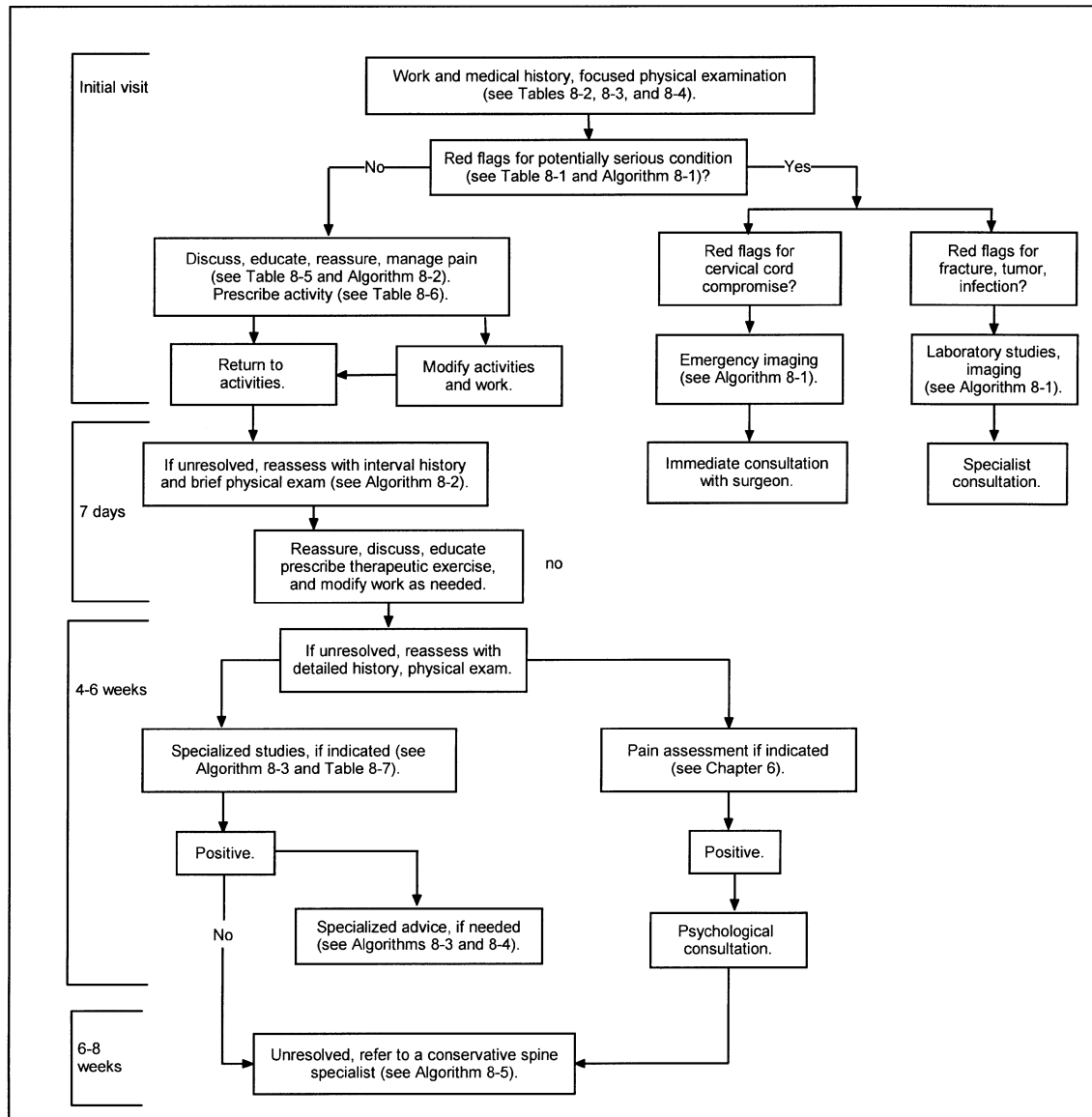


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## *II. Presenting Complaints*

**Master Algorithm. ACOEM Guidelines for Care of Acute and Subacute Occupational Neck and Upper Back Complaints**



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# 8                      *Neck and Upper Back Complaints*

## *General Approach and Basic Principles*

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Neck and upper back complaints that may be work related are common problems presenting to occupational and primary care providers; such complaints are among the ten most common causes of reported occupational complaints and workers' compensation claims. These complaints account for about 6-8% of total lost workdays in workers' compensation and about 8% of claims, ranking them in the top ten for financial severity as well.

Recommendations on assessing and treating adults with potentially work-related neck and upper back complaints are presented in this chapter. Topics include the initial assessment and diagnosis of patients; identification of red flags that may indicate the presence of a serious underlying medical condition; initial management; diagnostic considerations and special studies for identifying clinical pathology, work-relatedness, return to work, modified duty and activity; and further management considerations, including the management of delayed recovery.

Algorithms for patient management are included. This chapter's master algorithm schematizes the manner in which primary care and occupational medicine practitioners generally can manage patients with acute and subacute neck and upper back complaints. The following text, tables, and numbered algorithms expand upon the master algorithm.

The principal recommendations for assessing and treating patients with neck and upper back complaints are as follows:

- The initial assessment focuses on detecting indications of potentially serious disease, termed red flags.
- In the absence of red flags, imaging and other tests are not usually helpful during the first four weeks of neck and upper back symptoms.
- Relieving discomfort can be accomplished most safely by nonprescription medication.
- Primary care or occupational physicians can effectively manage acute and subacute neck and upper back problems conservatively in the absence of red flags.

- While some activity or job modification may be necessary in the acute period, bed rest for more than two days is not helpful and may further debilitate the patient.
- Patients may engage in normal, preinjury activities to facilitate recovery from non-red-flag acute neck disorders such as whiplash-associated disorders (WAD), which is generally more effective than rest and immobilization.<sup>1</sup>
- Low-stress aerobic activities can be safely started immediately as tolerated to help avoid debilitation. Stretching exercises may be helpful to avoid further restriction of motion. Exercises to strengthen neck, upper back, and shoulder muscles are commonly delayed for several weeks.
- Patients recovering from acute and subacute neck and upper back problems should be encouraged to return to modified- or full-duty work as soon as possible.
- If symptoms persist (e.g., beyond four to six weeks), further evaluation may be indicated.
- Within the first three months of neck and upper back symptoms, the only patients who can be expected to benefit from surgery are those with evidence of severe spinovertebral disease (tumor, infection, major trauma, or progressive neurologic deficit) or with severe, debilitating symptoms and physiologic evidence of specific nerve root or spinal cord compromise, corroborated by appropriate imaging studies.
- Nonphysical factors (such as psychosocial, workplace, or socioeconomic problems) can be investigated and addressed in cases of delayed recovery or return to work.

## *Initial Assessment*

Thorough medical and work histories and a focused physical examination (see Chapter 2) are sufficient for initially assessing a patient complaining of potentially work-related neck or upper back symptoms. Certain findings in this assessment raise suspicion of serious underlying medical conditions; these are referred to as red flags (see Table 8-1). Their absence rules out the need for special studies, referral, or inpatient care during the first four weeks, during which time spontaneous recovery is expected (provided any inciting workplace factors are mitigated). Findings of the medical history and physical examination also may alert the clinician to other pathology (not of neck or upper back

<sup>1</sup>The Quebec Task Force on Whiplash Associated Disorders (WAD) defines whiplash as an acceleration/deceleration mechanism of energy transferred to the neck and may result from rear end or side impact motor vehicle collisions but can also occur during diving or other mishaps. The impact may result in bony or soft tissue injuries, which in turn may lead to a variety of clinical manifestations called WAD. Neck pain, headache and decreased mobility of the cervical spine are the most common symptoms.

