Diagnosis and management of low-back pain in primary care

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Low-back pain is the leading cause of disability worldwide.[1] It is the second most common symptom-related reason for seeking care from a primary care physician.[2] In Australia, low-back pain is the number one cause of early retirement and income poverty.[3] Although most people will have low-back pain at some point, only around half will seek health care.[4] In 2013, patients in the United States spent an estimated US$87.6 billion on health services for low-back and neck pain (ranked third out of all health conditions), and this amount is increasing rapidly.[5] When indirect costs (e.g., from lost productivity) are included, this estimate exceeds $100 billion per annum.[6]

Despite increased spending on health services, patient outcomes have not improved,[7] and global disability related to low-back pain has continued to increase.[1] One explanation for this phenomenon could be that patients are receiving "low-value" health services — services that provide little to no benefit or cause harm[8] — such as prescriptions for opioids,[9] diagnostic imaging[10] and spinal fusion surgery for patients with persistent low-back pain, that is, pain for more than 12 weeks.[11] One survey of practice found 25% of patients with acute low-back pain, that is, pain for less than 12 weeks, were referred for imaging during the first visit to a family physician.[12] In addition to problems of overuse, there is increasing evidence that physicians underuse treatments known to improve low-back pain. In a review of the medical records of 1000 adults in Australia (2009–2010) to measure compliance with expert consensus indicators representing appropriate care for 22 common medical conditions, only 21% of clinicians reported providing advice and reassurance[13] — a recommendation given by all current major guidelines.

Two new guidelines — the UK National Institute for Health and Care Excellence clinical guideline for low-back pain and sciatica published in 2016 and a clinical practice guideline from the American College of Physicians published in 2017 — encourage a shift in thinking about the primary care management of low-back pain and support physicians in the provision of more appropriate care for their patients.[14,15] We discuss the current recommendations and evidence base for management of low-back pain in primary care (Box 1). We focus on management options for nonspecific low-back pain and radicular pain or neurogenic claudication; these conditions comprise more than 95% of low-back pain seen in primary care[2] and can be effectively managed in this setting.

KEY POINTS

- Most low-back pain with or without radicular pain or neurogenic claudication does not require immediate diagnostic imaging and can be managed in primary care.

- All patients with nonspecific low-back pain should be offered information on the nature of low-back pain, reassurance about the likely low risk of serious underlying disease and advice on evidence-based self-management.

- Patients with acute low-back pain who do not respond to initial management, or who are screened as being at high risk of a poor outcome with a validated prognostic screening tool, may benefit from nonpharmacologic treatments for pain relief, such as heat, massage or spinal manipulation.

- For patients with persistent low-back pain with no obvious pathology, nonpharmacologic treatments for pain relief, such as exercise programs, cognitive behavioural therapy, mindfulness-based stress reduction, operant therapy, massage, spinal manipulation, acupuncture or multidisciplinary rehabilitation programs, may be of benefit.

- For patients with persistent low-back pain, there is limited evidence for the effectiveness of pharmacologic treatment and mixed recommendations from guidelines.

Box 1: Evidence used in this review

We used evidence provided in two clinical practice guidelines that were published in the past 12 months: the 2016 guideline from the National Institute for Health and Care Excellence in the United Kingdom[14] and the 2017 guideline from the American College of Physicians in the United States with its accompanying evidence review.[15] We prioritized the discussion of evidence from the 2017 guideline recommendations because they were the most recent. In addition, we searched the Cochrane Database of Systematic Reviews for reviews that were published by the Cochrane Back and Neck Review Group from database inception to Apr. 6, 2017. We found 17 review protocols and 51 reviews of low-back pain. We complemented this search with the most recent literature from our own collections. We used these articles to describe the evidence in areas where the 2017 American College of Physicians guideline did not describe the evidence base, the two recent guidelines had conflicting recommendations, and recent evidence may have superseded evidence provided in a guideline. We graded the quality of evidence that we located from other sources using the Grading of Recommendations Assessment, Development and Evaluation approach (http://gradeworkinggroup.org/).

How can physicians decide if low-back pain has a serious cause?

Low-back pain is a common symptom and there are many possible causes. In primary care, low-back pain can be classified into one of four categories: a problem beyond the lumbar spine (e.g., kidney stones); a serious disorder affecting the lumbar spine (e.g., epidural abscess); low-back pain occurring with radicular pain (e.g., related to intervertebral disc herniation) or neurogenic claudication (e.g., related to central spinal canal stenosis); or nonspecific low-back pain.[16] Nonspecific low-back pain — where a specific pathoanatomic diagnosis is not possible — accounts for about 90% of all low-back pain seen in primary care.[17] The primary purpose of this initial classification is to identify the small number of patients with low-back pain who require specific treatments or urgent referral to a specialist to avoid serious consequences. In a longitudinal cohort study in primary care settings in Australia ($n = 1172$), less than 1% of patients were found to have a serious cause for their low-back pain (e.g., cancer, infection or fracture).[18]

A focused history and physical examination is used to identify those with a greater likelihood of serious disease or a specific cause of low-back pain (Box 2). All other cases are considered to be nonspecific low-back pain.

