinical pathway.

### Radiculopathy and Spinal Stenosis

*Radiculopathy* is defined as nerve root dysfunction manifesting as pain, paresthesia, reduced sensory function, decreased deep tendon reflexes, or weakness. The available evidence is insufficient to make specific self-care recommendations for patients in this group. However, there is evidence suggesting that self-care techniques used for patients with nonspecific low back pain may be safely used in this patient group [16]. Referral for physical or occupational therapy may be considered during the initial visit. Gabapentin has been shown to have small, short-term treatment effects in patients with radiculopathy. Otherwise, there is not sufficient evidence to establish specific medication recommendations for patients in this group. Imaging is not a part of the initial evaluation unless red flags are present [7,14,16], including patients being considered for epidural steroid injections [28]. An evidence-based order set for the initial visit is provided in Figure 4.

Follow-up takes place 4 weeks after the initial visit. If there is clinical improvement, self-care instructions and educational materials are provided, and additional follow-up is scheduled as needed (Figure 5 online). The patient is reassessed for psychosocial factors that may predict poorer long-term outcomes, such as depressive mood, somatization, and distress [29]. If there is no clinical improvement and the patient is a realistic candidate for invasive interventions, a referral for imaging may be appropriate. MRI is the modality of choice, with CT as a second option [14]. Surgical or interventional pain management referrals may be discussed with the patient at this point [16]. An order set for patients with radiculopathy or spinal stenosis who have not improved at the time of the initial follow-up visit is found in Figure 6 online.

### Red Flags

This category comprises the small percentage of patients who display red flags indicating the possibility of a serious underlying condition, such as malignancy, vertebral infection, vertebral compression fracture, cauda equina syndrome, and ankylosing spondylitis. Also included in this category are patients with severe or progressive neurologic deficits. Indicators of potentially serious underlying causes of acute low back pain

Patients with idiopathic/nonspecific low back pain of $\leq 4$ weeks duration without clinical concern for spine infection, malignancy, traumatic injury, or other serious conditions.
<b>PHARMACOLOGIC</b>
<input type="checkbox"/> Acetaminophen
<input type="checkbox"/> NSAID
<input type="checkbox"/> Skeletal muscle relaxants
<input type="checkbox"/> Other (tramadol, opioids, benzodiazepines)
<b>ACTIVITY</b>
<input type="checkbox"/> Normal
<input type="checkbox"/> Heat application
<input type="checkbox"/> Other
<b>EDUCATION</b>
<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book*)
<input type="checkbox"/> Other
<b>CONSULTS</b>
<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Other
<b>RETURN APPOINTMENT</b>
<input type="checkbox"/> 4 weeks
<input type="checkbox"/> Other

\*Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 1.** Nonspecific acute low back pain pathway: initial visit. NSAID = nonsteroidal anti-inflammatory drug.

include recent serious trauma or milder trauma in a patient  $>50$  years of age, immunosuppression, intravenous drug use or abuse, advanced age ( $>70$  years), and osteoporosis [14,16].

The diagnostic workup may include routine laboratory tests (eg, basic metabolic panel, complete blood count), erythrocyte sedimentation rate, C-reactive protein, human leukocyte antigen B27, serum or urine electrophoresis, electromyography, and nerve conduction velocity testing.

MRI is generally considered the initial imaging modality of choice for patients with red flags. CT with or without myelography may be used when there are contraindications to MRI. Plain radiography and  $^{99m}\text{Tc}$  bone scans may be considered acceptable modalities for the initial imaging workup of certain patients in this category [14]. Management of patients with red flags consists of treating the underlying etiology. An additional imaging workup may be required for treatment planning when a specific underlying etiology is identified

[14]. A complete evidence-based order set for patients presenting with red flags is found in Figure 7.

## DEVELOPMENT AND IMPLEMENTATION OF CLINICAL DECISION SUPPORT SYSTEMS

Once the decision has been made to develop a CDS system for acute low back pain, stakeholders are assembled to discuss of the objectives and desired outcome. Common objectives include improving patient care, reducing patient inconvenience, increasing efficiency, and reducing costs. Once consensus has been reached on the objectives and outcomes, the type of CDS application is determined.

