

RULE 17, EXHIBIT 8

# **Cervical Spine Injury**

## **Medical Treatment Guidelines**

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REFERENCED VERSION

# DEPARTMENT OF LABOR AND EMPLOYMENT

## Division of Workers' Compensation

CCR 1101-3

### RULE 17, EXHIBIT 8

#### **CERVICAL SPINE INJURY MEDICAL TREATMENT GUIDELINES**

##### **A. INTRODUCTION**

This document has been prepared by the Colorado Department of Labor and Employment, Division of Workers' Compensation (Division) and should be interpreted within the context of guidelines for physicians/providers treating individuals who qualify as injured workers with cervical spine injuries under the Colorado Workers' Compensation Act.

Although the primary purpose of this document is advisory and educational, these guidelines are enforceable under the Workers' Compensation Rules of Procedure, 7 CCR 1101-3. The Division recognizes that acceptable medical practice may include deviations from these guidelines, as individual cases dictate. Therefore, these guidelines are not relevant as evidence of a provider's legal standard of professional care.

To properly utilize this document, the reader should not skip or overlook any sections.

## B. GENERAL GUIDELINE PRINCIPLES

The principles summarized in this section are key to the intended implementation of all Division of Workers' Compensation guidelines and are critical to the reader's application of the guidelines in this document.

- 1. APPLICATION OF GUIDELINES:** The Division provides procedures to implement medical treatment guidelines and to foster communication to resolve disputes among the provider, payer, and patient through the Worker's Compensation Rules of Procedure. In lieu of more costly litigation, parties may wish to seek administrative dispute resolution services through the Division or the Office of Administrative Courts.
- 2. EDUCATION:** Education of the patient and family, as well as the employer, insurer, policy makers and the community should be the primary emphasis in the treatment of chronic pain and disability. Currently, practitioners often think of education last, after medications, manual therapy, and surgery. Practitioners must implement strategies, to educate patients, employers, insurance systems, policy makers, and the community as a whole. An education-based paradigm should always start with inexpensive communication providing reassuring information to the patient. More in-depth patient education is currently a component of treatment regimens which employ functional restorative, preventive, and rehabilitative programs. No treatment plan is complete without addressing issues of individual and/or group patient education as a means of facilitating self-management of symptoms and prevention.
- 3. INFORMED DECISION MAKING:** Providers should implement informed decision making as a crucial element of a successful treatment plan. Patients, with the assistance of their health care practitioner, should identify their personal and professional functional goals of treatment at the first visit. Progress towards the individual's identified functional goals should be addressed by all members of the health care team at subsequent visits and throughout the established treatment plan. Nurse case managers, physical therapists and other members of the health care team, play an integral role in informed decision making and achievement of functional goals. Patient education and informed decision making should facilitate self-management of symptoms and prevention of further injury.
- 4. TREATMENT PARAMATER DURATION:** Time frames for specific interventions commence once treatments have been initiated, not on the date of injury. Patient compliance, as well as availability of services will impact duration of treatment. Clinical judgment may substantiate the need to accelerate or decelerate the time frames discussed in this document.
- 5. ACTIVE INTERVENTIONS:** Active interventions emphasizing patient responsibility, such as therapeutic exercise and/or functional treatment, are generally emphasized over passive modalities, especially as treatment progresses. Generally, passive interventions are viewed as a means to facilitate progress in an active rehabilitation program with concomitant attainment of objective functional gains.
- 6. ACTIVE THERAPEUTIC EXERCISE PROGRAM:** Exercise program goals should incorporate patient strength, endurance, flexibility, coordination, and education. This includes functional application in vocational or community settings.
- 7. POSITIVE PATIENT RESPONSE:** Positive results are defined primarily as functional gains that can be objectively measured. Objective functional gains include, but are not limited to, positional tolerances, range of motion (ROM), strength, endurance, activities of

daily living (ADLs), cognition, psychological behavior, and efficiency/velocity measures that can be quantified. Subjective reports of pain and function should be considered and given relative weight when the pain has anatomic and physiologic correlation. Anatomic correlation must be based on objective findings.

- 8. RE-EVALUATION OF TREATMENT EVERY THREE TO FOUR WEEKS:** If a given treatment or modality is not producing positive results within three to four weeks, the treatment should be either modified or discontinued. Before discontinuing the treatment, the provider should have a detailed discussion with the patient to determine the reason for failure to produce positive results. Reconsideration of diagnosis should also occur in the event of poor response to a seemingly rational intervention.
- 9. SURGICAL INTERVENTIONS:** Surgery should be contemplated within the context of expected functional outcome and not purely for the purpose of pain relief. The concept of “cure” with respect to surgical treatment by itself is generally a misnomer. Clinical findings, clinical course, and diagnostic tests must be consistent in order to justify operative interventions. A comprehensive assimilation of these factors must lead to a specific diagnosis with positive identification of pathologic conditions.
- 10. SIX-MONTH TIME FRAME:** The prognosis drops precipitously for returning an injured worker to work once he/she has been temporarily totally disabled for more than six months. The emphasis within these guidelines is to move patients along a continuum of care and return to work within a six-month time frame, whenever possible. It is important to note that time frames may not be pertinent to injuries that do not involve work-time loss or are not occupationally related.
- 11. RETURN TO WORK:** Return to work is therapeutic, assuming the work is not likely to aggravate the basic problem. The practitioner must provide specific written physical limitations, and the patient should never be released to work with non-specific and vague descriptions such as, “sedentary” or “light duty.” The following physical limitations should be considered and modified as recommended: lifting, pushing, pulling, crouching, walking, using stairs, bending at the waist, awkward and/or sustained postures, tolerance for sitting or standing, hot and cold environments, repetitive motion tasks, sustained grip, tool usage, and vibration factors. Even if there is residual chronic pain, return to work is not usually contraindicated.

The practitioner should understand all of the physical demands of the patient's job position before returning the patient to full duty and should request clarification of the patient's job duties. Clarification should be obtained from the employer or, if necessary, including, but not limited to, an occupational health nurse, occupational therapist, vocational rehabilitation specialist, or an industrial hygienist.

- 12. DELAYED RECOVERY:** Strongly consider a psychological evaluation, if not previously provided, as well as interdisciplinary rehabilitation and vocational goal setting, for those patients who are failing to make expected progress 6 to 12 weeks after an injury. The Division recognizes that, even despite optimal care, 3–10% of all industrially injured patients will not recover within the timelines outlined in this document, . Such individuals may require treatments beyond the limits discussed within this document, but such treatment will require clear documentation by the authorized treating practitioner focusing on objective functional gains afforded by further treatment and impact on prognosis.
- 13. GUIDELINE RECOMMENDATIONS AND INCLUSION OF MEDICAL EVIDENCE: *All recommendations are based on available evidence and/or consensus judgment.*** When possible, guideline recommendations will note the level of evidence supporting the treatment recommendation. It is generally recognized that early reports of a positive



treatment effect are frequently weakened or overturned by subsequent research. When interpreting medical evidence statements in the guideline, the following apply:

- Consensus means the judgment of experienced professionals based on general medical principles. Consensus recommendations are designated in the guideline as “generally well-accepted,” “generally accepted,” “acceptable/accepted,” or “well-established.”
- “Some” means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective. The Division recognizes that further research is likely to have an impact on the intervention’s effect.
- “Good” means the recommendation considered the availability of multiple adequate scientific studies or at least one relevant high-quality scientific study, which reported that a treatment was effective. The Division recognizes that further research may have an impact on the intervention’s effect.
- “Strong” means the recommendation considered the availability of multiple relevant and high-quality scientific studies, which arrived at similar conclusions about the effectiveness of a treatment. The Division recognizes that further research is unlikely to have an important impact on the intervention’s effect.

All recommendations in the guideline are considered to represent reasonable care in appropriately selected cases, irrespective of the level of evidence or consensus statement attached to them. Those procedures considered inappropriate, unreasonable, or unnecessary are designated in the guideline as “**not recommended**.”

**14. CARE BEYOND MAXIMUM MEDICAL IMPROVEMENT (MMI):** MMI should be declared when a patient’s condition has plateaued to the point where the authorized treating physician no longer believes further medical intervention is likely to result in improved function. However, some patients may require treatment after MMI has been declared in order to maintain their functional state. The recommendations in this guideline are for pre-MMI care and are not intended to limit post-MMI treatment.

The remainder of this document should be interpreted within the parameters of these guideline principles that may lead to more optimal medical and functional outcomes for injured workers.

## **C. OVERVIEW OF CARE:**

Between 30 and 50% of the general population report experiencing neck pain within a given year (Carroll, 2008c). Neck pain in the workers compensation population usually occurs from whiplash associated disorders, other cervical strain injuries, or degenerative spondylolisthesis aggravated by work. Significant trauma resulting in fractures and/or spinal cord dysfunction is not covered in this overview.

Most individuals with documented neck pain without neurological findings are likely to recover with therapy and self-management, and not require invasive measures. Less than 10% of cases will experience disabling neck pain one year post injury, however, the recurrence of pain without significant impairment is common (Carroll, 2008d).

Whiplash can result in symptoms lasting one year in about 50% of cases. Specifics such as type of headrest, direction of collision, and higher speed do not seem to predict outcome (Carroll, 2008d). Severity of symptoms, including the presence of neurological findings, predicts a longer recovery period. A recent 2013 study of whiplash injuries confirmed that passive coping techniques did increase time to recovery and return to full duty (Carroll, 2013).

### **1. NECK PAIN WITHOUT RADICULAR PAIN OR NEUROLOGIC FINDINGS**

Multiple studies confirm the importance of the first visit and the need to follow specific processes in caring for the most common types of neck pain patients. It is important to perform a thorough neurological evaluation to clarify a specific diagnosis. Initial treatment should be similar for all patients who do not have “red flag” signs such as progressive neurologic deficits; myelopathy; upper extremity weakness; suspicion for epidural abscess; tumors; or other unusual presentations. Cervical strains, suspected facet syndromes, as well as disc herniations and spinal stenosis aggravations without progressive or serious neurological findings may initially be treated conservatively but not necessarily receive the same care as those with minor neurologic deficits. Refer to Section C.2, Neck Pain with Radicular and Neurological Findings.

All care begins with careful history taking, physical examination, and patient education. Additionally, the provider should present treatment options in order to lay the foundation for informed decision making. A detailed neurological exam should be done at the initial visit and repeated periodically to assess for any signs of progressive or continuing weakness, or myelopathy. In the absence of “red flag” findings, or objective motor deficits, there is normally no need to order imaging for these patients. Neither injections nor surgery are usually necessary until, after 6 weeks of conservative treatment has failed to result in adequate functional gains. At the first visit, patients with a benign clinical exam should understand that, with return to activity and some pain management, there is a high likelihood that their condition will improve over a period of several weeks. It is essential that neurologic exams be completed regularly to rule out disc herniations and stenosis.

Providers should take a thorough history on the first visit and carefully examine the patients to identify possible “yellow flags”, or conditions that may predispose the patient to a more complex clinical course. Examples include the following: multiple medical diagnoses; prior history of physical or emotional abuse or chronic pain; multiple unresolved musculoskeletal conditions; depression or other psychological factors; fear-avoidant behavior; passive coping skills; limited range of motion; involvement in prior legal situations; and drug or opioid abuse etc. (ACOEM guidelines; Carroll, 2008b,c,d). These patients may require multidisciplinary intervention to avoid the development of chronic pain, the use of unnecessary diagnostic testing, and prolonged treatment. Many

of these “yellow flags” can be identified using validated patient-completed screening tools. Patients with persistent neurologic complaints may also require a more progressive work-up or other treatment.

Health care providers are expected to discuss self-management of pain with their patients. Appropriate over-the-counter medication and ice or heat, if desired by the patient may initially be helpful. If pain is severe, as in some cases with ruptured discs, opioids may be prescribed for a short time period (such as 3-7 days). This avoids the accumulation of unused opioids that may be available for others in the household to misuse and minimizes the likelihood of opioid dependence. Multiple repeat prescriptions for opioids should generally be avoided. If it is necessary to prescribe opioids for more than 14 days, the provider should do the following:

- repeat a thorough neurologic and neck examination to rule out a more serious diagnosis;
- check the Physician’s Drug Monitoring Program (PDMP);
- consider urine drug screening;
- follow the patient closely; and
- consider a short screening questionnaire for abuse risk before prescribing.

All providers should emphasize return to activity with a detailed discussion describing exactly which activities should be performed and how often, as well as those activities that should be avoided. The patient should identify functional goals at the initial visit which are specific to their needs. Examples include return to work; gardening, playing softball, driving, and computer use. In the absence of instability, complete bed rest or cervical immobilization is not advisable for this group of patients. The discussion of functional goals and current recommended activities should lead to return-to-work recommendations (Australian Acute Musculoskeletal Pain Guidelines Group, 2003).

Multiple studies assessing cost-effectiveness and outcomes recommend initial interventions should include education, non-opioid pain medication, and exercise or active therapy (Australian Acute Musculoskeletal Pain Guidelines Group, 2003). Spinal manipulation and supervised physical therapy, often including an assessment to determine the existence of directional preference, may also be appropriate for some patients. Most patients will recover with these interventions. Return to activity is important and should include return to work at appropriate physical duty levels, possibly with reduced work hours.

It is also appropriate to address smoking, as there is some evidence that patients who smoke respond less well to non-operative spine care and that quitting smoking results in greater improvement (Behrend, 2012).

Given the expected recovery rate for neck pain in the general population, the need for referral to physical, psychological or other therapy frequently depends on the presence of “yellow flags” and the need for further patient education to sustain activity participation. “Yellow flags” include psychosocial issues, such as problems with supervisors; presence of depression or anxiety; catastrophization; social withdrawal; fear-avoidance beliefs (belief that activity causing pain is harmful); or belief that passive therapy alone is curative. Injured workers may benefit from at least 2 visits with a physical therapist to re-enforce return to activity and education regarding exercise and activity. Further visits may

be necessary if return to restricted duty cannot be arranged; and to reinforce education regarding exercise and activity. Patients with evidence of fear avoidant-behavior or other “yellow flags” are likely to require a different physical and/or psychosocial approach (Manca, 2007). Refer to Chronic Pain Medical Treatment Guidelines.

