

Background

Neck pain is very common. Approximately 10% of the adult population has neck pain at any given time ¹ and two thirds of adults are affected by neck pain at some time during their life. ² The majority of patients with neck pain don't miss work, do well and recover with conservative therapy. And less than 1% have neurologic symptoms. ¹ But even so, neck pain is so common it is still a very frequent cause of disability in the United States. ³ Managing those who do have persistent symptoms can be very complex due to high variability of patient's signs and symptoms, low specificity of diagnostic tests, and a relative lack of consistent evidence-based treatment recommendations. ¹ Effectively providing best-practice clinical care for patients with neck pain is a high priority at Sutter Health and aligns with the key Sutter Health goals. It helps improve clinical outcomes, patient quality of life, and 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, diagnosis, 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 Neck 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 (spinal surgeons, 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 neck 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 neck 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 neck 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:

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Classification

Causes: See **Table 1** for classification of causes of Neck Pain

Duration¹

- Acute neck pain (up to 6 weeks)¹
- Subacute neck pain (6 to 12 weeks)¹
- Chronic neck pain (more than 12 weeks)¹
- Recurrent
- Post-Surgical

Grade

- Neck Pain Associated Disorders (NAD)^{4, 5}
 - I. No signs of major pathology and little interference with daily activities^{4, 5}
 - II. No signs of major pathology but impacts daily activities^{4, 5}
 - III. Neck pain with neurologic signs or symptoms (radiculopathy)^{4, 5}
 - IV. Neck pain with major structural pathology (e.g. fracture, myelopathy, neoplasm, spinal infection)^{4, 5}
- Cervical Strain/Sprain (also called “Whiplash Associated Disorder [WAD]”)⁵
 - Grade 1. Neck pain or stiffness with no physical signs⁵
 - Grade 2. Neck pain or stiffness with physical signs (like decrease range of motion [ROM] or point tenderness)⁵
 - Grade 3. Neck pain or stiffness with neurologic signs⁵
 - Grade 4. Neck pain or stiffness with fracture or dislocation⁵
 - Grade 1-3 are called “whiplash”⁵

Goals

Assessment Goals

- The goals of neck pain assessment include:
 - Distinguish serious conditions that require intervention from those that are less serious.^{5, 6}
 - Identify signs and symptoms of significant neurologic compromise.
 - Note: Determining the other underlying causes of neck pain is less important⁵
- Use empathetic and reassuring tone and language. Address patient’s fears.

Treatment Goals

- Maintain or restore function
- Improve pain
- Prevent long-term disability
- Prevent recurrences

Communication

Key Messages for general neck pain

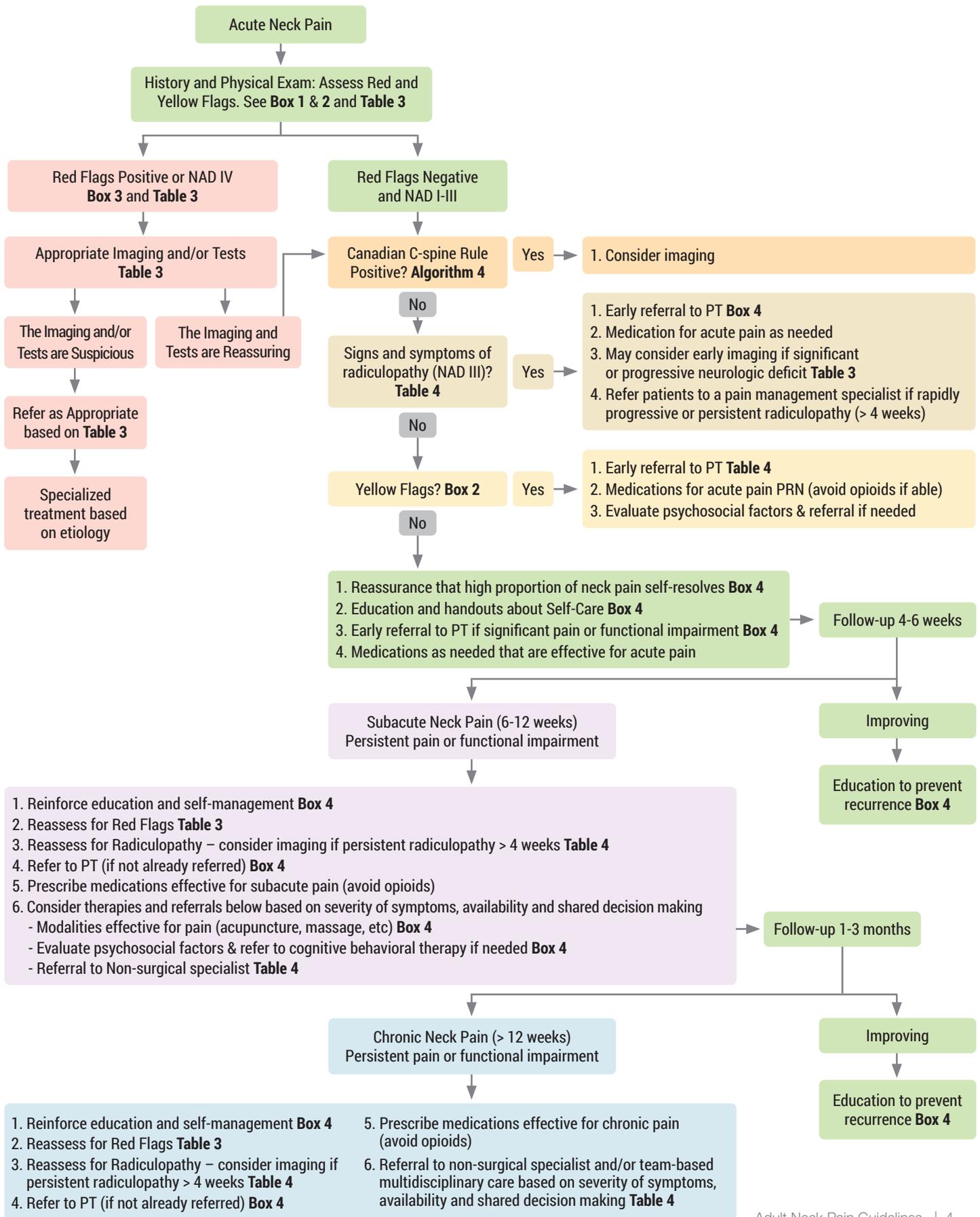
- Return to normal activities that don’t provoke the pain as soon as possible.⁶
- Recovery is expected within the first 2 to 3 months.⁶
- Exercises to decrease pain and increase ROM.⁶
- Minimize the use of a cervical collar.⁶