The number of decision support applications has grown significantly over time. These applications may be integrated into the electronic medical record or exist as stand-alone programs. Most CDS applications are commercial products, but a number of “homegrown” applications have been developed at academic centers. Common decision support applications include reference tools (eg, information buttons, Web searches), order sets, documentation templates,



Radiculopathy: Dysfunction of a nerve root associated with pain, sensory impairment, weakness, or diminished deep tendon reflexes in nerve root distribution.
Spinal Stenosis: Low back or radicular pain that increases with walking and improves with flexion (sitting or propping)
<b>PHARMACOLOGIC</b>
<input type="checkbox"/> Acetaminophen
<input type="checkbox"/> NSAID
<input type="checkbox"/> Skeletal muscle relaxants
<input type="checkbox"/> Gabapentin
<input type="checkbox"/> Other (tramadol, opioids, benzodiazepine)
<b>ACTIVITY</b>
<input type="checkbox"/> Normal
<input type="checkbox"/> Heat application
<input type="checkbox"/> Other
<b>EDUCATION</b>
<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book*)
<input type="checkbox"/> Other
<b>CONSULTS</b>
<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Other
<b>RETURN APPOINTMENT</b>
<input type="checkbox"/> 4 weeks
<input type="checkbox"/> Other

\*Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 4.** Acute low back pain with symptoms of spinal stenosis or radiculopathy pathway: initial visit. NSAID = nonsteroidal anti-inflammatory drug.

protocol support, data displays, alerts, and reminders. Integral to the decision of the type of CDS tool is determination of the degree of end user control over whether to launch the tool and whether to follow recommendations generated by the tool. The degree of user control may have a significant impact on the effectiveness of the intervention.

When considering the various CDS tools, it is important to discuss the feasibility of the different options with the systems designer or vendor. Depending on the type of electronic medical record, there may be decision support tools that are already available or CDS components that can be used (eg, interfaces, logic rules, templates). Additional hardware or software may be required to fully implement the desired application. Organizations should also be prepared to allocate additional personnel during CDS implementation and thereafter for ongoing system maintenance.

Kawamoto et al [30] identified 4 features that are critical to the successful deployment of decision support systems: automatic provision of decision support as a part of clinician workflow, provision of recommendations rather than assessments, provision at the time and location of clinical decision making, and computer-based decision support. Those systems that had all 4 features showed higher levels of success. Similar experiences have been reported elsewhere in the literature [31].

Potential barriers to the implementation of CDS systems include real or perceived threats to physician autonomy, harm to the doctor-patient relationship, prior experience with poorly functioning computerized systems, and overreliance on a computer application [32]. If effectively addressed early in the design and implementation process, these factors can be minimized.

Diagnostic work up and recommendations* for patient management will vary amongst the different possible underlying/associated conditions. Category also includes serious or progressive neurologic deficits and conditions that may respond to prompt or specific treatment.
<b>Malignancy: personal history of cancer, weight loss, age &gt;50</b>
<b>Imaging:</b>
<input type="checkbox"/> MRI of the lumbar spine without and with contrast (preferred)
<input type="checkbox"/> CT of the lumbar spine without contrast (if MRI unavailable or contraindicated or as needed for problem solving)
<input type="checkbox"/> Radiographs of the lumbar spine
<input type="checkbox"/> Tc 99m bone scan
<input type="checkbox"/> Other
<b>Lab tests:</b>
<input type="checkbox"/> ESR
<input type="checkbox"/> Other
<b>Discitis/Osteomyelitis: fever, IV drug user, recent infection</b>
<b>Imaging:</b>
<input type="checkbox"/> MRI of the lumbar spine without and with contrast (preferred)
<input type="checkbox"/> CT of the lumbar spine without contrast (if MRI unavailable or contraindicated or as needed for problem solving)
<input type="checkbox"/> Radiographs of the lumbar spine
<input type="checkbox"/> Tc 99m bone scan
<input type="checkbox"/> Other
<b>Lab tests:</b>
<input type="checkbox"/> ESR and CRP
<input type="checkbox"/> Other
<b>Fracture: osteoporosis, steroid use, trauma, older age</b>
<b>Imaging:</b>
<input type="checkbox"/> MRI of the lumbar spine without contrast (preferred)
<input type="checkbox"/> CT of the lumbar spine without contrast (if MRI unavailable or contraindicated or as needed for problem solving)
<input type="checkbox"/> Radiographs of the lumbar spine
<input type="checkbox"/> Other

**Fig 7.** Acute low back pain with red flags or underlying serious condition pathway: initial visit. CRP = C-reactive protein; ESR = erythrocyte sedimentation rate; IV = intravenous; NSAID = nonsteroidal anti-inflammatory drug.

Decision support systems can be costly to implement and maintain. In addition to the potential capital outlays for new software or hardware, demands on staff time can be substantial. This is the case not only before and during implementation but also on an ongoing basis to keep the decision support tools up to date [33].