Many patients with musculoskeletal disorders also experience anxiety or depression. Using accepted screening tools periodically during patient visits can identify early psychological concerns. Cognitive behavioral therapy (CBT) is recommended for these patients and others who are not progressing as expected due to fear avoidance factors. CBT is as effective in populations that have disability as in those without disability (Ebrahim, 2012).

It is generally not appropriate to perform invasive procedures on a patient who reports only mild neck pain, for example 3 points or less on a 10-point Visual Analog Scale (VAS) measurement. However, pain reports vary greatly among individuals with the same condition. Therefore, in the presence of compromised physical function that correlates with physical exam findings, invasive procedures may be considered after compliance with recommended treatment for 6 weeks, or as otherwise listed in the guidelines. The following are examples of functional compromise: difficulty with activities of daily living, inability to participate in the recommended active therapy, or lack of progress in job duty requirements.

As in the low back, cervical injections are unlikely to provide long-term relief. Spinal injections should not be done without prior imaging to establish the diagnosis. The risks versus benefits must be carefully weighed and discussed with the patient when these interventions are considered. Both the specialist referred to and the authorized provider must thoroughly discuss and document the possible complications, the limited short-term benefits, and the need for continuing engagement in active therapy.

Imaging is **not recommended** for at least 6 weeks after the initial injury unless it is necessary prior to a spinal injection or to rule out other acute diagnoses such as fracture, occult cancer, infection, upper extremity weakness, or signs of myelopathy. If a patient has persistent pain and imaging is deemed necessary, the ordering provider should document the following elements from face-to-face discussion with the patient:

- a.** the specific findings that the provider is trying to rule out with imaging and how the diagnostic test will influence treatment, **and**
- b.** the lack of importance of “degenerative disease” alone due to its frequent occurrence in asymptomatic patients.

Providers should remember that many medical terms used to describe radiographic findings or used as diagnostic terms engender fear and concern in patients. Unexplained concerns can lead patients to believe they have a significant pathological condition when, in fact, their condition is common and rarely leads to significant functional changes.

## **2. NECK PAIN WITH RADICULAR AND NEUROLOGICAL FINDINGS**

Radicular findings from a herniated disc without progressive neurological findings and/or obvious significant continuing weakness may be treated according to the protocol in the previous section. This condition in the cervical spine is fairly common with a prevalence of 3.5/1000 (Casey, 2010). Many patients with isolated radicular signs may be expected to recover without surgery; however, those with suspected spinal instability and/or spinal cord compression are likely to need surgery (Bono, 2011; Jiang, 2011). Approximately 10-20% of patients will require surgery due to severity of symptoms or lack of

improvement with initial treatment (Casey, 2011). Myelopathy or myeloradiculopathy is common among patients presenting with symptomatic cervical spondylolisthesis (Jiang, 2011). Therefore, the need for frequent detailed neurological exams in these patients is clear. Patients who have any signs of myelopathy or progressive neurological deficits should have expedited referral, magnetic resonance imaging (MRI) imaging, and may be appropriate for electrodiagnostic testing. Those with stable one- or two-level radicular findings without profound motor changes may be followed with conservative treatment for up to 6 weeks.

Any patient with neurologic findings of significant weakness or myelopathy, or significant functional impairment at 6 weeks should be considered for surgical referral since surgery should be performed before 12 weeks in order to allow the best outcome.

Most patients should exhibit the following signs of radiculopathy before invasive procedures are considered:

- pain in the arms greater than in the neck which interferes with function, return to work and/or active therapy; **and**
- physical exam findings of abnormal reflexes, motor weakness or radicular sensation deficits; **and**
- findings on the MRI which indicate impingement of nerves or the spinal cord corresponding to reproducible physical exam findings.

Spinal injections have not been shown to have long-term beneficial effects for most neck pain patients with or without radicular findings. Although complications are relatively rare, they can be catastrophic, particularly in the cervical spine. Thus, the cost-benefit versus risk ratio is small. Injections can contribute to the likelihood of lumbar osteoporotic fractures as the patient ages (Mandel, 2013) and appear to decrease the likelihood of successful surgery for spinal stenosis in the lumbar spine. This may also apply to the cervical spine. They may be used in uncommon cases when a patient continues to have measurable functional deficits at 6 weeks after not making progress despite compliance with conservative treatment or for those who are incapacitated after the initial treatment for herniated discs. Refer to F.3. Injections – Spinal Therapeutic and/or F.4. Injections – Other (including Radiofrequency).

Patients with objective findings causing functional impairment which does not improve may require surgical treatment. Herniated discs with continued neurologic findings interfering with activity or those with spondylolisthesis and radiculopathy or myelopathy frequently require surgery. Patients with symptomatic disc herniation have the best chance for a positive functional outcome if they receive surgery within 3 months of the onset of radicular pain and in most instances the results are excellent. All cases requiring surgical intervention require documentation of a discussion with the patient to clarify that functional goals such as anticipated ADL's and work status align with patient expectations and goals. Refer to G. Therapeutic Procedures – Operative for details.

## D. INITIAL DIAGNOSTIC PROCEDURES

The Division recommends the following diagnostic procedures be considered, at least initially, the responsibility of the workers' compensation carrier to ensure that an accurate diagnosis and treatment plan can be established. Standard procedures, which should be utilized when initially diagnosing a work-related cervical spine complaint, are listed below.

1. **HISTORY TAKING AND PHYSICAL EXAMINATION (HX & PE)**: Generally accepted, well-established and widely used procedures that establish the basis for and dictate subsequent stages of diagnostic and therapeutic procedures. When findings of clinical evaluations and those of other diagnostic procedures do not complement each other, the objective clinical findings should have preference. The medical records should reasonably document the following.
  - a. **History of Present Injury**: A detailed history, taken in temporal proximity to the time of injury, should primarily guide evaluation and treatment. The history should include:
    - i. **Mechanism of injury**. This includes details of symptom onset and progression, including a detailed description and the position of the body before, during, and at the end of the incident. In the absence of a known specific incident, common positioning of the body during the work day and frequency of requirements such as lifting, pushing, and pulling should be included.
    - ii. **Description of pain**: This should include location of pain, nature of symptoms, and alleviating/exacerbating factors (e.g. sleep positions, tolerance for neck flexion). Of particular importance, is whether raising the arm over the head alleviates radicular-type symptoms. The presence of pain at night or while at rest may be a sign of more extensive pathology. The history should include both the primary and secondary complaints (e.g., primary neck pain, secondary arm pain, headaches, and shoulder girdle complaints). Pain should be quantified on a Visual Analog Scale (VAS). The use of a patient-completed pain drawing is highly recommended, especially during the first two weeks following injury, to assure that all work-related symptoms are being addressed. Screening the patient for fear-avoidance issues may be useful initially to guide treatment (Rainville, 2011).
    - iii. **Functional Assessment**: Functional ability should be assessed and documented at the beginning of treatment. Periodic assessment should be recorded throughout the course of care to follow the trajectory of recovery. In addition to being more relevant to recovery from neck pain, functional measures are likely to be more reliable over time than pain measures. Common assessment tools include Neck Pain and Disability Scale (NPAD), Copenhagen Neck Functional Disability Scale (CNFDS), and the Neck Disability Index (NDI) (Misailidou, 2010).

Patient-reported outcomes, whether of pain or function, are susceptible to a phenomenon called response shift. This refers to changes in self-evaluation which may accompany changes in health status. Patient self-reports may not coincide with objective measures of outcome, such as motor strength improvement, due to reconceptualization of the impact of

pain on daily function and internal recalibration of pain scales (Schwartz, 2009). Response shift has potential to obscure treatment effects in clinical trials and clinical practice, and may lead to apparent discrepancies in patient-reported outcomes following treatment interventions. While methods of measuring and accounting for response shift are not yet fully developed, understanding that the phenomenon exists can help clinicians understand what is happening when some measures of patient progress appear inconsistent with other objective measures of progress.

- iv. Presence and distribution of upper and/or lower extremity numbness, paresthesias, or weakness, especially if precipitated by coughing or sneezing.
- v. Prior occupational and non-occupational injuries to the same area, including specific prior treatment, chronic or recurrent symptoms, and any functional limitations. Specific history regarding prior motor vehicle accidents may be helpful; and
- vi. Ability to perform job duties and activities of daily living (ADLs) including the ability to maintain balance and walk rapidly without difficulty.

**b. Past History:**

- i. Past medical history includes neoplasm, gout, arthritis, hypertension, diabetes, and fractures;
- ii. Review of systems includes symptoms of rheumatologic, neurologic, endocrine, neoplastic, infectious, and other systemic diseases;
- iii. Type 1 or Type 2 diabetes. People with a body-mass index (BMI) greater than 30 may be at risk for the disease.
- iv. Smoking history- smoking appears to be related to low back pain and thus may affect neck pain and may predispose patients to opioid addiction (Behrend, 2012; Cheng, 2013);
- v. Medication use - prescription and non-prescription including vitamins and natural products;
- vi. Vocational and recreational pursuits, including military service; **and**
- vii. History of depression, anxiety, or other psychiatric illness.

**c. Physical Examination:** Should include accepted tests and exam techniques applicable to the area being examined, including:

- i. General inspection, including posture, stance and gait;
- ii. Visual inspection;
- iii. Palpation of spinous processes, facets, and muscles noting myofascial tightness, tenderness, and trigger points;

- iv. Cervical range of motion (ROM), preferably measured or quantified range of motion, quality of motion, and presence of muscle spasm. Motion evaluation of specific joints may also be indicated. ROM should not be checked in acute trauma cases until fracture and instability have been ruled out on clinical examination, with or without radiographic evaluation. Patients with whiplash may be more likely to show decreased range of motion than asymptomatic patients (Dall'alba 2001);
- v. Examination of thoracic spine and shoulder;
- vi. Motor and sensory examination of the upper muscle groups with specific nerve root focus, as well as sensation to light touch, pin prick, temperature, position, and vibration. More than a 2 centimeter difference in the circumferential measurements of the two upper extremities may indicate chronic muscle wasting; motor and sensory changes may implicate a specific nerve root. Testing for hip flexion weakness may be a useful indicator of possible myelopathy;
- vii. Asymmetry of deep tendon reflexes may indicate pathology. Inverted reflexes (e.g. arm flexion or triceps tap) may indicate nerve root or spinal cord pathology at the tested level. Pathologic reflexes include wrist clonus, grasp reflex, and Hoffman's sign;
- viii. Assessment of gait, rapid walking, and balance;
- ix. Provocative tests for possible radiculopathy – The findings of provocative tests must be consistent with the patient's history, physical exam, and specific nerve root pathology. There is some evidence that Spurlings test, traction/neck distraction and Valsalva demonstrate high specificity. The upper limb tension test (ULTT) should be done with finger and wrist extension. There is some evidence that a negative ULTT can be used to rule out radiculopathy (Rubinstein, 2007);
- x. For providers trained in the technique, repeated end range testing may be done to establish the presence of a directional preference; and possible centralization (Refer to definition of directional preference in Therapeutic Procedures, Non-operative, neuromuscular testing);
- xi. A combination of multiple physical exam test results is preferred because none are independently diagnostic.

d. **Spinal Cord Evaluation:** In cases where the mechanism of injury, history, or clinical presentation suggests a possible severe injury, additional evaluation is indicated. A full neurological examination for possible spinal cord injury may include the following:

- Sharp and light touch, deep pressure, temperature, and proprioceptive sensory function; with specific identification of the level of sensory and/or motor deficit.
- Strength testing;
- Anal sphincter tone and/or perianal sensation;



- Presence of pathological reflexes of the upper and lower extremities; and
- Testing for hip flexion weakness may be a useful indicator of possible myelopathy.

Incomplete spinal cord injury syndromes include the following:

Anterior cord syndrome is characterized by the loss of motor function and perception of pain and temperature below the level of the lesion with preservation of touch, vibration, and proprioception. This is typically seen after a significant compressive or flexion injury. Emergent computed axial tomography or magnetic resonance imaging is necessary to look for a possible reversible compressive lesion requiring immediate surgical intervention. The prognosis for recovery is the worst of the incomplete syndromes.

Brown-Sequard syndrome is characterized by ipsilateral motor weakness and proprioceptive disturbance with contralateral alteration in pain and temperature perception below the level of the lesion. This is usually seen in cases of penetrating trauma or lateral mass fracture. Surgery is not specifically required, although debridement of the open wound may be.

Central cord syndrome is characterized by sensory and motor disturbance of all limbs, often upper extremity more than lower, and loss of bowel and bladder function with preservation of perianal sensation. This is typically seen in elderly patients with a rigid spine following hyperextension injuries. Emergent surgery is not usually required.

Posterior cord syndrome, a rare condition, is characterized by loss of sensation below the level of the injury, but intact motor function.

**SEE NEXT PAGE**

- Spinal cord lesions should be classified according to the American Spine Injury Association (ASIA) impairment scale.

ASIA IMPAIRMENT SCALE
<ul style="list-style-type: none"> <li>❑ A= Complete: No motor or sensory function is preserved in the sacral segments S4-S5</li> <li>❑ B= Incomplete: Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5</li> <li>❑ C= Incomplete: Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a muscle grade less than 3</li> <li>❑ D= Incomplete: Motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a grade of 3 or more</li> <li>❑ E= Normal: Motor and sensory function are normal</li> </ul>

A worksheet detailing dermatomes and the muscle testing required is available from ASIA.