*Table 8-1. Red Flags for Potentially Serious Neck and Upper Back Conditions*

<b>Disorder</b>	<b>Medical History</b>	<b>Physical Examination</b>
Fracture	Direct blow to the head Excessive force to the neck, with pain postinjury Loss of consciousness Thrown from vehicle	Inability to move neck due to pain Severe cervical (midline vertebral) tenderness Patient observed to hold head for stability Possible neurologic deficits
Tumor	Age > 50 years Pain at rest Weight loss History of cancer	Tenderness to vertebral percussion Cachexia
Infection	Systemic symptoms of fever, chills Recent bacterial infection IV drug abuse Immune suppression or compromise (e.g., corticosteroids, HIV, diabetes) Pain at rest Fever and nuchal rigidity	Severe cervical spasm Systemic signs of sepsis (elevated temperature, chills, hypotension, tachycardia)
Possible cervical spinal cord compromise	Significant trauma to neck Paresthesias of upper (or upper and lower) extremities Weakness of upper/lower extremity Global weakness of upper extremities Difficulty walking	Severe cervical spasm Weakness of upper or lower extremity major muscle groups Bilateral decreased sensation in upper or lower extremities Disturbance of sphincter control Positive Babinski signs Hyperactive reflexes

origin) that can present as neck or upper back complaints. Neck and upper back complaints can then be classified into one of three working categories although common factors may be operative in all three, thus confounding this classification:

- Potentially serious neck or upper back disorders: fracture, dislocation, infection, tumor, progressive neurologic deficit, or cord compression
- Degenerative disorders: consequences of aging or repetitive use, or a combination thereof, such as degenerative disk disease and osteoarthritis
- Nonspecific disorders: including benign, self-limited disorders with unclear etiology, such as regional upper back and neck pain and shoulder pain adjacent to the neck

## *Medical History*

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Asking the patient open-ended questions, such as those listed below, allows the clinician to gauge the need for further discussion or specific inquiries to obtain more detailed information (see also Chapter 2):

### 1. WHAT ARE YOUR SYMPTOMS?

- Do you have pain, numbness, weakness, or stiffness?
- For traumatic injuries: Was the area deformed? Did you lose any blood or have an open wound?
- Is the discomfort located primarily in your neck, upper back, or shoulder? Do you have pain or other symptoms elsewhere?
- Are your symptoms constant or intermittent? What makes the problem worse or better?

### 2. HOW DO THESE SYMPTOMS LIMIT YOU?

- How long can you sit, stand, walk, do overhead work?
- Can you lift? How much weight?
- When did your current limitations begin? Was there a specific inciting event?
- How did the limitations develop?
- How long have your activities been limited? More than four weeks?
- Have your symptoms changed? How?
- Have you had similar episodes previously?
- Have you had previous testing or treatment? With whom?
- What do you think caused the problem? How do you think it is related to work?
- What are your specific job duties? Do you use your neck and upper back to perform them? How? How often?
- What other activities (hobbies, workouts, sports) do you engage in at home or elsewhere? Do you use your neck and upper back to perform them? How? How often?
- Are your symptoms affected by activities of daily living, such as grooming (combing your hair) or driving?
- Do you have other medical problems?
- What do you hope we can accomplish during this visit?

Determining the presence of cervical nerve root compromise (and, if so, the level of compromise) is critical. Pain or paresthesia, combined with muscle

weakness, sensory deficits, and reflex loss suggests cervical nerve root compression. Clinical findings correlating with specific dermatomal levels of compression are shown in Table 8-2.

## *Physical Examination*

Guided by the medical history, the physical examination includes:

- General observation of the patient, including stance and gait
- Regional examination of neck, proximal shoulder area, and upper back
- Neurologic screening
- Testing for cervical nerve root irritation

The objective parts of the examination are testing reflexes and circumferential measurements of the upper extremity for atrophy. All other findings require the patient's cooperation. If spasm is present, it is an objective finding, not simply an inferred manifestation of guarding by the patient.

A patient who has a neck or upper back disorder may present with a complaint of shoulder pain; he or she may point to the top of the shoulder or to the upper trapezius area, between the base of the neck and the point of the shoulder. This type of pain is most commonly related to the neck, and evaluation includes inspecting the neck and upper back, as noted in this guideline. Interscapular or scapular pain also is a common manifestation of neck abnormalities. Careful physical examination of the cervical area is indicated for patients with either shoulder or interscapular/scapular pain.

*Table 8-2. Symptoms of Cervical Nerve Root Compromise*

Root Level	Pain or Paresthesia	Motor Weakness
C3	Ear	Neck rotation, shoulder elevation, diaphragm
C4	Top of shoulders	Shoulder elevation, rotation
C5	Lower shoulder, lateral upper arm	Shoulder abduction, elbow flexion, and supination
C6	Lateral forearm, thumb, index finger	Radial wrist extension
C7	Neck or scapula radiating to index, middle, and ring fingers	Elbow extension, ulnar wrist flexion, and finger extension
C8	Neck, radiating to ring and small fingers	Finger flexion
T1	Upper medial forearm, medial arm	Finger abduction, adduction

## Observation and Regional Neck Examination

Observing the patient's stance and gait is useful to guide the remainder of the examination. Uncoordination or abnormal use of the extremities may indicate the need for specific neurologic testing. Severe guarding of cervical motion in all planes may add credence to a suspected diagnosis of spinal or intrathecal infection, tumor, or fracture. However, because of the marked variation among persons with and without symptoms, range-of-motion measurements of the neck and upper back are of limited value except as a means to monitor recovery in cases of restriction of motion due to symptoms.

Vertebral-point tenderness to palpation, when associated with other signs or symptoms, is suggestive of, but not specific for, spinal fracture or infection. Palpable soft-tissue tenderness alone is an even less specific or reliable finding.

## Neurologic Screening

The neurologic examination should focus on a few tests that reveal evidence of nerve root impairment, peripheral neuropathy, or spinal cord dysfunction. Most herniated disks in the cervical spine involve the C5-6 or the C6-7 levels and the C6 or C7 nerve roots, respectively. The C5 and C8 roots are less commonly involved. Table 8-3 summarizes the clinical features of cervical nerve root compression.

*Table 8-3. Physical Examination Correlates of Cervical Nerve Root Dysfunction*

Root Level	Sensory Deficit	Motor Weakness	Reflex Loss
C3	Ear, anterior neck, occiput, posterior temporal area	Neck rotation, shoulder elevation, diaphragm	None
C4	Shoulder, posterior upper arm, upper chest	Shoulder elevation, rotation	None
C5	Lateral shoulder, upper arm	Shoulder abduction, elbow flexion	Biceps (brachioradialis)
C6	Lateral forearm, thumb, index and lateral middle fingers	Radial wrist extension	Brachioradialis (biceps)
C7	Middle finger	Elbow extension, wrist flexion, finger extension	Triceps
C8	Distal forearm, ulnar ring, and small finger	Finger flexion	Triceps
T1	Medial upper forearm and arm	Long-finger flexion, finger abduction, and adduction	None



## 1. TESTING FOR MUSCLE STRENGTH

Nerve root compromise at the C5 level (C4-5 disk) can cause weakness of shoulder abduction as well as elbow flexion or supination. Compromise at the C6 level (C5-6 disk) can produce weakness of radial wrist extension. The C7 nerve root (C6-7 disk) innervates the triceps muscle; weakness of elbow extension and of ulnar wrist flexion indicates compromise at this level. Weak finger extension is a sign of C7 nerve root compromise as well. C8 (C7-8 disk) involvement is indicated by weakness of finger abduction and adduction, as the lumbrical muscles of the hand are affected.