Is it always necessary to determine a cause?

Many physicians dismiss a diagnosis of nonspecific low-back pain[23] and instead pursue specific diagnoses of the anatomic structures responsible for the pain.[24] There are two problems with this approach. First, the tests used to identify anatomic sources of nonspecific low-back pain have unacceptably low validity,[25] so the diagnoses are nominal. For example, the clinical utility of describing patients as having "neuropathic" back pain has not been established; screening questionnaires used to detect this condition have unclear evidence for validity,[26] and there is evidence that drugs for neuropathic pain lack clinical effectiveness. One recent high-quality randomized controlled trial (RCT) involving patients with sciatica ($n = 209$) in Australia reported that pregabalin, a drug for neuropathic pain, was not effective for either acute or chronic radicular pain compared with placebo.[27] Second, structural diagnoses encourage the use of structure-based treatments that have been shown to be ineffective. Despite evidence of their ineffectiveness, treatment with injections of anesthetics, corticosteroids, sclerosing agents, stem cells and blood products into back structures that are thought to be generating the pain waste billions of dollars each year. For example, almost 1 million lumbar facet injections were funded by the Centers for Medicare and Medicaid Services in the US in 2011.[28]

Which patients require diagnostic imaging?

Most patients who complain of low-back pain do not require diagnostic imaging immediately. Imaging is only indicated if a specific cause of low-back pain is suspected and timely diagnosis is critical to safe effective care.[29] If there is low suspicion of cancer or fracture, it may be reasonable to defer testing and start a trial of treatment. However, if there is any level of suspicion of cauda equina syndrome or an epidural abscess, immediate investigation is warranted given the serious consequences of delayed diagnosis.[29] Contrary to common practice, patients with radicular pain or radiculopathy related to suspected disc herniation or neurogenic claudication related to suspected central spinal canal stenosis, do not need to be referred for immediate imaging, because the results will not change primary care management; the initial management of these conditions and nonspecific low-back pain are the same (Figure 1).

Some clinical guidelines encourage diagnostic imaging when one red flag is present (i.e., an alerting feature such as night pain).[30] Although serious disease is uncommon, red flags may be common; therefore, this approach is unwise. For example, in a

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Box 2: Alerting clinical features for specific causes of low-back pain*

Serious spinal disease

- New bladder or bowel disturbance, saddle numbness, lower motor neuron weakness (consider cauda equina syndrome†)
- New onset of fever and history of intravenous drug use, spinal procedure, immunosuppression (consider vertebral infection†)
- History of cancer that metastasizes to bone (e.g., breast, lung, prostate) (consider metastatic disease)
- History of osteoporosis, systemic steroid use, trauma, older age (more than 65 years of age) (consider vertebral fracture if multiple features present)[19]
- Persistent symptoms (more than 12 weeks), age at onset is less than 45 years, inflammatory features (insidious onset, no improvement with rest, pain at night and/or early morning that improves with exercise or activity), peripheral manifestations (e.g., arthritis, enthesitis, uveitis, psoriasis) or family history of spondyloarthritis (consider axial spondyloarthritis)[20]

Problem beyond the spine

- Systemically unwell
- Nonmechanical pain (i.e., pain that is unrelated to movement)
- Hip joint signs (consider hip joint disease)
- Abdominal pulsations (consider abdominal aortic aneurysm)[21]
- Gynecologic, renal/urinary tract, gastrointestinal signs and symptoms (e.g., abdominal tenderness, hematuria) (consider visceral origin)
- Atherosclerotic risk factors, claudication (consider vascular origin)

Radicular pain or neurogenic claudication

- Leg pain in a spinal nerve distribution with or without low-back pain (consider radicular pain†)
- Sensory loss, reduced reflex, myotomal weakness in spinal nerve distribution (consider radiculopathy†)
- Bilateral buttock, thigh or leg pain, pseudoclaudication (consider central spinal canal stenosis† (e.g., age-related degenerative changes including degenerative spondylolisthesis)

*Adapted from the article by Atlas and Deyo.[22]
†These patients may not have low-back pain. Suspicion of cauda equina syndrome or vertebral infection requires urgent referral to a specialist.

prospective longitudinal study involving 482 consecutive patients who attended a back pain triage clinic, 213 (44%) reported night pain, yet none of the these patients had serious disease.[31] In an Australian cohort of 1172 patients,[18] where less than 1% of patients had a serious cause of the low-back pain, 80% had at least one red flag. This means that most red flags will be false positives. A Cochrane review of 24 red flags for malignant disease[32] found only one (previous history of cancer) that had acceptable diagnostic accuracy in patients with low-back pain. Decisions about further diagnostic work-up should be based on consideration of a combination of clinical features, the strength of clinical suspicion and the consequences of a delayed diagnosis. Clinical decision aids to support screening for serious disease have been developed;[33] however, these have not been evaluated in diagnostic studies. Many patients expect diagnostic imaging,[34] and a clear explanation for not ordering immediate imaging should be provided. We have presented an example dialogue in Appendix 1 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170527/-/DC1).