**e. Soft Tissue Injury Evaluation:** Soft tissue injuries are traumatic injuries to the muscles, ligaments, tendons, and/or connective tissue. The most common mechanism is sudden hyperextension and/or hyperflexion of the neck. Acceleration/deceleration on the lateral plane may also result in one of these syndromes. A true isolated cervical strain is not associated with focal neurological symptoms. The signs and pathophysiology of these injuries are not well understood. Soft tissue injuries may include cervical strain, myofascial syndromes, somatic dysfunction, and fractures. The Quebec Classification is used to categorize soft tissue and more severe cervical injuries:

- i. Grade I — Neck complaints of pain, stiffness, or tenderness only, without physical signs. Lesion not serious enough to cause muscle spasm. Includes whiplash injury, minor cervical sprains, or strains.
- ii. Grade II — Neck complaints with musculoskeletal signs, such as limited ROM. Includes muscle spasm related to soft tissue injury, whiplash, cervical sprain, cervicgia with headaches, and sprained cervical facet joints and ligaments.

iii. Grade III —Neck complaints, such as limited ROM, combined with neurologic signs. Includes whiplash, cervicobrachialgia, herniated disc, and cervicgia with headaches.

iv. Grade IV — Neck complaints with fracture or dislocation.

f. **Relationship to Work and Other Activity:** This includes a statement of the probability that the illness or injury is medically work-related. If further information is necessary to determine work relatedness, the physician should clearly state what additional diagnostic studies or job information is required.

#### Principles of Causation of Occupational Neck Pain

Causation is a medical/legal analysis in the workers compensation system. The information in the Medical Treatment Guidelines pertaining to causation addresses only the evidence related to the medical analysis of causation. Actual cases may vary from the evidence presented based on specific circumstances of the claim. Work-related conditions may occur from the following:

- a specific incident or injury,
- aggravation of a previous symptomatic condition, **or**
- a work-related exposure that renders a previously asymptomatic condition symptomatic and subsequently requires treatment.

All of these conditions must be determined based on the specifics of the work related injury or exposure. The clinician determines the need for treatment due to the work-related event. Many neck pain cases may result from injuries. Neck pain frequently does not lead to a clear diagnosis that is agreed upon by all examiners. Whether a patient's neck pain results from disc changes, axial pain, or facet dysfunction is difficult to reliably determine. Therefore, the studies reviewed for this guideline were chosen because they identified neck pain as chronic or causing disability. The complaint of pain alone is generally not compensable in this system. To apply the below standards, the clinician must first make a specific cervical diagnosis that is substantiated by reproducible physical exam findings. The following information was reviewed using evidence-based standards to address the effects on workers subjected to cumulative exposures and whiplash; and therefore should only be considered in that context. It must be acknowledged that many of the studies reviewed reflect only the symptom of neck pain. The clinician should use this information judiciously.

Neck pain is prevalent in the population with an annual rate of approximately 30-50%, however only between 2-12% report activity limitation (Hogg-Johnson, 2008).

#### Causation of Neck Pain from Whiplash Events

The incidence of whiplash injury has doubled over the last several decades to 300/100,000 inhabitants annually and has been accompanied by increased emergency room visits. It is also greater in systems which compensate for pain and suffering, than in those which are no-fault (Holm, 2008).

Data from insurance claims have reported that “active” head rests and seat backs, which are activated automatically in case of a rear end collision and not movable by the driver/passenger, are associated with lower rates of whiplash (Holm, 2008). No evidence was found that crash severity predicts whiplash. Also one study showed that one third of those involved in low- impact rear-end collisions (8-10 mph) have temporary neck pain, as do one fourth of those who experienced a sham impact (Holm, 2008).

There is no evidence that degenerative disc disease is related to whiplash or general non-radicular neck pain (Hogg-Johnson, 2008; Holm, 2008).

Whiplash is a probably an uncommon cause of cervical disc herniation. Any potential causal connection between whiplash and cervical disc herniation should be supported by early and reproducible signs of radiculopathy.

Women and those in the middle age group tend to experience more neck pain, although whiplash is more likely to be reported by the younger age group (Cote, 2008; Hogg-Johnson, 2008; Holm, 2008; Hush, 2009).

#### Causation of Occupational Neck Pain from Non-Whiplash Events

Work- related factors contributing to neck pain are complex and multi-factorial, as with other musculoskeletal diseases. There is strong evidence that neck pain in the workplace is multifactorial and that a combination of workplace and individual factors is necessary to cause neck pain (Cote, 2009). In addition to psychosocial factors at work, poor social support outside work may contribute to neck pain.

In a study of office workers, it was found that workers with greater range of motion in cervical flexion and extension were less likely to develop neck pain (Hush, 2009).

Most work tasks involve more than one risk factor. Due to the variety of study methods it is difficult to set reliable measurements for determining the exact risk. Some ergonomic problems at in the workplace are likely to be related to occupational neck pain. Several studies of administrative workers and dentists suggest that awkward posture over a prolonged period of time may lead to neck pain. There is some evidence that sustained trapezius muscle activity, predicts later neck and shoulder pain (Hanvold 2013). There is some evidence that repetitive or precision work, accompanied by prolonged neck flexion are likely risk factors for neck pain in the work place (Cote, 2009). Possible aggravating factors include awkward postures including neck flexion or rotation (Hanvold, 2013; Memarpour, 2012; Shan, 2011).

#### Risk Factors for Non-occupational Neck Pain

Poor psychological health may also contribute to neck pain. BMI appears unrelated to neck pain (Hogg-Johnson, 2008). Genetic factors are not highly predictive of neck pain, particularly in the older age group (Carroll 2008; MacGregor, 2004). Wearing a helmet during recreational activities does not contribute to neck pain (Hogg-Johnson, 2008). Bicycling may be a sport that increases neck pain (Carroll, 2008b).

The question the clinician should consider in cases where there may be non-occupational issues is whether the work related exposure contributed to the need for treatment of the cervical condition. Clinicians need to ask the following

question: "Would the recommended treatment for the condition be the same if the work-related exposure had never occurred?" If the answer to the question is "no," the provider may consider that the non-occupational elements contributing to neck pain do not play a major role in the medical analysis of most cases.

Clinicians should be well-versed on the non-predictive value of degenerative x-ray findings as noted in section E.2. Imaging Studies. Numerous studies have validated the finding of degenerative changes in older asymptomatic individuals. The presence of these findings cannot be used to justify an argument that neck pain in a specific individual was inevitable and not due to work related exposures (Carragee, 2006a and section E.2. Imaging Studies).

**2. IMAGING:** Imaging of the cervical spine is a generally accepted, well-established, and widely used diagnostic procedure when specific indications based on history and/or physical examination are present. Basic X-ray views for the cervical spine are the anterior-posterior (AP), lateral, right, and left obliques; odontoid; and swimmer's view. computed tomography (CT) scans may be necessary to visualize C7 and odontoid in some patients. Lateral flexion and extension views are done to evaluate instability but may have a limited role in the acute setting. MRI is indicated when spinal cord injury is suspected. CT is necessary for suspected fracture/dislocation. The mechanism of injury and specific indications for the imaging should be listed on the request form to aid the radiologist and x-ray technician. Alert, non-intoxicated patients, who have isolated cervical complaints without palpable midline cervical tenderness, neurologic findings, or other acute or distracting injuries elsewhere in the body, may not require imaging. The following suggested indications are:

- History of significant trauma, especially high impact motor vehicle accident, rollover, ejection, bicycle, or recreational vehicle collision or fall from height greater than one meter;
- Age over 55 years;
- Suspicion of fracture, dislocation, instability, or objective evidence of neurologic deficit - Quebec Classification Grades III and IV.
- Unexplained or persistent cervical pain for at least 6 weeks or pain that is worse with rest.
- Localized pain, fever, constitutional symptoms, or history or exam suggestive of intravenous drug abuse, prolonged steroid use, or osteomyelitis;
- Suspected lesion in the cervical spine due to tumor or systemic illness, such as a rheumatic/rheumatoid disorder or endocrinopathy;
- Past medical history suggestive of pre-existing spinal disease, osteoporosis, spinal instrumentation, or cancer;
- Optionally, (radiographic imaging) prior to any manipulative treatment.

**3. LABORATORY TESTING:** Laboratory tests are generally accepted, well-established and widely used procedures. They are, however, rarely indicated at the time of initial evaluation, unless there is suspicion of systemic illness, infection, neoplasia, or underlying rheumatologic disorder, connective tissue disorder, or based on history and/or physical examination. Laboratory tests can provide useful diagnostic information.

Furthermore, they may assist the provider in determining the best course of treatment for the patient. Tests include, but are not limited to:

- Complete blood count (CBC) with differential, which can detect infection, blood dyscrasias, and medication side effects;
- Blood-glucose level, which can be used to detect evidence of Type 1 or Type 2 diabetes.
- Erythrocyte sedimentation rate (ESR), rheumatoid factor (RF), anti-nuclear antigen (ANA), human leukocyte antigen (HLA), and C-reactive protein (CRP), which can be used to detect evidence of a rheumatologic disorder, infection, or connective tissue disorder;
- Serum calcium, phosphorous, uric acid, alkaline phosphatase, and acid phosphatase, which can detect metabolic bone disease; and
- Liver and kidney function, which may be performed for prolonged anti-inflammatory use, or with use of other medications requiring monitoring.

REFERENCED VERSION

## E. FOLLOW-UP DIAGNOSTIC IMAGING AND TESTING PROCEDURES

One diagnostic imaging procedure may provide the same or distinctive information as does another procedure. Therefore, prudent choice of a single diagnostic procedure, a complement of procedures, or a sequence of procedures, will optimize diagnostic accuracy, maximize cost effectiveness (by avoiding redundancy), and minimize potential adverse effects to patients.

All imaging procedures have a degree of specificity and sensitivity for various diagnoses. No isolated imaging test can assure a correct diagnosis. Clinical information obtained by history taking and physical examination should form the basis for selecting an imaging procedure and interpreting its results.

MRI imaging of the cervical spine generally renders the most information. Magnetic resonance imaging (MRI), myelography, or Computed Axial Tomography (CT) scanning following myelography may provide useful information for many spinal disorders. Practitioners should be aware of the radiation doses associated with various procedures and provide appropriate warnings to patients. Coloradans have a background exposure to radiation, and unnecessary CT scans or X-rays increase the lifetime risk of cancer death (Hendricks, 2011).

When a diagnostic procedure, in conjunction with clinical information, provides sufficient information to establish an accurate diagnosis, the second diagnostic procedure will become a redundant procedure. At the same time, a subsequent diagnostic procedure can be a complementary diagnostic procedure if the first or preceding procedures, in conjunction with clinical information, cannot provide an accurate diagnosis. Usually, preference of a procedure over others depends upon availability, a patient's tolerance, and/or the treating practitioner's familiarity with the procedure.

1. **IMAGING STUDIES:** These are generally accepted, well-established, and widely used diagnostic procedures. In the absence of myelopathy or progressive neurological changes, imaging usually is not appropriate until conservative therapy has been tried and has failed. Six to eight weeks of treatment is frequently an adequate period of time before an imaging procedure is in order, but the clinician should use judgment in this regard. When indicated, imaging studies can be utilized for further evaluation of the cervical spine, based on the mechanism of injury, symptoms, and patient history. Prudent choice of a single diagnostic procedure, a complementary combination of procedures, or a proper sequential order of complementary procedures, will help ensure maximum diagnostic accuracy and minimize adverse effect to the patient.

When the findings of the diagnostic imaging and testing procedures are not consistent with the clinical examination, a careful neurological exam or referral may be appropriate. There is some evidence that the majority of workers over 60 show evidence of disc degeneration and posterior disc protrusions are present in the majority of asymptomatic workers over 40 years of age (Matsumoto, 1998). There is also some evidence that degenerative changes occurring over time in asymptomatic workers effect the cervical and lumbar spine equally (Matsumoto, 2013). Small herniations and protrusions are often not pain generators, although small foraminal disc herniations are likely to compress the nerve root and require surgical removal. Moderate reduction in the cross-sectional area of the spinal cord may be seen without myelopathy in the majority of patients older than 40; therefore, clinical correlation is required (Ishimoto, 2013).

The studies below are listed in frequency of use, not importance:

- a. **Magnetic Resonance Imaging (MRI):** The imaging study of choice for most abnormalities of the cervical spine. MRI is useful in suspected nerve root compression, in myelopathy to evaluate the spinal cord and/or masses, infections

such as epidural abscesses or disc space infection, bone marrow involvement by metastatic disease, and/or suspected disc herniation or cord contusion following severe neck injury. MRI should be performed immediately if there is a question of infection or metastatic disease with cord compression. MRI is contraindicated in patients with certain implanted devices; however, MRI scanners compatible with pacemakers are now available.

In general, conventional full-size, high field magnet 1.5 tesla MRI provides better resolution and is preferred. A lower field scan may be indicated when a patient cannot fit into a high field scanner or is too claustrophobic despite sedation. Inadequate resolution on the first scan may require a second MRI using a different technique. All questions in this regard should be discussed with the MRI center and/or radiologist.

**b.**     **Specialized MRI Scans:**

i.        **MRI with 3-dimensional Reconstruction:**

On rare occasions, MRI with 3-dimensional reconstruction views may be used as a pre-surgical diagnostic procedure to obtain accurate information of characteristics, location, and spatial relationships among soft tissue and bony structures.

ii.       **Dynamic-kinetic MRI of the Spine:**

Dynamic-kinetic MRI of the spine uses an MRI unit configured with a top-front open design that enables upright, weight-bearing patient positioning in a variety of postures not obtainable with the recumbent images derived from conventional, closed unit MRI systems. Imaging can be obtained in flexion, extension, and rotation of the spine, as well as in erect positioning. There is a theoretical advantage to imaging sequences obtained under more physiologic conditions than in the supine position. There is currently ongoing research to establish whether the theoretical advantages of positional and kinetic MRI result in improved sensitivity and specificity in detecting spine pathology. Currently, it remains investigational, and it is ***not recommended*** until the correlation with clinical syndromes is firmly established.

iii.       **Contrast MRI:**

Usually required for those with prior cervical surgery, possible infection, possible malignancy, or tumor.