## 2. CIRCUMFERENTIAL MEASUREMENTS

Muscle atrophy can be detected by bilateral circumferential measurements of the upper arms and forearms. The dominant upper extremity usually will have an increase of  $\frac{1}{4}$  inch in circumference at the forearm and, possibly, also at the upper arm.

## 3. REFLEXES

The biceps reflex primarily tests the C5 root, and, to a lesser extent, the C6 root. The brachioradialis reflex tests the C6 root; the triceps reflex, the C7 root. The Hoffmann reflex in combination with clonus may indicate an upper motor neuron lesion.

## 4. SENSORY EXAMINATION

Testing light touch, pressure, and pinprick sensations in the forearm and hand is usually sufficient to detect common nerve root compromise, but sensory examination of the area from the neck to the forearm may be necessary to test for higher nerve root compromise. Decreased sensation over the lateral deltoid muscle is a sign of C5 nerve root or axillary nerve compromise. Loss of sensation in the area of the lateral thumb, index finger, and medial half of the middle finger indicates C6 nerve root involvement. Decreased sensation in the long (middle) finger may be a sign of C7 involvement, although it also is supplied occasionally by the C6 or C8 nerve root. The C8 root may show ring- and fifth-finger sensory findings; the ulnar side of the small (fifth) finger is the purest area of C8 innervation. The T1 nerve root can be tested by evaluating sensation in the upper medial forearm and medial arm.

## **Assessing Red Flags and Indications for Immediate Referral**

Physical examination evidence of severe neurologic compromise that correlates with the medical history and test results may indicate a need for immediate consultation. The examination may further reinforce or reduce suspicions of tumor, infection, fracture, or dislocation. A medical history suggestive of

pathology originating somewhere other than in the cervical area may warrant examination of the head, shoulder, or other areas.

Cervical nerve root irritation can be demonstrated by depressing the clavicle or deeply palpating the posterior triangle of the neck. This maneuver should reproduce the patient's symptoms and signs if the cervical nerves are the source of neurologic symptoms and signs.

## Diagnostic Criteria

If the patient does not have red flags for serious conditions, the clinician can then determine which common musculoskeletal disorder is present. The criteria presented in Table 8-4 follow the clinical thought process, from the mechanism of illness or injury to unique symptoms and signs of a particular disorder, and finally to test results if any tests are needed to guide treatment at this stage.

*Table 8-4. Diagnostic Criteria for Non-red-flag Conditions that Can Be Managed by Primary Care Physicians*

Probable Diagnosis or Injury	Mechanism	Unique Symptoms	Unique Signs	Tests and Results
Regional neck pain (ICD-9 723.1, 723.3, 723.5, 723.7, 723.8, 723.9)	Not known	Diffuse pain	None	None indicated
Cervical strain (ICD-9 847.0)	Flexion-extension or rotation force Blow to head or neck	Neck pain Difficult or reduced motion	Limited range of motion due to pain	None indicated
Cervical nerve root compression with radiculopathy (ICD-9 722.71)	Degenerative condition Trauma	Dermatomal sensory changes Motor weakness	Specific motor, sensory, and reflex changes	None indicated for 4-6 weeks in the absence of progressive motor weakness
Spinal stenosis (ICD-9 723.0)	Older patients: degenerative condition Younger patients: congenital stenosis	Neck, shoulder, posterior arm pain Paresthesias in same distribution as pain	Weakness of shoulder girdle and upper arms Long tract signs Signs worse with extension, improved with flexion of neck	CT or MRI shows spinal stenosis
Postlaminectomy syndrome (ICD-9 722.81)	Complication of surgery	Pain and sensory complaints in nerve root distribution at level of surgery	Radicular signs corresponding to level of distribution of surgery	MRI with gadolinium shows scarring

*Note:* ICD-9 = *International Classification of Diseases*, 9th Ed.

## *Work-Relatedness*

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A thorough work history is crucial to establishing work-relatedness. See Chapter 2 for components of the work history.

Because neck and upper back complaints may be related to workstation factors, an accurate history of work- and non-work-related activities is imperative. Questioning about ergonomic positioning, use of a headset, computer screen placement, and many other factors is important. Reviews of epidemiologic studies have shown neck tension symptoms to be related to repetitive work and constrained postures. The work relatedness of the other neck and upper back conditions is not well delineated.

## *Initial Care*

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Comfort is often a patient's first concern. Nonprescription analgesics will provide sufficient pain relief for most patients with acute and subacute symptoms. If treatment response is inadequate (i.e., if symptoms and activity limitations continue), prescribed pharmaceuticals or physical methods can be added. Comorbid conditions, side effects, cost, and provider and patient preferences generally guide the clinician's choice of recommendations. Table 8-5 summarizes comfort options.

- Manipulation has been compared to various treatments, but not placebo or nontreatment, for patients with neck pain in nearly twenty randomized clinical trials. More than half favored manipulation, with one reporting better results in combination with exercise, while the remainder indicated treatments were equivocal. Cervical manipulation has not yet been studied in workers' compensation populations.

In rare instances (estimated at 1.0-1.5 per million manipulations), manipulation has been associated with cerebrovascular accident. Some studies suggest that this risk is based on the position of the patient, not the act of manipulation itself. Serious side effects are extremely rare and far less frequent than those associated with commonly prescribed alternatives such as nonsteroidal anti-inflammatory drugs (NSAIDs), but the issue is currently under study and should be monitored.

Using cervical manipulation may be an option for patients with occupationally related neck pain or cervicogenic headache. Consistent with application of any passive manual approach in injury care, it is reasonable to incorporate it within the context of functional restoration rather than for pain control alone. There is insufficient evidence to support manipulation of patients with cervical radiculopathy.

- There is no high-grade scientific evidence to support the effectiveness or ineffectiveness of passive physical modalities such as traction, heat/cold applications, massage, diathermy, cutaneous laser treatment, ultrasound, transcutaneous electrical neurostimulation (TENS) units, and

Table 8-5. *Methods of Symptom Control for Neck and Upper Back Complaints*

RECOMMENDED		
Nonprescription Medications		
<ul style="list-style-type: none"> <li>• Acetaminophen (safest)</li> <li>• NSAIDs (aspirin, ibuprofen)</li> </ul>		
Physical Modalities		
<ul style="list-style-type: none"> <li>• Adjustment or modification of workstation, job tasks, or work hours and methods</li> <li>• Stretching</li> <li>• Specific neck exercises for range of motion and strengthening</li> <li>• At-home local applications of cold packs during first few days of acute complaints; thereafter, applications of heat packs</li> <li>• Relaxation techniques</li> <li>• Aerobic exercise</li> <li>• 1-2 physical therapy visits for education, counseling, and evaluation of home exercise</li> </ul>		
Prescribed Pharmaceutical Methods		
Other NSAIDs		
OPTIONS		
Cervical Disk Displacement with Radiculopathy	Cervical Strain	Central Cord Compression
Short-term immobilization of the cervical spine if severe	Brief immobilization of the cervical spine if severe	Collar or brace for stabilization until emergent surgery performed
Spinal Stenosis	Postlaminectomy Syndrome	Regional Neck Symptoms
Brief immobilization of the cervical spine if severe	Immobilization of the cervical spine if severe	Brief immobilization of the cervical spine if severe

biofeedback. These palliative tools may be used on a trial basis but should be monitored closely. Emphasis should focus on functional restoration and return of patients to activities of normal daily living.

