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# Ambulatory Adult Low Back Pain Guideline



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**Ambulatory Clinical Guidelines Oversight**

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**Patient population:** Adults (≥ 18 years) with low back pain for < 6 weeks.

**Objectives:** (1) Identify persons at risk for chronic disability and intervene early. (2) Detect dangerous but uncommon lesions. (3) Utilize diagnostic tests efficiently. (4) Initiate treatment and refer when appropriate.

**Key points**

**Natural history.** Acute low back pain occurs in about 80% of people at some time in their life [evidence D*]. Within 6 weeks, about 90% of episodes will resolve satisfactorily regardless of treatment [D].

**Overview of diagnosis and treatment.** For an overview, see Figure 1.

**Initial visit.**

**Assessment.** Assess for "red flag" signs and symptoms of serious disease and for psychological and social risks for chronic disability (Table 1). Diagnostic tests are usually unnecessary [ID]. Assess spine, pelvis, and hips. If a patient has a red flag finding leading to a clinical suspicion for serious disease, obtain relevant diagnostic testing/imaging and refer to an appropriate specialist.

**Usually no imaging.** X-rays, MRI, and CT scan are not recommended for routine evaluation of patients with acute low back problems within the first 4-6 weeks of symptoms unless a red flag finding is present on clinical evaluation (Figure 1).



**Patient education.** Educate patients that their prognosis is good [IC*].

**Treatment.** Treat the disorder underlying the pain. For pain, treatment options include: heat [IIE], NSAIDs (Table 8) [IIA], non benzodiazepine muscle relaxants (Table 8) [IIA], and return to usual activities. Bed rest and opiates as first line treatment are not recommended [IIIA].

**Exercise.** Aerobic and core strengthening exercise programs that minimally stress the back can be started during the first 2 weeks for most patients. Recommend activities such as walking, biking, swimming, and core strengthening exercises to rehabilitate and prevent recurrent low back pain [IID].

**Follow-up.** Provide close clinical follow-up until return to work or key life activities (Tables 6 & 7) [IE].

**By 2 weeks** (acute). If work disability persists, consider referral to a specialist in back pain [IA].

**If the patient has radicular pain without weakness and is not improving by ≥ 4 weeks:** Obtain MRI [IIC]. If MRI is not diagnostic, obtain EMG (Table 5). Consider evaluation by a specialist in back pain if pathology is proven by MRI and/or EMG [IA] or if pathology is not proven [1E]. Although opioid pain medications are effective [IIA], they are not indicated as first-line treatment. Early opioid use may be associated with longer disability [IID].

**By 6 weeks** (subacute). If activities are still limited, consider referral to a program that provides a multidisciplinary approach for back pain, especially if patient has psychosocial risks for return to work [IA].

**By 12 weeks** (chronic)**.** If the patient is still disabled from major life activities or work, refer to a program that provides a multidisciplinary approach for back pain [IA].

**Special Topics** (pages 17-19):

▪ Primary prevention▪ Pregnancy and low back pain

▪ Recurrent low back pain▪ Occupational low back pain and work restrictions

*** Strength of recommendation:** I = generally perform; II = may be reasonable to perform; III = generally do not perform.

**Level of evidence supporting a diagnostic method or an intervention:** A = Systematic review of randomized controlled trials; B = randomized controlled trials; C = systematic review of nonrandomized controlled trials, nonrandomized controlled trials, group observation studies; D = Individual observation descriptive study; E = expert opinion.

Figure 1. Diagnosis and Treatment of Acute Low Back Pain

**Level of evidence supporting a diagnostic method or an intervention:**

A = Systematic review of randomized controlled trials;

B = randomized controlled trials;

C = systematic review on nonrandomized controlled trials, nonrandomized controlled trials, group observation studies;

D = Individual observation descriptive study,

E = expert opinion.

# Table 1. "Red Flags" for Serious Disease

| Red Flag Finding | Cauda Equina Syndrome | Fracture | Cancer | Infection |
|---|---|---|---|---|
| Progressive neurologic deficit | X | | | |
| Recent bowel or bladder dysfunction | X | | | |
| Saddle anesthesia | X | | | |
| Traumatic injury/onset, cumulative trauma | | X | | |
| Steroid use history | | X | | X |
| Female age > 50 | | X | X | |
| Male age > 50 | | | X | |
| History of diffuse osteoporosis or compression fracture | | X | | |
| Cancer history | | | X | |
| Diabetes mellitus | | | | X |
| Insidious onset | | | X | X |
| No relief at bedtime or worsens when supine | | | X | X |
| Constitutional symptoms (eg, fever, weight loss) | | | X | X |
| History of UTI or other infection | | | | X |
| IV drug use | | | | X |
| HIV | | | | X |
| Immunosuppression | | | | X |
| Previous surgery | | | | X |

# Table 2. Risks for Chronic Disability

| |
|---|
| **Clinical Factors** |
| Previous episodes of back pain |
| Multiple previous musculoskeletal complaints |
| Psychiatric history |
| Substance use disorder |
| Smoking |
| Obesity |
| **Pain Experience** |
| Rates pain as severe |
| Maladaptive pain beliefs (eg, pain will not get better, invasive treatment is required) |
| Legal issues or compensation |
| **Premorbid Factors** |
| Rates job as physically demanding |
| Believes they will not be working in 6 months |
| Does not get along with supervisors or coworkers |
| Is near retirement |

# Table 3. Differential Diagnosis of Back Pain

| Systemic Causes | Nonradiating (Axial) Back Pain | Radiating Low Back Pain |
|---|---|---|
| Aortic aneurysm<br>Pyelonephritis<br>Kidney stone<br>Peritonitis<br>Tumors<br>Subacute bacterial endocarditis<br>Metabolic disorders:<br>Porphyria<br>Sickle cell disease<br>Renal osteodystrophy<br>Seronegative spondylitic arthritis:<br>Ankylosing spondylitis<br>Reactive arthritis<br>Enteropathic arthritis<br>Psoriatic arthritis<br>Other arthritis:<br>Diffuse idiopathic skeletal hyperostosis (DISH)<br>Scheuermann epiphysitis<br>Rheumatoid arthritis (uncommon)<br>Connective tissue disorders:<br>Marfan syndrome<br>Ehlers-Danlos syndrome<br>Myopathy<br>Inflammatory radiculopathy (AIDP/CIDP) | **Dangerous local causes**<br>Tumor<br>Disk space infection<br>Epidural abscess<br>Spinal fracture<br>**Other causes**<br>Osteoporosis with fracture<br>Spondylolysis<br>Spondylolisthesis:<br>Congenital<br>Isthmic<br>Degenerative<br>Traumatic<br>Tumor related<br>Sacroiliac joint dysfunction and arthritis<br>Facet joint syndrome and arthritis<br>Internal disk disruption<br>Failed back surgery syndrome | **Causes**<br>Disk herniation<br>Spinal stenosis<br>Arachnoiditis<br>**Local pathology that mimics radiating low back pain**<br>Osteoarthritis of the hip<br>Aseptic necrosis of the femoral head<br>Sciatic nerve injury due to pressure, stretch or piriformis muscle entrapment<br>Cyclic radiating low back pain–endometriosis on the sciatic nerve/sacral plexus<br>Intrapelvic masses–benign or malignant<br>Peroneal (fibular) nerve entrapment at the fibular head |



# Table 4. Assessing Muscle Strength and Reflexes

(See footnotes for instructions on how to perform the tests.)

| Location | Muscle Strength Test | Neurological Levels | Reflex Tests | Spinal Level |
|---|---|---|---|---|
| Hip | Flexion | L-2, L-3 | | |
| | Abduction | L-5, S-1 | | |
| | Internal rotation[a] | L-5, S-1 | | |
| | Adduction | L-3, L-4 | | |
| Knee | Extension | L-3, L-4 | Medial hamstring[b] | L-5 |
| | Flexion | L-5, S-1 | Patella | L-4 |
| Ankle | Plantar flexion[c] | S-1 | Achilles | S-1 |
| | Dorsiflexion | L-4, L-5 | | |
| Toe | Plantar flexion | S-1 | Babinski | Tests upper motor neurons |
| | Dorsiflexion | L-5 | | |

[a] Hip, internal rotation: While seated, patient keeps knees together and ankles apart; examiner attempts to push ankles together.

[b] Knee, medial hamstring: While the patient is seated (or prone) the examiner palpates the medial hamstring tendon and sharply percusses the finger overlying the tendon. Contraction of the hamstring muscle is palpated.

[c] Ankle, plantar flexion: While standing on one leg, the patient rises up on the toes of that leg 5 times.

# Table 5. Imaging and Diagnostic Testing in Low Back Pain

| Indications | Imaging and Diagnostic Tests |
|---|---|
| **Do immediate imaging and testing:** | |
| High velocity trauma<br>Low velocity trauma with risk factors for fracture | CT<br>X-ray |
| Major risk factors for cancer (see Table 1)<br>Suspected spinal infection (see Table 1) | MRI and CBC/ESR/CRP<br>MRI and CBC/ESR/CRP |
| Signs of cauda equina syndrome (see Table 1)<br>Severe or progressive neurological deficits | MRI<br>MRI |
| **Defer imaging and testing until after initial treatment:** | |
| Weaker risk factors for cancer | X-ray and/or CBC/ESR/CRP |
| Risk factors for inflammatory arthritis | X-ray and/or CBC/ESR/CRP |
| Risk factors for spinal compression fracture | X-ray and/or CBC/ESR/CRP |
| Signs of radiculopathy | MRI |
| Signs of spinal stenosis | MRI |
| **Do no imaging or testing:** | |
| Improved or resolved pain 1 month after treatment | None |
| Previous imagining with no change in clinical status | None |



Abbreviations: CBC = complete blood count; CRP = C-reactive protein; ESR = erythrocyte sedimentation rate; CT = computed tomography; MRI = magnetic resonance imaging.