How should acute low-back pain be managed?

Two recent changes to guidelines for acute low-back pain are important. First, nondrug options are preferred over pharmacologic pain relief for initial management of back pain.[14,15] Second, a stratified approach to management based on scores from prognostic screening questionnaires rather than on response to initial management is recommended in the UK guideline.[14] Guideline-congruent management of acute low-back pain is summarized in Table 1. Key changes to management of low-back pain over the past 10 years are summarized in Appendix 2 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170527/-/DC1).
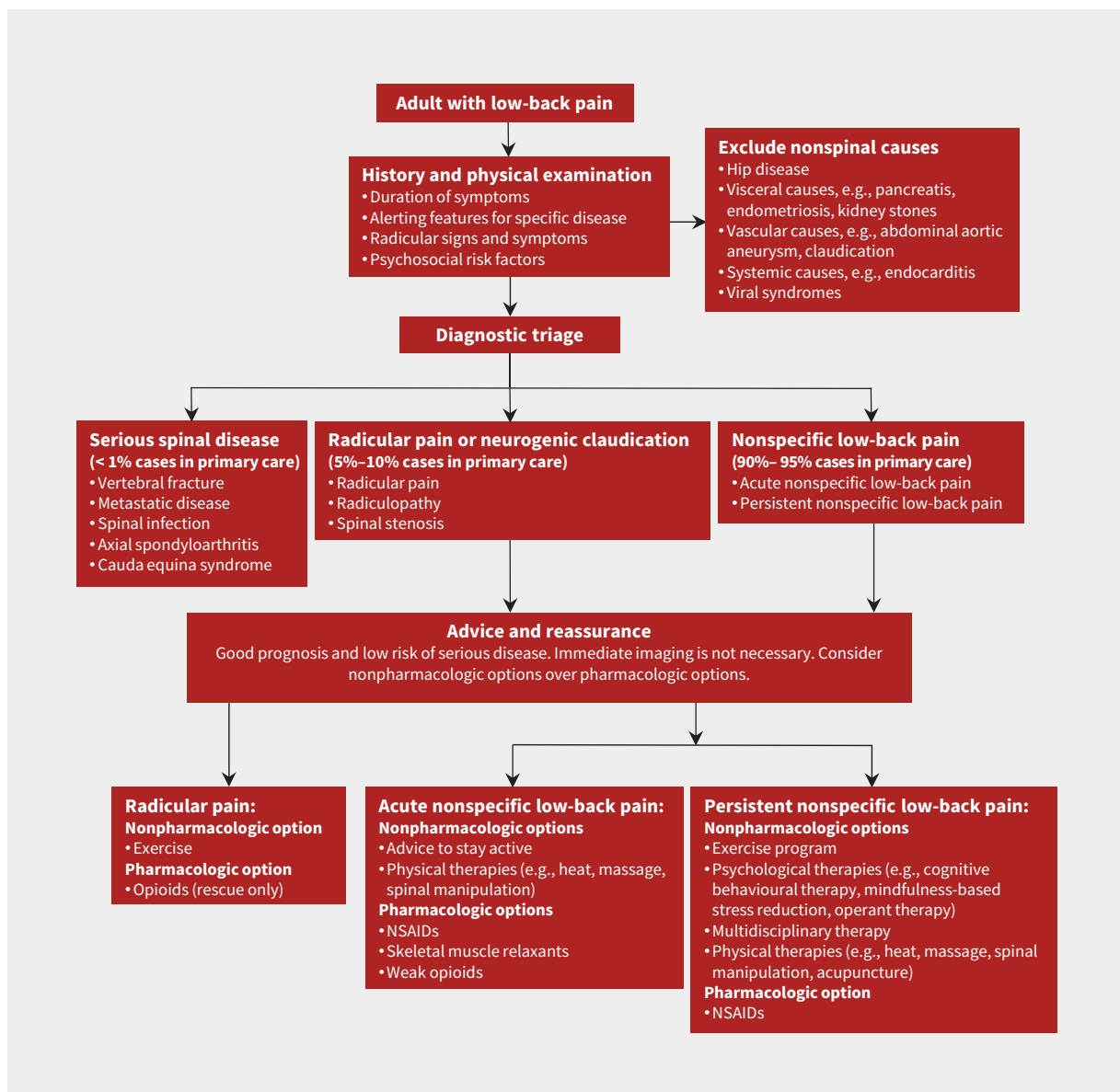

Figure 1: Diagnosis and management of low-back pain according to current clinical practice guidelines from the United Kingdom and United States.[14,15] NSAID = nonsteroidal anti-inflammatory drug.