- There is limited evidence that electromagnetic therapy may be effective to reduce pain in mechanical neck disorders. If used, there should be a trial period with objective signs of functional progress.
- Invasive techniques (e.g., needle acupuncture and injection procedures, such as injection of trigger points, facet joints,<sup>2</sup> or corticoste-

<sup>2</sup>There is limited evidence that radio-frequency neurotomy may be effective in relieving or reducing cervical facet joint pain among patients who had a positive response to facet injections. Lasting relief (eight to nine months, on average) from chronic neck pain has been achieved in about 60% of cases across two studies, with an effective success rate on repeat procedures, even though sample sizes generally have been limited ( $n = 24, 28$ ). Caution is needed due to the scarcity of high-quality studies.

roids, lidocaine, or opioids in the epidural space) have no proven benefit in treating acute neck and upper back symptoms. However, many pain physicians believe that diagnostic and/or therapeutic injections may help patients presenting in the transitional phase between acute and chronic pain.

- Injecting botulinum toxin (type A and B) has been shown to be effective in reducing pain and improving range of motion (ROM) in cervical dystonia (a disorder that is non-traumatic and non-work-related). Mild side effects were fairly common and dose dependent, including dry mouth and dysphagia. While existing evidence shows injecting botulinum toxin to be safe, caution is needed due to the scarcity of high-quality studies. There are no high quality studies that support its use in whiplash-associated disorder.
- Cervical epidural corticosteroid injections are of uncertain benefit and should be reserved for patients who otherwise would undergo open surgical procedures for nerve root compromise.
- Other miscellaneous therapies have been evaluated and found to be ineffective or minimally effective. For example, cervical collars have not been shown to have any lasting benefit, except for comfort in the first few days of the clinical course in severe cases; in fact, weakness may result from prolonged use and will contribute to debilitation. Immobilization using collars and prolonged periods of rest are generally less effective than having patients maintain their usual, “preinjury” activities.

## *Activity Alteration*

To avoid neck or upper back irritation and debilitation due to inactivity, recommendations for alternative activity can be helpful. As a general principle, acutely avoid activities that precipitate symptoms, but general activities and motion may be continued. Therapeutic exercise, including strengthening, should start as soon as it can be done without aggravating symptoms. Most patients with neck pain do not require bed rest. The most severe cases of neck pain (primarily those with arm pain) may be treated with one to two days of bed rest. Prolonged bed rest (more than two days) has potential debilitating effects, and its efficacy in treating acute neck pain is unproved.

Activities causing an increase in stress on the neck tend to increase neck symptoms. These activities can be reviewed with the patient and modifications advised. Activities and postures that increase stress on the neck (e.g., driving, workstation position, telephone use, repetitive motions, and other activities) may require modification. Patients who work with video-display terminals should be sure the keyboard and monitor are at a comfortable height and angle because misadjustment of terminals as well as awkward use of laptop computers are common causes of neck symptoms. Sitting posture and support are important as well. For example, cradling a telephone receiver on the

shoulder can cause neck symptoms and indicates the need for a headset. Frequent changes in position become important in many cases of neck and upper back problems. Work activities involving crouching, stooping, working under automobiles or dashboards, working in confined spaces, and the like may require modification to maximize the patient's activities and allow early return to work.

## Work Activities

Table 8-6 provides recommendations on activity modification and duration of absence from work. Intended for patients without comorbidity or complicating factors, including employment or legal issues, these guidelines are targets

*Table 8-6. Guidelines for Modification of Work Activities and Disability Duration\**

Disorder	Activity Modifications and Accommodation	Recommended Target for Disability Duration**		NHIS Experience Data***	
		With Modified Duty	Without Modified Duty	Median (cases with lost time)	Percent No Lost Time
Cervical strain	Avoid extremes of motion, prolonged periods in one position, and any other aggravating activities	5-7 days	7-14 days	13 days	19%
Cervical disk displacement, with radiculopathy	Same as for cervical strain, with avoidance of activities that aggravate arm symptoms as well	5-7 days	7-14 days	30 days	28%
Spinal stenosis	Same as for cervical radiculopathy, with generalized accommodation of life-style activities	5-7 days	7-14 days	6 days	58%
Postlaminectomy syndrome	Same as for radiculopathy, with surgical referral if limitations are ineffective	5-7 days	7-14 days	29 days	38%
Regional neck pain	Avoid aggravating circumstances; maximize safe activities	2-4 days	7-10 days	5 days	43%

\* These are general guidelines based on consensus or population sources and are never meant to be applied to an individual case without consideration of workplace factors, concurrent disease or other social or medical factors that can affect recovery.

\*\* These parameters for disability duration are "consensus optimal" targets as determined by a panel of ACOEM members in 1996, and reaffirmed by a panel of ACOEM members in 2002. In most cases persons with one nonsevere injury can return to modified duty immediately.

\*\*\* Based on the CDC NHIS (National Health Interview Survey), as compiled and reported in the eighth annual edition of *Official Disability Guidelines (ODG)*, © 2002 Work Loss Data Institute, all rights reserved.

providing a guide from the perspective of physiologic recovery. Key factors to consider in disability duration are age and type of job, especially if the regular work includes activities likely to worsen the condition. The clinician can make clear to patients and employers that:

- Even moderately heavy lifting, carrying, or working in awkward positions may aggravate neck symptoms from cervical strain, cervical nerve root irritation, etc.
- Any restrictions are intended to allow for spontaneous recovery or for time to build activity tolerance through exercise.

Measures to assist the patient in avoiding aggravating activities include reviewing work duties to decide whether modifications can be accomplished and to determine whether modified duty is available. Make every attempt to maintain the patient at maximal levels of activity, including work activities.

### *Follow-up Visits*

Patients whose neck or upper back complaints may be work related should receive follow-up care every three to five days by a midlevel practitioner, who can counsel them about avoiding static positions, medication use, activity modification, and other concerns. Take care to answer questions and make these sessions interactive so that patients are fully involved in their recovery. If the patient has returned to work, these interactions may be done on site or by telephone to avoid interfering with modified- or full-work activities.

Physician follow-up generally occurs when a release to modified, increased, or full duty is needed, or after appreciable healing or recovery can be expected, on average. Physician follow-up might be expected every four to seven days if the patient is off work and every seven to fourteen days if the patient is working.

### *Special Studies and Diagnostic and Treatment Considerations*

For most patients presenting with true neck or upper back problems, special studies are not needed unless a three- or four-week period of conservative care and observation fails to improve symptoms. Most patients improve quickly, provided any red-flag conditions are ruled out.