Modified from Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P, et al. Clinical Efficacy Assessment Subcommittee of the American College of Physicians. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Ann Intern Med. 2007; 147: 478-91.[1]

**Table 6. Nonradiating (Axial) Low Back Pain: Treatment and Follow-Up (Pain Does Not Extend Below the Knee)**

**Initial Visit**

**Diagnostic Tests:** Usually none.

**Physical modalities:**

**Heat** (superficial)**.** [IIC].

**Stretching.** Gradual stretching helps relieve cramping [IIE].

**Medication:** (See Table 8 for specific medications.)

**Dose by time.** Except for very minor pain, prescribe medications on a time contingent basis (eg, 4 times daily), not on a pain contingent basis (not PRN). [IA].

**Medication strategy.** Medication treatment depends on pain severity:

1. NSAIDs. Proven to be effective in treating low back pain [IIA]. COX-2 inhibitors are no more effective than traditional NSAID agents. They may offer a short-term advantage but probably no long-term advantage in GI tolerance for most patients [IIA] and may increase heart attack risk [IIC]. See **Table 9**.
2. Muscle relaxants **– non-benzodiazepines**. The mechanism of action of these medications remains in question. They are effective as monotherapy in acute low back pain [IA]. They have no additional benefit when combined with NSAIDs [IIA].
3. Acetaminophen. Analgesic effect is known in other musculoskeletal disorders, and there are few side effects [IIE]. However, studies have not demonstrated benefit in acute low back pain.
4. Topical preparations, eg, lidocaine and capsaicin, have few side effects and may be of some value [IID].

**Activity Limitations:**

**Avoid bed rest** [IA].

**Preventing Chronic Disability** [IA] (Table 2):

**Address barriers.** Discuss with the patient any barriers to success and ways to deal with them.

**Maintain work.** Avoid time off work if at all possible.

**Minimize restrictions.** Minimize any activity restrictions by consulting with the patient and possibly the employer about the physical demands of the patient's job and the availability of alternative work. If restrictions are given, make them time limited (eg, "no lifting over 30 lb. for 2 weeks, then unrestricted duty"). Specify an end date for the restrictions, and specify the date of physician follow-up.

**Follow-Up (for patients at risk for chronic disability)** [IIE]:

**Schedule**

- **If kept out of work:** See in 2–3 days, then weekly.
- **If moderate pain/restrictions:** See patient weekly.
- **If pain resolved and no restrictions:** See patient as needed.

**Early aggressive intervention.** At 6 weeks of disability, if the patient is at risk for chronic disability, strongly consider referral to a program that provides a multidisciplinary approach for back pain.

**Future prevention.** After the acute episode resolves, discuss preventing future disability.

**Subsequent Visits**

**History and Physical:** Update the patient's history and physical. If the diagnostic impression has changed, go to the appropriate steps in Figure 1.

**General Treatment:**

**If pain is better:** Reduce medications, increase activity.

**If pain is worse:** Consider changing or adding medications, or try increasing restrictions.

| | |
|---|---|
| **Work restrictions.** Patients should not typically be restricted from work [IE]. However, sometimes it is reasonable to restrict a person from long distance driving, heavy lifting, sitting for prolonged periods, or repetitive twisting and reaching [IE].<br>**General activity.** Resume usual activities as tolerated. Aerobic and core strengthening exercise programs that minimally stress the back can be started during the first 2 weeks for most patients.<br>**Patient Education** [IB*]. Advise patients of the following:<br>**Epidemiology. M**ost people have an episode of back pain. Though bothersome, it is rarely disabling.<br>**Diagnosis.** Having back pain does not mean they have nerve damage or another dangerous disease. Diagnostic tests are rarely helpful for muscle or ligament problems.<br>**Prognosis.** Prognosis is excellent regardless of treatment. Reoccurrences almost always resolve.<br>**Activity.** Staying active keeps muscles from cramping or stiffness.<br>**Physical modalities.** Heat and stretching are important interventions.<br>**Medications.** Review risks and side effects.<br>**Warnings.** They should seek immediate medical care if true weakness, sensory loss, bowel or bladder incontinence occur. (All are uncommon.) | **Physical therapy.** If there is no improvement at 4-6 weeks [IIA], consider physical therapy. Start physical therapy earlier if a work disability exists.<br>**Preventing Chronic Disability** (Table 2):<br>**Patient education** [IA]. Explain the expected course and advise the patient to stay active.<br>**Minimize restrictions**<br>**Recommend aerobic activities** such as walking, biking, and swimming, and recommend core strengthening exercises (Appendix C) to rehabilitate and prevent recurrent low back pain.<br>**At 2 weeks:** If work disability persists, consider referral to a specialist in back pain [IA]).<br>**At 6 weeks:** consider referral to a program that provides a multidisciplinary approach for back pain, especially if the patient has psychosocial risks affecting return to work.<br>**Follow-Up:** Same as at initial visit, plus:<br>**At 4 weeks:** If there is a positive dural tension sign (positive straight leg raising, or reverse straight leg raising) and no clinical improvement, consider MRI and evaluation by a back pain specialist [IA].<br>**At 6 weeks and disabled:** Consider referral to a multidisciplinary back pain program [IA]. |
| **Table 7. Radiating Low Back Pain: Treatment and Follow-Up (Sciatica – Pain Below the Knee)** | |
| **Initial Visit**<br>**Diagnostic Tests:** Usually none, unless there are neurological deficits or evidence of cauda equina syndrome.<br>**Physical Modalities:**<br>**Heat** (superficial) [IIC].<br>**Stretching.** Gradual stretching helps relieve cramping [E].<br>**Medication:** (See Table 8 for specific medications.)<br>**Dose by time.** Except for very minor pain, | **Warnings.** They should seek medical care if pain or weakness worsens, and seek immediate medical care if bowel or bladder incontinence occurs.<br>**If at Risk: Chronic Disability Prevention** [IE] (Table 2).<br>**Address barriers.** Discuss with patient any barriers to success and ways to deal with them.<br>**Maintain work.** Avoid time off work if at all possible.<br>**Minimize work restrictions.** Consider contacting |

prescribe medications on a time contingent basis (eg, 4 times daily) not on a pain contingent basis (not PRN) [IA].

**Medication strategy.** Medication treatment depends on pain severity.

1. NSAIDs and COX-2 inhibitors. Not yet been shown to be more effective than placebo in acute sciatica [IIE]. See **Table 9** for risks. Systemic steroids are not effective [IE].
2. Acetaminophen with codeine and other opioid analgesics are generally not indicated as first-line therapy [IIE]. Early use may increase length of disability [IID].
3. Topical preparations (eg, lidocaine, capsaicin) may be effective in neuropathic low back pain [IID].
4. Acetaminophen. Analgesic effect is known in other musculoskeletal disorders, and there are few side effects [IIE]. However, studies have not demonstrated benefit in acute low back pain.
5. Muscle relaxants. No studies in sciatica [IIE].
6. **Opiates are NOT first line agents (see table 8)**

**Activity Limitations**:

**Bed rest**. Up to 3-5 days of bed rest may provide comfort. Longer bed rest may lead to debilitation. Resume usual activities as soon as possible [IE].

**Work restrictions.** Restrict from work depending on neurologic findings, pain, and work demands [IIE].

**General activity restrictions**. Sometimes it is reasonable to restrict a person from long-distance driving, heavy lifting, sitting for prolonged periods, or repetitive twisting and reaching [IIE].

**Minimize restrictions**. Minimize any activity

employer (with patient permission) to discuss how to minimize work restrictions. Any restriction should be time limited (eg, "no lifting over 30 lb. for 2 weeks, then unrestricted duty").

**Follow-Up (for patients at risk for chronic disability)** [IIE]:

**Schedule**

- **If kept out of work:** See in 2–3 days, then weekly.
- **If moderate pain or some restrictions:** See patient weekly.
- **If pain resolved and no restrictions**: See patient as needed.

**Early aggressive intervention.** At 2-3 weeks of disability strongly consider referral to a program that provides a multidisciplinary approach for back pain.

**Future prevention.** After the episode resolves, discuss preventing future disability.

**Subsequent Visits**

**History and Physical**: Update the patient's history and physical. If the diagnostic impression has changed, go to the appropriate steps in Figure 1.

**If pain is better:** Reduce medications and increase activity [IIE]. Recommend aerobic activities such as walking, biking, and swimming, and recommend core strengthening exercises (Appendix C) to rehabilitate and prevent recurrent low back pain.

**If no improvement:**

**At 1-2 weeks** [IIE] consider physical therapy[A].

**At ≥ 4 weeks** obtain MRI [IIC]. If MRI is not diagnostic, obtain EMG [IC]. (Plain x-rays are usually not helpful.)

-**If pathology proven** by MRI/EMG: consider evaluation by a specialist in back pain or a back surgeon [IA].

-**If pathology not proven** by MRI/EMG: consider referral to a specialist in back pain [IE].

**Preventing Chronic Disability** (Table 2)

**Patient education:** See relevant information

restrictions by consulting with the patient and possibly the employer about physical demands of the patient's job and the availability of alternative work [IIE].

