

Background

Back pain is extremely common. Up to 84% of adults are affected by back pain at some time during their life and 26% say they have had back pain in the last 3 months.^{1, 2} Most patients have non-specific back pain, without an identifiable cause. Less than 1% have a serious systemic etiology.² And the vast majority of back pain self-resolves.² However, some back pain persists. Treating back pain is very complex, but critically important, as low back pain is the most common cause of disability in the United States and around the world.^{3, 4} Low back and neck pain had the highest health care spending of all measured conditions in the US (\$134.5 billion annually) and has had one of the greatest increases in costs over the last decade.⁵ Helping patients with back pain is a high priority at Sutter Health, in order to improve clinical outcomes, improve the quality of life of our patients, and increase the affordability of health care.

Clinical Practice Guidelines Benefit

A clinical practice guideline improves consistency of best-practice evidence-based care in a health care organization. It allows all members of a care team to screen, diagnose, monitor, treat and educate patients using standard recommendations consistently across care environments, specialties, and affiliates. It helps ensure outcome metrics are consistent with recommended patient care. It helps translate best practice care into electronic health record tools and standards, patient education materials, and staff training resources. And it provides a means to adjust care efficiently and consistently across the organization when new evidence emerges. Implementation of clinical practice guidelines is a key recommendation of national campaigns to improve clinical outcomes of chronic conditions.

Guideline Committee Process

The following Sutter Health Adult Back Pain Clinical Practice Guideline was written by a 57-person multi-disciplinary team from across Sutter Health. The team was carefully crafted to represent the wide spectrum of Sutter Health's clinical community: geography (both Bay and Valley geographic regions), types of providers (surgical specialists, non-surgical specialists, primary care physicians, advanced practice clinicians, registered nurses, physical therapists, and pharmacists), type of practice (foundation and independent affiliates), type of department (local office and system office), and type of work (in-person patient care, case management, quality and population health). A patient representative was

included in the writing team. Writing this guideline was a multi-step process. Key systematic reviews and guidelines for back pain were identified by a Sutter Health librarian. The recommendations from each source were carefully reviewed by the committee, and those recommendations with the strongest evidence most consistent with best practice care for the Sutter Health population were included.

Guideline Recommendations

This guideline is intended for the care of adults with back pain. It is not intended for pregnant patients, children or adolescents. It is intended to help clinicians, educators, case managers and patients make decisions according to standard clinical practice and to improve the care and management of patients with back pain at Sutter Health. However, it should not replace individual clinical judgment nor specialty consultation when indicated. All clinical decisions should be made within the context of the specific situation for each patient, including current health, medications, risk of treatment side effects, quality of life, life expectancy, and patient preference.

The guideline is divided into the following major topics:

(click on the topic to jump to that section)

General	2
Algorithm 1: Ambulatory Back Pain Algorithm	4
Algorithm 2: Surgical Back Pain Algorithm	5
Algorithm 3: Self-Management, Therapies and Referrals for Back Pain	6
Box 1 History	7
Box 2 Physical exam	9
Box 3 Imaging	9
Box 4 Treatment	10
Box 5: Pre-surgical evaluation and management	11
Box 6: Perioperative Care	12
Box 7: Transitions of Care and Post-Acute Care	12
Table 1. Classification of low back pain in adults	14
Table 2. Lower extremity myotomes, dermatomes, and reflexes by lumbar nerve root	14
Table 3. RED FLAG Key Features of Back Pain and Imaging studies	15
Table 4: Types, Causes and Treatment of Low Back Pain	16
Table 5: Non-surgical Interventions	18
Table 6: Surgical Interventions	19
Bibliography	20
Appendix: Back Pain Medication Tables	23
Bibliography: Medication Tables	27
Abbreviations and Acronyms	28

Classification

Causes: See Table 1 for causes of Back Pain

Location

- Low Back Pain (LBP)
- Thoracic Back Pain
- Sacral Pain

Duration/Type

- Acute (up to four weeks) ^{6, 7}
- Subacute (4-12 weeks) ^{6, 7}
- Chronic (more than 12 weeks) ^{6, 7}
- Recurrent
- Post-Surgical

Assessment Goals

- The goals of back pain assessment include:
 - Differentiate nonspecific back pain from serious or systemic causes.
 - Identify signs and symptoms of significant neurologic compromise.
 - Identify risk factors for chronicity.
- In most cases, the history and physical exam will be sufficient to accomplish these goals.
- Consider use of telehealth in the evaluation to ease access to assessment.

Treatment Goals

- Improve and/or manage pain ⁷
- Maintain or restore function ⁷
- Maximize coping skills ⁷
- Prevent long-term disability ⁷
- Prevent recurrences ⁷

Prognosis

- Most acute LBP resolves rapidly within the first month and further improvement occurs for most other patients over the next three months. ⁸
- For patients with chronic back pain symptoms, patients may not achieve complete resolution of pain but improvement focuses on controlling pain and improving activity. ⁸

Communication

- Focus on patient-centered goals.
- Use empathetic and reassuring tone and language during assessment. Address patient's fears.
- Include shared decision making tools when discussing treatment options
 - [Low Back Pain: Should I Have an MRI?](#)
 - [Low Back Pain: Should I Try Epidural Steroid Shots?](#)
 - [Lumbar Spinal Stenosis: Should I Have Surgery?](#)
 - [Lumbar Herniated Disc: Should I Have Surgery?](#)