Criteria for ordering imaging studies are:

- Emergence of a red flag
- Physiologic evidence of tissue insult or neurologic dysfunction

- Failure to progress in a strengthening program intended to avoid surgery
- Clarification of the anatomy prior to an invasive procedure

Physiologic evidence may be in the form of definitive neurologic findings on physical examination, electrodiagnostic studies, laboratory tests, or bone scans. Unequivocal findings that identify specific nerve compromise on the neurologic examination are sufficient evidence to warrant imaging studies if symptoms persist. When the neurologic examination is less clear, however, further physiologic evidence of nerve dysfunction can be obtained before ordering an imaging study. Electromyography (EMG), and nerve conduction velocities (NCV), including H-reflex tests, may help identify subtle focal neurologic dysfunction in patients with neck or arm symptoms, or both, lasting more than three or four weeks. The assessment may include sensory-evoked potentials (SEPs) if spinal stenosis or spinal cord myelopathy is suspected. If physiologic evidence indicates tissue insult or nerve impairment, consider a discussion with a consultant regarding next steps, including the selection of an imaging test to define a potential cause (magnetic resonance imaging [MRI] for neural or other soft tissue, compute tomography [CT] for bony structures). Additional studies may be considered to further define problem areas. The recent evidence indicates cervical disk annular tears may be missed on MRIs. The clinical significance of such a finding is unclear, as it may not correlate temporally or anatomically with symptoms.

Diskography is frequently used prior to cervical fusions and certain disk-related procedures. There is significant scientific evidence that questions the usefulness of diskography in those settings. While recent studies indicate diskography to be relatively safe and have a low complication rate, some studies suggest the opposite to be true. In any case, clear evidence is lacking to support its efficacy over other imaging procedures in identifying the location of cervical symptoms, and, therefore, directing intervention appropriately. Tears may not correlate anatomically or temporally with symptoms. Because this area is rapidly evolving, clinicians should consult the latest available studies.

Table 8-7 provides a general comparison of the abilities of different techniques to identify physiologic insult and define anatomic defects. In the following circumstances, an imaging study may be appropriate for a patient whose limitations due to consistent symptoms have persisted for four to six weeks or more:

- When surgery is being considered for a specific anatomic defect
- To further evaluate the possibility of potentially serious pathology, such as a tumor

Reliance on imaging studies alone to evaluate the source of neck or upper back symptoms carries a significant risk of diagnostic confusion (false-positive test results) because it's possible to identify a finding that was present before symptoms began and, therefore, has no temporal association with the symptoms.



Table 8-7. Ability of Various Techniques to Identify and Define Neck and Upper Back Pathology

Technique	Identify Physiologic Insult	Identify Anatomic Defect
History	+	+
Physical examination		
Circumference	+	+
Reflexes	++	++
Motor	++	++
Sensory	++	++
Physiologic studies	++	0
Laboratory studies		
Bone scan <sup>1</sup>	+++	++
Electromyography/sensory evoked potentials (EMG/SEPs)	+++	++
Imaging		
Radiography <sup>1</sup>	0	+(+++) <sup>2</sup>
Computed tomography (CT) <sup>1</sup>	0	++++ <sup>3</sup>
Magnetic resonance imaging (MRI)	0	++++ <sup>3</sup>
Myelo-CT <sup>1</sup>	0	++++ <sup>3</sup>
Myelography <sup>1</sup>	0	++++ <sup>3</sup>

<sup>1</sup>Risk of complications (e.g., infection, radiation) highest for myelo-CT; second highest for myelography; relatively less for bone scan, radiography, and CT.

<sup>2</sup>Cervical radiographs are most appropriate for patients with acute trauma associated with midline vertebral tenderness, head injury, drug or alcohol intoxication, or neurologic compromise. (*American College of Surgeons. Advanced Trauma and Life Support: A Manual for Instructors*. Chicago: ACS; 1993.)

<sup>3</sup>False-positive diagnostic findings in up to 30% of people without symptoms at age 30.

*Note:* Number of plus signs indicates relative ability to identify or define pathology.

## Surgical Considerations

Within the first three months of onset of potentially work-related acute neck and upper back symptoms, consider surgery only if the following are detected:

- Severe spinovertebral pathology
- Severe, debilitating symptoms with physiologic evidence of specific nerve root or spinal cord dysfunction corroborated on appropriate imaging studies that did not respond to conservative therapy

A disk herniation, characterized by protrusion of the central nucleus pulposus through a defect in the outer annulus fibrosis, may impinge on a nerve root, causing irritation, shoulder and arm symptoms, and nerve root dysfunction.

tion. The presence of a herniated cervical or upper thoracic disk on an imaging study, however, does not necessarily imply nerve root dysfunction. Studies of asymptomatic adults commonly demonstrate intervertebral disk herniations that apparently do not cause symptoms.

Referral for surgical consultation is indicated for patients who have:

- Persistent, severe, and disabling shoulder or arm symptoms
- Activity limitation for more than one month or with extreme progression of symptoms
- Clear clinical, imaging, and electrophysiologic evidence, consistently indicating the same lesion that has been shown to benefit from surgical repair in both the short- and long-term
- Unresolved radicular symptoms after receiving conservative treatment

The efficacy of cervical fusion for patients with chronic cervical pain without instability has not been demonstrated. If surgery is a consideration, counseling and discussion regarding likely outcomes, risks and benefits, and especially expectations is essential. Patients with acute neck or upper back pain alone, without findings of serious conditions or significant nerve root compromise, rarely benefit from either surgical consultation or surgery. If there is no clear indication for surgery, referring the patient to a physical medicine and rehab (PM&R) specialist may help resolve symptoms. Based on extrapolating studies on low back pain, it also would be prudent to consider a psychological evaluation of the patient prior to referral for surgery.

Many patients with strong clinical findings of nerve root dysfunction due to disk herniation recover activity tolerance within one month; there is no evidence that delaying surgery for this period worsens outcomes in patients without progressive neurologic findings. Spontaneous improvement in MRI-documented cervical disk pathology has been demonstrated with a high rate of resolution. Surgery increases the likelihood that patients will have to have future procedures with higher complication rates. A 12% reoperation rate was reported in one large series. Patients with comorbid conditions, such as cardiac or respiratory disease, diabetes, or mental illness, may be poor candidates for surgery. Comorbidity can be judged and discussed carefully with the patient.

## **A. Cervical Nerve Root Decompression**

Cervical nerve root decompression may be accomplished in one of two major ways. Some practitioners prefer cervical laminectomy and disk excision with nerve root decompression, especially for posterolateral or lateral disk ruptures or foraminal osteophytes. However, anterior disk excision is performed more often, especially for central herniations or osteophytes. Possible complications of decompression include wound infections, diskitis, recurrent disk material or graft slippage (requiring return to surgery either immediately or subacutely), and cervical cord damage. Thoroughly discussing the risks, benefits, and realis-

tic expectations of surgery with the patient is warranted. For instance, in one study, patients with radiation of pain to the arm(s) and hand(s) had better relief of pain with surgery than those with neck pain alone. Pre-surgical screening should include consideration of psychological evaluation.

## B. Other Procedures

Chemonucleolysis with chymopapain is less efficacious and has rare but serious complications. Percutaneous discectomy is not recommended because the effectiveness of this procedure has not been demonstrated.

## *Summary of Recommendations and Evidence*

See Table 8-8.