Nonpharmacologic treatments

The recent guidelines recommend providing advice to stay active, and reassurance about the high chance of a good prognosis and the low chance of serious disease.[14,15] We also suggest that physicians inform the patient that pain often recurs. Although nonpharmacologic treatment options may include massage or spinal manipulation, the US guideline qualified its recommendation for nonpharmacologic treatments by stating: "most patients with acute or subacute low back pain improve over time regardless of treatment." Acute episodes improve rapidly in the first two weeks;[37] we suggest arranging a review within one to two weeks of initial presentation at a mutually agreed time. Timely review will allow physicians to assess progress toward recovery and the effectiveness of any initial treatments that are provided.

The evidence for treatment with spinal manipulation in patients with acute low-back pain that was considered for the US guideline was not strong: two RCTs (n = 292) showed a small effect on function and an unclear effect on pain compared with placebo spinal manipulation.[15] A recent systematic review that included 15 RCTs (n = 1711) found moderate-quality evidence that, although it was no better than placebo spinal manipulation at reducing pain, spinal manipulation was associated with a small short-term reduction in pain compared with other treatments (around 10 points on a 100-point scale).[38] Identified harms of spinal manipulation included a short-term increase in pain in 50% to 67% of patients.[38]

A systematic review that included 14 RCTs (n = 4872) of patient education interventions in primary care found strong evidence that patient education reduced psychological distress and use of health care related to low-back pain;[39] yet, on its own, patient education did not improve pain or function in patients with acute low-back pain.

The US guideline suggested other nonpharmacologic options for initial management such as superficial heat and acupuncture.[15] The guideline's evidence review concluded that there was low-quality evidence (two RCTs, n = 100) for a small short-term effect of acupuncture on pain outcomes compared with placebo acupuncture. This contrasts with the UK guideline, which recommended that physicians not offer acupuncture to patients with low-back pain based on a lack of "compelling and consistent treatment specific effect."[14] The UK guideline acknowledged that

				Endorsement	
Type	Intervention	Size of effect*	Quality of evidence*	2016 UK guideline[14]	2017 US guideline[15]
Nonpharmacologic	Advice to stay active v. bed rest	Small	Moderate† (2 RCTs)[35]	Yes	Yes
	Massage v. sham treatment	Moderate	Low (2 RCTs)	Yes, if part of an exercise program	Yes
	Spinal manipulation v. inert treatment	No effect	Low (3 RCTs)	Yes, if part of an exercise program	Yes
	Acupuncture v. sham treatment	Small	Low (3 RCTs)	Do not offer	Yes
	Heat v. sham treatment	Moderate	Moderate (4 RCTs)	No mention	Yes
	Exercise v. usual care	No effect	Low (6 RCTs)	Yes	No mention
	Psychologically informed physiotherapy v. usual care	No trials	N/A†	Yes, for those at high risk of poor outcome	No mention
Pharmacologic	NSAIDs v. placebo	Small	Moderate (5 RCTs)	Yes	Yes, depending on patient preferences and drug risk profile
	Muscle relaxants v. placebo	Small	Moderate (5 RCTs)	No mention	Yes, depending on patient preferences and drug risk profile
	Opioids v. placebo	No trials	N/A†	Yes, if NSAIDs are unsafe or ineffective; weak opioid only	Do not offer
	Paracetamol v. placebo	No effect	High† (2 RCTs)[36]	Do not offer	Do not offer
	Systemic corticosteroids v. placebo	No effect	Low (2 RCTs)	No mention	Do not offer

Note: GRADE = Grading of Recommendations Assessment, Development and Evaluation, N/A = No evidence from RCTs, NSAID = nonsteroidal anti-inflammatory drug, RCT = randomized controlled trial.
*Based on 2017 American College of Physicians guideline summary of evidence except where otherwise noted. Comparisons are to placebo, sham treatment, no treatment or usual care, and on short-term pain outcomes.
†Our summary of evidence used the GRADE approach.

some studies have shown clinically important effects compared with usual care but also notes that they were short-term studies with possible contextual effects, such as those resulting from patients having positive expectations about the treatment or from receiving effective reassurance and emotional support.[14] Superficial heat therapy was endorsed by the US guideline based on a Cochrane review that found moderate-quality evidence (two RCTs, n = 258) for a moderate effect (about 17 points on a 100-point scale) on short-term pain outcomes compared with oral placebo or nonheated wrap.[40]