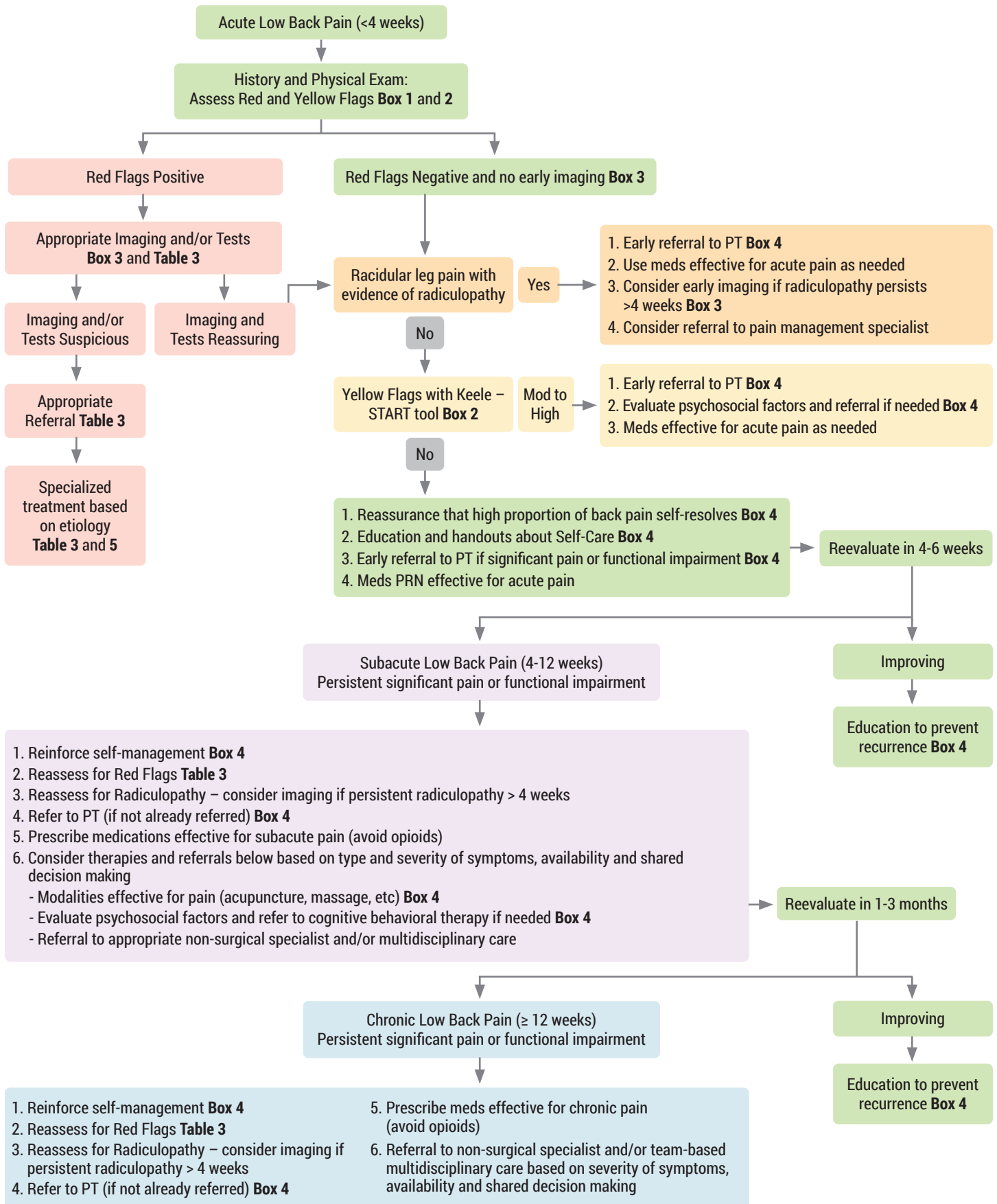
- Include patient choice in management to give a sense of self-efficacy.⁹
- Include key messages such as below (as suggested in other published guidelines such as by the Institute for Clinical Systems Improvement and Intermountain Healthcare):
 - “A history and physical didn’t reveal any serious problem.” “The spine is strong and flexible, and it’s difficult to damage or dislocate anything.”⁹
 - “Pain doesn’t mean harm.” “Experiencing discomfort during activities is expected.” “Here is a list of warning signs for you to watch for.”³
 - “Most people recover in a few weeks.” “Staying active helps your back recover.”⁹
 - “Imaging tests are not needed at this stage.”⁹

Types of Non-Surgical Specialists who Treat Patients with Back Pain

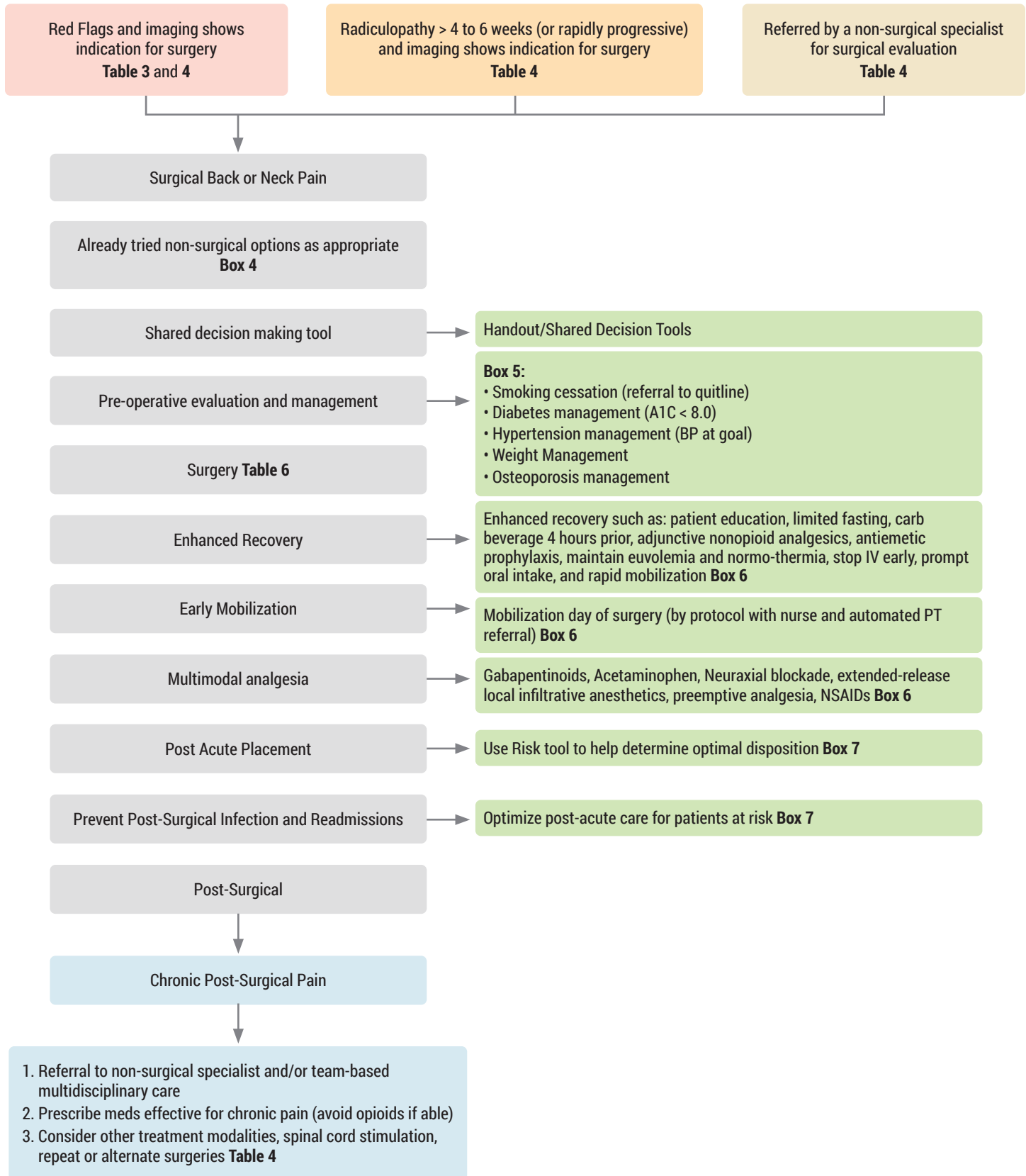
Choose an appropriate specialist according to specific clinical situation, diagnosis and needs of the patient.