**c.**       **Computed Axial Tomography (CT):** CT scans provide excellent visualization of bone and is used to further evaluate bony masses and suspected fractures not clearly identified on radiographic evaluation. It may sometimes be done as a complement to MRI scanning to better delineate bony osteophyte formation in the neural foramen. CT is usually utilized for suspected cervical spine fracture in a patient with negative plain films, or to further delineate a cervical fracture. CT scanning is also quite useful for congenital anomalies at the skull base and at the C1-2 levels. Instrument-scatter reduction software provides better resolution when metallic artifact is of concern. Unnecessary CT scanning should be avoided due to the radiation exposure contributing to cancer risk.



**d. Myelography:** This is the injection of radiopaque material into the spinal subarachnoid space, with x-rays then taken to define anatomy. It may be used as a pre-surgical diagnostic procedure to obtain accurate information of characteristics, location, and spatial relationships among soft tissue and bony structures. The use of small needles and a less toxic, water-soluble, nonionic contrast is recommended.

Myelography is an invasive procedure with numerous complications, including nausea, vomiting, headache, convulsion, arachnoiditis, cerebrospinal fluid leak (CSF) leakage, allergic reactions, bleeding, and infection. Therefore, myelography should be considered only in the following instances:

- when CT and MRI are unavailable;
- when CT or MRI is contraindicated such as for morbidly obese patients or those who have undergone multiple surgical procedures; **and** when other tests prove non-diagnostic in the surgical candidate.

**e. CT Myelogram:** This test provides more detailed information about relationships between neural elements and surrounding anatomy and is appropriate in patients with multiple prior operations, tumorous conditions, or those that cannot have MRIs due to implants, etc.

**f. Lineal Tomography:** This is infrequently used, yet may be helpful in the evaluation of bone surfaces, bony fusion, or pseudarthrosis.

**g. Bone Scan (Radioisotope Bone Scanning):** Bone scanning is generally accepted, well-established, and widely used. It is more sensitive but less specific than MRI. <sup>99m</sup>Tc diphosphonate uptake reflects osteoblastic activity and may be useful in diagnosing metastatic/primary bone tumors, occult or stress fractures, osteomyelitis, infection, and other inflammatory lesions, but it cannot distinguish between these conditions.

**h. Other Radioisotope Scanning:** Indium and gallium scans are generally accepted, well-established, widely used procedures, and often used to diagnose lesions seen on other diagnostic imaging studies. <sup>67</sup>Ga citrate scans are used to localize tumors, infections, and abscesses. <sup>111</sup>In-labeled leukocyte scanning is utilized for localizing infection or inflammation and is usually not used for the cervical spine.

**i. Dynamic [Digital] Fluoroscopy:** Dynamic [digital] fluoroscopy of the cervical spine measures the motion of intervertebral segments using a videofluoroscopy unit to capture images as the subject performs cervical flexion and extension, storing the anatomic motion of the spine in a computer. Dynamic fluoroscopy may be used in the acute trauma setting to evaluate the cervical spine. Its superiority over MRI has not been established. If performed, full visualization of the cervical spine (C1-T1), in accordance with [D.2. Imaging](#), should be accomplished prior to the procedure.

In some rare cases in the post-acute setting, dynamic [digital] fluoroscopy may be used but is primarily an investigational tool and therefore requires prior authorization in the post-acute setting. No studies have yet demonstrated predictive value in terms of standard operative and non-operative therapeutic outcomes.

**2. OTHER TESTS:** The following diagnostic procedures are listed in alphabetical order, not by importance:

**a. Electrodiagnostic Testing:**

i. Electromyography (EMG) and Nerve Conduction Studies (NCS): These are generally accepted, well-established, and widely used diagnostic procedures and may be ordered by an authorized physician. EMG and NCS, when performed and interpreted by a trained electrophysiologist, may be useful for patients with suspected neural involvement whose symptoms are persistent or unresponsive to initial conservative treatments. They are used to differentiate peripheral neural deficits from radicular and spinal cord neural deficits and to rule out concomitant myopathy. However, F-Wave Latencies are not diagnostic for radiculopathy.

In general, EMG and NCS are complementary to imaging procedures such as CT, MRI, and/or myelography or diagnostic injection procedures. Electrodiagnostic studies may provide useful, correlative neuropathophysiological information that would be otherwise unobtainable from the radiologic studies discussed above and can assist in treatment decisions, such as the need for surgery.

ii. Portable Automated Electrodiagnostic Device (also known as Surface EMG): This is not a substitute for conventional diagnostic testing in clinical decision-making and therefore, is **not recommended**.

iii. Somatosensory Evoked Potential (SSEP): Useful for the evaluation of myelopathy. It is **not recommended** to identify radiculopathy.

iv. Current Perception Threshold Evaluation (CPT): May be useful as a screening tool, but its diagnostic efficacy in the evaluation of cervical spine pain has not been determined. Therefore, CPT is **not recommended** as a diagnostic tool.

**b. Injections – Diagnostic (in alphabetical order):**

i. Description: Diagnostic spinal injections are established procedures. These injections may be useful for localizing the source of pain, and they may have some short-term therapeutic value. Each diagnostic injection has inherent risks, and risk versus benefit should always be evaluated when considering injection therapy. There is no proven benefit of steroids over local anesthetic alone (Anderberg, 2007; ISIS, 2013).

Cervical epidural injections carry additional risks of injury including death, spinal cord injury, and stroke when compared to lumbar injections (Scanlon, 2007). Given the lack of proof for significant long-term benefit and the risks, steroid injections are less commonly used in the cervical spine. Many of the neurologic and vascular complications are related to particulate steroid solutions. For cervical spinal injections, dexamethasone or another non-particulate substance should be used. Diagnostic injections may be useful if more specific diagnosis is needed prior to other invasive procedures.

In the lumbar spine, a high quality meta-analysis provides good evidence

against the use of lumbar facet or epidural injections for relief of non-radicular low back pain ([Cochrane] Staal, 2008). Thus, epidural injections should not be performed for non-radicular pain. Similarly epidural injections are **not recommended** for non-radicular cervical pain. There is insufficient evidence to support the use of therapeutic cervical facet injections (Peloso, 2013). Facet injections have very limited therapeutic or diagnostic use. Refer to F.3. Injections –Spinal Therapeutic.

Cervical injections have not proven to be extremely effective. There is some evidence that the results from transforaminal injections of anesthetic plus steroids is similar to injections with anesthetic only in the cervical spine (Anderberg, 2007). Further in that study less than 20% of patients reported a reduction in symptoms and about 30% reported some benefit at 3 weeks. A prospective cohort study of transforaminal and interlaminar cervical injections on patients without motor deficits and 4 weeks of arm pain after a herniated disc appeared to show an 80% response rate with 20% proceeding to surgery. The study is extremely difficult to interpret as there is no control group and 80% of similar cases improve without injections or surgery (Lee, 2012).

There is some evidence that patients who smoke respond less well to nonoperative spine care and that quitting smoking results in greater improvement (Behrend, 2012).

In summary, there is no proven benefit from adding steroids to local anesthetic spinal injections for most injections, with the possible exception of patients who are strong candidates for surgery based on a herniated disc and clear nerve impingement (ISIS, 2013). However, steroids are currently used routinely in spinal injections due to a presumed physiologic effect.

Therapeutic injections should only be used after diagnostic injections and imaging studies have established pathology which has not clinically improved after active engagement (6-8 weeks) of physical therapy and in patients who otherwise qualify for more invasive procedures and may need injections because they do not wish to proceed to surgery.

ii.

Indications: Since these procedures are invasive, less invasive or non-invasive procedures should be considered first. All spinal injections should be preceded by either an MRI or a CT scan. Selection of patients, choice of procedure, and localization of the level for injection should be determined by clinical information indicating strong suspicion for pathologic condition(s) from reproducible exam findings. Diagnostic blocks may be helpful when MRI or other diagnostic tests are not definitive.

The number of diagnostic procedures should be limited in any individual patient to those most likely to be primary pain generators. Patients should not receive all of the diagnostic blocks listed merely in an attempt to identify 100% of the pain generators. Blocks are only appropriate if the patient is eligible for increased therapy based on the results of the block.

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the

pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy.

The interpretation of the test results are primarily based on functional change. Symptom report and pain response (via a recognized pain scale) before and at an appropriate time period after the injection should also be documented. The diagnostic significance of the test result should be evaluated in conjunction with clinical information and the results of other diagnostic procedures. Injections with local anesthetics of differing duration may be used to support a diagnosis. In some cases, injections at multiple levels may be required to accurately diagnose cervical pain. Refer to F.3. Injections – Spinal Therapeutic and/or F.4. Injections – Other (Including Radio Frequency) for diagnostic information on specific injections

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the International Spine Intervention Society (ISIS) guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for diagnostic purposes.

Multiple injections provided at the same session without staging may

seriously dilute the diagnostic value of these procedures. Practitioners must carefully weigh the diagnostic value of the procedure against the possible therapeutic value of anticipated treatment changes.

- iii. Special Requirements for Spinal Diagnostic Injections: Since multi-planar fluoroscopy during procedures is required to document technique and needle placement, an experienced physician should perform the procedure. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement. Unnecessary fluoroscopy procedures should be avoided due to the radiation exposure contributing to cancer risk.

The subspecialty disciplines of the physicians performing the injections may be varied, including, but not limited to: anesthesiology, radiology, surgery, or physiatry. The practitioner should document hands-on training through workshops of the type offered by organizations such as the International Spine Intervention Society (ISIS) with post course proctoring and/or fellowship training with interventional training. They must also be knowledgeable in radiation safety and credentialed by a hospital or surgery center.

- iv. Complications: Cervical spinal injections have resulted in death, paralysis and infarctions, mainly in the brainstem, cerebellum and posterior cerebral artery (Scanlon, 2007). The arterial anatomy in the intervertebral foramina can vary widely which increases the likelihood of arterial spasm or embolism from particulate steroids and can result in severe morbidity (Hintoon, 2005; Hoeft, 2006). Other general complications of spinal injections may include transient neurapraxia, local pain, nerve injury, infection, headache, and vasovagal effects. Epidural hematoma, permanent neurologic damage, spinal cord injury, dural perforation and CSF leakage; and/or spinal meningeal abscess or meningitis may also occur. There are reports of direct spinal cord injury due to needle trauma. Permanent paresis, anaphylaxis, and arachnoiditis have been rarely reported with the use of epidural steroids.

With steroid injections, there may be a dose-dependent suppression of the hypothalamic-pituitary-adrenal axis lasting between one and three months (Kay, 1994). Case reports of Cushing Syndrome, hypopituitarism and growth hormone deficiency have been tied to systemic absorption of intra-articular and epidural steroid injections (Lansang, 2009).

Cushing's syndrome has been reported from serial occipital nerve injections and paraspinal injections (Edmonds, 1991; Lavin, 2001). Several cases of spinal epidural lipomatosis have also been reported that may have been caused or exacerbated by spinal steroid injections (Sandberg, 1999).

Morning cortisol measurements may be ordered prior to repeat steroid injections or initial spinal steroid injection when the patient has received multiple previous steroid joint injections.

A well-controlled, large retrospective cohort study found that individuals with the same risk factors for osteoporotic fractures were 20% more likely to suffer such a lumbar fracture if they had an epidural steroid

injection. The risk increased with multiple injections (Mandel, 2013). Thus the risk of epidural injections must be carefully discussed with the patient, particularly for patients over 60, and repeat injections should generally be avoided unless the functional goals to be reached outweigh the risk for future fracture. Patients with existing osteoporosis or other risk factors for osteoporosis should rarely receive epidural injections.

- v. Contraindications: Absolute contraindications to diagnostic injections include: (a) bacterial infection – systemic or localized to region of injection, (b) bleeding diatheses, (c) hematological conditions, (d) pain of 3 points or less on a 10-point VAS measurement, and e) possible pregnancy and f) poorly controlled diabetes mellitus for steroid injections.

Relative contraindications to diagnostic injections may include: allergy to contrast, somatization disorders, poorly controlled congestive heart failure (CHF) for steroid injections, risk factors for osteoporosis, uncontrolled hypertension, and inadequate interlaminar space due to spinal stenosis. The use of interlaminar injections requires pre-injection evaluation by MRI to assure there is adequate space. They should not be performed if there is significant spinal stenosis.

Drugs affecting coagulation frequently require restriction from use.

- vi. Specific Diagnostic Injections: In general, relief should last for at least the duration of the local anesthetic used and should significantly result in functional improvement and relief of pain. Refer to F.3. Injections – Spinal Therapeutic and/or F.4. Injections – Other (Including Radio Frequency) for information on specific therapeutic injections.

- A) Epidural injections: may include transforaminal, or interlaminar injections. Transforaminal injections are generally accepted and useful in identifying the level of nerve root irritation. When performed for diagnosis, the volume of local anesthetic needed to adequately block the nerve can be estimated by the real time assessment of contrast flow patterns around the nerve prior to the application of local anesthetic. The amount of local anesthetic needed to anesthetize the nerve will generally not be more than 1.0cc.

Needle Placement: Multi-planar fluoroscopic imaging is required for all epidural steroid injections. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement.

Indications: Cervical injections have not proven to be extremely effective. There is some evidence that the results from transforaminal injections of anesthetic plus steroids is similar to injections with anesthetic only in the cervical spine (Anderberg, 2007). Evidence does not support long-term benefits and patients can suffer long-term morbidity from injections, although these complications are rare. Therefore injections are allowed for only a small subset of patients with radicular findings. They may be used for patients who are having significant pain that is interfering with daily functions and the active therapy necessary

for recovery despite medical pain management and active therapy. All injections should be preceded by an MRI. Interlaminar injections should not be done above level C6-C7, nor at the level of any stenosis as demonstrated on pre-procedure imaging review due to the higher likelihood of neural damage.