The US guideline found low-quality evidence (six RCTs: three from a 2005 Cochrane review [n = 491] and an additional three trials [n = 653]) that exercise is not effective for acute low-back pain compared with usual care.[15] The role for exercise in the prevention of pain recurrence after the patient has recovered was evaluated in a systematic review of 21 RCTs (n = 30 850) that concluded there was low- to very low–quality evidence that exercise alone can reduce the risk of future episodes of low-back pain compared with no exercise (relative risk [RR] 0.65, 95% confidence interval [CI] 0.50–0.86).[41]

Pharmacologic treatments

Nonsteroidal anti-inflammatory drugs (NSAIDs) are the only pharmacologic option endorsed by both recent guidelines.[14,15] A systematic review found high-quality evidence (five randomized trials, n = 814) that NSAIDs provided a small effect on pain compared with placebo in patients with acute low-back pain (mean difference 6.4 points on a 100-point scale, 95% CI 2.5–10.3).[42] Harms of NSAIDs are well known; the US guideline found moderate-quality evidence (10 RCTs) for increased risk of adverse events such as abdominal pain, gastrointestinal bleeding and heartburn (RR 1.35, 95% CI 1.09–1.68).[15] It recommended pharmacologic options only as second-line options and, in addition to NSAIDs, included the option of skeletal muscle relaxants.

A review that evaluated the efficacy and tolerability of muscle relaxants found good-quality evidence (five RCTs, n = 496) that muscle relaxants provided clinically meaningful pain relief in patients with acute low-back pain (about 20 points on a 100-point scale) compared with placebo.[43] However, the US guideline cited the following harms of using muscle relaxants based on evidence from eight RCTs: increased risk of dizziness, drowsiness and sedation (RR 1.50, 95% CI 1.14–1.98). Such harms are particularly relevant to consider when prescribing for certain groups with low-back pain (e.g., older adults).

How should persistent nonspecific low-back pain be managed?

Nonpharmacologic treatments

Important differences between management of persistent and acute low-back pain are summarized in Table 2, with evidence-based nonpharmacologic options for persistent low-back pain. Both the US[15] and UK guidelines[14] endorsed exercise programs, cognitive behavioural therapy and multidisciplinary therapy as treatment options for persistent nonspecific pain, none of which were recommended for acute low back pain. Evidence from

53 RCTs (n = 5801) suggested that nonpharmacologic treatments (e.g., exercise, spinal manipulation, acupuncture, cognitive behavioural therapy), although traditionally thought to improve function but not pain, may provide modest effects on pain intensity, equivalent to those of popular pharmacologic options.[47]

Most nonpharmacologic treatments for persistent low-back pain are time and resource intensive, which limits their provision in primary care. In some countries, including Canada, these options may not be funded by public health services. Strategies to improve access to nonpharmacologic treatments, for example, through remotely delivered interventions or funding of allied health staff to provide treatments such as cognitive behavioural therapy in primary care, have not been researched extensively.

Physicians who recommend nonpharmacologic treatments for persistent low-back pain can use a "stratified" approach (i.e., allocate higher-intensity treatments to those patients at highest risk of poor outcomes — discussed in the "Who needs referral?" section) or a "stepped" approach (i.e., allocate higher-intensity treatments to those patients whose symptoms fail to respond to low-intensity treatments). The UK guideline endorsed the stratified approach (presumably because there is evidence of its effectiveness from one trial conducted in the UK[48]), whereas the US guideline described the traditional stepped approach. There is little evidence that compares the effectiveness and cost-effectiveness of these two strategies.

Pharmacologic treatments

Notable recent changes to recommendations regarding pharmacologic management of persistent low-back pain are summarized in Appendix 3 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170527/-/DC1). Similar to acute low-back pain, the only pharmacologic option endorsed by both recent guidelines for persistent low-back pain is use of NSAIDs. The previously mentioned systematic review investigated the effects of NSAIDs in patients with persistent low-back pain and found evidence from seven RCTs (n = 2277) that brief courses of NSAIDs had a small effect on pain compared with placebo (mean difference 11.1 points on a 100-point scale, 95% CI 8.4–13.8).[42] Nonsteroidal anti-inflammatory drugs should be confined to a brief course of less than two weeks in carefully selected patients with a favourable renovascular and gastrointestinal risk profile, given their potential harms. The UK guideline suggested ongoing monitoring of risk factors for patients taking NSAIDs and consideration of gastroprotection. Both guidelines specify that NSAIDs should be used for the shortest possible period. Use of acetaminophen, tricyclic antidepressants and benzodiazepines are discouraged in the management of persistent low-back pain. Unlike for acute low-back pain, there is insufficient evidence to support the use of muscle relaxants for persistent low-back pain.[43]