**Timetable**. Specify an end date for any activity restrictions, and specify the date of physician follow-up [IIE].

**Patient Education**. Advise patients of the following:

**Diagnosis.** The most likely diagnosis is disk herniation. Diagnostic tests will not change the initial treatment. Tests will be ordered if the pain does not change or symptoms worsen.

**Prognosis.** Chances of spontaneous recovery are good. About half of people are better within 6 weeks.

**Activity.** A few days of bed rest may help with discomfort, but staying active will speed recovery. Avoid highly physical activity until pain has decreased.

**Physical modalities.** Heat and stretching are important interventions.

**Medications.** Review risks and side effects.

under "initial visit" above.

**Minimize restrictions**

**At 6 weeks** consider referral to a program that provides a multidisciplinary approach for back pain.

**Follow-Up (in patient at risk for chronic disability)**

**If kept out of work:** See in 2–3 days, then weekly.

**If moderate pain or some restrictions:** See patient weekly.

**At 6 weeks and disabled** [IA]: Consider referral to a multidisciplinary back pain program.

## Table 8. Selected Medications for Low Back Pain (Nonradiating and Radiating)

| Class | Medication | Brand Name | Typical Dose | Cost/Month ($)[1] Generic | Brand | Risks/Benefits |
|---|---|---|---|---|---|---|
| **Nonsteroidal anti-inflammatory drugs (NSAIDs)[2]** | | | | | | |
| Acetylated | Aspirin | multiple | 325-650 mg every 4-6 hours | 10 | NA | Higher doses can cause tinnitus. |
| Propionic acids | Naproxen | Naprosyn | 250-550 mg every 12 hours | 9 | 148 | May have less cardiovascular toxicity compared to other NSAIDs. |
| | Ibuprofen | Advil, Motrin | 400-800 mg every 6-8 hours | 13 | NA | Can cause aseptic meningitis. |
| Acetic acids | Diclofenac | Voltaren[2], Cataflam | 50 mg every 8 hours | 20-25 | 223-298 | Can cause hepatotoxicity. Also available as topical diclofenac. |
| | Indomethacin | Indocin; Tivorbex | 25-50 mg every 8-12 hours | 7-9 | 234 | More frequent CNS side effects compared to other NSAIDs |
| Oxicams | Meloxicam | Mobic | 7.5-15 mg once daily | 5-30 | 273-417 | Long duration of effect and relatively COX-2 selective. Rare risk of Stevens-Johnson syndrome. |
| Selective COX-2 inhibitor | Celecoxib | Celebrex | 200 mg once daily | 14 | 410 | Less GI toxicity than nonselective NSAIDs. No effect on platelet function. |
| **Topical preparations** | Capsaicin | multiple | 0.025%, 0.03%, 0.0375% | $56 | varies | Can cause serious burns (eg, first- to |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | up to 8 hours (max: 4 patches/ day) | | | third-degree chemical burns) at the application site. |
| | Lidocaine | Lidoderm 5% Rx, 4% OTC | 4% or 5% patch 12 hours daily or ointment 3-4 times daily | 36 | 95 | Application site reactions. Rare allergic reactions. |
| **Muscle relaxants (nonbenzodiazepines)** [3] | Cyclobenzaprine | Flexeril | 5-10 mg 3 times daily | 11 | 241 | Sedation. Anticholinergic effects, especially in the elderly. |
| | Methocarbamol | Robaxin | 750 mg 3-4 times daily | 17 | 262 | Less sedating than other muscle relaxants. Low abuse potential. |
| | Tizanidine | Zanaflex | 2- 4 mg every 6-12 hours as needed and/or at bedtime | 132 | 160 | Potential antinociceptive and gastroprotective effects, but risks of hepatotoxicity, hallucinations, sedation, hypotension, and hypersensitivity reactions. |
| **Opioids**[4] | *All opioids* | | | | | *Analgesic benefit is small and adverse effects are significant. Concerns for abuse and drug diversion.* |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Oxycodone | Roxicodone | For opiate-naïve patients: 5 mg every 4 hours or as needed For opiate tolerant patients: 10-15 mg every 3 hours | 138 | 250 | Preferred to hydrocodone in patients taking scheduled acetaminophen or NSAIDs. |
| | Oxycodone/ acetaminophen | Endocet; Percocet; Primlev; Xartemis XR | | 41 | 222-3500 | |
| | Hydrocodone/ acetaminophen | Lortab; Norco; Verdrocet; Vicodin | For opiate-naïve patients: 5 mg every 4 hours or as needed For opiate tolerant patients: 5-10 mg every 3 hours | 36-108 | 80-1400 | |
| | Tramadol | ConZip, Ultram | 50 mg 3-4 times daily | 60 | 450 | |
| | | | | | | |



[1]Approximate Retail Cost - May vary from store to store. Cost = Average Wholesale Price minus 10%. AWP from Lexicomp Online 7/19. For generic drugs, Maximum Allowable Cost plus $3 from BCBS of Michigan MAC List, 7/19.

[2]NSAIDs may interact with aspirin, warfarin, methotrexate, antihypertensives, serotonin reuptake inhibitor antidepressants (eg, SSRIs, cyclic antidepressants, venlafaxine), and other drugs. NSAID use in patients with heart disease or its risk factors increases overall risks of heart disease or stroke.

[3]No effect on muscle spasm and no studies in sciatica. Diazepam is not an effective muscle relaxant and should not be used. Soma (carisoprodol) is not an effective muscle relaxant, it is also associated with addiction and overdose and should not be used.

[4]Opioids should be prescribed only when necessary (not first line), in the lowest effective dose, and for the shortest duration necessary. Prior to prescribing an opioid, the clinician should discuss the goals for pain relief, risks and benefits of opioid therapy, other reasonable options for pain management, and specific instructions on taking, stopping, storing, and disposing of medication. State and institutional policies for controlled substance management need to be followed at all times, both in the acute and chronic pain settings.

# Table 9. Decision to Use NSAIDs 1 Based on Gastrointestinal (GI) Risk

**Assess for factors that increase the risk of GI complications associated with NSAIDs**
History of GI bleeding, peptic ulcer, cardiovascular disease, or *Helicobacter pylori* positive
History of bariatric surgery
High dose, chronic, or multiple NSAIDs
Concomitant use of low dose aspirin, anticoagulants, corticosteroids, or selective serotonin reuptake inhibitors[2]
Age > 60 years
Severe rheumatoid arthritis disability
**If no GI risk factors**
NSAID
**If also elevated cardiovascular risk [2]** (assume on low-dose aspirin or other antiplatelet medication): naproxen plus proton pump inhibitor (PPI)
**If any GI risk factor**
NSAID plus PPI, or cyclo-oxygenase-2 (COX-2) selective inhibitor (similar action, but cost may differ). However, if:

- NSAID not tolerated: COX-2.
- Very high GI risk (eg, concomitant use of oral glucocorticoids, concomitant use of oral anti-coagulants, cirrhosis, hepatic failure, and recent GI bleed): if possible avoid NSAIDs and COX-2. If cannot avoid, then COX-2 plus PPI.

**If also elevated cardiovascular risk [2, 3]**(assume on low-dose aspirin or other antiplatelet medication): If possible avoid NSAIDs/COX-2 due to greater likelihood of heart attack or stroke following NSAID use. If cannot avoid, then assess patient to prioritize GI and cardiovascular risks. If primary concern is:

- Very high GI risk: COX-2 plus PPI.
- Very high cardiovascular risk (eg, history of symptomatic CVD combined with any of the following: diabetes, current smoker, dyslipidemia, polyvascular disease, age > 70): Do not use NSAIDs.[4]

Adapted from Scheiman JM, Fendrick AM. Summing the risk of NSAID therapy. The Lancet, 2007; 369: 1580-1581. And from Rostom A, Moayyed P, Hunt R, Canadian Association of Gastroenterology Consensus Group. Canadian consensus guidelines on long-term nonsteroidal anti-inflammatory drug therapy and the need for gastroprotection: benefits versus harms. Alimentary Pharmacology & Therapeutics, 2009; 29:481-496.

[1] Prescribe NSAIDs at the lowest effective dose for the shortest needed duration.

[2] To assess cardiovascular risk, see the American College of Cardiology Risk Estimator for 10-year risk of develop atherosclerotic cardiovascular disease (ASCVD) http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/estimate/

[3] FDA warns about potential interaction between PPIs and clopidogrel, but the interaction appears to be clinically insignificant.

[4] In patients who have heart disease or its risk factors, NSAID use increases overall risk of heart attack or stroke.

# Definitions

**Low back pain** is posterior trunk pain from the lower ribcage to the horizontal gluteal crease. It also includes lower extremity pain that results from a low back disorder (ie, sciatica or radiating low back pain), whether there is trunk pain or not.

**Sciatica** is radiating lower extremity pain that may or may not be associated with back pain. Sciatica should be distinguished from nonradiating (axial) low back pain.

**Acute low back pain:** Back pain duration < 6 weeks.

**Subacute low back pain:** Back pain duration ≥ 6 weeks but < 3 months.

**Chronic low back pain:** Back pain disabling the patient from some life activity for ≥ 3 months.

**Recurrent low back pain:** Acute low back pain in a patient who has had previous episodes of low back pain from a similar location, with asymptomatic intervals between episodes.[3]

# Concerns and Issues

**Summary**
The prevalence of low back pain is high.
The financial impact is substantial.
While the acute prognosis is good for most, prognosis worsens for the minority with longer symptom duration.
The prognosis is worse with obesity or smoking.
When new acute low back pain occurs in patients who have chronic pain, general recommendations for the diagnosis and treatment of the acute pain are the same as for patients without chronic pain.