The following sets of patients may have epidural injections:

1. When a patient with radicular findings due to herniated disc, meets all of the indications for surgery at approximately 6-8 weeks post active therapy, one epidural may be attempted at the patient's discretion.
2. For rare, acute ruptured (herniated) disc with clear objective radiculopathy if, after one to two weeks of initial oral analgesic and conservative treatment; the patient:
  - has continued pain interfering with most activities of daily living (ADL) functions **and**
  - is unable to tolerate the required movements to participate in therapy; **and**
  - has pain greater in the arm than in the neck, generally of 7 or greater on a VAS scale of 10; **and**
  - has pain following a correlated radicular dermatome; **and**
  - there is a herniated disc on the MRI at the level of subjective and objective findings; **and**
  - has either:
    - dural tension, Spurlings' Sign, traction/distraction, or upper limb tension test (ULTT); **and/or**
    - one of the following documented, reproducible findings, which correlates with the suspected nerve root impingement:
      - Decreased reflexes, **or**
      - Radicular sensation deficits, **or**
      - Motor weakness on testing.
3. Spinal Stenosis Patients:

- a. Patients with radicular findings: When the patient has documented spinal stenosis, has completed 6-8 weeks of active therapy, has persistent radicular findings and difficulty with some activities, thus meeting criteria for surgical intervention, the patient may have one diagnostic injection. Because stenosis is not likely to change anatomically, unlike herniated discs which recede overtime, and due to the success rate of surgery for this condition in most cases, early surgical consultation is encouraged whenever the patient remains symptomatic after conservative therapy. If the patient does not wish to have a surgical intervention two additional injections may be provided if the original diagnostic intervention was successful per guideline standards.
- b. Patients with claudication: The patient has documented spinal stenosis, has completed 6-8 weeks of active therapy, has persistent claudication symptoms and difficulty with some activities, thus meeting criteria for surgical intervention. The patient may have one diagnostic injection. Patients who have any objective neurologic findings should proceed as the above patient with radicular findings for whom an early surgical consultation is recommended. Refer to 3.a. Those who have mild claudication, or moderate or severe claudication and who do not desire surgery, may continue to receive up to 2 additional injections if the original diagnostic intervention was successful per guideline standards..

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy.

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the



procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for diagnostic purposes.

It is essential that only light sedation be used for diagnostic trials in order to avoid having the sedation interfere with the patient's ability to interpret pain relief from the injection itself. Many patients may not need any medication. For those requiring anxiolytics, short acting agents, such as midazolam, may be used. As with all patients, the pain diary and functional testing post injection must be rigorously adhered to in order to correctly interpret the results of the diagnostic injection.

- ❖ Time to produce effect: Local anesthetic, less than 30 minutes.

- B) Medial Branch Blocks These are generally accepted diagnostic injections, used to determine whether a patient is a candidate for radiofrequency medial branch neurotomy (also known as facet rhizotomy).

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation

of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for diagnostic purposes.

A separate comparative block on a different date should be performed to confirm the level of involvement. A comparative block uses anesthetics of varying lengths of activity. Medial Branch blocks are probably not helpful to determine the likelihood of success for spinal fusion.

The success rate of radiofrequency neurotomy is likely to decrease with lesser percentages of pain relief from a branch block.

It is essential that only light sedation be used for diagnostic trials in order to avoid having the sedation interfere with the patient's ability to interpret pain relief from the injection itself. Many patients may not need any medication. For those requiring anxiolytics, short acting agents, such as midazolam, may be used. As with all patients, the pain diary and functional testing post injection must be rigorously adhered to in order to correctly interpret the results of the diagnostic injection.

Needle Placement: Multi-planar fluoroscopic imaging is required for all medial branch blocks injections. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement.

Indications: All injections should be preceded by an MRI or a CT scan. Individuals should have met **all** of the following indications:

- Physical exam findings consistent with facet origin pain, **and**

- At least 3 months of pain, unresponsive to 6-8 weeks of conservative therapies, including manual therapy, **and**
- 
- A psychosocial screening (e.g., thorough psychosocial history, screening questionnaire) with treatment as appropriate.
  - ❖ Frequency and Maximum Duration: May be repeated once for comparative blocks. Limited to 2 anatomic facet levels or 3 medical branch levels.

C) Zygapophyseal (Facet) Blocks:

Description — An accepted intra-articular or pericapsular injection of local anesthetic and corticosteroid with very limited uses. There is no justification for a combined facet and medial branch block.

Facet injections have very limited therapeutic or diagnostic use. Refer to F.3. Injections –Spinal Therapeutic.

Needle Placement: Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement.

Indications: Patients with pain 1) suspected to be facet in origin based on exam findings **and** 2) affecting activity; OR patients who have refused a rhizotomy and appear clinically to have facet pain; OR patients who have facet findings with a thoracic component. The physician should document the findings which, for lumbar and cervical spine, consist of pain with extension and lateral bending with referral patterns consistent with the expected pathologic level. In these patients, facet injections may be occasionally useful in facilitating a functionally-directed rehabilitation program and to aid in identifying pain generators. Patients with recurrent pain should be evaluated with more definitive diagnostic injections, such as medial nerve branch injections, to determine the need for a rhizotomy. Because facet injections are not likely to produce long-term benefit by themselves and are not the most accurate diagnostic tool, they should not be performed at more than two levels, neither unilaterally nor bilaterally. There is insufficient evidence to support the use of therapeutic cervical facet injections (Peloso, 2013). In the lumbar spine, a high quality meta-analysis provides good evidence against the use of lumbar facet or epidural injections for relief of non-radicular low back pain ([Cochrane] Staal, 2008). Due to the lack of proof that these injections improve outcome, prior authorization is required (ISIS, 2013; [Cochrane] Staal, 2008).

All injections should be preceded by an MRI or a CT scan.

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation, usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy.

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for diagnostic purposes.

It is essential that only light sedation be used for diagnostic trials in order to avoid having the sedation interfere with the patient's ability to interpret pain relief from the injection itself. Many patients may not need any medication. For those requiring

anxiolytics, short acting agents, such as midazolam, may be used. As with all patients, the pain diary and functional testing post injection must be rigorously adhered to in order to correctly interpret the results of the diagnostic injection.

- ❖ Time to produce effect: Up to 30 minutes for local anesthetic;
- ❖ Frequency and Maximum Duration: Once per suspected level, limited to two levels unilaterally or bilaterally. If radiofrequency neurotomy is being considered, refer to the medial branch block section. It is recommended that morning cortisol levels are checked prior to the 3<sup>rd</sup> or 4<sup>th</sup> steroid injection.

**c. Personality/Psychological/Psychosocial Evaluation:** Generally accepted and well-established diagnostic procedures with selective use in the acute cervical spine injury population and more widespread use in sub-acute and chronic cervical spine populations.

These diagnostic testing procedures may be useful for patients with symptoms of depression, delayed recovery, chronic pain, recurrent painful conditions, disability problems, and for pre-operative evaluation as well as a possible predictive value for post-operative response. Psychological testing should provide differentiation between pre-existing depression versus injury-caused depression, as well as post-traumatic stress disorder.

Formal psychological or psychosocial evaluation should be performed on patients not making expected progress within 6 to 12 weeks following injury and whose subjective symptoms do not correlate with objective signs and tests. In addition to the customary initial exam, the evaluation of the injured worker should specifically address the following areas:

- i. Employment history;
- ii. Interpersonal relationships, both social and work;
- iii. Leisure activities;
- iv. Current perception of the medical system;
- v. Results of current treatment;
- vi. Perceived locus of control; and
- vii. Childhood history, including abuse and family history of disability.

Results should provide clinicians with a better understanding of the patient, thus allowing for more effective rehabilitation. The evaluation will determine the need for further psychosocial interventions, and in those cases, a Diagnostic Statistical Manual of Mental Disorders (DSM) diagnosis should be determined and documented. An individual with a PhD, PsyD, or Psychiatric MD/DO credentials should perform initial evaluations, which are generally completed within one to

two hours. A professional fluent in the primary language of the patient is strongly preferred. When such a provider is not available, services of a professional language interpreter must be provided. When issues of chronic pain are identified, the evaluation should be more extensive and follow testing procedures as outlined in the Division's Chronic Pain Disorder Medical Treatment Guidelines.

- ❖ Frequency: One-time visit for evaluation. If psychometric testing is indicated as a portion of the initial evaluation, time for such testing should not exceed an additional two hours of professional time.

**d. Provocation Discography:** This procedure remains extremely controversial, carries a high risk when performed in the cervical spine, and findings are of unclear significance due to false positives and the general lack of indications for cervical surgery in patients without radicular findings (Randhawa, 2013). Therefore, it is ***not recommended***. However, it may be performed in specific cases when a single level fusion or artificial disc replacement is being considered for a patient with isolated one level axial pain who meets all of the other requirements for the procedure. To understand these concepts, the reader must refer to both the cervical operative indications and the Division's Low Back Pain Medical Treatment Guidelines for a detailed description of the requirements for discogram performance and interpretation.

**e. Thermography:** An accepted and established procedure, but it has no use as a diagnostic test for neck pain. It may be used to diagnose complex regional pain disorders. Refer to the Division's Complex Regional Pain Syndrome/Reflex Sympathetic Dystrophy Medical Treatment Guidelines.

**3. SPECIAL TESTS:** These are generally well-accepted tests and are performed as part of a skilled assessment of the patients' capacity to return to work, his/her strength capacities, and physical work demand classifications and tolerance. The procedures in this subsection are listed in alphabetical order, not by importance.

**a. Computer-Enhanced Evaluations:** These may include isotonic, isometric, isokinetic, and/or isoinertial measurement of movement; range of motion (ROM); endurance; or strength. Values obtained can include degrees of motion, torque forces, pressures, or resistance. Indications include determining validity of effort, effectiveness of treatment, and demonstrated motivation. These evaluations should not be used alone to determine return-to-work restrictions.

- ❖ Frequency: One time for evaluation, one for mid-treatment assessment, and one at final evaluation.

**b. Functional Capacity Evaluation (FCE):** This is a comprehensive or modified evaluation of the various aspects of function as they relate to the worker's ability to return to work. Areas such as endurance, lifting (dynamic and static), postural tolerance, specific range of motion (ROM), coordination and strength, worker habits, employability, as well as psychosocial aspects of competitive employment may be evaluated. Reliability of patient reports and overall effort during testing is also reported. Components of this evaluation may include: (a) musculoskeletal screen; (b) cardiovascular profile/aerobic capacity; (c) coordination; (d) lift/carrying analysis; (e) job-specific activity tolerance; (f) maximum voluntary effort; (g) pain assessment/psychological screening; and (h) non-material and material handling activities. Standardized national guidelines (such as National Institute for Occupational Safety and Health (NIOSH)) should be used as the basis for FCE recommendations.

There is some evidence that an FCE fails to predict which injured workers with chronic low back pain will have sustained return to work (Gross, 2004a). Another cohort study concluded that there was a significant relation between FCE information and return to work, but the predictive efficiency was poor (Streibelt, 2009). There is some evidence that time off work and gender are important predictors for return to work, and floor-to-waist lifting may also help predict return to work, however, the strength of that relationship has not been determined (Matheson, 2002).

A full review of the literature reveals that there is no evidence to support the use of FCEs to prevent future injuries ([Cochrane] Mahmud, 2010). There is some evidence in chronic low back pain patients that (1) FCE task performance is weakly related to time on disability and time for claim closure and (2) even claimants who fail on numerous physical performance FCE tasks may be able to return to work (Gross, 2004b).

Full FCEs are rarely necessary. In many cases, a work tolerance screening or return to work performance will identify the ability to perform the necessary job tasks. There is some evidence that a short form FCE reduced to a few tests produces a similar predictive quality compared to the longer 2-day version of the FCE regarding length of disability and recurrence of a claim after return to work (Gross, 2007).

When an FCE is being used to determine return to a specific jobsite, the provider is responsible for fully understanding the physical demands and the duties of the job the worker is attempting to perform. A jobsite evaluation is usually necessary. A job description should be reviewed by the provider and FCE evaluator prior to having this evaluation performed. FCEs cannot be used in isolation to determine work restrictions. It is expected that the FCE may differ from both self-report of abilities and pure clinical exam findings in chronic low back pain patients (Brouwer, 2005). The length of a return to work evaluation should be based on the judgment of the referring physician and the provider performing the evaluation. Since return to work is a complicated multidimensional issue, multiple factors beyond functional ability and work demands should be considered and measured when attempting determination of readiness or fitness to return to work (Gross, 2007). FCEs should not be used as the sole criteria to diagnose malingering.

❖ Frequency: Can be used: (1) initially to determine baseline status; and (2) for case closure when patient is unable to return to the pre-injury position and further information is desired to determine permanent work restrictions. Prior authorization is required for FCEs performed during treatment.

- c. Jobsite Evaluation:** A comprehensive analysis of the physical, mental, and sensory components of a specific job. These components may include, but are not limited to: (a) postural tolerance (static and dynamic); (b) aerobic requirements; (c) ROM; (d) torque/force; (e) lifting/carrying; (f) cognitive demands; (g) social interactions; (h) visual perceptual; (i) sensation; (j) coordination; (k) environmental factors of a job; (l) repetitiveness; and (m) essential job functions.

Job descriptions provided by the employer are helpful but should not be used as a substitute for direct observation. A jobsite evaluation may include observation

and instruction of how work is done, what material changes (desk, chair) should be made, and determination of readiness to return to work.

Requests for a jobsite evaluation should describe the expected goals for the evaluation. Goals may include, but are not limited to the following:

- To determine if there are potential contributing factors to the person's condition and/or for the physician to assess causality;
- To make recommendations for, and to assess the potential for ergonomic changes;
- To provide a detailed description of the physical and cognitive job requirements;
- To assist the patient in his/her return to work by educating him/her on how he/she may be able to do his/her job more safely and in a more bio-mechanically appropriate manner;
- To give detailed work/activity restrictions.
  - ❖ Frequency: One time with 1-2 additional visits as needed for follow-up per jobsite.