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

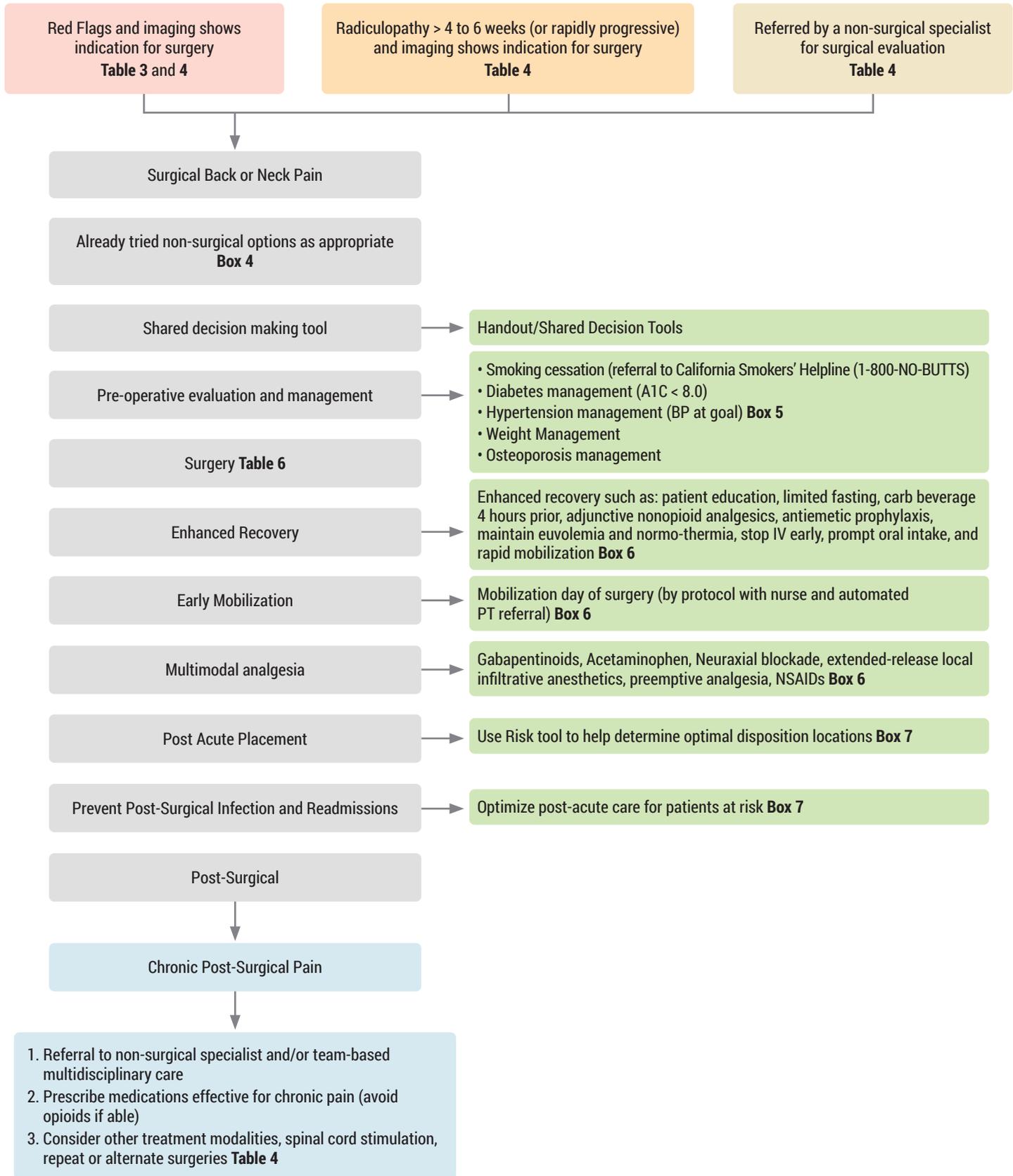
Choose an appropriate specialist according to the specific clinical situation, diagnosis and needs of the patient.

- Pain Management Specialist – Physicians from specialties below with advanced certification and training in the evaluation, management, treatment & specific interventions for back & neck pain.⁷
 - Physical Medicine & 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.⁸
 - Anesthesiology – Physicians trained in helping patients with serious acute, chronic or recurring pain.¹⁰
 - Neurology – Physicians that diagnose, treat, and manage disorders of the brain and nervous system.¹¹
- Sports Medicine – Physicians trained in improving athletic performance and in treating athletic and musculoskeletal injuries.¹²
- Osteopathic Manipulative Medicine (OMM) – Physicians trained in OMM.¹³
- Integrative Medicine – Physicians trained to use a variety of different therapeutic modalities and approaches to treat chronic conditions¹⁴
- Rheumatology – Physicians trained in the diagnosis and treatment of musculoskeletal disease and systemic autoimmune conditions¹⁵

Algorithm 1: Ambulatory Neck Pain Algorithm



Algorithm 2: Surgical Neck Pain Algorithm



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

Category	Intervention	Neck 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 patients with neck pain to remain active
	Postural Modification	←————→			
	Avoidance of provocative activities	✓	✓		Avoid of provocative activities
	Heat or Cold	✓	✓		Consider use heat wrap for acute or subacute neck pain. Some patients may consider cold treatment.
	Massage	✓	✓		Consider use massage for neck pain.
	Specific exercises	✓	✓	✓	Consider exercise programs for neck pain with evidence of effectiveness such as: Neck rotation, neck tilting, neck bending, shoulder rolls, supervised graded strengthening exercises, endurance exercises, Qigong and Yoga
	Aerobic Exercise			✓	Activity that includes cardiovascular conditioning (such as activities like brisk walking, swimming, running, or cycling).
Therapies*	Physical Therapy	✓ (if yellow flags, radiculopathy, or significant pain or decrease function)	✓	✓	Refer patients with neck pain with Yellow Flags, 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.
	Mindfulness Based Stress Reduction		✓	✓	Incorporates mindfulness practices such as meditation and breathing exercises
	Cognitive Behavioral Therapy (CBT)		✓	✓	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.
	Spine Surgeon	✓ (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 (> 4 weeks). Includes neurosurgeons and orthopedic surgeons.
	Team-based Multimodal & Multidisciplinary Care			✓	Includes multiple specialist services and treatment modalities ^{[4][6][1][2]}