**High prevalence.** The one-year point prevalence of low back pain in the US population is 15-20%.[4,5] Eighty

percent of the population will experience at least one episode of disabling low back pain during their lifetime. Approximately 40% of people with low back pain initially seek help from a primary care physician, 40% from a chiropractor, and 20% from a subspecialist. Acute low back pain is the second most common symptomatic reason for office visits to primary care physicians, and the most common reason for office visits to orthopedic surgeons, neurosurgeons, and occupational medicine physicians. Recurrence of low back pain is common; 60-80% of patients experience a recurrence within two years.

**Substantial financial impact.** The personal, social, and financial effects of back pain are substantial.[6] In the US, the direct annual cost is $40 billion, with annual indirect costs (lost wages and productivity, legal and insurance overhead, and impact on family) at over $100 billion. Important acute care costs result from over-utilization of diagnostic and treatment modalities, as well as inappropriate activity restrictions. The small number of persons who become chronically disabled consume 80% of the cost.

**The acute prognosis is good, but it worsens with time.** A great majority of persons with **nonradiating** low back pain will have resolution of symptoms within 6 weeks.[7] About half of all persons with **radiating** low back pain recover spontaneously within 6 weeks.

As time passes, the prognosis worsens to the point where the small group of persons who remain disabled with low back pain at three months has less than a 50% chance of recovery, and those out of work at one year have a 10% chance of ever returning to gainful employment if left untreated.

**Acute on chronic pain.** When new acute low back pain occurs in patients who have chronic pain, general recommendations for the diagnosis and treatment of the acute pain are the same as for patients without chronic pain. Consider the causes and effects of chronic pain and treatment occurring for chronic pain when individualizing treatment for acute pain in a specific patient. Also consider the previous baseline level of chronic pain when assessing whether the acute pain has resolved. For more information on treating chronic pain, see the Michigan Medicine chronic pain guideline.



# Diagnosis

## Diagnosis Often Difficult

**Summary**
An anatomical diagnosis cannot be made in most cases of low back pain.

Causes of low back pain can be:

- Mechanical (involving the spine and its supporting structures)
- Neuropathic (irritation of a nerve root)
- Secondary to another cause.

A differential diagnosis of back pain is presented in Table 3 as background.[8–11]

Many common causes of low back pain cannot be verified by diagnostic tests. These include the presence of muscle strains, ligament sprains, or small tears of the annulus fibrosis of the disk, which seem intuitively plausible as causes of pain. Other possible diagnoses such as facet joint arthritis (degenerative joint disease), sacroiliac joint asymmetry, or disk bulges do not correlate statistically with

the presence of pain in large populations, nor with reproduction of pain or alleviation of pain on examination or injection in studies with designs to control potential biases.

Some causes fit into well-documented syndromes such as disk herniation, spondylolisthesis, or spinal stenosis. Even in these cases the diagnosis is often not simple. For example, one-third of asymptomatic volunteers have disk changes on MRI. Neither the radiologist's report of stenosis nor measures of the spinal canal on imaging are useful in positively diagnosing the clinical syndrome of spinal stenosis. Low-grade spondylolisthesis noted on x-ray is most often asymptomatic. In these cases, diagnostic tests must be interpreted in conjunction with the clinical history and physical examination.

## History and Physical Exam

**Recommendations:**
For patients with low back pain, conduct a history and physical examination, including identification and evaluation of:

- Red flag signs and symptoms of serious disease, including neurological deficits and symptoms of malignancy, fracture, or infection (see Table 1).
- Signs of nonorganic pain and psychosocial factors associated with chronic disability (see Table 2).
- Mental health conditions that may modify treatment.
- Comorbid obesity that can affect outcome.



**Red flag signs and symptoms of serious disease**. Dangerous causes of low back pain occur in a small number of patients (see Table 1). Sensitivity is limited for history and physical examination findings, including evaluation of red flag findings. However, the risk of missing an important and progressive disorder has greater consequences than the risk and cost of unnecessary testing in false positive cases. A thorough examination and testing may identify potential malignancy or fracture, but is less accurate at identifying infection or cauda equina syndrome. Avoid alarming patients during the evaluation process to limit psychological distress.[12–18]

**Cauda equina syndrome**, which causes progressive loss of nerve function, including bowel and bladder continence, is a surgical emergency. **Fractures** can occur with high velocity impacts or with minor trauma in persons with osteoporosis. A high index of suspicion is needed to diagnose uncommon problems such as **tumors** (metastatic more often than primary) and **infections** (such as epidural abscesses or disk space infections). **Systemic disorders** may present with back pain, including polyarthritis, kidney stones, kidney infections, aortic aneurysms, nerve diseases, muscle diseases, and various metabolic disorders. In rare cases, **psychiatric diseases** such as hysteria, malingering, or somatization disorders are the primary diagnosis.

**Spine and hips.** Physical examination of the spine and hips allows the clinician to identify specific disorders.[12–18] Patients presenting with low back pain who have physical examination findings of hip pathology typically have gait dysfunction and pain that often radiates into the groin, buttocks, and upper thighs.[19] (In these patients, therapy directed at the hips results in improved pain, function and patient outcomes.[20]) Patients with radicular pain are more likely to describe their pain as shooting or stabbing

and that it radiates below the knee.

**Movement.** Mechanical causes of back pain are typically worse with movement and improved with rest. Prolonged sitting or forward flexion may aggravate disc disorders. Pain from spinal stenosis is classically relieved with forward flexion (pushing the lawnmower or grocery cart) and worsened with extension.

**Focused assessment**. Focused assessment includes:

**Back.** Assess areas of back tenderness and back mobility, including degree of flexion, extension, and lateral rotation (see Table 4).

**Muscles.** Test muscle strength, reflexes, and range of motion. The strength examination should be done so that the examiner overcomes the strength of each muscle in order to assess its full innervation. In subtle cases, true radiculopathy is more certain if two muscles from different nerves but the same root and the corresponding reflex are all abnormal. Neurologic deficits in multiple roots suggest more serious spinal or neurologic disorders or pain inhibition (the normal ability of the brain to dampen or block successive painful stimuli).

**Straight leg test.** A positive straight leg test requires pain radiation below the knee. The straight leg raise test detects over 90% of clinically significant radiculopathies due to disk herniation.

**Femoral stretch.** The femoral stretch test is about 50% sensitive for less common high lumbar disk herniations. The test involves extension of the hip in the prone patient; the presence of anterior thigh (L2–3) or medial leg (L4) pain indicates disc herniation at the levels indicated.

**Waddel's five "nonorganic pain" signs.** If three or more of the 5 Waddel signs are present, a psychogenic component to the patient's pain behavior is likely.[21–23]

1. **Overreaction.** Overreaction during the exam.
2. **Simulated testing.** This is positive when pain is reported with axial loading (pressing on top of the head) or rotation with the pelvis and shoulders in the same plane.
3. **Distracted testing.** Test straight leg raise while distracted when sitting (eg, extend knee in sitting position while appearing to be performing a Babinski reflex).
4. **Superficial, nonanatomical, or variable tenderness.** Skin rolling (moving skin over muscle with relatively light palpation) over the back markedly increases pain. Mark areas of tenderness and examine again later for reproducibility.
5. **Nonanatomical motor or sensory disturbances.** This is positive when sensory loss does not follow a dermatome, or entire leg is numb or without strength, or when there is a "ratchety" give-way on strength testing.

The presence of two or more of these findings correlates with poor surgical outcome, but not rehabilitation outcome. The findings should not be interpreted as specific for malingering, which is an uncommon disorder. In a primary care setting these findings are best viewed as a warning that the patient's report of pain will not be a reliable guide to treatment success, and that the patient is at risk for becoming chronically disabled. Multidisciplinary rehabilitation may be warranted.

**Psychosocial risk factors.** See Table 2 for factors associated with low back pain becoming a chronic

disability. Patients with risk factors are more likely to have a protracted course toward chronic back pain.[24–26] Somatization is an important factor in identifying patients at risk for protracted disability. Resilience and coping have not been demonstrated as protective.[27]

**Mental health screening.** Poorer low back pain outcomes are associated with post-traumatic stress disorder, major depressive disorders, and anxiety disorders.[24–26] Low back pain patients with depression have greater pain impact on their life, lower quality of life, more sleep problems, and greater functional disability.[24–26] Recent twin studies demonstrate the relationship between depression and the incidence of low back pain but not its chronicity.[28,29]

**Overweight, obesity, and smoking** are key factors associated with functional treatment outcome failures with physical therapy.[30] Overweight and obese patients with acute low back pain tend to present with greater disability. For patients with obesity class II-III (BMI ≥ 35 kg/m$^2$), physical therapy has less effect on low back pain than for nonobese patients[31] with increased cost of care.[32] Elevated BMI, waist circumference, percent fat, and fat mass are associated with chronic low back pain disability.[33]

## Laboratory Tests

**Recommendation:**
No special laboratory testing is needed except when pursuing red flag signs and symptoms of serious disease (Table 5).

Laboratory tests will usually not identify causes or alter management for most patients with acute low back pain.

If cancer or infection is suspected, a complete blood count (CBC) and erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP) are sufficiently inexpensive and efficacious as initial tests.