**d. Vocational Assessment:** If the injury is such that the practitioner can easily determine that the worker will be unable to return to his/her previous occupation, then vocational assessment at that time may aid in the overall medical management and assessment of the patient. The physician may decide that the patient is unable to return to the previous occupation prior to the declaration of Maximum Medical Improvement (MMI).

The vocational assessment should provide valuable guidance in the determination of future rehabilitation program goals. It should clarify rehabilitation goals, which optimize both patient motivation and utilization of rehabilitation resources. The physician should have identified the expected permanent limitation(s) prior to the assessment. Declaration of MMI should not be delayed solely due to lack of attainment of a vocational assessment.

- ❖ Frequency: One time with additional visits as needed for follow-up.

**e. Work Tolerance Screening:** A determination of an individual's tolerance for performing a specific job based on a job activity or task and may be used when a full FCE is not indicated. It may include a test or procedure to specifically identify and quantify work-relevant cardiovascular, physical fitness, and postural tolerance. It may also address ergonomic issues affecting the patient's return-to-work potential.

- ❖ Frequency: One time for initial screen. May monitor improvements in strength every 3 to 4 weeks up to a total of 6 visits.



## F. THERAPEUTIC PROCEDURES – NON-OPERATIVE

Before initiation of any therapeutic procedure, the authorized treating provider, employer, and insurer must consider these four important issues in the care of the injured worker.

*First*, patients undergoing therapeutic procedure(s) should be released or returned to modified or restricted duty during their rehabilitation at the earliest appropriate time. Refer to F.12. Return to Work for detailed information.

*Second*, cessation and/or review of treatment modalities should be undertaken when no further significant subjective or objective improvement in the patient's condition is noted. If patients are not responding within the recommended duration periods, alternative treatment interventions, further diagnostic studies, or consultations should be pursued.

*Third*, providers should provide and document patient education. Before diagnostic tests or referrals for invasive treatment take place, the patient should be able to clearly articulate the goals of the intervention, the general side effects and associated risks, and the patient's agreement with the expected treatment plan.

*Last*, formal psychological or psychosocial evaluation should be performed on patients not making expected progress within 6 to 12 weeks following injury and whose subjective symptoms do not correlate with objective signs and tests.

Home therapy is an important component of therapy and may include active and passive therapeutic procedures as well as other modalities to assist in alleviating pain, swelling, and abnormal muscle tone.

The following procedures are listed in alphabetical order.

- 1. ACUPUNCTURE** When acupuncture has been studied in randomized clinical trials, it is often compared with sham acupuncture and/or no acupuncture (usual care). The differences between true acupuncture and usual care have been moderate, but clinically important. These differences can be partitioned into two components: nonspecific effects and specific effects. Nonspecific effects, such as patient beliefs and expectations, attention from the acupuncturist, administration of acupuncture in a relaxing setting, and other components of what is often called the placebo effect. Specific effects refer to any additional effects which occur in the same setting of expectations and attention, but are attributable to the penetration of the skin in the specific, classic acupuncture points on the surface of the body by the needles themselves. Although a bulk of the studies reviewed relate to spinal pain of the low back, the study conclusions may relate to cervical spine care as long as there are no contraindications.

There is good evidence that acupuncture, true or sham, is superior to usual care for the reduction of disability and pain in patients with chronic nonspecific low back pain, and that true and sham acupuncture are likely to be equally effective (Cherkin, 2009). A sham procedure is a non-therapeutic procedure that appears similar to the patient as the purported therapeutic procedure being tested. In most controlled studies, sham and classic acupuncture have produced similar effects. However, the sham controlled studies have shown consistent advantages of both true and sham acupuncture over no acupuncture when the studies have included a third comparison group that was randomized to usual medical care. Having this third comparison group has been advantageous in the interpretation of the non-specific effects of acupuncture, since the third comparison group controls for some influences on study outcome. These influences include more frequent contact with providers, the natural history of the condition, regression to the mean, the effect of being observed in a clinical trial, and, if the follow-up

observations are done consistently in all three treatment groups, biased reporting of outcomes. Controlling for these factors enables researchers to more closely estimate the contextual and personal interactive effects of acupuncture as it is generally practiced.

Because the sham acupuncture interventions in the clinical trials are generally done by trained acupuncturists, and not by totally untrained personnel, the sham acupuncture interventions may include some of the effects of true acupuncture (Dincer, 2003), much as a partial agonist of a drug may produce some of the effects of the actual drug. For example, a sham procedure involving toothpicks rather than acupuncture needles may stimulate cutaneous afferents in spite of not penetrating the skin, much as a neurological sensory examination may test nociceptor function without skin penetration. To the extent that afferent stimulation is part of the mechanism of action of acupuncture, interpreting the sham results as purely a control group would lead to an underestimation of the analgesic effects of acupuncture. Thus we consider in our analysis that “sham” or non-classic acupuncture may have a positive clinical effect when compared to usual care.

Clinical trials of acupuncture typically enroll participants who are interested in acupuncture, and may respond to some of the nonspecific aspects of the intervention more than would be expected of patients who have no interest in or desire for acupuncture. The nonspecific effects of acupuncture may not be produced in patients who have no wish to be referred for it.

There is good evidence that both acupuncture and sham acupuncture are superior to usual care without acupuncture for moderate short-term and mild long-term alleviation of low back pain, neck pain, and the pain of joint osteoarthritis (Brinkhaus, 2006; Ernst, 2011; Haake, 2007). In these studies 5-15 treatments were provided. Comparisons of acupuncture and sham acupuncture have been inconsistent, and the advantage of true over sham acupuncture has been small in relation to the advantage of sham over no acupuncture”

Acupuncture is recommended for chronic pain patients who are trying to increase function and/or decrease medication usage and have an expressed interest in this modality. It also may be beneficial for individuals experiencing acute or subacute neck pain who cannot tolerate NSAIDs. Acupuncture is not the same procedure as dry needling for coding purposes; however, some acupuncturists may use acupuncture treatment for myofascial trigger points. Dry needling is performed specifically on myofascial trigger points. Refer to F.4.g. Trigger Point Injections and Dry Needling Treatment.

Credentialed practitioners with experience in evaluation and treatment of chronic pain patients must perform acupuncture evaluations. The exact mode of action is only partially understood. Western medicine studies suggest that acupuncture stimulates the nervous system at the level of the brain, promotes deep relaxation, and affects the release of neurotransmitters. Acupuncture is commonly used as an alternative or in addition to traditional Western pharmaceuticals. It may be used when pain medication is reduced or not tolerated; as an adjunct to physical rehabilitation; and surgical intervention; and/or as part of multidisciplinary treatment to hasten the return of functional activity. Acupuncture must be performed by practitioners with the appropriate credentials in accordance with state and other applicable regulations. Therefore, if not otherwise within their professional scope of practice and licensure, those performing acupuncture must have the appropriate credentials, such as L.A.c., R.A.c, or Dipl. Ac.

- a. Acupuncture:** This is the insertion and removal of filiform needles to stimulate acupoints (acupuncture points). Needles may be inserted, manipulated, and retained for a period of time. Acupuncture has a variety of possible physiologic

actions, but their relevance to the clinical response is speculative. For example, one crossover trial measured increasing palmar blood flow and increased nitric oxide synthase activity in arms which had had acupuncture, but this observation may have no bearing on actual analgesic effects (Tsuchiya, 2007).

Indications include joint pain, joint stiffness, soft tissue pain and inflammation, paresthesia, post-surgical pain relief, muscle spasm, and scar tissue pain.

**b. Acupuncture with Electrical Stimulation:** is the use of electrical current (micro-amperage or mille-amperage) on the needles at the acupuncture site. It is used to increase effectiveness of the needles by continuous stimulation of the acupoint. Physiological effects (depending on location and settings) can include endorphin release for pain relief, reduction of inflammation, increased blood circulation, analgesia through interruption of pain stimulus, and muscle relaxation.

It is indicated to treat chronic pain conditions, radiating pain along a nerve pathway, muscle spasm, inflammation, scar tissue pain, and pain located in multiple sites.

There is some evidence that a combination of electrical acustimulation to the wrist combined with neck stretching and strengthening exercises for 30 minutes two times per week for a period of about four weeks demonstrates more improvement in chronic neck pain and patient self-confidence in performing functional activities than neck exercises alone for up to one month (Chan, 2009).

**c. Other Acupuncture Modalities:** Acupuncture treatment is based on individual patient needs and therefore treatment may include a combination of procedures to enhance treatment effect. Other procedures may include the use of heat, soft tissue manipulation/massage, and exercise. Refer to F.12. Therapy – Active and F.13. Therapy - Passive for a description of these adjunctive acupuncture modalities and time frames.

**d. Total Time Frames For Acupuncture and Acupuncture with Electrical Stimulation:** Time frames are not meant to be applied to each of the above sections separately. The time frames are to be applied to all acupuncture treatments regardless of the type or combination of therapies being provided.

- ❖ Time to Produce Effect: 3 to 6 treatments.
- ❖ Frequency: 1 to 3 times per week.
- ❖ Optimum Duration: 1 to 2 months.
- ❖ Maximum Duration: 15 treatments.

Any of the above acupuncture treatments may extend longer if objective functional gains can be documented and when symptomatic benefits facilitate progression in the patient's treatment program. Treatment beyond 15 treatments must be documented with respect to need and ability to facilitate positive symptomatic and functional gains. Such care should be re-evaluated and documented with each series of treatments. All treatments should be accompanied by active therapy.

- 2. BIOFEEDBACK:** Biofeedback is a form of behavioral medicine that helps patients learn self-awareness and self-regulation skills for the purpose of gaining greater control of their physiology, such as muscle activity, brain waves, and measures of autonomic nervous system activity. Stress-related psycho-physiological reactions may arise as a reaction to organic pain and in some cases may cause pain. Electronic instrumentation is used to monitor the targeted physiology and then displayed or fed back to the patient visually, auditorily, or tactilely with coaching by a biofeedback specialist. There is good evidence that biofeedback or relaxation therapy is equal in effect to cognitive behavioral therapy for chronic low back pain (Hoffman, 2007).

Indications for biofeedback include cases of musculoskeletal injury, in which muscle dysfunction or other physiological indicators of excessive or prolonged stress response affects and/or delays recovery. Other applications include training to improve self-management of pain, anxiety, panic, anger or emotional distress, opioid withdrawal, insomnia/sleep disturbance, and other central and autonomic nervous system imbalances. Biofeedback is often utilized for relaxation training. Mental health professionals may also utilize it as a component of psychotherapy, where biofeedback and other behavioral techniques are integrated with psychotherapeutic interventions. Biofeedback is often used in conjunction with physical therapy or medical treatment.

Recognized types of biofeedback include the following:

- a. EMG/Electromyogram (EMG):** Used for self-management of pain and stress reactions involving muscle tension.
- b. Skin Temperature:** Used for self-management of pain and stress reactions, especially vascular headaches.
- c. Respiration Feedback (RFB):** Used for self-management of pain and stress reactions via breathing control.
- d. Respiratory Sinus Arrhythmia (RSA):** Used for self-management of pain and stress reactions via synchronous control of heart rate and respiration. Respiratory sinus arrhythmia is a benign phenomenon which consists of a small rise in heart rate during inhalation, and a corresponding decrease during exhalation. This phenomenon has been observed in meditators and athletes, and is thought to be a psycho-physiological indicator of health.
- e. Heart Rate Variability (HRV):** Used for self-management of stress via managing cardiac reactivity.
- f. Electrodermal Response (EDR):** Used for self-management of stress involving palmar sweating or galvanic skin response.
- g. Electroencephalograph (EEG, QEEG):** Used for self-management of various psychological states by controlling brainwaves.

The goal in biofeedback treatment is normalizing the physiology to the pre-injury status to the extent possible and involves transfer of learned skills to the workplace and daily life. Candidates for biofeedback therapy or training should be motivated to learn and practice biofeedback and self-regulation techniques. In the course of biofeedback treatment, patient stressors are discussed and self-management strategies are devised. If the patient has not been previously evaluated, a psychological evaluation should be performed prior to beginning biofeedback treatment for chronic pain. The psychological evaluation may reveal cognitive difficulties, belief system conflicts, somatic delusions,

secondary gain issues, hypochondriasis, and possible biases in patient self-reports, which can affect biofeedback. Home practice of skills is often helpful for mastery and may be facilitated by the use of home training tapes.

Psychologists or psychiatrists, who provide psycho-physiological therapy which integrates biofeedback with psychotherapy, should be either Biofeedback Certification International Alliance (BCIA) certified or practicing within the scope of their training. All non-licensed health care providers of biofeedback for chronic pain patients must be BCIA certified and shall have their biofeedback treatment plan approved by the authorized treating psychologist or psychiatrist. Biofeedback treatment must be done in conjunction with the patient's psychosocial intervention. Biofeedback may also be provided by health care providers who follow a set treatment and educational protocol. Such treatment may utilize standardized material or relaxation tapes.

- ❖ Time to Produce Effect: 3 to 4 sessions.
- ❖ Frequency: 1 to 2 times per week.
- ❖ Optimum Duration: 6 to 8 sessions.
- ❖ Maximum Duration: 10 to 12 sessions. Treatment beyond 12 sessions must be documented with respect need, expectation, and ability to facilitate positive symptomatic and functional gains.

### 3. INJECTIONS – SPINAL THERAPEUTIC:

Description: Therapeutic spinal injections have not been proven to change the long-term course of patients with spinal pain. They have a very limited role in treatment and should be used in only a small subset of patients where the criteria below have been clearly met.