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

Box 1

History:

Consider use smart phrase

- History of other conditions (including osteoporosis, cancer, arthritis, infection, etc.)
- Pain characteristics
 - Patients descriptors
 - » Examples: numbness / tingling, burning, ache, pulsing, constant, intermittent, sharp, stabbing, shooting
 - Location of the pain
 - » Radiation into shoulder or arm
 - Duration – acute < 6 weeks, subacute 6-12 weeks, or chronic > 12 weeks
 - History – first time or previous history of neck pain
 - Timing
 - » Increasing, decreasing, fluctuating or unremitting
 - » Day or night pain
 - Severity and functional impairment
 - Response to positioning
 - Aggravating and alleviating factors
 - » Activity associated with the onset of the pain
 - » Response to positioning
 - Association with onset – such as trauma
- Neurologic symptoms including sensory and/or motor changes See **Table 2**
- Psychosocial issues
 - Depression screen
 - » PHQ2 if no history of depression
 - » PHQ9 if history of depressions or PHQ2 positive
 - Association with workman’s comp (as different/additional services may be available if so)
 - Medication adherence
 - Financial issues

Red Flags^{5,3}

See **Table 3**

History

- Recent major neck trauma^{5,3} – See Canadian C-spine rule
- Infection risk
- History of injection drug use^{5,3}
- Immunosuppression⁵
- Chronic glucocorticoid use⁵
- Unexplained weight loss^{5,3}
- History of cancer^{5,3}
- History of vascular disease³
- History of inflammatory arthritis³

Symptoms

- Unrelenting, new or severe headache ^{5, 3}
- Anterior neck pain ⁵
- Shoulder or hip girdle pain ⁵
- Weakness ⁵
- Gait difficulty ⁵ or scissor gait
- Bowel or bladder dysfunction ⁵
- Fever or chills ^{5, 3}
- Nausea or vomiting ³
- Visual symptoms ⁵

Physical Signs

- Severe neck tenderness ³
- Substantial neck stiffness ³ and/or Torticollis ³
- Rash ³
- Lhermitte's phenomenon (shock-like paresthesia with neck flexion) ⁵
- Hoffmann's sign ³
- Babinski's sign ³
- Hyperreflexia ³
- Altered muscle tone ³
- Ataxia ³ or balance problems
- Incontinence ³
- Altered cognitive status ³
- Visual loss ³
- Photophobia or phonophobia ³

Yellow Flags

Characteristics that increase risk of conversion of acute to chronic pain:

Consider questionnaires to identify a baseline status and to monitor pain, function, disability, and psycho-social function ⁶

- Pain severity at the time of injury ⁵
- Reduction in cervical range of motion ⁵
- Lack of social supports ⁵
- Depression ⁵
- Somatization ⁵
- Catastrophizing ⁵
- Cultural differences in expectations of pain ⁵
- Possibility of financial compensation ⁵

Box 2

Physical exam:

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

Observation – alignment and movement of the head, neck, and thoracic spine ⁵

- Neurologic Exam see **Table 2**
 - Muscle strength
 - Reflexes
 - Sensory exam
 - Upper motor neuron finding – such balance problems, scissor gate, babinski sign

Palpation – paraspinal and upper trapezius muscles ⁵

Range of Motion (ROM) compared to normal below ⁵

- Rotate an average of 90 degrees ⁵
- Bend an average of 45 degrees laterally ⁵
- Forward flex to 60 degrees ⁵
- Extend backward 75 degrees ⁵

Specific Maneuvers to help identify cervical radiculopathy

- Spurling’s maneuver and modified Spurling’s maneuver (“neck compression test”) ⁵
 - Downward pressure on the head in a neutral position (Spurling’s) (stop if positive) and with head tilted back and rotated towards side of pain (modified Spurlings). ^{16, 5}
 - Positive for radiculopathy if arm pain or paresthesia past the shoulder are produced (stop test if so). Production of neck pain alone is not a positive test. ⁵
 - Highly specific for cervical root compression (80% and 90%) but lower sensitivity so a positive test is helpful, but a negative test does not rule out radiculopathy. ⁵
 - Caution in suspected rheumatoid arthritis, cervical malformations, metastatic disease, or suspected cervical myelopathy. It may injure the spine. ⁵
- Cervical distraction test
 - The head is lifted releasing the pressure on the nerve roots. ⁵
 - Positive for radiculopathy if the pain is decreased. ⁵
- Shoulder abduction relief test
 - Place the affected arm above the head and rest the hand on the top of the head. ^[16]
 - Positive if decrease symptoms with procedure. ^[16]
 - Some patients may use the position it to help relieve their symptoms. ^[16]
- Elvey’s upper limb tension test
 - Turn the head and abduct the arm with the elbow extended (similar to straight leg raise in the lower extremity). ⁵
 - Positive for radiculopathy if reproduces arm pain. ⁵
- Lhermitte’s phenomenon
 - Shock-like paresthesia with neck flexion ^[16]
- Hoffman’s test
 - “Flicking” the nail of the person’s middle finger causes the index finger and the thumb to move

Other systems or areas as indicated by history

Box 3

Imaging:

No Imaging for acute neck pain if

- No Red Flags⁵
- Mild pain that does not affect daily activities and no signs or symptoms of radiculopathy⁵
- Negative Canadian C-spine rule if trauma⁵

Imaging and/or appropriate tests if See Table 3.

- Red Flags⁵
- Positive Canadian C-Spine rule if trauma.⁵ See algorithm 4.
- Cervical radiculopathy signs and symptoms^{5, 16}
 - Consider early imaging if¹⁶:
 - » significant or progressive neurologic deficit^{5, 16}
 - » risk of or suspicion for neoplasm, infection, inflammatory etiology^{5, 16}
 - Otherwise consider imaging after four to six weeks of conservative therapy^{5, 16}

Individualized Decision

- Consider imaging if persistent moderate to severe neck pain (even without trauma, red flags or radiculopathy) lasting more than 6 weeks and affecting sleep, daily activities and/or occupation⁵
- If so, consider x-ray⁵ (use of CT or MRI individualized)¹⁷

Box 4

Prevention and Treatment:

Primary Prevention of first episode (Handout):

- Exercise may help prevent first episode if neck pain.
- In general, education does not generally prevent first episodes of neck pain. However, education after whiplash injury may prevent development of pain.