Assessment of a CDS intervention properly begins before implementation, with the collection of baseline data. Preimplementation and postimplementation data can then be compared to evaluate program efficacy. Arguments have also been made for small-scale evaluations that take place throughout the design and implementation phases that incorporate feedback from all stakeholders [34].

<b>Focal neurologic deficit with progressive or disabling symptoms, cauda equine symptoms (urinary retention, multilevel motor deficit, fecal incontinence, saddle anesthesia)</b>
<b>Imaging:</b>
<input type="checkbox"/> MRI of the lumbar spine without contrast (preferred)
<input type="checkbox"/> MRI of the lumbar spine without and with contrast
<input type="checkbox"/> Myelography and postmyelography CT of the lumbar spine
<input type="checkbox"/> CT lumbar spine with or without IV contrast
<input type="checkbox"/> Other
<b>Other:</b>
<input type="checkbox"/> Electromyography/nerve conduction velocity
<b>PHARMACOLOGIC</b>
<input type="checkbox"/> Acetaminophen
<input type="checkbox"/> NSAID
<input type="checkbox"/> Antidepressants (TCA†)
<input type="checkbox"/> Benzodiazepines
<input type="checkbox"/> Tramadol
<input type="checkbox"/> Opioids
<input type="checkbox"/> Other
<b>ACTIVITY</b>
<input type="checkbox"/> Normal
<input type="checkbox"/> Heat application
<input type="checkbox"/> Other
<b>EDUCATION</b>
<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book‡)
<input type="checkbox"/> Other
<b>CONSULTS</b>
<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Psychiatry
<input type="checkbox"/> Neurology
<input type="checkbox"/> Neurosurgery
<input type="checkbox"/> Orthopedics
<input type="checkbox"/> Hematology-Oncology
<input type="checkbox"/> Infectious Disease
<input type="checkbox"/> Endocrine
<input type="checkbox"/> Other

Fig 7. Continued

<b>RETURN APPOINTMENT:</b> (If no specific cause is identified follow-up at 4 weeks, otherwise, appropriate action and referral should take place)
<input type="checkbox"/> 4 weeks
<input type="checkbox"/> Other

\* Imaging tests listed in descending order of appropriateness according to the ACR recommendations from Low Back Pain Appropriateness Criteria.

† TCA - tricyclic antidepressants

‡ Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 7.** Continued

## DISCUSSION

Decision support interventions have the potential to increase clinician speed and efficiency. However, evidence-based order sets have well-known pitfalls that must be taken into consideration [34]. For instance, order sets that are difficult or inconvenient to access may not be used. Once implemented, order sets that are not regularly reviewed and revised quickly become outdated. Additionally, although order sets have many useful features, they typically cannot be sufficiently customized (eg, cannot be adjusted on the basis of current laboratory results, medication lists, or other dynamic factors) [35].

Systematic reviews have demonstrated improvement in clinician performance after CDS interventions [36,37]. A host of CDS systems used in a variety of clinical settings were included in these reviews. Although improvement in physician performance was observed in most of these studies, such was not often the case in terms of patient outcomes. At the present time, it is not clear what CDS features, if any, lead to improved patient outcomes.

A handful of studies have evaluated decision support systems implemented in the diagnostic imaging order entry process. An early study demonstrated that the implementation of decision support resulted in patterns of imaging utilization that more closely resembled imaging expert recommendations. Other groups have reported reductions in the percentage of low-utility imaging examinations [38,39] and reductions in the rate of growth of imaging utilization after the implementation of CDS systems [40].

Blackmore et al [41] developed an evidence-based decision support tool that specifically targeted inappropriate lumbar MRI utilization, the only intervention of its type to date. The CDS intervention in this case consisted of providers answering a series of questions during the order entry process. Providers that did not document compliance with institutionally approved indications were denied access to MRI, although alternatives were provided. This more restrictive intervention resulted in a sustained decrease in lumbar MRI utilization by 23.4%.

In addition to the meaningful use incentives previously discussed, payers in some regions are beginning to incentivize physicians to use CDS systems by waiving

preauthorization requirements. In these arrangements, physician orders must fall within a certain range of the established imaging appropriateness criteria to obtain such a waiver. The appeal of such arrangements is that they are more likely to be evidence based, transparent, education based, and to increase the efficiency of payers and physicians alike.