- Pain Management – Physicians from specialties below with advanced certification and training in the evaluation, management, treatment and specific interventions for back and neck pain.¹⁰
 - » Physical Medicine and Rehabilitation (PM&R) – Physicians trained in different conditions affecting the brain, spinal cord, nerves, bones, joints, ligaments, muscles, and tendons focusing on improving quality of life and ability to function.¹¹
 - » Anesthesiology – Physicians trained in helping patients with serious acute, chronic or recurring pain.¹³
 - » Neurology – Physicians that diagnose, treat, and manage disorders of the brain and nervous system.¹⁴
- Sports Medicine – Physicians trained in improving athletic performance and in treating athletic and musculoskeletal injuries.¹⁵
- Osteopathic Manipulative Medicine (OMM) - Physicians trained in OMM.¹⁶
- Integrative Medicine – Physicians trained to use a variety of different therapeutic modalities and approaches to treat chronic conditions.¹⁷
- Rheumatology – Physicians training in the diagnosis and treatment of musculoskeletal disease and systemic autoimmune conditions.¹⁸

Algorithm 1: Ambulatory Back Pain Algorithm



Algorithm 2: Surgical Back Pain Algorithm



Algorithm 3: Self-Management, Therapies and Referrals for Back Pain

Category	Intervention	Low Back Pain Duration			Description
		Acute (< 6 weeks)	Subacute (6-12 weeks)	Chronic (>12 weeks)	
Self-Management	Education	←————→			Include handouts and other patient engagement tools about self-management, prevention, treatment options, and shared decision making.
	Remain active	←————→			Encourage all patients with acute and chronic back pain to remain active.
	Heat	✓	✓		Consider use heat wrap for acute or subacute back pain. Some patients may consider cold treatment (but not clearly effective).
	Massage	✓	✓		Consider use massage for acute or subacute back pain.
	Specific exercises			✓	Recommend exercise programs for chronic back pain that have evidence of effectiveness such as: Pilates: a low-impact exercise that aims to strengthen muscles while improving postural alignment and flexibility. Tai Chi: self-paced system of gentle physical exercise and stretching with posture flowing into the next without pause. Yoga: a practice of physical exercise, breath control, relaxation, and meditation aimed at developing harmony in the body, mind, and environment.
	Aerobic Exercise			✓	Recommend aerobic physical activity for chronic back pain (Activity that includes cardiovascular conditioning – such as brisk walking, swimming, running, or cycling).
Therapies*	Physical Therapy	✓ (if yellow flags, radiculopathy, or significant pain or decrease function)	✓	✓	Refer patients with acute back pain with moderate to high score on Keele STarT, radiculopathy, or significant pain or impaired function to PT at initial visit. Refer all patients with persistent subacute or chronic pain to PT. PT uses methods such as massage, heat treatment, and exercise and may include joint mobilization.
	Acupuncture		✓	✓	May consider acupuncture as an option to treat patients with significant subacute or chronic pain. Includes inserting very thin needles through a person's skin at specific points on the body, to various depths.
	Manipulation		✓	✓	May consider manipulation as an option to treat significant subacute or chronic pain. Includes controlled high- or low- velocity thrusts applied to a joints in the spine. Manipulation is performed by some Osteopathic Manipulative Medicine Physicians and Chiropractic Physicians.
	Mindfulness Based Stress Reduction		✓	✓	May consider Mindfulness Based Stress Reduction for patients with significant subacute or chronic pain. Incorporates mindfulness practices such as meditation and breathing exercises.
	Cognitive Behavioral Therapy (CBT)		✓	✓	Consider refer patients with moderate to high yellow flag score (Keele STarT) to cognitive behavior therapy. Includes short-term, goal-oriented psychotherapy that takes a hands-on, practical approach to problem-solving.
Referral*	Non-surgical specialists	✓ (if severe symptoms)	✓	✓	Refer patients to pain management specialist or other appropriate non-surgical specialist as indicated when significant radiculopathy or significant pain or impaired function > 6 weeks.
	Surgical Specialist	✓ (if urgent surgical indication)	✓ (if surgical indication)	✓ (if surgical indication)	Refer patients to a surgeon when imaging shows a surgical indication associated with red flags or rapidly progressive or persistent radiculopathy (> 6 weeks).
	Team-based Multidisciplinary Multimodal Care			✓	Includes multiple specialist services and treatment modalities. Evidence recommends referral for patients with persistent chronic back pain. ^{7 19 6} 20 21 1

*Based on type, severity and progression of symptoms, availability, and shared decision making

Box 1

History:

Consider use smart phrase

History of other conditions (such as osteoporosis, infection, cancer, arthritis, etc.)⁹

Pain characteristics

- Patients descriptors
 - Examples: numbness/tingling, burning, ache, pulsing, constant, intermittent, sharp, stabbing, shooting
- Location
 - Thoracic, low back (majority), sacral
 - Radiation into buttock or leg (note that pain past the knee can be mechanical or radicular in origin)
- Duration – acute < 4 weeks, subacute 4-12 weeks, or chronic > 12 weeks⁶
- History – first time or previous history
 - Note: previous back pain is a risk factor for recurring episodes and risk of chronic back pain NASS Grade B, 22
- Timing
 - Increasing, decreasing, fluctuating or unrelenting
 - Day or night pain
- Severity and functional impairment
 - Note: this helps stratify risk of conversion from acute to chronic LBP. NASS Grade A 22
- Aggravating and alleviating factors
 - Activity associated with the onset of the pain³
 - Response to positioning⁹
- Association with onset – such as trauma

Neurologic symptoms including sensory motor changes⁶ See **Table 2**

Psychosocial issues

- Depression screen^{3, 6}
 - PHQ2 if no history of depression⁶
 - PHQ9 if history of depressions or PHQ2 positive⁶
 - Note: depression, anxiety, or other mood disorders may be the strongest predictors of low back pain outcomes (including surgery)⁸
- Association with workman's comp (as different/additional services may be available if so)
- Medication understanding and adherence by patients³
- Financial issues³

Red Flags

Note: Screen for red flags for evidence of need for urgent evaluation^{3, 6} See **Table 3** Includes:

- Bowel/bladder dysfunction³ Note: all patients should be asked about urinary retention³ and progressive neurologic weakness³
- Saddle anesthesia³
- Bilateral radiculopathy³
- Incapacitating pain³
- Unrelenting night pain³

Yellow Flags

Note: Screen for yellow flags using Keele StarT screen to help predict likelihood of conversion from acute to chronic LBP and return to work.^{6, NASS Grade A, 22, 3, 9, 7, 23}

- Elicits concerns about this episode of back pain beyond just the pain
- Includes below:⁶
 - Fear avoidance beliefs⁷
 - » Fear of chronicity, further “damage”, loss of livelihood or lifestyle
 - » Fear of Movement (kinesiophobia)^{NASS Grade B, 22}
 - Psychological distress/Depression⁷
 - Somatization⁷
 - Impaired function⁷
 - Job dissatisfaction⁷
 - Disputed compensation claims⁷

Recommend Keele STarT Yellow Flag Screening Tool^{3, 9, 23, 7}

Results:

- **Low risk:** Total score ≤ 3.
- **Medium risk:** Total score > 3 and sub score ≤ 3
- **High risk:** Total score > 3 and sub score > 3
- Note: may also consider other screening tools, such as **Orebro Musculoskeletal Pain Questionnaire (OMPQ)** or **Fear-Avoidance Beliefs Questionnaire (FABQ)**, which contain more detail but take longer to administer

Keele STarT:

Thinking about the last 2 weeks mark your response to the following questions:

	Disagree 0	Agree 1
1. My back pain has spread down my leg(s) at some time in the last 2 weeks	_____	_____
2. I have had pain in the shoulder or neck at some time in the last 2 weeks	_____	_____
3. I have only walked short distances because of my back pain	_____	_____
4. In the last 2 weeks, I have dressed more slowly than usual because of back pain	_____	_____
5. It's not really safe for a person with a condition like mine to be physically active	_____	_____
6. Worrying thoughts have been going through my mind a lot of the time	_____	_____
7. I feel that my back pain is terrible and it's never going to get any better	_____	_____
8. In general I have not enjoyed all the things I used to enjoy	_____	_____
9. Overall, how bothersome has your back pain been in the last 2 weeks?	_____	_____
	Not at all (0)	Slightly (0)
	Moderately (0)	Very much (1)
	Extremely (1)	