## Invasive Diagnostic Tests/Imaging

**Recommendations**:
When to obtain imaging:

- Do **not** order imaging for **acute** low back pain that is localized and nonradiating.
- Obtain diagnostic imaging and appropriate laboratory testing for low back pain with serious or progressive neurologic deficits, or when other red flag findings are present (Table 1).
- Consider imaging for low back pain that lasts more than one month with no improvement or response to initial treatments.

Selecting an imaging modality (Table 5):

- Plain x-ray is recommended for suspected fracture and may be helpful for suspected tumor or infection.
- Magnetic resonance imaging (MRI) is the preferred imaging modality to define medical or surgical therapies for serious conditions of the spine, or when considering injection or surgical intervention for severe radiating pain or spinal stenosis. If MRI is contraindicated, the preferred modality is computed tomography (CT) or CT-myelography.
- Electromyography (EMG) is used in patients with risk factors for neuropathy or to help delineate abnormal neurological exams when imaging is not diagnostic.



**When to image.** Imaging studies are usually not helpful during the first 3-4 weeks of back symptoms, but should be considered when there are red flag findings or a clinical suspicion for serious disease, or if the patient has increasing pain and weakness.[34]

After 4 weeks, further evaluation including imaging may be indicated if low back symptoms persist.[35] Imaging is strongly indicated if radicular symptoms (leg pain and weakness) persist undiminished.[36,37] Start with a review and update of the history and physical exam to reassess for red flag findings or evidence of nonspinal conditions causing back symptoms.

**Selection of imaging modality.** Imaging is used to assess suspected causes of red flag findings. The imaging modality is selected based on clinical suspicion of the underlying cause (Table 5).

**X-rays.** Plain x-rays are recommended for ruling out fractures when any of the following red flag findings are present:

- Recent significant trauma (any age)
- Recent mild trauma (patient over age 50)
- History of prolonged steroid use
- Osteoporosis
- Patient over age 70.[35]

X-rays in combination with complete blood count (CBC) and erythrocyte sedimentation rate (ESR) may be useful for ruling out tumor or infection when any of the following red flag findings are present:

- Prior prolonged steroid use
- Low back pain that is worse at night and with rest
- Unexplained weight loss
- Unexplained fever with concomitant back pain.

Additional considerations for x-ray imaging:

- If red flag findings are present, especially for tumor or infection, the use of other imaging studies such as CT, or MRI may be clinically indicated, even when plain x-ray imaging is negative.
- Lumbar x-rays very rarely add useful clinical information concerning spinal degenerative changes, scoliosis, spondylolysis, spondylolisthesis, or congenital anomalies.[35]
- X-rays are to be avoided in pregnancy.

**MRI, CT, CT-myelography**. In patients with low back pain, the use of these imaging modalities is to define medical or invasive therapies (eg, surgery or epidural injection for radiculopathic pain) for remediable pathological conditions.

Interpret the results of imaging studies in conjunction with the clinical history and physical examination to determine if the imaging results are clinically significant. Abnormal findings are common. For example, MRI shows significant degenerative change and encroachment into the spinal canal in more than 50% of asymptomatic older persons, and the incidence of asymptomatic herniated discs was approximately 20% in persons in their 30s.[38–41]



In general, MRI is the preferred imaging modality for low back pain with red flag findings.[42] If MRI is contraindicated, consider CT or CT-myelography for patients with one of the following clinical situations:

- History, clinical examination, or other findings suggesting serious conditions affecting the spine, such as cauda equina syndrome, spinal fracture, infection, tumor, or other mass lesions or defects.[1,43,44]
- Patients limited by radiating low back pain for more than 2 weeks with physiologic evidence of nerve root compromise, and symptoms or disability severe enough to consider injection or surgical intervention.[1,43,44]
- A history of neurogenic claudication and other findings in elderly patients suggesting spinal stenosis with symptoms severe enough to consider injection or surgical intervention.[1,15,43,44]

For patients with acute low back problems who have had prior back surgery, MRI with contrast is usually the imaging test of choice to distinguish disc herniation from scar tissue associated with prior surgery.[43,44]

For women who are pregnant:

- Avoid x-rays and CT scans.
- When considering MRI, consult a radiologist.

**Electromyography (EMG)**. EMG may be used to help delineate abnormal neurological exams in patients with risk factors for neuropathy (eg, alcohol or diabetes). However, do **not** use EMG testing if the diagnosis of radiculopathy is obvious on the clinical exam. EMG results may be unreliable in detecting subtle nerve damage until a patient has had significant and persistent radiculopathy for over 3 weeks.[45]

After performing imaging studies, EMG of the lower limb and paraspinal muscles may be helpful for patients: [45]

- Limited by radiating low back pain for more than 4 weeks without clear evidence on imaging studies of nerve root compromise.
- Whose imaging study demonstrates lesions that do not correlate with the clinical picture. (The false positive rate for EMG is quite low.)
- With radiating pain or neurological deficits in the absence of imaging findings of disc herniation, in order to assess neuropathies, radiculitis, and focal nerve injuries that may mimic radiating low back pain.
- With abnormal MRI at multiple levels and a clinical examination does not clarify the level of clinical significance.

# Treatment



Low back pain may be treated using several approaches. Often more than one approach is used. Decisions regarding treatment are usually made jointly by physicians and patients based on the physician's clinical insights and the patient's treatment preferences. Treatment options include the following categories:

Patient education

Physical modalities

Medication

Injections

Surgery

Mental health interventions

Multidisciplinary approaches

Treatment for nonradiating low back pain (axial pain that does not extend below the knee) is summarized in Table 6. Treatment for radiating low back pain (pain that extends below the knee) is summarized in Table 7.

## Patient Education

**Recommendations:**
Teach patients about their expected course.
Advise them to stay active.
Consider adding an education component as part of self-management interventions.

Teach patients about the expected course and duration of symptoms, and discuss evidence-based self-care options. Appropriate patient education diminishes fear, increases positive attitudes, and can favorably affect future outcomes.[12,14] For example, patients receiving educational booklets (nonstructured education) had better outcomes and significantly fewer subsequent follow up visits over the next year than a control group.[46] Individualized self-care education (structured teaching), along with more general information (using resources like the Back Book), may improve patient understanding of prognosis.

Advise patients to remain as active as possible.[12,14] Two randomized controlled trials have shown functional restoration combined with guideline-based education to be superior to education alone.[47,48]

Exactly what education to provide has not been resolved. Variation in educational content across studies is an important reason that a recent systematic review and a meta-analysis found no consistent benefit for low back pain from education alone.[49,50] Evidence regarding the use of "back schools" is of very low quality and shows uncertain benefits.[51]

## Physical Modalities

**Recommendations:**
Activity: Encourage patients to stay as active as possible.
Heat: Advise patients that heat can distract from pain and may relax muscles.
Exercise program

- For acute low back pain, consider clinician-directed exercise.
- For chronic low back pain, recommend starting an exercise program and consider clinician-directed exercises.

Physical therapy: Consider clinician-directed exercises, spinal manual therapy or spine stabilization exercises.
Evidence is insufficient to recommend treatment with kinesio tape, lumbar traction, acupuncture, ultrasound, or transcutaneous electrical nerve stimulation (TENS).



**Activity limitations.** Strong evidence shows that bed rest is not an effective treatment option for acute low back pain.[52] Maintaining usual activities has been shown to improve recovery. It may be appropriate in some circumstances to limit physical activity, after considering the nature of a patient's work and the severity of the pain. Since pain is not objectively quantified, and the physician is typically not expert in the patient's work situation, take the patient's knowledge of these factors into account when considering limiting initial activity.

Length of time off work is directly correlated with the risk of long-term disability. Therefore, consider how to minimize activity limitations. Activity limitations should be for a specific time period. Before taking a patient completely off of work, consider communicating with the employer to see if limited hours or light duty may be available. Workplace modification improves return to work rates and decreases disability time. Consider consulting with an occupational therapist or other allied health professional with expertise in job site evaluation. Follow patients every two weeks to update progress, work time and restrictions

based on symptom changes and progress with treatment. Clinician directed exercise can be by the treating physician or treating physical therapist taking into account the patient's specific past and current medical history.

**Heat.** Applying heat in the form of a warm shower, bath, or hot pack, and using counterirritants such as "deep" heating compounds, are approaches that distract the patient from the pain and may relax muscles.[53]

Initial treatment with ice or cold is typically not useful because the site of the underlying pathology is not commonly superficial.

**Exercise.** Advising patients to remain as active as possible is a beneficial part of routine care (see Patient Education). For patients with acute low back pain, the additional value of adding clinician directed exercise is uncertain because evidence is limited.[6,53–58] For patients with chronic low back pain, recommend starting an exercise program. Recommend exercises such as Pilates, yoga, tai chi, strength or resistance training, spine stabilization, aquatic exercise, cycling, and walking.

**Physical therapy.** Consider offering clinician-directed exercises.[52,59] Although clinician-directed exercise shows minimal to moderate evidence of value, it is relatively low risk, with benefits likely exceeding risks. Clinician directed exercise as part of a multimodal intervention is superior to its use alone.