*Table 8-8. Summary of Recommendations for Evaluating and Managing Neck and Upper Back Complaints*

Clinical Measure	Recommended	Optional	Not Recommended
History and physical exam	Basic history and exam (C) History of cancer infection (B) History of significant trauma (D) Neurologic exam (C)		
Medication (See Chapter 3)	Acetaminophen (C) NSAIDs (B)	Muscle relaxants (C) Opioids, short course (C)	Use of opioids for more than 2 weeks (C)
Physical treatment methods		Physical manipulation for neck pain early in care only (B) At-home applications of heat or cold (D) Radio-frequency neurotomy (C)	Traction (B) TENS (C) Other modalities (D)
Injections		Epidural injection of corticosteroids to avoid surgery (D) Botulinum toxin (dystonia only) (B)	Facet injection of corticosteroids (D) Diagnostic blocks (D)
Rest and immobilization		1 or 2 days' partial bed rest for severe pain (D)	Bed rest longer than 1 or 2 days (B) Cervical collar more than 1 or 2 days

Table 8-8. (continued)

Clinical Measure	Recommended	Optional	Not Recommended
Activity and exercise	Maintenance of activity levels while recovering (B) Office instruction on exercises after initial pain decreases (D) Low-stress conditioning and aerobic exercises to avoid debilitation (D)		
Detection of neurologic abnormalities	EMG to clarify nerve root dysfunction in cases of suspected disk herniation preoperatively or before epidural injection (D)	SEPs if spinal stenosis or myelopathy suspected (D)	EMG for diagnosis of nerve root involvement if findings of history, physical exam, and imaging study are consistent (D)
Radiography	Initial studies when red flags for fracture, or neurologic deficit associated with acute trauma, tumor, or infection are present (D)		Routine use in first 4 to 6 weeks if red flags are absent (D)
Other imaging procedures	MRI or CT to evaluate red-flag diagnoses as above (D)		Imaging before 4 to 6 weeks in absence of red flags (C, D)
	MRI or CT to validate diagnosis of nerve root compromise, based on clear history and physical examination findings, in preparation for invasive procedure (D). If no improvement after 1 month, bone scan if tumor or infection possible (D)		Preoperative diskography (D)

Table 8-8. (continued)

Clinical Measure	Recommended	Optional	Not Recommended
Surgical considerations	Careful preoperative education of the patient regarding expectations, complications, and short- and long-term sequelae of surgery (D) Indications clear for failed conservative treatment and history, exam, and imaging consistent for specific lesion (D)		Discectomy or fusion without conservative treatment 4 to 6 weeks minimum (D) Discectomy or fusion for nonradiating pain or in absence of evidence of nerve root compromise (D)

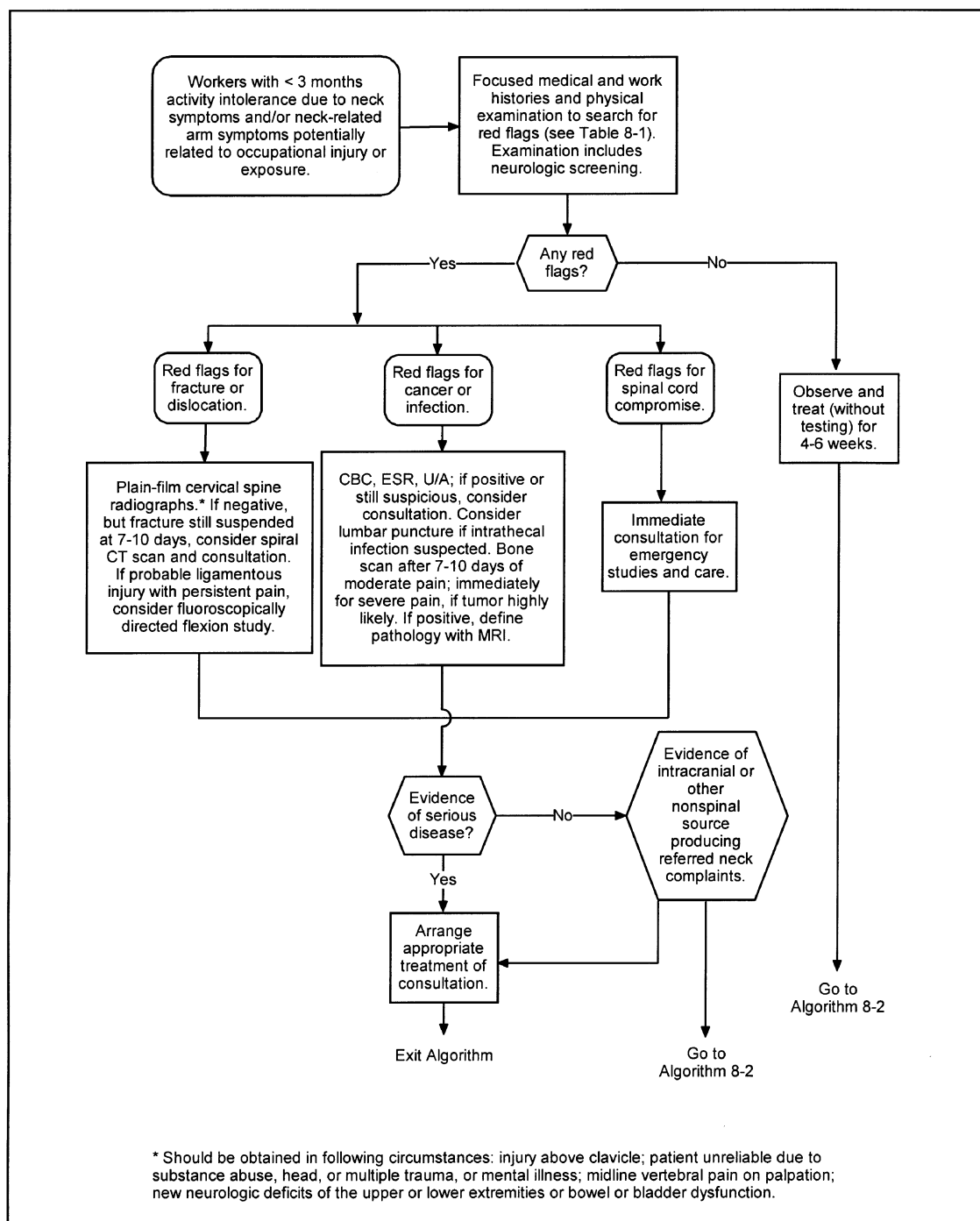
A = Strong research-based evidence (multiple relevant, high-quality scientific studies).

B = Moderate research-based evidence (one relevant, high-quality scientific study or multiple adequate scientific studies).