Box 2

Physical exam:

Focus on whether there are signs of serious or systemic causes of back pain

NOTE: Consider use EPIC smart phrase

- Gait ⁹
- Neurologic Exam (see **Table 2** for details related to lumbar nerve root)
 - Muscle strength ^{NASS Grade A, 24, 9}
 - Reflexes ⁹
 - Sensory exam ^{9, NASS Grade A, 24, 9}
 - Note: assess rectal tone and perirectal sensation if concern of cauda equina syndrome
- Palpation of vertebra and greater trochanters and ischial bursa (vertebral fracture)
- Straight leg raise (Lasègue’s sign), contralateral leg test, and crossed straight leg (femoral nerve test) ^{NASS Grade A, 24, 9}
- Vascular exam – if pain radiates distally
- Hip Range of Motion – if pain in the buttocks, lateral or anterior hip area or radiates distally ⁹
- Upper motor neuron findings ⁹
- Other systems or areas as indicated by history

[UCSF How to do a back exam on a video visit](#)

Box 3

Imaging:

No Imaging recommended for acute, axial, localized, non-radiating low back pain less than 4 weeks if no red flags ^{9, 23, 6, 25, 26, 27, 3, 28}

- Note that early imaging of LBP without red flag indications may cause harm: ^{6, 25}
 - MRI leads to:
 - » many false positive findings ⁶
 - » pressure to do additional workup, treatments and procedures ^{6, 25}
 - » feelings of worry and anxiety which can slow recovery ^{6, 25}
 - X-ray and CT lead to:
 - » radiation exposure ^{6, 25}
 - Discography may lead to:
 - » premature disc degeneration ⁶
- The American College of Physicians recommends the following talking points when discussing imaging with patients: ²⁵
 - “Risk factor assessment can almost always identify patients who require imaging” ²⁵
 - “The prevalence of serious underlying conditions is low in patients without risk factors” ²⁵
 - “The natural history of acute low back pain is quite favorable, but patients require reevaluation if they are not better after about 1 month” ²⁵
 - “Routine imaging does not improve clinical outcomes but increases costs and may lead to potentially unnecessary invasive treatments, such as surgery” ²⁵
 - “Imaging abnormalities are extremely common, especially in older adults, but most are poorly correlated with symptoms” ²⁵
 - “In most cases, treatment plans do not change after imaging studies” ²⁵

Consider imaging and/or other appropriate testing based on the following:

- Red flags as described in **Table 3** ^{9, 3, 23, 6, 25, 28}
- History and/or physical exam with significant concern for serious or secondary cause of LBP
- Neurologic deficits that are serious or progressive ^{6, 3}

Make an individualized decision if persistent or recurring LBP without red flags that has failed to improve or respond to initial therapies ⁶ noting the following:

- Consider imaging only if findings will likely alter treatment. ^{6, 23}
- Base decision on the patient's needs, values, and preferences. ⁶
- Consider x-ray in place of other types of imaging. ⁶
- Inform patient that even specialists may not get imaging. ²³
- Inform patient that imaging will most likely reveal nonspecific findings unrelated to current back pain which can lead to unnecessary further testing. ⁶

Box 4

Treatment:

Self-Management

- Education
 - Provide education and educational handouts ^{9, NASS: Grade A, 22, 3, 6, 29, 23, 7, 21}
 - » Include reassurance about expected course of recovery, effective self-management, and fear avoidance. ^{21, NASS: Grade A, 22, 29}
 - » Address barriers to care.
- Self-care
 - Stay active (for acute and chronic back pain) ^{9, 3, 6, 23, 7, NASS: Grade B, 22, 21, 29}
 - » Note that bedrest has worse outcomes for acute axial LBP than remaining active ^{21, 29}
 - Consider heat wrap for pain (for acute back pain) ^{3, 7, NASS: Grade B, 22, 20, 1}
 - » Some patients may consider cold treatment but not clearly effective (acute) ^{3, 7}
 - Massage (for acute back pain) ^{1, 7, 20, 21}
 - Exercise (for chronic back pain) ^{1, 6, 20, 23, 7, NASS: Grade B, 22, 9, 21}
 - » Aerobic exercise ^{NASS: Grade A, 22, 9, 7}
 - » Consider specific types: Tai Chi, Yoga, Motor Control and/or Pilates have evidence of effectiveness ^{1, 19, 6, 20, NASS: Grade B for yoga ^{22, 9, 7}}

Note: choose type based on patient preference and availability ⁷

Prevention of Future Back Pain

- Exercise ³
 - Such as 30 min of physical activity 5 days/week. 5,000-10,000 steps/day
 - Note: Frequency of exercise matters more than specific exercises ³
- Core exercises and stretching
- Preconditioning (especially specific for work and/or hobbies)
- Appropriate posture while lifting and sitting
- Correct ergonomics
- General weight loss has unknown effect on back pain ³⁰ (Weight loss due to bariatric surgery has been shown to reduce back pain ³¹)

Therapies

Note: choose options based on local availability, nature and severity of back pain and function, progression of symptoms, and shared decision making with patient, and review of the quality and strength of the evidence of effectiveness.

- Physical Therapy^{19, 9, 32, 33, 7, 3}
 - Refer patients with yellow flags (such as scores mod-high on Keele STarT), radiculopathy, or significant pain or impaired function early to moderate to high physician therapy (at initial visit). Including psychologic support for patients.^{19, 9, 32, 33, 7, 3}
 - Refer all back pain patients to physical therapy if pain or impaired function persists after 4 weeks
 - Note: physical therapy may include joint mobilization^{19, 9, 32, 33, 7, 3}
- Acupuncture^{NASS Grade A, 22, 7, 20, 21, 1, 19, 3, 6}
- Spinal manipulation^{3, 7, 6, NASS: Grade C, 22, 20, 19, 21, 23, 1}
 - Such as by osteopathic medicine physician or chiropractic physician⁷
 - Evidence best if combined with exercise^{23, NASS: Grade B, 22}
- Mindfulness-based stress reduction^{20, 7}
- Cognitive Behavior Therapy^{6, NASS: Grade A, 22, 1, 20, 23, 7, 9}
 - Evidence best if combined with exercise²³
- **No evidence of effectiveness**
 - Lumbar supports^{7, 6, 1}
 - Foot orthotics or rocker soles²³
 - Firm mattress/Sleeping surface⁷
 - Ultrasound^{7, 6, 20, 1, NASS: no benefit Grade A, 22, 23}
 - Traction^{7, NASS: no benefit Grade A, 22, 3, 6, 9, 23, 1, 20}
 - Transcutaneous Electrical Nerve Stimulation (TENS)^{7, 9, 20, 1}

Box 5

Pre-surgical evaluation and management:

Evaluate and modify risk factors for elective (non-emergent) procedures

- Smoking
 - Increases risk of surgical infections after surgery^{34, 35}
 - Fusion is more successful in nonsmokers³⁶
 - Patients should stop smoking before surgery. Refer to smoking cessation program
- Diabetes
 - Increases risk of surgical infections^{35, 37}
 - A1C goal should be < 8.0 before surgery
- Hypertension
 - Increases risk of surgical infections after surgery^{35, 37}
 - Goal of BP at goal before surgery
- Obesity
 - Increases the risk of surgical infections after surgery^{35, 37}
- Osteoporosis
 - Consider treat osteoporosis before surgery

Box 6

Perioperative Care:

Mobilize early after surgery

- Use protocols to mobilize the patient the same day of surgery to reduce post-operative complications and hospital length of stay, and improve performance tests and patient reported outcomes.³⁸

Use Multimodal approaches to post-operative pain management

- The following medications for post-operative pain management leads to improved surgical outcome, reduced hospital stays, reduced dependence on opioids, and decreased development of new chronic pain conditions.³⁹
 - Gabapentinoids³⁹
 - Acetaminophen³⁹
 - Neuraxial blockade (intrathecal, epidural)³⁹
 - Extended-release local infiltrative anesthetics³⁹
 - Preemptive analgesia³⁹
 - NSAID³⁹

Use Enhanced recovery strategies

- Early pre-operative evaluation and management, multi-modal post-operative pain management and early-mobilization as above and the following additional actions leads to improve length of stay, healthcare costs, complication rate, pain control, post-op opioid use, and patient satisfaction.^{38, 40, 41}
 - Education and discharge planning
 - Nutrition and metabolism optimization
 - Screening for chronic opioid use
 - Screening for sleep apnea
 - Coordination of post-surgical clinical team, care management, and post-acute care follow-up.

Box 7

Transitions of Care and Post-Acute Care:

Discharge Planning – include acute case management in assessment and management

- Assess patient functional status and rehabilitation needs.
- Create a comprehensive, structured, individualized care plan in collaboration by the patient's care team (surgeon, hospitalist, physical therapist, etc.).
- Identify care needs and potential barriers to care. Help plan patient support system.
- Provide a discharge summary with easy to identify information about spinal precautions, wound care, and therapy recommendations.
- Ensure discharge summary and plan of care is sent to providers seeing patient after discharge.

Discharge Disposition

- Use model or risk score to predict level of care at discharge with goal to send patients home or lowest level of care when able^{42, 43, 44, 45, 46, 47}

Follow-up

- Use the Oswestry Disability Index to monitor patient reported outcomes over time (including administer the questionnaire before surgery as well).

Prevent Readmissions

- Provide extra support for patients with highest risk of readmissions – including risk factors below ⁴⁸.
 - American Society of Anesthesiology score of 3-4+
 - Longer operative duration
 - Medicare/Medicaid
 - Older age
 - Smoking, COPD
 - Kidney disease, Heart disease, Diabetes
- Notes: The most common cause of readmission is wound infection ⁴⁸. Most re-admissions occur within 10 days of hospital discharge ⁴⁵

Post-Acute Care

- Follow-up with appropriate physician within two weeks of discharge

Table 1. Classification of low back pain in adults

>85% of patients seen in primary care have nonspecific back pain^{49,2}

<10% of patients seen in primary care have a specific etiology²

<1% of patients seen in primary care have a systemic severe etiology²

Mechanical Low Back Pain	Non-mechanical Spinal Conditions	Other
Nonspecific low back pain 5%	Neoplasia (0.07%) ⁶	Sacroiliac joint, hip joint or trochanteric bursa
Disc/facet degeneration	Multiple myeloma	Disease of pelvic organs
Herniated disc (4%) ⁶	Metastatic carcinoma	Prostatitis
Spinal stenosis (3%) ⁶	Lymphoma/leukemia	Endometriosis
Spondylolisthesis (~0.5%) ²	Spinal cord tumors	Pelvic inflammatory disease
Vertebral compression fracture (~4%) ^{2,6}	Retroperitoneal tumors	Renal disease
Traumatic fracture	Primary vertebral tumors	Nephrolithiasis
Congenital disease	Infection (0.01%) ⁶	Pyelonephritis
Other mechanical conditions	Osteomyelitis	Perinephric abscess
Spondylolysis	Septic discitis	Cardiac or pericardial disease
Internal disc disruption or discogenic LBP	Paraspinous abscess	Aortic aneurysm
Presumed instability	Epidural abscess	Gastrointestinal disease
Poor posture and strength	Shingles	Pancreatitis
Scoliosis	Inflammatory arthritis	Cholecystitis
Myofascial pain, fibromyalgia ⁶ ,	Ankylosing spondylitis	Penetrating ulcer
Complex pain disorders	Psoriatic spondylitis	Pulmonary or pleural disease
	Reiter's syndrome	
	Inflammatory bowel disease	
	Rheumatoid arthritis	
	Scheuermann's disease (steochondrosis)	
	Paget's disease of bone	

Table 2. Lower extremity myotomes, dermatomes, and reflexes by lumbar nerve root^{50 51}

Note there is considerable individual variability⁵¹

Approximately 90 to 95 percent of radiculopathies occur at L4-L5 and L5-S1⁵¹

Lumbar Nerve Root	Muscle Group	Sensory Distribution	Deep Tendon Reflex
L2	Hip flexor	Anterior medial thigh	Patellar
L3	Quadriceps	Anterior thigh to knee	Patellar
L4	Anterior tibialis	Medial calf/ankle	Patellar
L5	Extensor hallucis longus	Lateral ankle/dorsum of foot	Internal hamstring
S1	Gastrocnemius/soleus/peroneal	Plantar-lateral foot	Achilles

Table 3. RED FLAG Key Features of Back Pain and Imaging studies ^{28,6,9,3}

Cause	Key features on history or physical examination (Red Flags) ⁶	Imaging and Additional Studies	Referral
Cauda equine syndrome	Urinary retention*** ³ Urinary or fecal incontinence ³ Saddle anesthesia ³ Changes in rectal tone Lower motor neuron weakness ⁹ lower extremity motor deficits at multiple levels with reduced reflexes ³ Progressive weakness, gait disorder ⁵¹	MRI* ^{9,25}	Urgent referral to spine surgeon ^{§9}
Myelopathy	Upper motor neuron weakness ⁹ Babinski or sustained clonus ⁹ Gait or balance abnormalities ⁹	MRI* ⁹	Urgent referral to spine surgeon ^{§9}
Cancer	History of Cancer with new onset of back pain ^{9,3} Additional risk factors: • Unexplained weight loss ³ • Age greater than 50 years ³ • Failure of LBP to improve after one month ³	X-ray** ^{9,25} ESR ²⁵ CBC, CRP ⁹	Urgent referral to oncologist ^{§9}
Infection	Fever/Chills esp. with pain at rest or at night ⁹ Intravenous drug use Recent infection (such as UTI) ⁹ HIV or Immunosuppression ⁹ Recent spinal procedure ⁹	MRI ²⁵ ESR and/or CRP, CBC ⁹	Urgent admission or referral depending on type and acuity of infection
Vertebral fracture	Recent trauma ³ (note: fractures can occur without trauma) History of osteoporosis ³ Use of corticosteroids ³ Older age (such as ≥ 75) ³ Young person at risk for stress fracture	X-ray** ^{9,25}	Urgent referral to spine surgeon or appropriate non-surgical specialist depending on type, acuity and stability of fracture and local practice patterns ⁹
Spinal deformity		X-ray** ⁹	Referral to non-surgical specialist and/or surgical specialist depending on type of deformity
Spondylolysis	Age <20 ⁹ Pain with standing, walking, and extension (occurs more often in athletes and dancers) ⁹	X-ray** §§ ^{25,9}	Referral to sports medicine specialist
Spondyloarthropathies	Morning stiffness Improvement with exercise Alternating buttock pain Awakening due to back pain during the second part of the night (early morning awaking) Younger age	X-ray** ^{9,25} ESR and/or CRP, HLA-B27 ⁹ CBC, RF, anti-CCP ⁹	Referral to rheumatologist
Radiculopathy	Radicular pain Lower extremity dysesthesia and/or paresthesia Positive straight-leg-raise test or crossed straight-leg-raise test (disc herniation) Neurogenic claudication (spinal stenosis)	<4 weeks: None ^{§§§} >4 weeks: MRI ^{NASS Grade A,24,25,28} May consider EMG/NCT (if uncertain etiology after imaging) ²⁸	Referral to pain management specialist (or surgeon if substantial or progressive motor weakness)