Spinal manual therapy, which can be provided by physical therapists, osteopathic physicians, or chiropractors, may provide long-term benefits in perceived improvement, satisfaction with care, and lower medication use. It may have a small (clinically insignificant) advantage over supervised exercise, home exercises, McKenzie method repeated motion exercises, or back school training.[6,53–56] Spinal manual therapy reduced neither sick leave nor reconsultation rates compared to no manual therapy in the management of acute low back pain. It did not lead to meaningful savings by replacing other health services or eliminating costs.[60]

Spine stabilization exercises were comparable to manual therapy and superior to general exercise in reducing pain and improving function in low back pain.[58]

Evidence is insufficient to recommend treatment with kinesio tape in the management of low back pain.[61] There is no evidence of benefit from lumbar traction,[57] and lumbar traction did not provide any additional outcomes benefit for low back pain when compared to an extension-based exercise program alone.[62] The evidence base is insufficient to support the use of ultrasound in the management of low back pain[53] or the use of electrical stimulation in low back pain management.[53,63] While transcutaneous electrical nerve stimulation (TENS) did somewhat improve both radicular and nonradicular pain, patient outcomes are not altered by its use.[64]

**Complementary and Alternative Therapies.** A large percentage of individuals who develop low back pain will first seek care from alternative health providers. Evaluating the effects of treatments is difficult because of the considerable variation in techniques applied and the difficulty in randomizing these studies due to the physical nature of treatments. Reviews of complementary therapies for acute low back pain show insufficient evidence to support the use of acupuncture, chiropractic manipulation, massage therapy, or yoga.[57]

## Medication

**Recommendations:**
Treat acute low back pain (including acute exacerbations of chronic low back pain) with NSAIDs, considering GI risk (see Table 9).
Consider treating with:

- Topical preparations such as lidocaine and capsaicin.
- Short term use of nonbenzodiazepine muscle relaxants.
- If pain is refractory to NSAIDs and nonbenzodiazepine muscle relaxants, consider a time-limited course of opioids. (Opioid analgesics are generally not indicated for acute low back pain.)

Do **not** treat with acetaminophen, benzodiazepines, systemic corticosteroids, SSRIs, SNRIs, or tricyclic antidepressants.
Evidence is inconclusive, with potential harms likely outweighing benefits for use of pregabalin, gabapentin, and herbal medications or supplements.



Commonly used medications are listed in Table 8. Certain medications have been shown to decrease the discomfort of acute low back pain. None has been shown to decrease disability or change the natural history of the disorder.

Advise patients not to wait until discomfort or pain is felt. Instruct them to take medications for discomfort or pain at the prescribed time intervals, not as needed.

**Nonsteroidal anti-inflammatory drugs (NSAIDs).** NSAIDs are more effective than placebo in patients with acute low back pain.[54,55] Traditional NSAIDs and COX-2 NSAIDs provide similar pain relief for acute low back pain.[54] Data regarding disability and functional outcome improvement with NSAIDs are inconclusive.

The choice of NSAID depends on cost and side effect profile. Randomized controlled trials have produced inconclusive evidence of any differences regarding side effects from traditional NSAIDs versus placebo.[56] COX-2 NSAIDs have fewer GI side effects than traditional NSAIDs.[54]

Assess gastrointestinal and cardiovascular risks prior to using NSAIDs (see Table 9).

- In patients with GI risk, COX-2 selective inhibitors may have relatively lower risk. Treatment with NSAIDs increases the risk of GI bleeding. Long-term use increases the risk of chronic kidney disease. The risk of GI bleeding is reduced by adding a proton pump inhibitor (PPI). However, long term PPI use may increase the risk of osteoporosis, aspiration pneumonia, and *C. difficile* colitis.
- Heart attack and stroke risk increase with even short term use of NSAID's and the risk can begin after only a few weeks if treatment. The risk is greatest for those with the known heart disease and at highest doses. Time and dose limited use of NSAID's, especially in patients with known heart disease is recommended
- In patients with significant cardiovascular risk, naproxen with PPI may be a viable option.

**Topical preparations.** Few studies address benefit of topical preparations (eg, lidocaine, capsaicin) in acute low back pain. However, these topical preparations may be beneficial in neuropathic low back pain.[57] Topical therapies have a lower incidence of systemic adverse effects than most oral medications. Additional data are needed to make definite recommendations regarding effective clinical use of topical preparations.

**Nonbenzodiazepine muscle relaxants**. The benefits of muscle relaxants seem to be limited to short-term use of 3-7 days only.[58,59] No difference in acute low back pain is noted when comparing NSAID alone to NSAID plus muscle relaxant in combination.[60] The mechanism of action of muscle relaxants is uncertain.

Consider the adverse effects of muscle relaxants. Drowsiness, headache, nausea, and dizziness have been commonly reported. Little evidence exists regarding the benefit of one agent over another. Cyclobenzaprine is inexpensive and commonly used, but it has a higher rate of anticholinergic effects, which may be a concern in the geriatric population. Benzodiazepines, including diazepam, are not effective muscle relaxants and should not be used. Carisoprodol is not recommended because of its risks of central nervous system depression and dependence.

**Opioids.** Contrary to common practice, opioid analgesics are generally not indicated for acute low back pain. Their small and clinically unimportant benefit is outweighed by the potential harms.

Systematic reviews and a meta-analysis showed that opioid therapy provided only small additional analgesic effects over placebo.[54,59] Opioid use provided no clinically important improvement in function compared to placebo at 30-91 days in a meta-analysis.[59] One systematic review found that use of strong opioid compared to placebo resulted in a small, clinically unimportant function improvement.[54]

Opioids have significant adverse effects including drowsiness, respiratory depression, constipation, and potential for addiction and diversion. One meta-analysis has shown that the median incidence of adverse events is 68.9% for opioid treatment groups versus 49.1% for placebo groups.[59]

Trials that compare opioids to other drug therapies (eg, acetaminophen, NSAIDs) are limited and inconclusive. Opioids may provide a small benefit for acute low back pain that is refractory to NSAIDs and nonbenzodiazepine muscle relaxants. However, before deciding to try a time-limited opioid course, seek objective findings that the pain is truly acute, consider factors that may preclude the use of opioids (eg, age, frailty, potential for drug interactions, social issues, psychiatric problems, abuse history, pain or disability severity), check health records for previous opioid use, and query your state's Prescription Drug Monitoring Program (MAPS in Michigan) for other controlled substance prescriptions.

Opioid use for chronic pain is addressed in the UMHS clinical guideline Managing Chronic Non-Terminal Pain in Adults, Including Prescribing Controlled Substances.

**Acetaminophen.** Evidence has shown no benefit of acetaminophen use in low back pain, so considerations for harm or burden predominate. Therefore, acetaminophen is not recommended for treatment of low back pain.

Two large systematic reviews found no substantial benefit from acetaminophen over placebo on the outcomes of pain, disability, function or quality of life at twelve weeks.[54,61] Similarly, no difference between acetaminophen and placebo was noted at any of the time points in a large high quality randomized controlled trial.[62]

Acetaminophen is easily accessible over the counter and is considered by patients to be a "safe" medication, especially because it lacks the gastrointestinal, renal, and bleeding adverse effects seen with NSAIDs. However, it is easily overused without proper education. Elderly individuals and patients with hepatic insufficiency may be subgroups that are the most susceptible to harm.

**Benzodiazepines.** Low quality data indicate that harms of benzodiazepines outweigh benefits. Compelling reasons to avoid them are the significant potential for abuse, addiction, and overdose leading to respiratory depression and death.

Evidence to support the use of benzodiazepines in acute low back pain remains insufficient. One systematic review found inconclusive evidence between diazepam and placebo for low back pain improvement.[54] The same review with low quality evidence reported more frequent central nervous system adverse events like fatigue, lightheadedness, and somnolence for benzodiazepines compared with placebo.

**Systemic corticosteroids.** Little evidence exists for systemic corticosteroids being efficacious for either pain or disability in acute low back pain. Moderate quality studies have found no significant differences related to pain, and mixed results in relation to health care utilization.[54,63]

Corticosteroid use has definite risks both in the short and long term. When prednisone was compared to placebo in a moderate quality study, prednisone produced significantly more adverse events, including nervousness, headache, increased appetite, insomnia and sweating.[63,64]

**SSRIs, SNRIs, and tricyclic antidepressants.** For acute low back pain, literature does not support the use of SSRIs, SNRIs, or tricyclic antidepressants. However, for chronic low back pain, some of these agents (in particular, the SNRI duloxetine) have demonstrated benefit for both pain and function improvement.[54,65]

Adverse effect burdens between medications in this category may vary greatly and should be taken into consideration when choosing a particular medication.

**Gabapentinoids (pregabalin, gabapentin).** Although evidence is mixed regarding the use of gabapentinoids for acute low back pain, pregabalin and gabapentin are not recommended due to little benefit compared to potential harm.[66]

No trials address use of gabapentinoids and other antiepileptics in acute nonradicular low back pain. Two low quality randomized controlled trials indicated a small difference in pain in the short term.[67,68] One moderate quality study showed no difference between gabapentin and placebo for radicular or nonradicular chronic low back pain.[69]

Adverse events are a concern for pregabalin and gabapentin. Each agent was studied in a randomized controlled trial. Both drugs resulted in higher adverse events, including fatigue, difficulties with concentration, and loss of balance.[69,70] In addition, pregabalin and gabapentin are controlled substances with some potential for abuse and dependence.

**Herbal medications and supplements.** Little high-quality evidence is available to support the use of herbal medications and supplements. The lack of FDA regulation and the wide variety of preparations and their bioactivity raise concerns that harms may outweigh benefits.

For glucosamine, a three-trial systematic review with very low-quality evidence showed no difference between glucosamine and placebo in two of the included studies. Subclinical doses of glucosamine were used, raising concerns about the validity of the results.[71]

For two oral herbal medications (devil's claw and white willow bark), a systematic review including ten trials for acute and chronic low back pain showed good results in the short term. However, safety and long term efficacy have not been studied.[72]

## Injections

**Recommendations:**
Little evidence supports the use of any type of injection for nonspecific acute low back pain.
Epidural steroid injections may provide short term relief for radiating pain due to disk herniation or spinal stenosis. However, long term outcomes are not clear.