The UK and US guidelines differ regarding use of opioids. Although the UK guideline supported offering weak opioids to patients with acute low-back pain if NSAIDs are contraindicated, prescribing opioids for persistent low-back pain was discouraged. There are no placebo-controlled trials of opioids involving patients with acute low-back pain, only those with persistent low-back pain.[9] The US guideline advised against

prescribing opioids for acute low-back pain but to consider them as a last resort for patients with persistent low-back pain. A Cochrane review that included 15 RCTs (*n* = 5540) of moderate quality found evidence of pain reduction of about 11 points on a 100-point scale for use of opioids compared with placebo among patients with persistent low-back pain;[44] however, many patients do not respond to, or tolerate, these drugs. A 2016 systematic review of 20 placebo-controlled RCTs (*n* = 7925) that evaluated opioids for persistent low-back pain reported that the median drop-out rate owing to adverse events or lack of efficacy was 50%.[9] The 2016 US Centers for Disease Control and Prevention guideline for prescribing opioids for chronic pain[49] suggested that physicians should prescribe opioids only under the following circumstances: benefits are likely to outweigh the risks for a given patient; treatment with opioids is combined with nonpharmacologic and nonopioid pharmacologic therapy; and treatment goals, including a discontinuation plan, are established with the patient. The 2017 Canadian "Guideline for Opioid Therapy and Chronic Noncancer Pain"[50] provides strategies to minimize use

Table 2: Recent guideline recommendations for management of persistent nonspecific low-back pain

Management type	Intervention	Size of effect*	Quality of evidence*	Endorsement	
				2016 UK guideline[14]	2017 US guideline[15]
Nonpharmacologic	Exercise v. no exercise	Small	Moderate (19 RCTs)	Yes, for patients with flare-up (a temporary increase in severity of the ongoing symptoms)	Yes
	Spinal manipulation v. inert treatment	Small	Low (7 RCTs)	Yes, if part of an exercise program	Yes
	Cognitive behavioural therapy v. no treatment	Moderate	Low (5 RCTs)	Yes, if part of an exercise program	Yes
	Behavioural (operant) therapy v. no treatment	Small	Low (3 RCTs)	Yes, if part of an exercise program	Yes
	Multidisciplinary therapy v. usual care	Moderate	Moderate (9 RCTs)	Yes, if previous treatment not effective or at high risk of poor outcome	Yes
	Massage v. usual care	No effect	Low (1 RCT)	Yes, if part of an exercise program	Yes
	Acupuncture v. placebo	Moderate	Low (9 RCTs)	Do not offer	Yes
	Ultrasonography v. no treatment	No effect	Low (5 RCTs)	Do not offer	Do not offer
	TENS v. sham treatment	No effect	Low (4 RCTs)	Do not offer	Do not offer
Pharmacologic	NSAIDs v. placebo	Small	Moderate (6 RCTs)	Yes, if safe, at lowest dose and short term only	Yes, if nonpharmacologic options fail
	Opioids v. placebo	Small	Moderate† (15 RCTs)[44]	Do not offer	Yes, only as last resort
	Paracetamol v. placebo	No effect	Very low† (1 RCT)[36]	Do not offer	Insufficient evidence
	Tricyclic antidepressants v. placebo	No effect	Moderate (4 RCTs)	Do not offer	Do not offer
	Benzodiazepines v. placebo	Lower likelihood of failure to improve	Low (2 RCTs)	Do not offer	Insufficient evidence
Injection therapy	Epidural steroid injection v. placebo	No effect	Low† (2 RCTS)[45]	Do not offer	No mention
	Facet joint steroid injection v. placebo	No effect	Low† (2 RCTS)[45]	Do not offer	No mention
	Radiofrequency denervation v. sham intervention	Facet: small	Low† (4 RCTs)[14]	Yes, if nonsurgical treatment failed and positive response to medial branch block	No mention
Surgery	Spinal fusion v. rehabilitation	No effect	Moderate† (4 RCTs)[46]	Do not offer unless as part of a trial	No mention

Note: GRADE = Grading of Recommendations Assessment, Development and Evaluation, NSAID = nonsteroidal anti-inflammatory drug, RCT = randomized controlled trial, TENS = transcutaneous electrical nerve stimulation.
*Based on 2017 American College of Physicians guideline summary of evidence except where otherwise noted. Comparisons are to placebo, sham treatment, no treatment or usual care, and on short-term pain outcomes.
†Our summary of evidence used the GRADE approach.

of this medicine including optimizing nonpharmacologic therapy before prescribing a trial of opioids, restricting the prescribed dosage to less than 90 morphine mg equivalents daily and providing multidisciplinary programs to patients on chronic opioid therapy who are having difficulty tapering (https://magicapp.org/app#/guideline/2178).