Self-Management (Handout)

- Education
 - Provide education and educational handouts^{1, 6}
 - » address barriers to care
- Ergonomics:^{18, 13}
 - Sit straight with the head tall, chin minimally down, shoulders down¹
 - Minimize weight of items carried over the shoulder¹
 - Avoid prolonged sitting¹
 - Use pillow that aligns the head and neck with the body¹
- Self-care
 - Avoid rest for more than 3 days (acute)²
 - Avoid of provocative activities¹
 - Consider topical heat or cold¹

- Exercises
 - » Neck rotation, neck tilting, neck bending, shoulder rolls ¹
 - » Supervised graded strengthening exercises ^{4, 6}
 - » Endurance exercises ⁶
 - » Tai Chi, Qigong, Yoga ^{1, 4, 3}

Note: chose type based on patient preference and availability

- Massage (subacute or chronic) ^{1, 4, 3}
- Aerobic exercise (chronic) ^{1, 4, 6}

Therapies and Modalities of Care for Neck Pain

Make decisions based on local availability, nature and severity of neck pain and function, progression of symptoms, and shared decision making with patient.

Consider Modalities Below:

- Physical Therapy (acute and chronic) ^{1, 2}
 - Refer early (at initial visit) if patient has yellow flag, radiculopathy, or significant pain or impaired function. Otherwise refer all neck pain patients if pain or impaired function persists after 6 weeks ¹
 - » Include postural modification, activities that encourage movement, improve strength, and preserve or increase range of motion.
 - » Includes cervical, shoulder, and scapulothoracic strengthening, stretching, and stabilizing exercises.
- Acupuncture (subacute) ^{1, 3}
- Mindfulness-based stress reduction (chronic) ¹
- Cognitive Behavior Therapy ¹

Avoid/minimize/individualize options below:

- Used only as part of specialized situation or therapy
 - Cervical collar ¹
 - Traction ¹
- Carries risk
 - High velocity chiropractic adjustments of the neck (“cracking the neck”) – which carries risk for adverse outcomes including carotid vessel dissection, thrombus formation, stroke and paralysis. ^{1, 8}
- No significant evidence of effectiveness
 - Botulinum toxin injections ¹
 - Low-level laser therapy ¹
 - Transcutaneous electrical nerve stimulation ¹
 - EMG Feedback ¹

Box 5

Pre-surgical evaluation and management:

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

- Smoking (nicotine)
 - Increases risk of surgical infections after surgery ^{19, 20}
 - Fusion is more successful in nonsmokers ²¹
 - Patients should stop smoking before surgery. Refer to smoking cessation program
- Diabetes
 - Increases risk of surgical infections after surgery ^{20, 22}
 - Goal of A1C < 8.0 before surgery
- Hypertension
 - Increases risk of surgical infections after surgery ^{20, 22}
 - Goal of BP at goal before surgery
- Obesity
 - Increases risk of surgical infections after surgery ^{20, 22}
- 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, LOS, performance tests, and patient reported outcomes. ²³

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. ²⁴
 - Gabapentinoids ²⁴
 - Acetaminophen ²⁴
 - Neuraxial blockade (intrathecal, epidural) ²⁴
 - Extended-release local infiltrative anesthetics ²⁴
 - Preemptive analgesia ²⁴
 - NSAID ²⁴

Use Enhanced recovery strategies

- Early pre-operative evaluation and management, multimodal 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. ^{23, 25, 26}
 - 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 ^{27, 28, 29, 30, 31, 32}

Prevent Readmissions

- Provide extra support for patients with highest risk of readmissions –including risk factors below ¹⁸.
 - 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 ¹⁸. Most re-admissions occur within 10 days of hospital discharge. ³⁰