Cervical epidural injections carry additional risks of injury including death, spinal cord injury, and stroke when compared to lumbar injections (Scanlon, 2007). Given the lack of proof for significant long-term benefit and the risks, steroid injections are less commonly used in the cervical spine. Many of the neurologic and vascular complications are related to particulate steroid solutions. For cervical spinal injections, dexamethasone or another non-particulate substance should be used. Diagnostic injections may be useful if more specific diagnosis is needed prior to other invasive procedures.

In the lumbar spine, a high quality meta-analysis provides good evidence against the use of lumbar facet or epidural injections for relief of non-radicular low back pain ([Cochrane] Staal, 2008). Thus, epidural injections should not be performed for non-radicular pain. Similarly epidural injections are **not recommended** for non-radicular cervical pain. There is insufficient evidence to support the use of therapeutic cervical facet injections (Peloso, 2013). Facet injections have very limited therapeutic or diagnostic use. Refer to F.3.e. Zygapophyseal (Facet) Injections.

Cervical injections have not proven to be extremely effective. There is some evidence that the results from transforaminal injections of anesthetic plus steroids is similar to injections with anesthetic only in the cervical spine (Anderberg, 2007). Further in that study less than 20% of patients reported a reduction in symptoms and about 30% reported some benefit at 3 weeks. A prospective cohort study of transforaminal and interlaminar cervical injections on patients without motor deficits and 4 weeks of arm pain after a herniated disc appeared to show an 80% response rate with 20% proceeding to surgery. The study is extremely difficult to interpret as there is no control group and 80%

of similar cases improve without injections or surgery (Lee, 2012).

There is some evidence that patients who smoke respond less well to nonoperative spine care and that quitting smoking results in greater improvement (Behrend, 2012).

In summary, there is no proven benefit from adding steroids to local anesthetic spinal injections for most injections, with the possible exception of patients who are strong candidates for surgery based on a herniated disc and clear nerve impingement (ISIS, 2013). However, steroids are currently used routinely in spinal injections due to a presumed physiologic effect.

Therapeutic injections should only be used after diagnostic injections and imaging studies have established pathology which has not clinically improved after active engagement (6-8 weeks) of physical therapy and in patients who otherwise qualify for more invasive procedures and may need injections because they do not wish to proceed to surgery.

The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain and inflammation. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation, usually beginning within 7 days, at the injectionist's discretion. Active treatment, which patients should have had prior to injections, will frequently require a repeat of the sessions previously ordered (Refer to F.12. Therapy - Active). Injections, by themselves, are not likely to provide long-term relief. Rather, active rehabilitation with modified work achieves long-term relief by increasing active range of motion (ROM), strength, and stability.

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for assessment purposes.

If the first injection does not provide an improvement in function documented by a therapist or a non-injectionist authorized treating physician, and a diagnostic response with temporary and sustained pain relief substantiated by accepted pain scales, (i.e. approximately 80% pain reduction on visual analog scale), similar injections should not be repeated.

Studies have not shown repeat injections to be beneficial in most cases (MacVicar,

2013). As pain reports vary among patients, the most important criteria is documentation of functional change. Common examples of functional change include increased range of motion, increased ability to perform job tasks, increased ability to progress in physical therapy, and decreased use of pain medication with increased function. As the purpose of injections is to aid the patient in participation with active therapy and to hasten achievement of treatment goals, injections should not be repeated if they are not achieving the more important goals of active therapy and return to work.

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy.

Special Requirements for Spinal Therapeutic Injections: Since multi-planar fluoroscopy during procedures is required to document technique and needle placement, an experienced physician should perform the procedure. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement. Unnecessary fluoroscopy procedures should be avoided due to the radiation exposure contributing to cancer risk.

The subspecialty disciplines of the physicians performing the injections may be varied, including, but not limited to: anesthesiology, radiology, surgery, or physiatry. The practitioner should document hands-on training through workshops of the type offered by organizations such as the International Spine Intervention Society (ISIS) with post course proctoring and/or fellowship training with interventional training. They must also be knowledgeable in radiation safety and credentialed by a hospital or surgery center.

Complications: Cervical spinal injections have resulted in death, paralysis and infarctions, mainly in the brainstem, cerebellum and posterior cerebral artery (Scanlon, 2007). The arterial anatomy in the intervertebral foramina can vary widely which increases the likelihood of arterial spasm or embolism from particulate steroids and can result in severe morbidity (Hintoon, 2005; Hoeft, 2006). Other general complications of spinal injections may include transient neurapraxia, local pain, nerve injury, infection, headache, and vasovagal effects. Epidural hematoma, permanent neurologic damage, spinal cord injury, dural perforation and cerebrospinal fluid (CSF) leakage; and/or spinal meningeal abscess or meningitis may also occur. There are reports of direct spinal cord injury due to needle trauma. Permanent paresis, anaphylaxis, and arachnoiditis have been rarely reported with the use of epidural steroids.

With steroid injections, there may be a dose-dependent suppression of the hypothalamic-pituitary-adrenal axis lasting between one and three months (Kay, 1994). Case reports of Cushing Syndrome, hypopituitarism and growth hormone deficiency have been tied to systemic absorption of intra-articular and epidural steroid injections (Lansang, 2009).

Cushing's syndrome has been reported from serial occipital nerve injections and paraspinal injections (Edmonds, 1991; Lavin, 2001). Several cases of spinal epidural lipomatosis have also been reported that may have been caused or exacerbated by

spinal steroid injections (Sandberg, 1999).

Morning cortisol measurements may be ordered prior to repeat steroid injections or initial spinal steroid injection when the patient has received multiple previous steroid joint injections.

A well-controlled, large retrospective cohort study found that individuals with the same risk factors for osteoporotic fractures were 20% more likely to suffer such a lumbar fracture if they had an epidural steroid injection. The risk increased with multiple injections (Mandel, 2013). Thus the risk of epidural injections must be carefully discussed with the patient, particularly for patients over 60, and repeat injections should be generally avoided unless the functional goals to be reached outweigh the risk for future fracture. Patients with existing osteoporosis or other risk factors for osteoporosis should rarely receive epidural injections.

Contraindications: Absolute contraindications to diagnostic injections include: (a) bacterial infection – systemic or localized to region of injection, (b) bleeding diatheses, (c) hematological conditions, (d) pain of 3 points or less on a 10-point Visual Analog Scale (VAS) measurement, (e) possible pregnancy, and (f) poorly controlled diabetes mellitus for steroid injections.

Relative contraindications to diagnostic injections may include: allergy to contrast, somatization disorders, poorly controlled congestive heart failure (CHF) for steroid injections, risk factors for osteoporosis, uncontrolled hypertension, and inadequate space for interlaminar, due to spinal stenosis. The use of interlaminar injections requires evaluation by MRI to assure there is adequate space. They should not be performed if there is significant spinal stenosis.

Drugs affecting coagulation frequently require restriction from use.

The following are in alphabetical order:

**a. Epidural Steroid Injection (ESI):** may include transforaminal or interlaminar injections.

**i. Description:** Epidural steroid injections are injections of corticosteroid into the epidural space. Purported to reduce pain and inflammation in the acute or sub-acute phases of injury, restoring range of motion and, thereby, facilitating progress in more active treatment programs. Use non-particulate steroids to avoid complications.

Therapeutic spinal injections have not been proven to change the long-term course of patients with spinal pain. They have a very limited role in treatment and should be used in only a small subset of patients where the criteria below have been clearly met. Cervical epidural injections carry additional risks of injury including death, spinal cord injury, and stroke when compared to lumbar injections (Scanlon, 2007). Given the lack of proof for significant long-term benefit and the risks, steroid injections are less commonly used in the cervical spine. ESI uses two approaches: transforaminal and interlaminar (midline). The transforaminal approach is the preferred method for unilateral, single-level pathology and for post-surgical patients.

There is some evidence that peri-radicular injections are equally beneficial whether or not steroids are added to local anesthetic (Ng,



2005). This findings argues against the proposed beneficial anti-inflammatory effects of injections.

A high quality meta-analysis provides good evidence against the use of lumbar facet or epidural injections for relief of non-radicular low back pain ([Cochrane] Staal, 2008). Thus, epidural injections should not be performed for lumbar non-radicular pain. Similarly, epidural injections are **not recommended** for non-radicular cervical pain.

Cervical injections have not proven to be extremely effective. There is some evidence that the results from transforaminal injections of anesthetic plus steroids is similar to injections with anesthetic only in the cervical spine (Anderberg, 2007). Further in that study less than 20% of patients reported a reduction in symptoms and about 30% reported some benefit at 3 weeks. A prospective cohort study of transforaminal and interlaminar cervical injections on patients without motor deficits and 4 weeks of arm pain after a herniated disc appeared to show an 80% response rate with 20% proceeding to surgery. The study is extremely difficult to interpret as there is no control group and 80% of similar cases improve without injections or surgery (Lee, 2012).

There is some evidence that patients who smoke respond less well to nonoperative spine care and that quitting smoking results in greater improvement (Behrend, 2012).

In summary, there is no proven benefit from adding steroids to local anesthetic spinal injections for most injections, with the possible exception of patients who are strong candidates for surgery based on a herniated disc and clear nerve impingement (ISIS, 2013). However, steroids are currently used routinely in spinal injections due to a presumed physiologic effect.

ii. **Needle Placement:** Multi-planar fluoroscopic imaging is required for all epidural steroid injections. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement. Digital subtraction angiography may be used as appropriate.

iii. **Indications:** Evidence does not support long-term benefits and patients can suffer long-term morbidity from injections; although these complications are rare. Therefore, injections are allowed for only a small subset of patients with radicular findings. They may be used for patients who are having significant pain that is interfering with daily functions and the active therapy necessary for recovery despite medical pain management and active therapy. Injections should be preceded by an MRI. Interlaminar injections should not be done above level C6-C7, nor at the level of any stenosis as demonstrated on pre-procedure imaging review due to the higher likelihood of neural damage.

The following sets of patients may have therapeutic epidural injections, when diagnostic epidural injections are positive:

A) When a patient with radicular findings or herniated disc, meets all of the indications for surgery at approximately 6-8 weeks post

active therapy, one epidural may be attempted at the patient's discretion.

B) For rare acute ruptured (herniated) disc with clear objective radiculopathy if, after one to two weeks of initial oral analgesic and conservative treatment; the patient:

- has continued pain interfering with most activities of daily living (ADL) functions; **and**
- is unable to tolerate the required movements to participate in therapy; **and**
- has pain greater in the arm than in the neck, generally of 7 or greater on a VAS scale of 10; **and**
- has pain following a correlated radicular dermatome; **and**
- there is a herniated disc on the MRI at the level of subjective and objective findings; **and**
- has either:
  - dural tension, Spurlings' Sign, traction/distraction, or upper limb tension test (ULTT); **and/or**
  - one of the following documented, reproducible findings, which correlates with the suspected nerve root impingement:
    - Decreased reflexes, **or**
    - Radicular sensation deficits, **or**
    - Motor weakness on testing.

C) Spinal Stenosis Patients:

- 1) Patients with radicular findings: When the patient has documented spinal stenosis, has completed 6-8 weeks of active therapy, has persistent radicular findings and difficulty with some activities, thus meeting criteria for surgical intervention, the patient may have one injection for diagnostic purposes. Because stenosis is not likely to change anatomically, unlike herniated discs which recede overtime, and due to the success rate of surgery for this condition in most cases, early surgical consultation is encouraged whenever the patient remains symptomatic after conservative therapy. If the patient does not wish to have a surgical intervention two additional injections may be provided if the original

diagnostic intervention was successful per guideline standards.

- 2) Patients with claudication: The patient has documented spinal stenosis, has completed 6-8 weeks of active therapy, has persistent claudication symptoms and difficulty with some activities, thus meeting criteria for surgical intervention. The patient may have one injection for diagnostic purposes. Patients who have any objective neurologic findings should proceed as the above patient with radicular findings for whom an early surgical consultation is recommended. Refer to C.1. Those who have mild claudication, or moderate or severe claudication and who do not desire surgery, may continue to receive up to 2 additional injections if the original diagnostic intervention was successful per guideline standards..

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy.

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the

week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for assessment purposes.

Light sedation and pain relief may be needed for some patients requiring therapeutic injection.

- ❖ Time to produce effect: Local anesthetic, less than 30 minutes.
- ❖ Frequency: One or more divided levels can be injected in one session. Whether injections are repeated depends upon the patient's response to the previous injection. There is no role for a "series" of 3 injections. Each injection should be judged on the actual functional outcome. Patients with existing osteoporosis or other risk factors for osteoporosis should rarely receive epidural steroid injections (refer to complications section). Subsequent injections may occur after 1 to 2 weeks if patient response has been favorable. Injections can be repeated after a hiatus of six months if the patient has demonstrated functional gain and pain returns or worsens. If the first injection does not provide a diagnostic response of temporary and sustained pain relief (approximately 80% lasting between 2 and 6 weeks) substantiated by accepted pain scales and improvement in function, documented preferably by a therapist or non-injectionist authorized physician, similar injections should not be repeated. Patients should complete a pain diary over several days post injection.
- ❖ Optimum duration: Usually 1 to 3 injection(s) over a period of six months depending upon each patient's response and functional gain. Most patients will not require 3 injections within 6 months and injections should not be repeated without documented functional change.
- ❖ Maximum duration: Up to 4 per year. Patients should be reassessed after each injection for an 80% improvement in pain (as measured by accepted pain scales) and evidence of functional improvement. It is recommended that morning cortisol levels are checked prior to the 3<sup>rd</sup> or 4<sup>th</sup> steroid injection.

**b. Intradiscal Steroid Therapy:**

- There is some evidence that intradiscal steroid injection is unlikely to relieve pain or provide functional benefit in patients with non-radicular back pain therefore they are ***not recommended*** (Khot, 2005).

- Intradiscal injections of other substances such as bone marrow, stem cells, are **not recommended** at this time due to lack of evidence and possible complications (Subach, 2012).