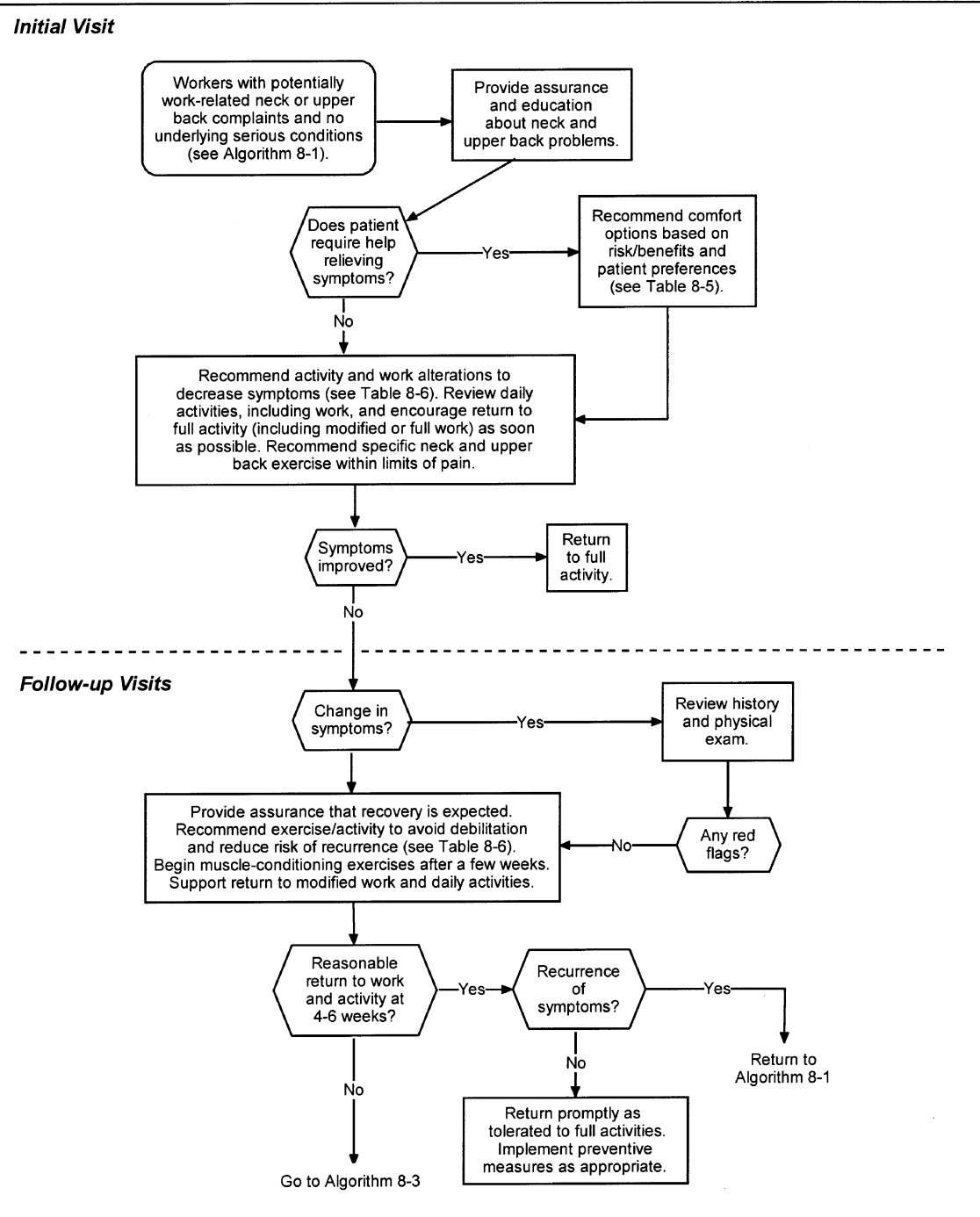
C = Limited research-based evidence (at least one adequate scientific study of patients with neck and upper back disorders).

D = Panel interpretation of information not meeting inclusion criteria for research-based evidence.

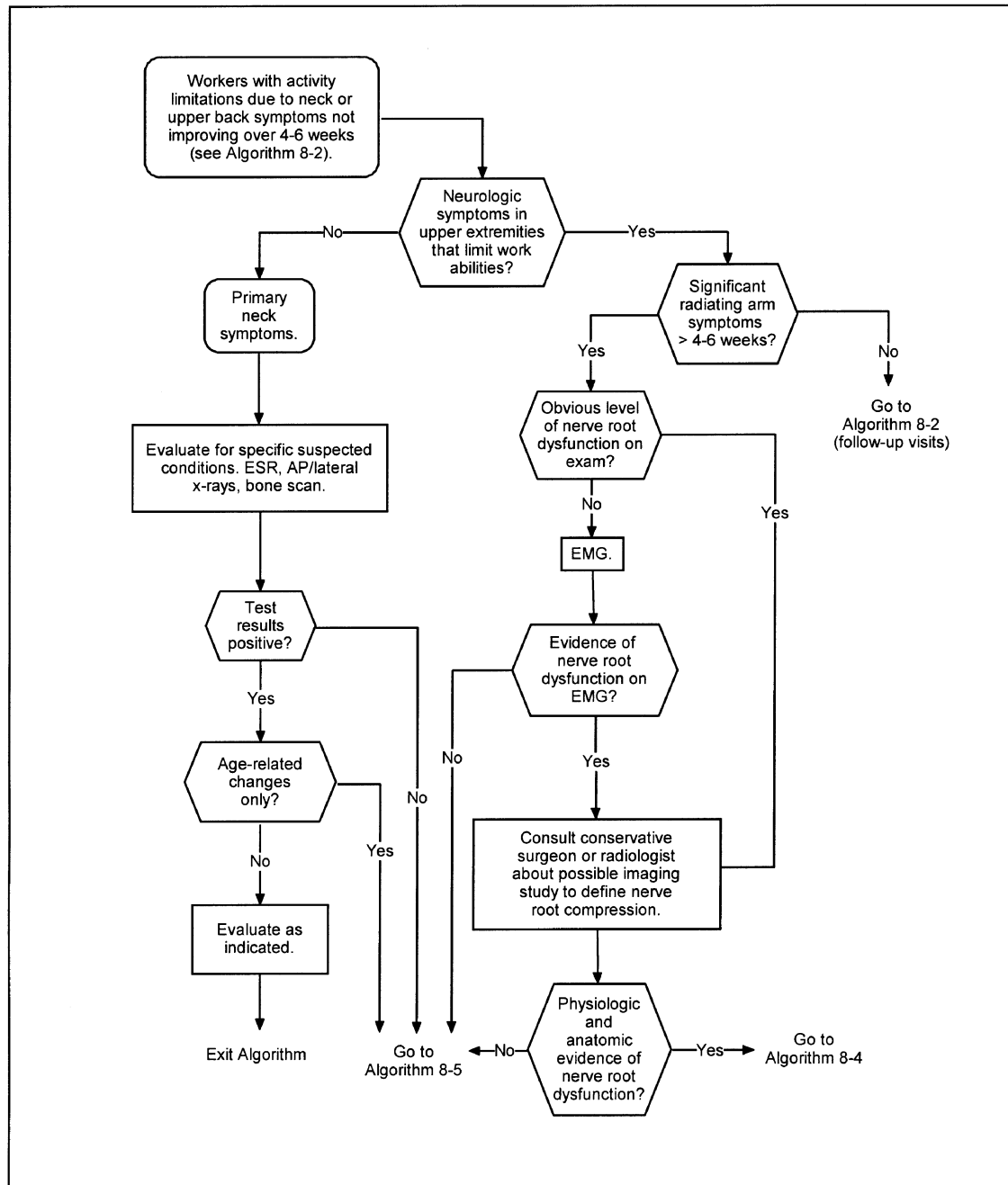
**Algorithm 8-1. Initial Evaluation of Occupational Neck and Upper Back Complaints**



**Algorithm 8-2. Initial and Follow-up Management of Occupational Neck and Upper Back Complaints**



**Algorithm 8-3.** Evaluation of Slow-to-recover Patients with Occupational Neck or Upper Back Complaints (Symptoms > 4 Weeks)