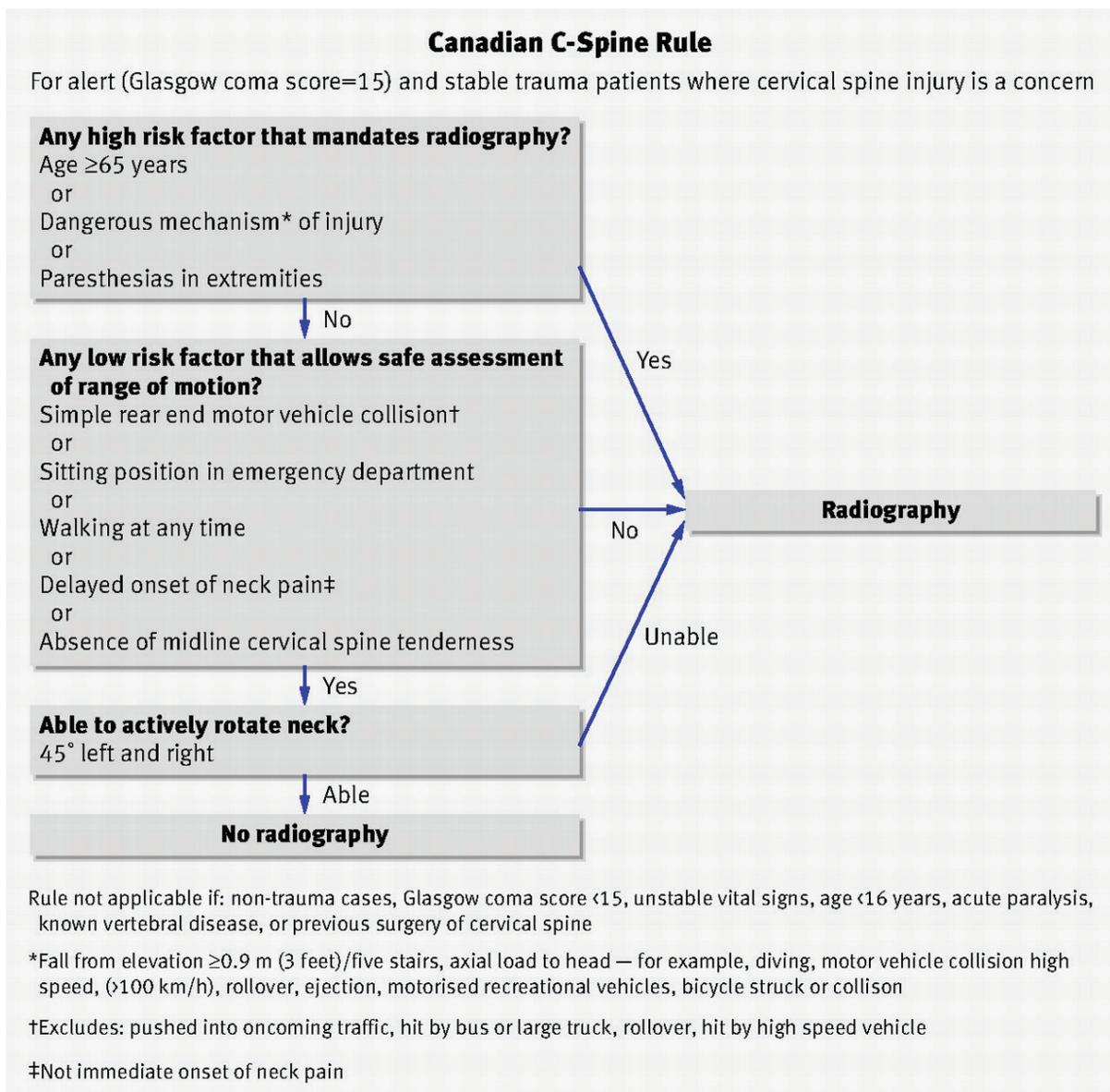
Post-Acute Care

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

Follow-up

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

Algorithm 4: Adult Canadian C-spine Rule Algorithm



Copied from: Stiell, I. G., et al. (2009). Implementation of the Canadian C-Spine Rule: prospective 12 centre cluster randomised trial. *BMJ* (Clinical research ed.), 339, b4146. <https://doi.org/10.1136/bmj.b4146>³⁷

Table 1. Classification of Neck pain in adults^{5,3}

Neck or Neurologic Etiology	Other
<p>Degenerative changes of the spine is the most common cause⁵</p> <p>Musculoskeletal</p> <ul style="list-style-type: none"> • Cervical strain or “Whiplash” injury⁵ • Cervical discogenic pain⁵ (contributes to more than 70% of neck pain³) • Cervical facet osteoarthritis⁵ (estimated to contribute to 40-50% of neck pain³) • Cervical myofascial pain⁵ (common cause)³ • Cervical spinal stenosis³ • Diffuse skeletal hyperostosis (DISH)⁵ • Referred shoulder pain (eg, impingement, adhesive capsulitis, rotator cuff tear)⁵ • Tension headache⁵ <p>Cervical radiculopathy</p> <ul style="list-style-type: none"> • Cervical Radiculopathy⁵ C7 is the most commonly affected nerve root; the most frequent age is 50-55; it is more common in men than women.^{3, 16} • Cervical spondylotic myelopathy⁵ • Ossification of the posterior longitudinal ligament⁵ <p>Neurologic</p> <ul style="list-style-type: none"> • Cervical dystonia⁵ • Chiari malformation (CM-1)⁵ • Peripheral neuropathy³ • Amyotrophic lateral sclerosis³ • Transverse myelitis³ • Guillain-Barré syndrome³ • Brachial plexus lesion³ 	<p>Endocrine</p> <ul style="list-style-type: none"> • Paget’s disease³ • Osteoporotic fractures³ <p>Rheumatology</p> <ul style="list-style-type: none"> • Polymyalgia rheumatica⁵ • Giant cell arteritis⁵ • Fibromyalgia⁵ • Thoracic outlet syndrome⁵ • Rheumatoid arthritis³ • Seronegative spondyloarthropathies³ <p>Vascular conditions</p> <ul style="list-style-type: none"> • Vertebral or carotid artery dissection⁵ • Arteriovenous fistula or malformation³ • CAD or MI⁵ <p>Infection^{5, 3}</p> <ul style="list-style-type: none"> • Osteomyelitis^{5, 3} • Epidural abscess³ • Discitis^{5, 3} • Herpes zoster³ • Meningitis^{5, 3} • Pharyngeal abscess⁵ <p>Malignancy^{5, 3}</p> <ul style="list-style-type: none"> • Metastatic tumor³ • Multiple myeloma³ • Spinal cord tumors³ • Chordoma³ <p>Visceral</p> <ul style="list-style-type: none"> • Esophageal obstruction⁵ • Biliary tract disease⁵ • Apical lung tumor⁵

Table 2. Upper extremity nerve roots, pain, myotomes, dermatomes, and reflexes by lumbar nerve root ⁵

Nerve Root	Pain	Numbness	Weakness	Reflex affected
C5	Neck, shoulder, scapula	Lateral arm (in distribution of axillary nerve)	Shoulder abduction, external rotation, elbow flexion, forearm supination	Biceps, brachioradialis
C6	Neck, shoulder, scapula, lateral arm, lateral forearm, lateral hand	Lateral forearm, thumb and index finger	Shoulder abduction, external rotation, elbow flexion, forearm supination and pronation	Biceps, brachioradialis
C7	Neck, shoulder, middle finger, hand	Index and middle finger, palm	Elbow and wrist extension (radial), forearm pronation, wrist flexion	Triceps
C8	Neck, shoulder, medial forearm, fourth and fifth digits, medial hand	Medial forearm, medial hand, fourth and fifth digits	Finger extension, wrist extension (ulnar), distal finger flexion, extension, abduction and adduction, distal thumb flexion	None
T1	Neck, medial arm and forearm	Anterior arm and medial forearm	Thumb abduction, distal thumb flexion, finger abduction and adduction	None