Other treatments

The UK guideline recommended that surgical procedures, such as spinal fusion, should not be offered to patients with persistent low-back pain unless it is part of a RCT.[14] The guideline provided clear advice on the role of epidural steroid injections: do not offer these injections to patients with persistent low-back pain. It also endorsed radiofrequency denervation for selected patients with persistent low-back pain. However, the recently published Mint randomized clinical trials[51] — three high-quality trials (n = 681) that showed that radiofrequency denervation was not effective at reducing pain among patients with persistent low-back pain who had a positive response to a diagnostic block of the facet joint,

sacroiliac joints, a combination of those areas or the intervertebral disc — has cast doubt on that recommendation. The authors of the US guideline excluded invasive treatments from their 2017 recommendations.

What is the approach to a patient with radicular pain or neurogenic claudication?

Nonpharmacologic treatments

Guideline recommendations[14,15] on nonpharmacologic management of radicular pain complicating low-back pain include providing advice to stay active and suggesting an exercise program. Initial management of neurogenic claudication follows similar principles to radicular pain (Figure 1). These recommendations were based on a limited and inconsistent evidence base (Table 3). In 2010, a Cochrane review of two RCTs (n = 346) reported little to no effect of such advice on relief of pain.[35] However, remaining active can have other benefits, such as preventing deconditioning and improving mood. The US guideline cited

Table 3: Recent guideline recommendations for management of radicular pain of the lower back

Management type	Intervention	Size of effect*	Quality of evidence*	Endorsement	
				2016 UK guideline[14]	2017 US guideline[15]
Nonpharmacologic	Exercise v. usual care	Small	Low (3 RCTs)	Yes	Yes
	Multidisciplinary therapy v. usual care	No trials	N/A†	Yes, if previous treatment not effective or at risk of poor prognosis	Insufficient evidence
	Traction v. other active treatments	No effect	Low (2 RCTs)	Do not offer	Do not offer
Pharmacologic	Diazepam v. placebo	Harm	Low (1 RCT)	No mention	Do not offer
	Systemic corticosteroids v. placebo	No effect	Moderate (6 RCTs)	No mention	Do not offer
	Pregabalin v. placebo	No effect	High† (1 RCT)[27]	Yes	Insufficient evidence
	Gabapentin v. placebo	Unclear	Very low† (2 RCTs)[52,53]	Yes	Insufficient evidence
	Opioids v. placebo	No effect	Low† (1 crossover study)	Yes, rescue/short-term only	Yes, second-line therapy only if nonpharmacologic therapy fails
	Amitriptyline v. placebo	No trials	N/A†	Yes	Do not offer
	Duloxetine v. placebo	No trials	N/A†	Yes	Insufficient evidence
Injection therapy	Epidural steroid injection v. placebo	Small	High† (23 RCTs)[54]	Yes	No mention
Surgery	Lumbar discectomy v. conservative management	Discectomy associated with faster reduction in pain intensity	Low† (3 RCTs)[55]	Yes, if nonsurgical treatment failed and radiologic findings are consistent with sciatic symptoms	No mention

Note: GRADE = Grading of Recommendations Assessment, Development and Evaluation, N/A = No evidence from RCTs, RCT = randomized controlled trial.
*Based on the 2017 American College of Physicians guideline summary of evidence except where otherwise noted. Comparisons are to placebo, sham treatment, no treatment or usual care, and on short-term pain outcomes.
†Our summary of evidence used the GRADE approach.

low-quality evidence from three RCTs (*n* = 779) that exercise can have a small effect on short-term pain outcomes compared with usual care.[15] Exercise may also help patients with neurogenic claudication, but evidence is limited: a 2013 Cochrane review found only one small RCT that reported that a three-week exercise program could improve leg pain compared with no treatment.[56] Mechanical traction was discouraged by both guidelines: a 2013 Cochrane review found low-quality evidence from two RCTs (*n* = 79) that mechanical traction was no more effective at reducing pain than placebo traction or no treatment among patients with radicular pain.[57]

Pharmacologic treatments

The recent guidelines differ in their recommendations on pharmacologic management of radicular pain. Both endorse the use of opioids either as rescue medication[14] or if nonpharmacologic options are unsuccessful,[15] but the guidelines diverge in their endorsement of neuropathic pain medication. For example, the US guideline did not endorse anticonvulsants for radicular pain, whereas the UK guideline referred its readers to their recommendations on pharmacologic management of neuropathic pain in nonspecialist settings,[58] which endorsed the use of some anticonvulsants (e.g., pregabalin and gabapentin to manage neuropathic pain).[58] Two small RCTs (placebo controlled, *n* = 143) of gabapentin[52,53] and one high-quality RCT (placebo controlled, *n* = 209) of pregabalin[27] found that these drugs were ineffective for patients with radicular low-back pain. We found limited evidence on effective pharmacologic options for patients with neurogenic claudication: the 2013 Cochrane review[56] found low- to very low–quality evidence for the efficacy of a prostaglandin analogue (limaprost alfadex) compared with an NSAID (one RCT, *n* = 79), gabapentin compared with placebo (one RCT, *n* = 55), and vitamin B12 compared with conservative care (one RCT, *n* = 152).