## CONCLUSIONS

We have presented a framework for the development of decision support applications for acute low back pain. At the initial visit, patients are categorized into 1 of 3 groups after a thorough history and physical examination: non-specific low back pain, low back pain potentially associated with radiculopathy or spinal stenosis, or low back pain potentially associated with a specific cause. Evidence-based order sets are provided for each category that are intended to guide practitioners through the process of evaluation, management, and follow-up of patients.

Order set templates for use at the initial follow-up visit (4 weeks) provide evidence-based recommendations for appropriate imaging, laboratory workup, referral for invasive procedures, or surgical consultation. Reminders to reassess for psychological factors and red flags can be integrated into the order screen at this stage.

The evidence-based order templates we have presented are designed to assist practitioners with the sometimes confusing process of managing patients with acute low back pain. We have presented a logical method of choosing, developing, and implementing CDS interventions that is based on the best available evidence. A carefully designed CDS system may be reasonably expected to improve patient care, decrease inappropriate imaging utilization, reduce the inappropriate use of steroids and narcotics, and potentially decrease the number of inappropriate invasive procedures. Ideally, these templates could also be used to develop transparent criteria for payer coverage determinations with regard to imaging, medications, procedures, and surgical interventions.



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Patients with idiopathic/nonspecific low back pain of 4 weeks to 3 months duration without clinical concern for spine infection, malignancy, traumatic injury, or other serious conditions.	
<b>Patient Symptoms Same or Better</b>	
<b>PHARMACOLOGIC</b>	<b>EDUCATION</b>
<input type="checkbox"/> Acetaminophen	<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book†)
<input type="checkbox"/> NSAID	<input type="checkbox"/> Other
<input type="checkbox"/> Antidepressants (TCA*)	<b>CONSULTS</b>
<input type="checkbox"/> Benzodiazepines	<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Tramadol	<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Opioids	<input type="checkbox"/> Other
<input type="checkbox"/> Other	
<b>ACTIVITY</b>	<b>RETURN APPOINTMENT</b>
<input type="checkbox"/> Normal	<input type="checkbox"/> 4 weeks
<input type="checkbox"/> Heat application	<input type="checkbox"/> Other (as needed)
<input type="checkbox"/> Massage	
<input type="checkbox"/> Yoga	
<input type="checkbox"/> Acupuncture	
<input type="checkbox"/> Progressive relaxation	
<input type="checkbox"/> Cognitive-behavioral therapy	
<input type="checkbox"/> Other	

\* TCA - tricyclic antidepressants

† Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 2.** Nonspecific acute low back pain pathway: follow-up visit. NSAID = nonsteroidal anti-inflammatory drug.

Patients with idiopathic/nonspecific low back pain of 4 weeks to 3 months duration without clinical concern for spine infection, malignancy, traumatic injury, or other serious conditions.	
<b>Patient symptoms worsened and/or signs/symptoms of spinal stenosis or radiculopathy</b>	
<b>PHARMACOLOGIC</b>	<b>IMAGING</b> (surgery/ intervention candidate)
<input type="checkbox"/> Acetaminophen	<b>No previous spine surgery:</b>
<input type="checkbox"/> NSAID	<input type="checkbox"/> Lumbar spine MRI without contrast (preferred)
<input type="checkbox"/> Antidepressants (TCA*)	<input type="checkbox"/> Lumbar spine CT without contrast (if MRI is nondiagnostic or unavailable)
<input type="checkbox"/> Benzodiazepines	<input type="checkbox"/> Other
<input type="checkbox"/> Tramadol	<b>Previous lumbar spine surgery</b>
<input type="checkbox"/> Opioids	<input type="checkbox"/> Lumbar spine MRI without and with contrast (preferred)
<input type="checkbox"/> Other	<input type="checkbox"/> Lumbar spine CT without contrast
<b>ACTIVITY</b>	<input type="checkbox"/> Lumbar spine MRI without contrast (if contrast contraindication)
<input type="checkbox"/> Normal	<input type="checkbox"/> Other
<input type="checkbox"/> Heat application	<b>CONSULTS</b>
<input type="checkbox"/> Massage	<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Yoga	<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Acupuncture	<input type="checkbox"/> Psychiatry
<input type="checkbox"/> Progressive relaxation	<input type="checkbox"/> Neurology
<input type="checkbox"/> Cognitive-behavioral therapy	<input type="checkbox"/> Neurosurgery
<input type="checkbox"/> Other	<input type="checkbox"/> Orthopedics
<b>EDUCATION</b>	<input type="checkbox"/> Other
<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book†)	<b>RETURN APPOINTMENT</b>
<input type="checkbox"/> Other	<input type="checkbox"/> 4 weeks
	<input type="checkbox"/> Other

\* TCA - tricyclic antidepressants

† Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 3.** Nonspecific acute low back pain pathway: follow-up visit. NSAID = nonsteroidal anti-inflammatory drug.