Table 3. RED FLAG Key Features of Neck Pain and Imaging studies

Cause	Key features on history or physical examination (Red Flags)	Imaging and other tests	Referral
Cervical spondylotic myelopathy (spinal cord dysfunction)	Gait or coordination difficulties such as a spastic or scissoring gait (this is a common, early symptom) ^{33, 5} Lower extremity weakness with upper motor neuron signs: increased reflexes, increased tone, loss of vibration sense, and Babinski signs ³³ Weakness, atrophy, and decreased reflexes in the arms or hands (in a myotomal distribution – C5-7 are most common) ³³ Bowel or bladder dysfunction such as urgency, frequency, and/or retention (less common). ^{33, 5} Lhermitte sign positive. ^{33, 5}	MRI	Spinal Surgeon
Ossification of the posterior longitudinal ligament	Neck pain and stiffness ⁵ Progressive radiculopathy and/or myelopathy symptoms. ⁵ Focal neurologic signs in upper and/or lower extremities ⁵	MRI	Spinal Surgeon
Fracture	Recent major neck trauma (Use Canada C-spine rule to decide about imaging if trauma) ⁵	CT scan*	Spinal Surgeon
Infection	Fever/chills Immunosuppression Signs consistent with type of infection (such as osteomyelitis, discitis, pharyngeal abscess, meningitis) ⁵	MRI; WBC, ESR, CRP; Lumbar puncture	Urgent admission/referral depending on type and acuity of infection
Cancer	Prior history of cancer ⁵ Unexplained weight loss ⁵ Localized tenderness on palpation of spine ⁵	MRI	Urgent referral to oncologist**
Chiari malformation	Neck pain or headache from meningeal irritation ⁵ Focal CNS signs ⁵	MRI	Spinal Surgeon
Polymyalgia Rheumatica	Symmetrical Aching and morning stiffness in shoulders, hip, neck, and torso. ⁵ Decreased range of motion of joints in affected areas ⁵ Normal muscle strength ⁵	ESR, CRP	Rheumatologist
Giant cell arteritis	Constitutional symptoms ⁵ Headache ⁵ Visual loss ⁵ Prominent and/or tender temporal artery ⁵ Absent temporal artery pulse ⁵	ESR, CRP, temporal artery biopsy	Rheumatologist
Thoracic outlet syndrome	Focal neurologic signs and symptoms in upper extremities (numbness, paresthesia, weakness) ⁵ Signs of venous or arterial compression in the upper extremities (e.g., swelling, pain, pallor, and/or coldness in the hand) ⁵	CTA or MRA EMG/NCS Neck and chest US with Doppler	Vascular surgeon
Vertebral or carotid artery dissection	Sudden onset of focal motor and/or sensory deficits ⁵	MRI/MRA or CTA	Vascular surgeon
Cervical radiculopathy (nerve root dysfunction)	Pain, tingling, numbness, and/or weakness in the upper extremity in a dermatomal distribution ⁵ Note the signs and symptoms are often non-localizing because of extensive overlapping dermatomes. ¹⁶	> 6 weeks: MRI < 6 weeks: consider MRI if significant or progressive neurologic deficit or other red flags	Pain management specialist (or spinal surgeon if substantial or progressive motor weakness)

*X-ray can miss fractures as difficult to see due to shoulder blade – if use X-ray be sure to get swimmer's view

** Or consult with current specialist if patient already has one

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

Types of Neck Pain	Characteristics	Referral
Non Specific Neck Pain	<p>The most common cause is degenerative changes (esp. between C4 and C7). Degenerative changes are common and nonspecific.⁵</p> <p>Multiple cervical spine conditions often occur together.⁵</p> <p>Determining the specific cause is usually not possible or necessary.⁵</p> <p>Imaging: The majority of patients do not require imaging.⁵</p>	<p>Reassurance, education and self-care.</p> <p>Remain active.</p> <p>Avoid provocative activities.</p> <p>Physical Therapy if substantial pain or impairment, positive yellow flags or pain persists > 4 weeks</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 • Acupuncture • Mindfulness Based Stress Reduction • Cognitive Behavioral Therapy (CBT) <p>Referral to an appropriate non-surgical specialist and/or team-based multidisciplinary care</p>
Cervical radiculopathy – nerve root dysfunction	<p>Pain, tingling, numbness, and/or weakness in the upper extremity in a dermatomal distribution (often non-localizing because of extensive overlapping dermatomes)¹⁶</p> <p>Decreased or altered sensation, diminished deep tendon reflexes, and/or decreased strength in upper extremity¹⁶</p> <p>Note: Most common disk is C7 (70%). Average age 50. Men more common than woman.¹⁶</p> <p>Recommend imaging if persistent symptoms > 4 to 6 weeks, or before that if progressive or severe signs and symptoms¹⁶</p>	<p>Self-care and education</p> <p>Avoid provocative activities³⁴</p> <p>Physical Therapy³⁴</p> <p>Use medications effective for acute and/or chronic pain as appropriate (avoid opioids if able)³⁴</p> <p>Consider therapies with evidence of benefit</p> <ul style="list-style-type: none"> • Heat • Massage • Exercise programs • Aerobic Exercise • Physical Therapy • Acupuncture • Mindfulness Based Stress Reduction • Cognitive Behavioral Therapy (CBT) <p>Referral to pain management specialist and/or team-based multidisciplinary care</p> <p>Refer patients to a surgeon when imaging shows a surgical indication associated with red flags or rapidly progressive or persistent radiculopathy (> 4 weeks).</p>
Cervical spondylotic myelopathy – spinal cord dysfunction	<p>Pain in the neck, scapula or shoulders, often radiating to the arms^{33, 5}</p> <p>Gait or coordination difficulties such as a spastic or scissoring gait (this is a common, early symptom)^{33, 5}</p> <p>Lower extremity weakness with upper motor neuron signs: increased reflexes, increased tone, loss of vibration sense, and Babinski signs^{33, 5}</p> <p>Weakness, atrophy, and decreased reflexes in the arms or hands (in a myotomal distribution – C5-7 are most common)³³</p> <p>Bowel or bladder dysfunction such as urgency, frequency, and/or retention (less common).^{33, 5}</p> <p>Lhermitte sign positive.^{33, 5}</p> <p>Often gradual onset but may suddenly worsen after minor trauma</p> <p>Patients can deteriorate progressively or in a stepwise fashion with long periods of stability³³</p>	<p>Avoid high-risk or aggravating activities.³³</p> <p>Use medications (avoid opioids if able)³³</p> <p>Referral to pain management specialist and/or team-based multidisciplinary care.</p> <p>Referral to spinal surgeon if severe myelopathy or progressing deficits³³</p> <p>Emergent referral to spinal surgeon if acute deterioration³³</p>

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

Types of Neck Pain	Characteristics	Referral
Ossification of the posterior longitudinal ligament (OPLL)	<p>Caused by abnormal calcification of the posterior longitudinal ligament ³⁵</p> <p>Neck pain, stiffness, and progressive radiculopathy or myelopathy symptoms. ⁵</p> <p>Focal neurologic signs in upper and/or lower extremities may be present</p> <p>May be associated with spondyloarthropathies, ³⁵</p> <p>More common in Asian people and in men typically age 40-60s ³⁵</p>	<p>Referral to pain management specialist and/or team-based multidisciplinary care</p> <p>Referral to spinal surgeon to consider surgical decompression if significant radiculopathy or myelopathy symptoms from compression</p>
Chronic Post-Surgical Neck Pain	Persistent chronic pain after spinal surgery	<p>Referral to pain management specialist and/or team-based multidisciplinary care</p> <p>Prescribe medications effective for chronic pain (avoid opioids)</p> <p>Consider other treatment modalities</p>