Other treatments

The UK guideline endorsed the option of an epidural steroid injection to manage "acute or severe sciatica." However, a well-conducted systematic review and meta-analysis of 14 RCTs (*n* = 1316) found that while these interventions were associated with immediate reductions in pain, the benefits were small (about a 6-point reduction on a 100-point pain scale) and not sustained beyond three months compared with comprehensive rehabilitation programs.[54] The UK guideline recommended that steroid injections should not be offered for treatment of neurogenic claudication related to central spinal canal stenosis; however, it did suggest that surgery may be considered for those patients with radicular pain where nonsurgical treatment has not sufficiently improved symptoms. Surgery is only indicated if diagnostic imaging finds a lesion that is consistent with the clinical presentation. The role of surgery in the management of neurogenic claudication is unclear (Box 3); a 2016 Cochrane review that evaluated the effectiveness of different types of surgery compared with different types of nonsurgical interventions in adults with symptomatic lumbar spinal stenosis found insufficient evidence to conclude whether surgical management was more effective than nonsurgical management (five RCTs, *n* = 643, low-quality evidence).[59]

It may be difficult to offer minimal intervention to the patient who has substantial pain. In Appendix 1, we outline how conversations with patients might proceed to reassure and advise in these clinical situations.

Who needs referral?

Referral for physical or psychological treatments

For many patients with acute low-back pain, initial care (self-management advice, reassurance, timely review) can be provided by the primary care physician (Appendix 1). In some emergency departments, general practices and hospital clinics, a physiotherapist or nurse may provide the initial management sessions rather than a physician, although the effectiveness of this approach has not been assessed.

The recent guidelines have recommended nonpharmacologic treatments that commonly require referral for a course of treatment (e.g., exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, cognitive behavioural therapies or spinal manipulation).[14,15]

The UK guideline recommended the use of prognostic screening tools to help physicians identify who may need referral for additional treatments, and to guide the intensity and type of management they recommend.[14] Examples of validated tools include the STarT Back Screening Tool[60] for patients with acute or persistent low-back pain, and the Orebro Musculoskeletal Pain Questionnaire[61] and PICKUP model[62] for patients with acute low-back pain. However, the risk estimates produced by the tools may be limited. For example, one systematic review of 18 cohort studies found that the prognostic accuracy of screening tools for low-back pain was, at best, modest.[63] This suggests that physicians guided by the tools could misclassify a patient's prognosis (i.e., overtreat patients with a good prognosis or undertreat patients with a poor prognosis).

An alternative approach is to use the subscales of these tools to match the type of treatment to the patient. For example, tool subscales may indicate particular prognostic factors such as depressive symptomatology. These could be useful factors for physicians to discuss during a consultation and possibly address in a management plan. A limitation of this approach is that many of the available tools fail to make a distinction between prognostic factors and causal factors; targeting prognostic factors may not necessarily lead to improved outcomes. Despite this limitation, a 2011 RCT that compared the clinical effectiveness and

> **Box 3: Unanswered questions**
>
> - Is it possible to identify a structural cause of nonspecific low-back pain in routine clinical care, and does it matter?
> - Does the content of self-management advice lead to different clinical outcomes?
> - Can opioids improve recovery from acute low-back pain?
> - Is surgery effective for central spinal canal stenosis?
> - Which methods can help translate evidence on management of low-back pain into practice?

cost-effectiveness of stratified primary care for back pain with usual care (n = 851) found that matching treatment and referral pathways to prognostic factors led to small improvements in disability compared with usual care.[64] Further validation of the prognostic approach to stratified management of back pain is needed.

Referral to a specialist

Patients with clinical features of cauda equina syndrome or spinal infection require urgent referral to a spine surgeon or infectious disease specialist, respectively. A strong suspicion of metastatic disease warrants referral for definitive diagnosis. A strong suspicion of spondyloarthritis warrants referral to a rheumatologist; however, if unsure, physicians can delay the referral until after a trial of conservative treatment. Similarly, for a patient with osteoporosis who may have a stable vertebral fracture, immediate specialist referral is not warranted unless an initial trial of treatment has been unsuccessful. However, the decision to refer will depend on individual circumstances.

A thorough history and careful physical examination, rather than laboratory tests or diagnostic imaging, will help clinicians identify patients in need of specialist referral. Unfortunately, key steps in identifying serious disease from clinical evaluation are often missed. For example, one recent survey of primary care practice in Australia[65] reported that only 22% of physicians performed a neurologic examination, 21% asked questions to elicit history or symptoms of infection and 12% asked questions to screen for cauda equina syndrome. These types of omissions limit ability to identify patients who must be referred for specialist review.

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