Radiculopathy: Dysfunction of a nerve root associated with pain, sensory impairment, weakness, or diminished deep tendon reflexes in nerve root distribution.	
Spinal Stenosis: Low back or radicular pain that increases with walking and improves with flexion (sitting or propping)	
<b>Improved</b>	
<b>PHARMACOLOGIC</b>	<b>EDUCATION</b>
<input type="checkbox"/> Acetaminophen	<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book <sup>†</sup> )
<input type="checkbox"/> NSAID	<input type="checkbox"/> Other
<input type="checkbox"/> Antidepressants (TCA*)	<b>CONSULTS</b>
<input type="checkbox"/> Benzodiazepines	<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Tramadol	<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Opioids	<input type="checkbox"/> Other
<input type="checkbox"/> Gabapentin	<b>RETURN APPOINTMENT</b>
<input type="checkbox"/> Other	<input type="checkbox"/> 4 weeks
<b>ACTIVITY</b>	
<input type="checkbox"/> Normal	
<input type="checkbox"/> Heat application	
<input type="checkbox"/> Massage	
<input type="checkbox"/> Yoga	
<input type="checkbox"/> Acupuncture	
<input type="checkbox"/> Progressive relaxation	
<input type="checkbox"/> Cognitive-behavioral therapy	
<input type="checkbox"/> Other	

\* TCA - tricyclic antidepressants

<sup>†</sup> Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 5.** Acute low back pain with symptoms of spinal stenosis or radiculopathy pathway: follow-up visit. NSAID = nonsteroidal anti-inflammatory drug.

Radiculopathy: Dysfunction of a nerve root associated with pain, sensory impairment, weakness, or diminished deep tendon reflexes in nerve root distribution.	
Spinal Stenosis: Low back or radicular pain that increases with walking and improves with flexion (sitting or propping)	
<b>Unchanged or Worsening signs/symptoms of Spinal Stenosis/Radiculopathy</b>	
<b>PHARMACOLOGIC</b>	<b>IMAGING</b> (surgery and/or intervention candidate)
<input type="checkbox"/> Acetaminophen	<b>No previous spine surgery</b>
<input type="checkbox"/> NSAID	<input type="checkbox"/> Lumbar spine MRI without contrast (preferred)
<input type="checkbox"/> Antidepressants (TCA*)	<input type="checkbox"/> Lumbar spine CT without contrast (if MRI is nondiagnostic or unavailable)
<input type="checkbox"/> Benzodiazepines	<input type="checkbox"/> Other
<input type="checkbox"/> Tramadol	<b>Previous lumbar spine surgery</b>
<input type="checkbox"/> Opioids	<input type="checkbox"/> Lumbar spine MRI without and with contrast (preferred)
<input type="checkbox"/> Gabapentin	<input type="checkbox"/> Lumbar spine CT without contrast
<input type="checkbox"/> Other	<input type="checkbox"/> Lumbar spine MRI without contrast (if contrast contraindication)
<b>ACTIVITY</b>	<input type="checkbox"/> Other
<input type="checkbox"/> Normal	<b>CONSULTS</b>
<input type="checkbox"/> Heat application	<input type="checkbox"/> Physical Therapy
<input type="checkbox"/> Massage	<input type="checkbox"/> Occupational Therapy
<input type="checkbox"/> Yoga	<input type="checkbox"/> Psychiatry
<input type="checkbox"/> Acupuncture	<input type="checkbox"/> Neurology
<input type="checkbox"/> Progressive relaxation	<input type="checkbox"/> Neurosurgery
<input type="checkbox"/> Cognitive-behavioral therapy	<input type="checkbox"/> Orthopedics
<input type="checkbox"/> Other	<input type="checkbox"/> Other
<b>EDUCATION</b>	<b>RETURN APPOINTMENT</b>
<input type="checkbox"/> Back Pain Pamphlet (eg, The Back Book†)	<input type="checkbox"/> 4 weeks
<input type="checkbox"/> Other	<input type="checkbox"/> Other

\* TCA - tricyclic antidepressants

† Gokaslan ZL, Riley LH. The back book. Baltimore: Johns Hopkins University Press; 2008.

**Fig 6.** Acute low back pain with symptoms of spinal stenosis or radiculopathy pathway: follow-up visit. NSAID = nonsteroidal anti-inflammatory drug.