For nonspecific acute low back pain, little evidence supports the use of any type of injection.[73] For disk herniations or spinal stenosis, epidural steroid injections may provide some short term relief in decreasing radiating leg pain, but the effect on long-term outcome is not clear.[74,75]

Steroid injections into the facet joints and sacroiliac joints do not appear to have significant effect when done outside the confines of a comprehensive rehabilitation program. Trigger point injections with local anesthetic and "dry needling" have been shown to have short-term effectiveness in the management of low back pain. The use of botulinum toxin injections in the management of acute low back pain shows no advantage and increased cost compared to trigger point injections.[73,76–79]



## Surgery

**Recommendations:**
In patients with progressive neurologic deficits or cauda equina syndrome, request emergent surgical evaluation.
In patients with symptomatic spondylolisthesis, spinal stenosis, and/or segmental hypermobility, consider surgical evaluation.
In patients with radiating pain after failure of 4 weeks of conservative treatment, consider surgical evaluation.

Patients with progressive neurologic deficits or cauda equina syndrome require emergent surgical evaluation because over time these neural problems may become irreversible. Patients with pain radiating below the knee, positive neurologic findings, and disk herniation on imaging studies have faster relief of symptoms with surgery as opposed to conservative treatment. For disk herniation, surgical treatment shortens the length of disability compared to conservative treatment, although long-term outcomes are similar for both approaches.

Consider surgical evaluation in patients with symptomatic spondylolisthesis, spinal stenosis, and/or segmental hypermobility, because these conditions may be corrected surgically.[78,82]

Many patients with radiating pain get better within the first few weeks. Therefore, surgery is usually not considered until a patient has failed at least 4 weeks of conservative treatment.

## Mental Health Interventions

**Recommendations:**
Perform mental health screening as part of the initial evaluation for low back pain.
For patients with comorbid psychiatric and mood disorders, consider counseling or psychotherapy.
Consider mindfulness-based stress reduction therapy to improve short-term outcomes.

For patients with comorbid psychiatric and mood disorders, acute low back pain may trigger worsening depression and anxiety symptoms. Counseling or psychotherapy is an effective strategy for preventing exacerbations of underlying mood disorders.[24,26,28]

Consider mindfulness-based stress reduction therapy; compared to usual care, it can improve short-term outcomes in pain intensity and physical functioning, but does not significantly alter long-term outcomes.[83]

While biofeedback and self-hypnosis are safe and may be useful, data are not sufficient to offer recommendations for or against them.

## Multidisciplinary Approaches



**Recommendations:**
For patients with acute low back pain, do not offer multidisciplinary biopsychosocial rehabilitation.
For patients with chronic or subacute low back pain not satisfactorily responding to more limited approaches, offer a multidisciplinary biopsychosocial rehabilitation program.
For patients with chronic low back pain, recommend a multicomponent self-management intervention, and consider adding a structured education component that includes pain neurophysiology.

Multidisciplinary biopsychosocial rehabilitation offers little benefit for acute low back pain because it typically resolves within 4 weeks.[84]

For patients with chronic low back pain, multidisciplinary biopsychosocial rehabilitation has a favorable risk to benefit ratio.[85–88] It has also demonstrated benefit in subacute low back pain.[89] Multidisciplinary biopsychosocial rehabilitation should include at least one physical component and at least one other component of the biopsychosocial model (psychological, social, occupational). The components should be used in an explicitly coordinated manner.

For patients with chronic low back pain, recommend a multicomponent self-management intervention, and consider adding a structured education component that includes pain neurophysiology.

# Special Topics

## Primary Prevention

**Recommendations:**
To reduce the likelihood of acute low back pain in a healthy population, recommend:

- Physical activity or exercise, either alone or combined with education.
- Reducing risk factors: obesity, smoking, strenuous physical work.

No preventive benefit is provided by education alone, back belts, shoe inserts, or ergonomic programs.
Do not screen individuals at higher risk for low back pain with x-ray or other imaging.

Physical activity and exercise can protect against the development of low back pain. A combination of stretching, strengthening, and aerobic exercises 2-4 times per week is reasonable. A systematic review found that exercise alone reduced the risk of developing low back pain by 33%, compared to control groups. The severity of low back pain and disability related to low back pain were also lower in exercise groups. Exercise combined with education reduced risk by 27%.[90] A separate review also found that exercise and exercise plus education reduced the risk of developing low back pain in healthy individuals.[91,92] Individuals who walk or ride a bicycle to work have lower levels of new-onset low back pain.[93]

Significant risk factors for developing new-onset low back pain include abdominal obesity as measured by waist circumference (> 102 cm [40 inches] for men, > 88 cm [35 inches] for women), general obesity (BMI ≥ 30 kg/$m^2$), smoking, and strenuous physical work.[93]

For individuals at higher risk for developing low back pain, screening with x-ray or other imaging is not useful. This recommendation against imaging is supported by multiple physician and provider groups, including the American Academy of Family Physicians, American Society of Anesthesiologists, American Chiropractic Association, and American College of Physicians.[94] Diagnostic imaging is performed for red flag findings.

Other strategies for primary prevention, including education alone, back belts, shoe inserts, and ergonomic programs, were no more effective than control groups at preventing low back pain.[49] The recommendation against the use of lumbar supports for prevention or treatment of acute low back pain is supported by the American Chiropractic Association.[95]

## Recurrent Low Back Pain

**Recommendations:**
If recurrent low back pain is similar to a previous episode and previous treatment was successful, reinstitute the treatment that was previously used.
If pain is different than or more severe than a previous episode, address it as a new instance of acute low back pain.

Most patients who have an episode of back pain will have one or more recurrences within the year. The incidence of recurrence is not known but has been shown to be as high as 33% in 1 year. The likelihood of reoccurrence goes up in patients with more than two previous episodes of low back pain.

If the pain is similar to a previous episode, treatments previously used can be reinstituted. If pain is different than or more severe than a previous episode, address it as a new instance of acute low back pain. Patients who have recurrent activity-limiting acute episodes over a longer period of time may require further diagnostic and treatment efforts, and perhaps consultation with a specialist.[91,92]

## Pregnancy and Low Back Pain

**Recommendations:**
Musculoskeletal low back pain is common in pregnancy. This diagnosis is based on clinical findings and typically does not require additional evaluation.
Further evaluate any suspected urologic, neurologic, or obstetrical causes for back pain in pregnancy.
Recommend exercise for all pregnant women who can safely engage in physical activity. A variety of physical activities are effective to prevent and treat musculoskeletal low back pain in pregnancy. A combination of stretching, strengthening, and aerobic exercises 2-4 times per week is reasonable.
Possibly effective nonpharmacologic treatments for low back pain in pregnancy include acupuncture, osteopathic manual therapies, transcutaneous electrical nerve stimulation (TENS), and kinesio taping.
If medication is to be used in pregnancy, recommend acetaminophen. Avoid NSAIDS.
Avoid x-ray and CT imaging in pregnancy. Consider MRI when neurologic symptoms are concerning for cauda equina syndrome, when there are progressive neurological deficits, or if persistent radiating low back pain does not improve within four weeks.



Low back pain occurs in 50-80% of pregnancies. Onset is most frequent in the second and third trimesters, approximately between weeks 18-31 of pregnancy.[96] Most low back pain in pregnancy is caused by musculoskeletal strain that results from a combination of factors including increased lordosis, weight gain, and increased soft tissue laxity.

Musculoskeletal low back pain in pregnancy is a clinical diagnosis that typically does not require additional evaluation. However, individuals with urologic symptoms (eg, dysuria, costovertebral angle tenderness, fever), neurologic symptoms (eg, saddle anesthesia, urinary retention, rapidly progressive numbness or weakness) or obstetrical symptoms (eg, vaginal bleeding, change in fetal movement, severe abdominal pain, uterine contractions) require appropriate evaluation and attention for these potentially serious causes of low back pain.[97]

Exercise reduces low back pain in pregnancy. A reasonable approach is to recommend a combination of stretching, strengthening, and aerobic exercises 2-4 times per week. A systematic review found that any land-based exercise added to usual prenatal care significantly reduces low back pain compared to usual care. The types of exercise programs studied were heterogeneous, and no specific type of exercise program is considered superior to others.[98] Randomized controlled trials demonstrate that water-based exercise and prenatal yoga can reduce the severity of low back pain.[99,100] Additionally, prenatal yoga improves mood and can reduce symptoms of depression and anxiety in pregnant women.[101]

Individual studies show that the following modalities may reduce low back pain in pregnancy: acupuncture, TENS, progressive muscle relaxation with music, osteopathic manipulation, and kinesio taping.[98,102–105]

Medications in pregnancy are limited by safety concerns for both the mother and child. While studies have failed to show a therapeutic benefit of acetaminophen for low back pain in the general population, it is generally considered safe in pregnancy. In pregnant women who experience moderate to severe pain despite nonpharmacologic therapy, acetaminophen is a first-line medication for pain relief.[106,103] Avoid aspirin, ibuprofen, and other NSAIDs in pregnancy. Avoid opioid medications in pregnancy except in cases of severe, refractory back pain, when they can be cautiously considered for short-term relief. Do not initiate long-term use of opioids due to risks of abuse or dependence in the pregnant patient, as well as the risk of opioid withdrawal in the newborn.[106]

Imaging in pregnancy is limited by safety concerns for the mother and child. For musculoskeletal low back pain in pregnancy, avoid x-ray and CT imaging. Consider MRI when neurologic symptoms are concerning for cauda equina syndrome.[106]

## Occupational Low Back Pain and Work Restrictions

**Recommendations:**
Provide educational information about managing acute low back pain to employees at the onset of injury.
Emphasize an early return to work to minimize chronic disability.
Recommend when to return to work using clinical judgment based on objective results of physical exam, diagnostic testing, and multidisciplinary assessments.