* If urgent consider spiral CT as needed due to availability

** Consider additional imaging if suspicion is high

*** 90% sensitivity. If a patient does not have urinary retention, the probability of CES is approximately 1 in 10,000⁶

§ Or consult with current specialist if patient already has one

§§ Five views including oblique view to evaluate for Spondylolysis

§§§ Consider Imaging and referral < 4 weeks if progressive motor weakness

Table 4. Types, Characteristics and Treatment of Mechanical Back Pain

Types of Back Pain	Characteristics/Evaluation	Treatments
Non-Specific Low Back Pain	<p>Common causes: Facet Pain and Degenerative Disc Disease</p> <p>Symptoms: Axial back pain. May or may not have proximal lower limb pain.</p> <p>Physical exam: Exam does not predict the source of pain; degeneration of facets is a normal finding. May have pain with lumbar flexion; Generally negative straight leg test</p> <p>Imaging: Not helpful; Disc and facet degeneration is a normal finding</p>	<p>Reassurance, Self-care and Education</p> <p>Remain active</p> <p>Physical Therapy if substantial pain or impairment, positive yellow flags or pain persists >4 weeks,</p> <p>Medications for pain based on acute/chronic (avoid opioids if possible)</p> <p>Use medications effective for acute and/or chronic pain as appropriate (avoid opioids if able)</p> <p>Consider therapies with evidence of benefit</p> <ul style="list-style-type: none"> • Heat • Massage • Exercise programs • Aerobic Exercise • Physical Therapy • Acupuncture • Manipulation • Mindfulness Based Stress Reduction • Cognitive Behavioral Therapy (CBT) <p>Referral to appropriate non-surgical specialist or multidisciplinary team-based care</p>
Radiculopathy	<p>Common causes:</p> <ul style="list-style-type: none"> • Herniated disc: disk between two vertebrae slips out of place and irritate the surrounding nerves • Lumbar spinal stenosis: narrowing of the spinal canal that compresses nerves <p>Symptoms: Acute and often severe buttock, leg and back pain</p> <ul style="list-style-type: none"> • Herniated disk is often worse when sitting, bending, lifting, or sneezing. • Spinal stenosis is often bilateral, asymmetric pain, worse when walking and prolonged standing (“neurogenic claudication”). Often older age. <p>Physical exam: variable sensory loss, weakness, and loss of DTR</p> <ul style="list-style-type: none"> • Herniated disk: positive straight leg raise test • Spinal stenosis: negative straight leg raise test, kyphotic gait. <p>Imaging: MRI if symptoms > 4 weeks or severe/progressive</p> <p>Prognosis:</p> <ul style="list-style-type: none"> • Herniated disk: radiculopathy is typically self-limited⁵² • Spinal stenosis: symptoms may come and go, long-term prognosis may be less favorable than for disc herniation⁵² 	<p>Self-care and Education. Inform patient often self resolves.</p> <p>Physical therapy</p> <p>Use medications effective for acute and/or chronic pain as appropriate (avoid opioids if able)</p> <p>Consider therapies with evidence of benefit</p> <ul style="list-style-type: none"> • Heat • Massage • Exercise programs • Aerobic Exercise • Physical Therapy • Acupuncture • Manipulation • Mindfulness Based Stress Reduction • Cognitive Behavioral Therapy (CBT) <p>Referral to pain management specialist and/or team-based multidisciplinary care</p> <p>May consider Epidural steroid injection trial</p> <p>Refer patients to a spinal surgeon when imaging shows a surgical indication associated with red flags or rapidly progressive or persistent radiculopathy (>6 weeks)</p>
Spondylolisthesis	<p>Common causes:</p> <ul style="list-style-type: none"> • Degenerative spondylolisthesis • Isthmic spondylolisthesis: a lytic defect in the pars interarticularis results in anterior subluxation of the affected vertebral body <p>Symptoms: Back pain when standing and walking, relieved when sitting</p> <p>Physical exam: variable numbness, weakness and loss of DTR</p> <p>Imaging: X-ray or MRI</p>	<p>Education</p> <p>Physical Therapy with lumbar-based stabilization and leg stretching/strengthening</p> <p>Use medications effective for acute and/or chronic pain as appropriate (avoid opioids if able)</p> <p>Referral to appropriate non-surgical specialist</p>

Table 4. Types, Causes and Treatment of Mechanical Neck Pain, cont.

Types of Back Pain	Characteristics/Evaluation	Treatments
Chronic Post-Surgical Back Pain	<p>Persistent chronic back pain after spinal surgery</p> <p>For example: some patients have successful treatment for radicular pain but have persistent chronic back pain.</p>	<p>Education</p> <p>Physical Therapy</p> <p>Use medications effective for acute and/or chronic pain as appropriate (avoid opioids if able)</p> <p>Referral to non-surgical specialist and/or team-based multidisciplinary care</p> <p>Consider other treatment modalities, spinal cord stimulation, and repeat or alternate surgeries</p>
Sacroiliac (SI) joint disease	<p>More common in pregnant women, inflammatory spondyloarthropathy, or after a fall on the buttocks</p> <p>Symptoms: Buttock and proximal leg pain, which may be worse when sitting, bending, or lifting</p> <p>Physical exam: Exam often nonspecific but points to upper buttock or mid-buttock as most painful location; positive FABER (flexion, abduction, and external rotation) test</p> <p>Imaging: Often not helpful</p>	<p>Education</p> <p>Physical Therapy</p> <p>Consider Image-guided SI joint cortisone injection</p> <p>Surgery not generally indicated</p>
Spondyloarthropathie	<p>Ankylosing spondylitis: onset <40 years old, slow onset, improvement with exercise, no improvement with rest, pain at night (with improvement after rising), morning stiffness.^{9, 53}</p> <p>Reactive arthritis/Reiter's Syndrome: recent gastrointestinal or genitourinary infection, sudden onset, eye inflammation, asymmetric inflammation of lower joints, fever.^{9, 54}</p> <p>Spondyloarthropathy associated with inflammatory bowel disease (IBD): sudden onset, asymmetric arthritis especially lower limbs (such as knees), non-deforming, more common in men, stiffness and pain in the back, associated^{9, 55}</p> <p>Psoriatic arthritis: distal asymmetric arthritis, nail involvement, morning stiffness, pain worse at night, psoriatic lesions.^{9, 56}</p> <p>Evaluation: ESR and/or CRP, HLA-B27, CBC, RF, anti-CCP, X-ray⁹</p>	<p>Referral to rheumatologist</p> <p>Physical Therapy⁵⁷</p>

Table 5: Non-Surgical Back Pain Interventions ^{49 3 58 23 22 52 59 60 61 62}

Procedures may be diagnosis or therapeutic.

Indications generally include subacute or chronic radiculopathy or severe disabling chronic nonspecific low back pain ⁴⁹

Refer to appropriate pain management specialist for treatment recommendations, discussion of the relative evidence of effectiveness given each individual situation, and appropriate additional referrals if needed.