Table 5: Non-surgical neck pain interventions.^{[1] [3] [2]}

Procedures may be for diagnosis or treatment

Indications subacute or chronic symptoms that are progressive > 6 weeks of conservative therapy

Refer to a 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	General Description/Indications
Epidural Steroid Injections	Diagnostic and Therapeutic	Helps differentiate cervical radiculopathy from other causes of pain and provide relief for patients with significant pain despite conservative therapy. May be considered for axial neck pain and post-laminectomy syndrome. Relative contraindication in patients with severe stenosis or myelopathy.
Cervical Medial Branch Block	Diagnostic	Anesthetize the innervation of the cervical facet joint. Used to diagnose facet- joint mediated neck pain
Radiofrequency Ablation (RFA)	Therapeutic	Used for facet- joint-mediated neck pain ³ if successful response to previous cervical medial branch block

Table 6: Surgical neck pain interventions. ^{36, 3, 3, 34}

Recommend surgical evaluation for neck pain patients with red flags and imaging consistent with surgical etiology, severe or progressive motor weakness, or radiculopathy with progressive significant neuropathy.

Recommend discussion of the relative evidence of effectiveness of treatment options given each individual situation.

Intervention	Type of Condition	General Description	Indication
Anterior Cervical Discectomy and Fusion	Cervical Radiculopathy or Cervical Myelopathy	Conservative management should be tried before surgery unless progressive nerve or spinal cord compression resulting in a significant neurologic deficit Divided into anterior, posterior, or combined surgical approach.	Instability of the cervical spine Spondylotic cervical myelopathy Cervical radiculopathy Ossification of the Posterior Longitudinal Ligament (OPLL) Cervical synovial cyst Degenerative cervical kyphosis Pseudoarthrosis Instrumentation failure Progressive neck pain or deformity following prior posterior cervical decompressive laminectomy or laminoplasty
Cervical Laminectomy/ Laminotomy, with or without Fusion		Posterior approach for decompression with or without fusion	Cervical radiculopathy, myelopathy and conditions above
Cervical Laminoplasty	Multilevel spinal stenosis with or without myelopathy	Posterior approach with laminar “hinge” creation for decompression of the spinal canal.	Cervical myelopathy with multilevel Spinal stenosis
Cervical disc arthroplasty (CDA)	Cervical Radiculopathy or Cervical Myelopathy	Also known as cervical artificial disc replacement (CADR). Conservative management should be tried before surgery unless progressive nerve or spinal cord compression resulting in a significant neurologic deficit Contraindications are severe spondylosis or kyphosis of the cervical spine	Radiculopathy Myelopathy

Bibliography

1. Isaac, Z, et. al. Management of non-radicular neck pain in adults. UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
2. BMJ, "Comparison of CPG's for the diagnosis, prognosis and management of non-specific neck pain: a systematic review," 2019.
3. S. Cohen, "Advances in the diagnosis and management of neck pain," BMJ, 2017.
4. Cananda, "The Treatment of Neck Pain–Associated Disorders and Whiplash-Associated Disorders: A Clinical Practice Guideline," Canada, 2016.
5. UpToDate, "Evaluation of the adult patient with neck pain. UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
6. APTA, "Neck Pain: Revision 2017 Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Orthopaedic Section of the APTA," APTA, 2017 .
7. American Society of Regional Anesthesia and Pain Medicine. The specialty of chronic pain management. <https://www.asra.com/patient-information/chronic-pain-management>. (Accessed January, 2021)
8. American Academy of Physical Medicine and Rehabilitation. What is a Physiatrist? <https://www.aapmr.org/about-physiatry/about-physical-medicine-rehabilitation/what-is-physiatry>. (Accessed January, 2021)
9. Society of Interventional Radiology What is interventional radiology? <https://www.sirweb.org/patient-center/conditions-and-treatments/what-is-interventional-radiology/> (Accessed January, 2021)
10. American Society of Anesthesiologists. Role of Physician Anesthesiologist, <https://www.asahq.org/madeforthismoment/anesthesia-101/role-of-physician-anesthesiologist/>. (Accessed January, 2021)
11. American Academy of Neurology, What is a Neurologist? <https://www.aan.com/tools-and-resources/medical-students/careers-in-neurology/what-is-a-neurologist/>. (Accessed January, 2021)
12. The American Medical Society for Sports Medicine, What is a Sports Medicine Physician? <https://www.amssm.org/what-is-a-sports-medicine-physician.php>. (Accessed January, 2021)
13. What is Osteopathic Medicine?, American Academy of Osteopathy, [Online]. Available: <https://www.academyofosteopathy.org/what-is-osteopathy>. (Accessed January, 2021)
14. American Board of Physician Specialties Integrative Medicine Defined. Available: <https://www.abpsus.org/integrative-medicine-defined>. (Accessed January, 2021)
15. American College of Rheumatology What is a Rheumatologist?, <https://www.rheumatology.org/I-Am-A/Patient-Caregiver/Health-Care-Team/What-is-a-Rheumatologist>. (Accessed January, 2021)
16. Robinson, J. et. al. Clinical features and diagnosis of cervical radiculopathy. UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
17. Expert Panel on Neurological Imaging. ACR Appropriateness Criteria® Cervical Neck Pain or Cervical Radiculopathy. J Am Coll Radiol. 2019 May;16(5S):S57-S76.
18. Bernatz JT, Anderson PA. Thirty-day readmission rates in spine surgery: systematic review and meta-analysis. Neurosurg Focus. 2015 Oct;39(4):E7.
19. Kong L, et. al. Smoking and Risk of Surgical Site Infection after Spinal Surgery: A Systematic Review and Meta-Analysis. Surg Infect (Larchmt). 2017 Feb/Mar;18(2):206-214.
20. Meng FC, et. al. Risk factors for surgical site infections following spinal surgery. J Clin Neurosci. 2015 Dec;22(12):1862-6.
21. Hermann PC, et.al. Influence of smoking on spinal fusion after spondylodesis surgery: A comparative clinical study. Technol Health Care. 2016 Sep 14;24(5):737-44.
22. Peng XQ, et. al. Risk Factors for Surgical Site Infection After Spinal Surgery: A Systematic Review and Meta-Analysis Based on Twenty-Seven Studies. World Neurosurg. 2019 Mar;123:e318-e329.
23. Burgess LC, Wainwright TW. What Is the Evidence for Early Mobilisation in Elective Spine Surgery? A Narrative Review. Healthcare (Basel). 2019 Jul 18;7(3):92.
24. Devin CJ, et.al. Best evidence in multimodal pain management in spine surgery and means of assessing postoperative pain and functional outcomes. J Clin Neurosci. 2015 Jun;22(6):930-8.
25. Ali ZS, et.al. Enhanced recovery after elective spinal and peripheral nerve surgery: pilot study from a single institution. J Neurosurg Spine. 2019 Jan 25:1-9.
26. Elsarrag M, et. al. Enhanced recovery after spine surgery: a systematic review. Neurosurg Focus. 2019 Apr 1;46(4):E3.
27. Ogink PT, et. al. Predicting discharge placement after elective surgery for lumbar spinal stenosis using machine learning methods. Eur Spine J. 2019 Jun;28(6):1433-1440.