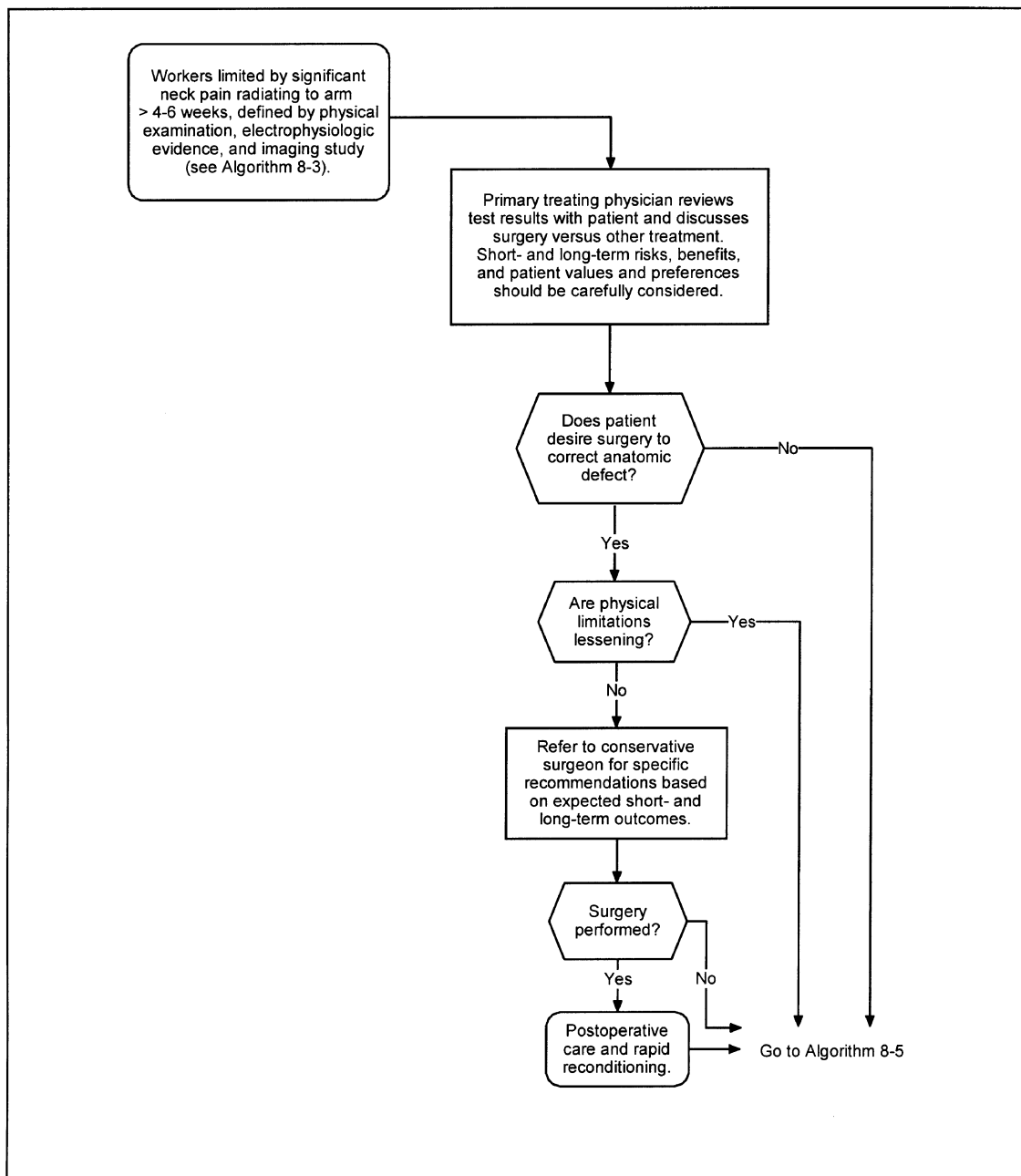




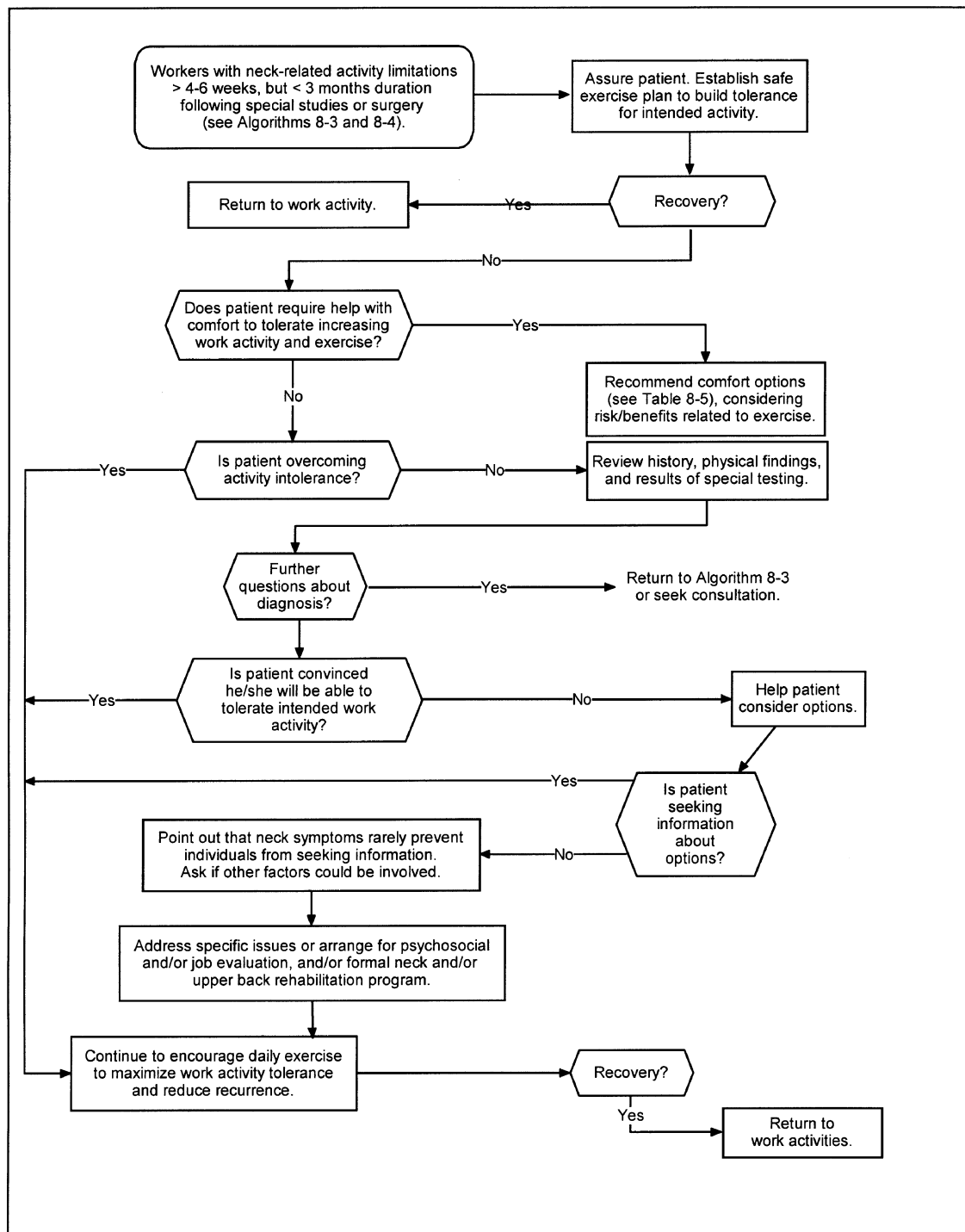
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**Algorithm 8-4. Surgical Considerations for Patients with Persistent Radiating Arm Pain**

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**Algorithm 8-5. Further Management of Occupational Neck and Upper Back Complaints**



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