Intervention	Diagnostic or Therapeutic	Description	Indication
Epidural Block with glucocorticoids	Diagnostic and therapeutic	Injection of steroids via a needle inserted either intralaminar or transforaminal. Diagnostic and also provides short term pain relief. The interval or number of injections, optimal steroid dose, technique or site of injection, and whether local anesthetic should also be injected have not been firmly established	Radiculopathy >6 weeks
Provocative discography	Diagnostic	Injection of contrast under fluoroscopy into the nucleus of a disc – considered positive if it demonstrates an annular disruption and reproduces the patient’s usual LBP symptoms. Rarely done currently.	Low back pain
Medial branch block	Diagnostic and therapeutic	Injection of steroid or local anesthetic to block the medial branch of the primary dorsal ramus. If successful often followed by radiofrequency ablation.	Facet joint pain
Sacroiliac joint injection	Diagnostic and therapeutic	Injection of steroid into the periarticular region (does not require radiographic guidance) if successful then may be followed by radiofrequency ablation.	Sacroiliac joint pain
Facet joint injection	Therapeutic	Injection into the facet joint	Facet joint pain
Radiofrequency ablation	Therapeutic	A catheter or electrode is placed near or in the target nerve with position confirmed by fluoroscopy; radiofrequency current is applied to heat and coagulate adjacent tissues to destroy the target nerve.	Presumed facet joint pain
Spinal cord stimulation	Therapeutic	Percutaneous or surgical implantation of electrodes in the epidural space, with power supplied by an implanted battery. ⁵⁹ The first step is usually a trial with a nonpermanent stimulator, followed by surgical implantation if successful.	Chronic axial back pain or radiculopathy without surgical options or complex regional pain syndrome

Table 6: Surgical interventions ^{63, 64, 23, 52, 8}

Indications

- Recommend surgical evaluation for back pain patients with red flags and imaging consistent with surgical etiology, severe or progressive motor weakness, or radiculopathy with progressive significant neuropathy.
- Surgical indication less clear for patients with persistent LBP without red flags or persistent radiculopathy.
- Recommend discussion of the relative evidence of effectiveness of treatment options given each individual situation.

Predictors

- Studies have identified varying predictors for outcome of surgical treatment of spinal stenosis:
- Positive predictors: Male, Younger, Better walking ability, Better self-rated health, Less comorbidity, More pronounced canal stenosis ⁶⁴
- Negative predictors: Depression, Concomitant disorder affecting walking, Cardiovascular comorbidity, Scoliosis. ⁶⁴

Intervention	Diagnostic or Therapeutic		General Description/Indications
Lumbar Decompression Procedures (Discectomy, Laminotomy/Laminectomy and Foraminotomy)	Radicular Pain and Claudication	<p>Relieves symptoms of neural compression.</p> <p>Performed alone or in combination with spinal fusion</p> <ul style="list-style-type: none"> • Discectomy involves removal of the disc, in whole or part • Foraminotomy and laminectomy involve removal of a portion of the bony arch, or lamina, on the dorsal surface of a vertebra ⁶³ • Hemilaminectomy involves removal of the lamina on only one side of the bone 	<p>Disc herniation with radicular pain, significant functional impairment and/or physical exam findings that correlate with radiculopathy</p> <p>Acute neurologic deterioration</p> <p>Lumbar disc herniation with lumbar spinal stenosis (with or without spondylolisthesis)</p> <p>Lumbar synovial cyst</p>
Lumbar artificial disc replacement	Axial Back Pain (disc origin)	<p>An alternative to lumbar fusion for treatment of back pain due to severe disco-genic back pain.</p> <p>Unlike fusion, motion at the level of disc replacement is maintained, which would seem to be advantageous in terms of preventing secondary degenerative changes and preserving spine mechanics.</p>	<p>Patients who are in good health and ≤60 years old, with disease limited to one disc between L3 and S1 and no associated deformity, spondylolisthesis, or neurologic deficit (per FDA)</p> <p>Prior posterior spine surgery is generally a contraindication</p>
Spinal fusion	Axial Back Pain	Treats back and leg pain from a variety of degenerative, deformity and traumatic conditions	<p>Instability</p> <p>Spinal stenosis</p> <p>Recurrent disc herniation</p> <p>Spondylolisthesis</p> <p>Scoliosis (lumbar or thoracolumbar)</p> <p>Flat back syndrome</p> <p>Implant/Instrumentation failure</p> <p>Failed lumbar disc arthroplasty</p>
Vertebroplasty/Kyphoplasty	For debilitating pain due to bony destruction of the vertebral body or stable compression fracture	These are interventional techniques in which bone cement is injected via percutaneous insertion of a needle into the vertebral body under image guidance	<p>Vertebral compression fracture</p> <p>Osteolytic vertebral metastasis, myeloma, or plasmacytoma</p>

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Grades of Recommendation for Summaries or Reviews of Studies as adopted by the North American Spine Society [22]	
Grade A	Good evidence (Level I studies with consistent findings) for or against recommending intervention.
Grade B	Fair evidence (Level II or III studies with consistent findings) for or against recommending intervention.
Grade C	Poor quality evidence (Level IV or V studies) for or against recommending intervention.
Grade I	There is insufficient or conflicting evidence not allowing a recommendation for or against intervention.

Appendix: Back and Neck Pain Medication Tables

This table is a summary of the most common classes and brands of medications used for back and neck pain, including key considerations in terms of class, name, dose, titration, general notes, and cautions/adverse reactions/side effects.

- This table is meant to be used in combination with the **Sutter Health Back and Neck Pain Guidelines**.
- This table is not meant to be a comprehensive inclusion of all information about each medication. In particular drug-drug interactions are not included in this table.
- Information for this table was mostly obtained from Lexicomp. Please refer to the references and each medications' package insert, and electronic health record prescribing details and alerts for full information.
- In general, when using medications for back and neck pain
 - Consider evidence regarding risks versus benefits.
 - Provide in combination with education
 - Assess for comorbidities (such as sleep disturbance) due to pain when making treatment decisions.

1st line for ACUTE and CHRONIC back and neck pain

NSAIDs

Name	Initial Daily Dose	Titration	Notes
Selective			
Ibuprofen	400mg–800mg q8 PRN	Max dose 3200 mg/day	Not recommended for chronic therapy
Naproxen	250–500mg q12h PRN	Max dose 1500 mg/day	
Non-Selective			
Celecoxib	100 mg q 12h PRN	Max 400 mg/day	may be associated with reduced risk of GI adverse effects and renal toxicity

See Lexicomp for dosing and notes for other selective and non-selective NSAIDS

General Notes:

- Use as first line treatment of acute and chronic lower back pain for patients without contraindications
- Use lowest dose for shortest time possible. Consider a 2-4 week trial before moving to 2nd line medicines.
- Generally, use non-selective NSAIDS.
- If ibuprofen or naproxen are not effective, consider switching to another NSAID before moving to 2nd or 3rd line. Different NSAIDS may have different effects due to variations in mechanism of action.
- Celecoxib may be associated with reduced risk of GI adverse effects and renal toxicity.
- If an NSAID is required in a patient with GI risk, prescribing with a proton pump inhibitor may be a viable option

Black Box Warning: increased risk of CV events.