28. Aldebeyan S, Predictors of Discharge Destination After Lumbar Spine Fusion Surgery. *Spine (Phila Pa 1976)*. 2016 Oct 1;41(19):1535-1541.
29. McGirt MJ, et.al. Predictors of extended length of stay, discharge to inpatient rehab, and hospital readmission following elective lumbar spine surgery: introduction of the Carolina-Semmes Grading Scale. *J Neurosurg Spine*. 2017 Oct;27(4):382-390.
30. Cook C, et. al. The association of discharge destination with 30-day rehospitalization rates among older adults receiving lumbar spinal fusion surgery. *Musculoskelet Sci Pract*. 2018 Apr;34:77-82.
31. Abt NB, et. al. Discharge to a rehabilitation facility is associated with decreased 30-day readmission in elective spinal surgery. *J Clin Neurosci*. 2017 Feb;36:37-42.
32. Di Capua J, et. al. Predictors for Non-Home Patient Discharge Following Elective Adult Spinal Deformity Surgery. *Global Spine J*. 2018 May;8(3):266-272.
33. Levin, K, et. al. Cervical spondylotic myelopathy. UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
34. Robinson, J, et. al. Treatment and prognosis of cervical radiculopathy. UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
35. Eisen, A, et. al. Disorders affecting the spinal cord. UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
36. Theodore N. Degenerative Cervical Spondylosis. *N Engl J Med*. 2020 Jul 9;383(2):159-168.
37. Stiell, I.G., et. al. (2009). Implementation of the Canadian C-Spine Rule: prospective 12 centre cluster randomized trial. *BMJ (Clinical research ed.)*, 339, b4146.
38. Childress, M.A., & Becker, B.A. (2016). Nonoperative Management of Cervical Radiculopathy. *American family physician*, 93(9), 746-754.

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

Bibliography: Medication Tables

1. Lexicomp Online Database. Hudson (OH): <http://online.lexi.com>. (Accessed January, 2021)
2. North American Spine Society Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy, 2012. <https://www.spine.org/Portals/0/assets/downloads/ResearchClinicalCare/Guidelines/LumbarDiscHerniation.pdf> (Accessed January, 2021)
3. Thorson, D, et.al. Adult Acute and Subacute Low Back Pain, March 2018. Institute for Clinical Systems Improvement. <https://www.icsi.org/guideline/low-back-pain/> (Accessed January, 2021)
4. Chou R, et al. Noninvasive Treatments for Low Back Pain [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2016 Feb. (Comparative Effectiveness Reviews, No. 169.) Available from: <https://www.ncbi.nlm.nih.gov/books/NBK350276/> (Accessed January, 2021)
5. Pangarkar SS, et. al. VA/DoD Clinical Practice Guideline: Diagnosis and Treatment of Low Back Pain. J Gen Intern Med. 2019 Nov;34(11):2620-2629.
6. Qaseem A, et. al. Clinical Guidelines Committee of the American College of Physicians. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. Ann Intern Med. 2017 Apr 4;166(7):514-530.
7. Oliveira CB, et.al. Clinical practice guidelines for the management of non-specific low back pain in primary care: an updated overview. Eur Spine J. 2018 Nov;27(11):2791-2803
8. National Institute for Health and Care Excellence (NICE) Low back pain and sciatica in over 16s: assessment and management
9. NICE guideline [NG59] Published: 30 November 2016 Last updated: 11 December 2020 (Accessed January, 2021)
10. Chao, R. et.al Subacute and chronic low back pain: Nonsurgical interventional treatment UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)
11. Wong JJ, et.al.Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration. Eur J Pain. 2017 Feb;21(2):201-216.
12. Intermountain Health Care System. Intermountain Low Back Pain Guideline. August 2014. <https://intermountainhealthcare.org/ckr-ext/Dcmnt?ncid=522579081> (Accessed January, 2021)
13. North American Spine Society Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis & Treatment of Low Back Pain, 2020. <https://www.spine.org/Portals/0/assets/downloads/ResearchClinicalCare/Guidelines/LowBackPain.pdf> (Accessed January, 2021)
14. Soprano SE, et. al. Assessment of Physician Prescribing of Muscle Relaxants in the United States, 2005-2016. JAMA Netw Open. 2020 Jun 1;3(6):e207664
15. Levin, K. et. al. Acute lumbosacral radiculopathy: Treatment and prognosis, UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed January, 2021)

List of Abbreviations and Acronyms:

Abbreviation	Meaning
A1C	Hemoglobin A1C
BP	Blood Pressure
CAD	Coronary artery disease
CADR	cervical artificial disc replacement
CBT	Cognitive Behavioral Therapy
CDA	Cervical disc arthroplasty
CM	Chiari malformation
CNS	Central Nervous System
COPD	Chronic Obstructive Lung Disease
CRP	C-Reactive Protein
CT	Computed Tomography
CTA	Computed Tomography (CT) Angiography
DISH	Diffuse skeletal hyperostosis
ED	Emergency Department
EMG	Electromyography
ESR	Erythrocyte Sedimentation Rate
GCS	Glasgow Coma Scale
LOS	Length of service
MI	Myocardial Infarction
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance Imaging
MVC	Motor Vehicle Collision
NAD	Neck Pain Associated Disorders
NSAIDs	Non-steroidal Anti-inflammatory medications
OMM	Osteopathic Manipulative Medicine
PHQ2	Patient Health Questionnaire-2
PHQ9	Patient Health Questionnaire-9
PM&R	Physical Medicine and Rehabilitation
PT	Physical Therapy
RFA	Radiofrequency Ablation
ROM	Range of Motion
US	Ultrasound
WAD	Whiplash Associated Disorders