Providing information on the management of acute nonspecific low back pain to employees at the onset of injury is cost effective. This information can reduce time off work and helps to limit health care costs.[107]

No significant associations have been found between daily duration of forward bending of the trunk and development or aggravation of low back pain.[108] Heavy physical workload was associated with radiating low back pain among women (OR 4.09, 95% CI 1.62 to 10.31) and men (OR 2.01, 95% CI 1.06 to 3.82). A history of low back pain augmented this association in men.[109]

When a clinician is asked to provide permanent restrictions or a disability rating, the advice of an expert may be helpful. Legal disability rating systems (such as the AMA Guidelines to Physical Impairment or a number of other state compensation systems) have little or no correlation with actual future risk of injury or disability.

Little evidence exists regarding specific work restrictions for spinal disorders. In general, an early return to work is associated with better outcomes. However, heavy lifting, twisting, and seated vibration (as in a car or truck) are risk factors for back pain. When these risk factors are present, use clinical judgment when determining work restrictions.

Decide on permanent work restrictions by using objective findings on physical examination and diagnostic tests. Multidisciplinary evaluations may be helpful to document physical abilities. However,

consider reversible causes in cases of limited performance, including deconditioning or psychosocial factors.

# Related National Guidelines and Performance Measures

## National Guidelines

This guideline is generally consistent with the:

VA/DoD Clinical Practice Guideline for Diagnosis and Treatment of Low Back Pain. Washington DC: Department of Veterans Affairs and Department of Defense, 2017.

## Performance Measures

National and regional programs that have a clinical performance measure for care for low back pain include the following.

- Centers for Medicare & Medicaid Services (Medicare)
- Blue Cross Blue Shield of Michigan (BCBSM)
- Blue Care Network [HMO]: clinical performance measures (BCN)



While specific measurement details vary between program (eg, method of data collection, population inclusions and exclusions), the general measure is:

**Imaging studies.** Adults 18–50 with a primary diagnosis of low back pain who did not have an imaging study (plain x-ray, MRI, or CT scan) within 28 days of the diagnosis (BCBSM, BCN, Medicare).

# Guideline Development Methodology

## Funding

The development of this guideline was funded by UMHS.

## Guideline Development Team and Disclosures

The multidisciplinary guideline development team consisted of:

- Primary care physicians: Suvarna N. Bhat MBBS, General Internal Medicine; Gregory D. Shumer, MD, Family Medicine.
- Specialists in low back pain care: Anthony E. Chiodo, MD, Physical Medicine & Rehabilitation; Ronald A. Wasserman, MD, Anesthesiology, Back and Pain Center.
- Consultant specialists: Paul Park, MD, Neurosurgery; Rakesh D. Patel, MD, Orthopedic Surgery.
- Guideline development methodologist: R. Van Harrison, PhD, Learning Health Sciences.
- Literature search services were provided by informationists at the Taubman Health Sciences

Library, University of Michigan Medical School.

UMHS endorses the Standards of the Accreditation Council for Continuing Medical Education that the individuals who present educational activities disclose significant relationships with commercial companies whose products or services are discussed. Contributions of team members with relevant financial relationships are reviewed by team members without relevant financial relationships to assure the information is presented without bias.

None of the team members or consultants have relevant personal financial relationships.

## Systematic Review of Literature

A detailed description of the systematic search and review of literature upon which this guideline is based is presented in the associated UMHS document "Acute Low Back Pain, 2019: Literature Review Methods and Results." The following section highlights major aspects of the literature search and review process.

**Literature search**. The team began the search of literature by accepting the results of a systematic literature review performed in 2016:

VA/DoD Clinical Practice Guideline for Diagnosis and Treatment of Low Back Pain. Washington DC: Department of Veterans Affairs and Department of Defense, 2017 (which searches and synthesizes literature through Oct 2016).

To update those results, we performed a systematic search of literature on Medline and in the Cochrane Database of Systematic Reviews for the time period 1/1/16 – 5/31/19.

The major search term was low back pain. The searches were for guidelines, controlled trials (including meta-analyses), and cohort studies, for literature on humans in the English language. Within these parameters individual searches were performed for the following topics:

A. Etiology: Chronic low back pain, risk factors
B. Diagnosis of acute low back pain: History, physical exam, tests: Laboratory tests, imaging (eg, x-ray, CT, CT-myelography), electromyogram (EMG), bone scan, other diagnosis not included in B.
C. Treatment of acute low back pain: Patient education; therapy: heat, spinal manipulation, exercise, ultrasound, diathermy, phonophoresis, iontophoresesis of medications, transcutaneous electrical nerve simulators (TENS), shoe inserts, lumbar corsets/belts, traction, activity restrictions; medication: opioids, benzodiazepines, medications other than opioids and benzodiazepines (eg, acetaminophen, NSAIDs, "muscle relaxants", etc.); injections; surgery; counseling; multidisciplinary approaches; other treatments not included in C.
D. Special topics: Prevention of acute low back pain, recurrent low back pain, acute low back pain occurring for those chronic low back pain, pregnancy and low back pain, occupational low back pain and work restrictions for acute low back pain, alternative and complementary medicine for acute low back pain, acute low back pain in general not included in D.

A more formal presentation of the inclusion and exclusion criteria is in Section II of the accompanying Literature Review Methods and Results.

The detailed search strategies are presented in Section III of the accompanying Literature Review Methods and Results.

The search was conducted in components of a formal problem structure (outlined above). The search was supplemented with very recent clinical trials known to expert members of the panel. The search was a single cycle. The number of publications identified is presented in Section IV of the accompanying Literature Review Methods and Results.

**Literature review and assessment.** Members of the guideline team reviewed the publications identified to be relevant to specific topics in order to select those with best evidence. Criteria to identify overall best evidence included relevance of the study setting and population, study design, sample size, measurement methods (variables, measures, data collection), intervention methods (appropriateness, execution), appropriateness of analyses, and clarity of description.

In considering level of evidence based on study design, the classification was:

A = systematic reviews of randomized controlled trials with or without meta-analysis

B = randomized controlled trials

C = systematic reviews of nonrandomized controlled trials or observational studies, nonrandomized controlled trials, group observation studies (cohort, cross-sectional, case-control)

D = individual observation studies (case study or case series)

E = expert opinion regarding benefits and harm.

Beginning with best evidence identified by the VA/DoD systematic literature review, team members checked publications identified in the more recent search (1/1/16 – 5/31/19.) to determine whether better evidence was available. Team members also had the option of considering very recent literature (published since 5/31/19) in determining whether even better evidence was available.

The process of review and assessment is described in more detail in Section V of the accompanying Literature Review Methods and Results.

**Best evidence and recommendations.** Team members identified articles or other publications with best evidence regarding specific topics.

The guideline team reviewed the evidence and determined the importance of performing or not performing key aspects of care (listed on the first page of this guideline). In the absence of empirical evidence, the guideline team based recommendations on their expert opinion.

The strength of recommendations regarding care were categorized as:

I = Generally should be performed

II = May be reasonable to perform

III = Generally should not be performed.

Section VI of the accompanying Literature Review Methods and Results presents a table of each recommendation and the source of best evidence on which the recommendation is based.

## Review and Endorsement

A draft of this guideline was reviewed by the units within UMHS to which the content is most relevant. Pharmacy Services performed the initial review. Then reviews occurred in clinical conferences or by distribution for comment within the following clinical departments and divisions: Back and Pain Center, Family Medicine, General Medicine, Geriatric Medicine, Neurosurgery, Obstetrics & Gynecology (Women's Health), Orthopedic Surgery, and Physical Medicine and Rehabilitation. The draft was revised based on comments from these groups.

The final version of this guideline was endorsed by the Executive Committee for Clinical Affairs of the University of Michigan Hospitals and Health Centers.

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1997: Andrew J. Haig, MD; Connie J. Standiford, MD; David J. Alvarez, DO; Gregory P. Graziano, MD; R. Van Harrison, PhD; Stephen M. Papadopoulos, MD; Amy L. Tremper, MD.

2003: Anthony Chiodo, MD; David J. Alvarez, DO; Gregory P. Graziano, MD; Andrew J. Haig, MD; R. Van Harrison, PhD; John E. McGillicuddy, MD; Connie J. Standiford, MD; Amy L. Tremper, MD.

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| **APPROVALS** | |
|---|---|
| P&T<br>Pain Committee<br>CPC | Date: 9/15/2020<br>Date: 10/15/2020<br>Deferred |
| ECCA | Date: 11/24/2020 |

**Literature search service**

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## Attachments

Diagnosis and Treatment of Acute Low Back Pain

## Approval Signatures

| Step Description | Approver | Date |
|---|---|---|

| | | |
|---|---|---|
| Quality Review | April Proudlock: Project Senior Manager | 12/2020 |
| Quality Review | Ellen Patrick: Admin Specialist Intermediate | 12/2020 |
| Owner | Ellen Patrick: Admin Specialist Intermediate | 12/2020 |