Cautions:

- Use with caution in patient with renal dysfunction, gastritis, peptic ulcer disease, history of GI bleed, CV comorbidities, gout, and patient on anticoagulation

Adverse Reactions/Side Effects:

- Side effects: GI upset/irritation, hepatic and renal dysfunction, fluid retention, hypersensitivity reactions, and cardiovascular events in high risk patients

Acetaminophen

Name	Initial Dose	Titration	Notes
Acetaminophen	650mg q6h PRN	Limit dose to 3000 mg per in 24 hrs	Dose limit applies to all sources of APAP including OTC

General Notes:

- Can be tried as first line therapy for acute pain if treatment with NSAIDs is not appropriate. However, some studies have shown no effectiveness against placebo
- Does not have anti-inflammatory effect
- Avoid use in chronic back pain.

Black Box Warning: Fetal injury and death. Discontinue as soon as possible when pregnancy detected

Cautions:

- Risk of hepatotoxicity. Limit dose to 3000 mg in 24 hours
- For patient with liver disease or alcohol use disorder, limit to short term use at dose less than 2000 mg in 24 hours

Adverse Reactions/Side Effects:

- Study in low back pain showed no more side effects than placebo

2nd line for ACUTE back and neck pain

Skeletal Muscle Relaxants

Name (Brand)	Initial Daily Dose	Max Dose	Notes
Cyclobenzaprine	5mg q8h prn	Max 30mg/d	Not preferred in patients who have a history of arrhythmias or who are concurrently taking medications that also may prolong QTc 2. Use not recommended in patients > 65 years of age per American Geriatrics Society 2015 Updated Beers Criteria
Baclofen	5mg TID	Max 80mg/day	Boxed warning to taper use with discontinuation to prevent seizures
Metaxalone	800mg TID	Max 3200mg/day	Contraindicated in severe hepatic and renal dysfunction. Use not recommended in patients > 65 years of age per American Geriatrics Society 2015 Updated Beers Criteria
Carisoprodol (Soma)	Not recommended	Not recommended	Due to risk of abuse/dependence

General Notes:

- May be used as adjacent therapy for acute pain if NSAIDs and/or acetaminophen are not effective
- Effective for short term pain relief
- Insufficient evidence that they are effective in subacute or chronic lower back pain
- Use lowest dose for shortest time possible (such as limit to a 7-day course)
- Not better than Tylenol or NSAIDs alone
- Insufficient evidence to recommend one over the other.

Cautions:

- Use with caution in elderly due to fall risk and sedation

Adverse Reactions/Side Effects:

- Drowsiness, dizziness, light-headedness, fatigue and sedation
- Hepatotoxicity (usually reversible) associated with tizanidine
- Abrupt discontinuation of tizanidine may induce a hyperadrenergic syndrome that can include reflex tachycardia and hypertension, tremor, anxiety and hypertonicity.
- Long term use associated with QT prolongation

2nd line for CHRONIC back and neck pain

Selective serotonin and norepinephrine reuptake inhibitor antidepressant

Name (Brand)	Initial Daily Dose	Titration	Notes
Duloxetine delayed release	30 mg daily	Max dose 60 mg/d	Avoid with hepatic impairment

General Notes:

- Duloxetine is the only medication. May be considered for chronic low back pain (may have additional benefit in patient with coexisting depression)
- Increase dose weekly, takes 4-6 weeks for onset of action.
- To discontinue, gradual taper over 2-4 weeks.
- Better than placebo for chronic pain

Adverse Reactions/Side Effects:

- Risk of serotonin syndrome

3rd line for ACUTE back and neck pain

Tramadol

Name (Brand)	Initial Dose	Titration	Notes
Tramadol	50mg q6h PRN	Max 400 mg/d	25 to 50 mg TID may be sufficient for patients with moderate acute

General Notes:

- May be consider for short term use in acute low back pain if other medications are not effective
- Use lowest dose for shortest time possible
- Insufficient evidence to support the use of tramadol for the treatment of chronic pain

Cautions:

- Has been associated with the risk of addiction, physical dependence, and tolerance.
- Avoid or use with caution in patients taking certain antidepressants due to serotonin syndrome
- Contraindicated if history of seizure

Side Effects:

- Constipation, somnolence, dizziness, nausea, vomiting, and pruritus

4th line for ACUTE back and neck pain

Opioids

Name (Brand)	Initial Dose	Titration	Notes
Please see Lexicomp for full information about brands, dose, titration and notes			

General Notes:

- May be considered for short term use in severe acute low back pain if other medications are contraindicated or not effective
- Insufficient evidence to support the use of opioid for the treatment of chronic low back pain
- Individual risk assessment should be performed prior to the initiation of opioids due to the potential for addiction. Avoid use if risks outweigh benefits
- Use lowest dose for shortest time possible
- Not better than Tylenol or NSAIDs alone
- Avoid abrupt withdrawal
- Avoid use with tramadol due to risk of side effects, dependency, abuse, longer disability

Cautions:

- Risk of drug abuse/dependence

Adverse Reactions/Side Effects:

- Constipation, nausea, vomiting, sedation, and pruritus. Less common effects include dry mouth, mental confusion, urinary retention, and respiratory depression.

Other medications

Name (Brand)	Indication
Topical Diclofenac	May be considered for the treatment of acute musculoskeletal pain Insufficient evidence to support use for chronic pain NOTES: - Available OTC - The average amount systemically absorbed is 6% of the oral form
Topical Capsaicin	May be considered on a short-term basis for acute pain (3 months or less).
Topical Lidocaine Patch 5%	Not known to be effective for back or neck pain. Available over-the-counter in a 4% patch formulation.
Antidepressants (other than duloxetine)	Not known to be effective for back pain Low dose TCA may be considered for chronic neck pain Low dose TCA may be considered for sleep disturbance
Anticonvulsants	Not known to be effective for the treatment of low back pain or radicular back pain. May be considered for chronic neck pain May be considered for overlapping pain syndromes or chronic neck pain
Steroids	Not recommended for back or neck pain May occasionally be used by specialist for radiculopathy NOTES: - If used with NSAIDs consider prophylaxis against gastrointestinal bleeding - Side effects include elevated blood pressure, mood disorders, psychosis, insomnia, gastritis, ulcer formation, gastrointestinal bleeding, hyperglycemia, bone loss, and heightened risk of typical infections

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List of Abbreviations and Acronyms:

Abbreviation	Meaning
A1C	Hemoglobin A1C
anti-CCP	Anti-cyclic citrullinated peptide antibodies
BP	Blood Pressure
CBC	Complete Blood Count
CBT	Cognitive Behavioral Therapy
CRP	C-Reactive Protein
CT	Computed Tomography
DTR	Deep tendon reflexes
EMG/NCT	Electromyography and nerve conduction testing
ESR	Erythrocyte Sedimentation Rate
FABER	Flexion, abduction, and external rotation
FABQ	Fear-Avoidance Beliefs Questionnaire
FDA	U.S. Food and Drug Administration
HLA-B27	Human leukocyte antigen B27
IBD	Inflammatory bowel disease
LBP	Low Back Pain
MRI	Magnetic Resonance Imaging
NASS	North American Spine Society
NSAIDs	Non-steroidal Anti-inflammatory medications
OMM	Osteopathic Manipulative Medicine
OMPQ	Orebro Musculoskeletal Pain Questionnaire
PM&R	Physical Medicine and Rehabilitation
PT	Physical Therapy
RF	Rheumatoid Factor
ROM	Range of Motion
TENS	Transcutaneous Electrical Nerve Stimulation (TENS)