**c. Transforaminal Injection with Etanercept:**

- i. Description - Transforaminal injection with a tumor necrosis factor alpha inhibitor is thought to decrease the inflammatory agents which may be associated with the pathophysiology of lumbar radicular pain from a herniated disc.

It is **not recommended** due to the results of a study which showed no advantage over steroids or saline injections (Cohen, 2012).

**d. Zygapophyseal (Facet) Injection:**

- i. Description — This is an accepted intra-articular or pericapsular injection of local anesthetic and corticosteroid with very limited uses. There is no justification for a combined facet and medial branch block.

Facet injections have very limited use. Refer to F.3.a. Injections - Spinal Therapeutic.

- ii. Needle Placement: Multi-planar fluoroscopic imaging is required for all steroid injections. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement.

- iii. Indications: Patients with pain 1) suspected to be facet in origin based on exam findings and 2) affecting activity; OR patients who have refused a rhizotomy and appear clinically to have facet pain; OR patients who have facet findings with a thoracic component. The physician should document the findings which, for lumbar and cervical spine, consist of pain with extension and lateral bending with referral patterns consistent with the expected pathologic level. In these patients, facet injections may be occasionally useful in facilitating a functionally-directed rehabilitation program and to aid in identifying pain generators. Patients with recurrent pain should be evaluated with more definitive diagnostic injections, such as medial nerve branch injections, to determine the need for a rhizotomy. Because facet injections are not likely to produce long-term benefit by themselves and are not the most accurate diagnostic tool, they should not be performed at more than two levels, neither unilaterally nor bilaterally. Due to the lack of proof that these injections improve outcome, prior authorization is required (ISIS, 2013; [Cochrane] Staal, 2008). There is insufficient evidence to support the use of therapeutic cervical facet injections (Peloso, 2013). In the lumbar spine, a high quality meta-analysis provides good evidence against the use of lumbar facet or epidural injections for relief of non-radicular low back pain ([Cochrane] Staal, 2008). All injections should be preceded by an MRI or a CT scan.

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well

as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to continuing appropriate exercise with functionally directed rehabilitation usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy.

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the diagnostic value of the procedure is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for diagnostic purposes.

Light sedation and pain relief may be needed for some patients requiring therapeutic injection.

- ❖ Time to produce effect: Up to 30 minutes for local anesthetic; corticosteroid up to 72 hours.
- ❖ Frequency: 1 injection per level with a diagnostic response. A well-controlled, large retrospective cohort study found that individuals with the same risk factors for osteoporotic fractures were 20% more likely to suffer such a lumbar fracture if they had an epidural steroid injection. The risk increased with multiple injections (Mandel, 2013). Thus the risk of epidural injections must be carefully discussed with the patient, particularly for

patients over 60, and repeat injections should be generally avoided unless the functional goals to be reached outweigh the risk for future fracture. Patients with existing osteoporosis or other risk factors for osteoporosis should rarely receive steroid injections. It is unknown whether facet steroid injections contribute to increased vertebral fractures, however appropriate caution should be taken for at risk patients as described above. Facet injections may be repeated if they result in increased documented functional benefit for at least three months and at least an 80% initial improvement in pain scales as measured by accepted pain scales (such as VAS).

- ❖ Optimum duration: 2 injections for each applicable joint per year. Not to exceed two joint levels.
- ❖ Maximum Duration: 2 per level per year only when at least three months of functional benefit is documented. Prior authorization must be obtained for injections beyond two levels. It is recommended that morning cortisol levels are checked prior to the 3<sup>rd</sup> or 4<sup>th</sup> steroid injection.

**4. INJECTIONS – OTHER (INCLUDING RADIO FREQUENCY):** The following are in alphabetical order:

**a. Botulinum Toxin Injections:**

- i. Description: Used to temporarily weaken or paralyze muscles. These injections may reduce muscle pain in conditions associated with spasticity or dystonia. Neutralizing antibodies develop in at least 4% of patients treated with botulinum toxin type A, rendering it ineffective. Several antigenic types of botulinum toxin have been described. Botulinum toxin type B, first approved by the Food and Drug Administration (FDA) in 2001, is similar pharmacologically to botulinum toxin type A. It appears to be effective in patients who have become resistant to the type A toxin. The immune responses to botulinum toxins type A and B are not cross-reactive, allowing type B toxin to be used when type A action is blocked by antibody. Experimental work with healthy human volunteers suggests that muscle paralysis from type B toxin is not as complete or as long lasting as that resulting from type A. The duration of treatment effect of botulinum toxin type B for cervical dystonia has been estimated to be 12 to 16 weeks. Electromyography (EMG) needle guidance may permit more precise delivery of botulinum toxin to the target area.

There is strong evidence that botulinum toxin A has objective and symptomatic benefits over placebo for cervical dystonia (Costa, 2005).

Botulinum Injections are no longer generally recommended for cervicogenic or other headaches based on good evidence of lack of

effect ([Cochrane] Langevin, 2011; Linde, 2011, Aurora, 2011). There is good evidence that botulinum toxin is not more effective than placebo for reducing the frequency of episodic migraines (Shuhendler, 2009). It may be considered in a very small subset of patients with chronic migraines 12–15 days/month who have failed all other conservative treatment, including trials of at least three drug classes, and who have committed to any life style changes related to headache triggers (Jackson, 2012a, b).

ii. Indications: For conditions which produce chronic spasticity or dystonia. There should be evidence of limited range-of-motion prior to the injection. **Not recommended** for cervicogenic headaches. Refer to the Division's Traumatic Brain Injury (TBI) Medical Treatment Guidelines for indications regarding headache.

There is insufficient evidence to support its use for longer-term pain relief of other myofascial trigger points and it is likely to cause muscle weakness or atrophy if used repeatedly (Ferrante, 2005; Gobel, 2006; Porta, 2000). Examples of such consequences include subacromial impingement, as the stabilizers of the shoulder are weakened by repeated injections of trigger points in the upper trapezii. Therefore, it is **not recommended** for use for other myofascial trigger points (Abbott, 2007).

iii. Complications: There is good evidence that cervical botulinum toxin A injections cause transient dysphagia and neck weakness. Allergic reaction to medications, dry mouth and vocal hoarseness may also occur ([Cochrane] Costa, 2005). Rare systemic effects include flu-like syndrome, and weakening of distant muscle. There is an increased risk of systemic effects in patients with motor neuropathy or disorders of the neuromuscular junction.

- ❖ Time to Produce Effect: 24 to 72 hours post injection with peak effect by 4 to 6 weeks.
- ❖ Frequency: No less than 3 months between re-administration. Patients should be reassessed after each injection session for an 80% improvement in pain (as measured by accepted pain scales) and evidence of functional improvement for 3 months. A positive result would include a return to base line function, return to increased work duties, and measurable improvement in physical activity goals including return to baseline after an exacerbation.
- ❖ Optimum Duration: 3 to 4 months.
- ❖ Maximum Duration: Currently unknown. Repeat injections should be based upon functional improvement and therefore used sparingly in order to avoid development of antibodies that might



render future injections ineffective. In most cases, not more than four injections are appropriate due to accompanying muscle atrophy.

- b. Epiduroscopy and Epidural Lysis of Adhesions:** is an investigational treatment of cervical pain. It involves the introduction of a fiberoptic endoscope into the epidural space via the sacral hiatus. With cephalad advancement of the endoscope under direct visualization, the epidural space is irrigated with saline. Adhesiolysis may be done mechanically with a fiberoptic endoscope. The saline irrigation is performed with or without epiduroscopy and is intended to distend the epidural space in order to obtain an adequate visual field. It is designed to produce lysis of adhesions, which are conjectured to produce symptoms due to traction on painful nerve roots. Saline irrigation is associated with risks of elevated pressures which may impede blood flow and venous return, possibly causing ischemia of the cauda equina and retinal hemorrhage. Other complications associated with instrumented lysis include catheter shearing, need for catheter surgical removal, infection (including meningitis), hematoma, and possible severe hemodynamic instability during application. Although epidural adhesions have been postulated to cause chronic cervical pain, studies have failed to find a significant correlation between the level of fibrosis and pain or difficulty functioning. Studies of epidural lysis demonstrate no transient pain relief from the procedure (Dashfield, 2005). Given the low likelihood of a positive response, the additional costs and time requirement, and the possible complications from the procedure, epiduroscopy, or mechanical lysis, is **not recommended**.

Epiduroscopy-directed steroid injections are also **not recommended** because there is no evidence to support an advantage in using an epiduroscope with steroid injections (Manchikanti, 2005).

- c. Prolotherapy:** Also known as sclerotherapy consists of a series of injections of hypertonic dextrose, with or without glycerine and phenol, into the ligamentous structures of the neck. Its proponents claim that the inflammatory response to the injections will recruit cytokine growth factors involved in the proliferation of connective tissue, stabilizing the ligaments of the neck when these structures have been damaged by mechanical insults.

There is good evidence that prolotherapy alone is not an effective treatment for chronic low back pain ([Cochrane] Dagenais, 2007). Similarly, the use of prolotherapy for cervical pain is generally **not recommended**.

- d. Radio Frequency Ablation – Dorsal Nerve Root Ablation:** Due to the combination of adverse side effects, time-limited effectiveness, and mixed study results, this treatment is **not recommended**. Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines.

- e. Radio Frequency (RF) Denervation - Medial Branch Neurotomy/Facet Rhizotomy:**

- i. Description:** A procedure designed to denervate the facet joint by ablating the corresponding sensory medial branches. Continuous percutaneous radiofrequency is the method generally used. Pulsed radiofrequency should not be used as it may result in incomplete denervation. Cooled radiofrequency is generally **not recommended** due

to current lack of evidence.

There is some evidence that radiofrequency neurotomy relieves pain and restores function in patients whose neck pain arises from the facet joint but benefits beyond one year are not yet established (Lord, 1996). Generally, pain relief lasts 7-9 months and repeat radiofrequency neurotomy can be successful and last longer (Smuck, 2012). RF neurotomy is the procedure of choice over alcohol, phenol, or cryoablation. Precise positioning of the probe using fluoroscopic guidance is required because the maximum effective diameter of the device is a 5x8 millimeter oval. Permanent images should be recorded to verify placement of the device.

- ii. Needle Placement: Multi-planar fluoroscopic imaging is required for all injections. Injection of contrast dye to assure correct needle placement is required to verify the flow of medication. Permanent images are required to verify needle placement.
- iii. Indications: Those patients with proven, significant, facetogenic pain. This procedure is **not recommended** for patients with multiple pain generators or involvement of more than 3 levels of medial branch nerves.

Individuals should have met **all** of the following indications:

- Physical exam findings consistent with facet origin pain, **and**
- Positive response to controlled medial branch blocks, **and**
- At least 3 months of pain, unresponsive to 6-8 weeks of conservative therapies, including manual therapy, **and**
- A psychosocial screening (e.g., thorough psychosocial history, screening questionnaire) with treatment as appropriate has been undergone.

All patients should continue appropriate exercise with functionally directed rehabilitation. Active treatment, which patients will have had prior to the procedure, will frequently require a repeat of the sessions previously ordered (Refer to F.13. Therapy-Active).

It is obligatory that sufficient data be accumulated by the examiner performing this procedure such that the value of the medial branch block is evident to other reviewers. This entails documentation of patient response regarding the degree and type of response to specific symptoms. As recommended by the ISIS guidelines, the examiner should identify three or four measurable physical functions, which are currently impaired and can be objectively reassessed 30 minutes or more after the injection (ISIS, 2013). A successful block requires

documentation of positive functional changes by trained medical personnel experienced in measuring range of motion or assessing activity performance. The evaluator should be acquainted with the patient, in order to determine pre and post values, and preferably unaffiliated with the injectionist's office. Qualified evaluators include nurses, physician assistants, medical assistants, therapists, or non-injectionist physicians. To be successful the results should occur within the expected time frame and there should be pain relief of approximately 80% demonstrated by pre and post Visual Analog Scale (VAS) scores. Examples of functional changes include reaching and lifting. Additionally, a prospective patient completed pain diary must be recorded as part of the medical record that documents response hourly for a minimum requirement of the first 8 hours post injection or until the block has clearly worn off and preferably for the week following an injection. The diary results should be compared to the expected duration of the local anesthetic phase of the procedure. Responses must be identified as to specific body part (e.g., neck, arm pain). The practitioner must identify the local anesthetic used and the expected duration of response for diagnostic purposes.

In almost all cases, this will mean a reduction of pain to 1 or 2 on the 10-point Visual Analog Scale (VAS) correlated with functional improvement. The patient should also identify activities of daily living (ADLs) (which may include measurements of ROM) that are impeded by their pain and can be observed to document objective functional improvement in the clinical setting. Ideally, these activities should be assessed throughout the observation period for function. The observer should not be the physician who performed the procedure. It is suggested that this be recorded on a form similar to ISIS recommendations.

A separate comparative block on a different date should be performed to confirm the level of involvement prior to the rhizotomy. A comparative block uses anesthetics with varying lengths of activity. Medial Branch blocks are probably not helpful to determine the likelihood of success for spinal fusion.

The success rate of radiofrequency neurotomy is likely to decrease with lower percentages of pain relief from a medial branch block.

Informed decision making should also be documented for injections and all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. The purpose of spinal injections is to facilitate active therapy by providing short-term relief through reduction of pain. Patients should be encouraged to express their personal goals, outcome expectations and desires from treatment as well as any personal habits or traits that may be impacted by procedures or their possible side effects. All patients must commit to

continuing appropriate exercise with functionally directed rehabilitation usually beginning within 7 days, at the injectionist's discretion. Since most patients with these conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment. All injections must be accompanied by active therapy

- iv. Complications: Bleeding, infection, or neural injury. The clinician must be aware of the risk of developing a localized neuritis, or rarely, a deafferentation centralized pain syndrome as a complication of this and other neuroablative procedures. Spinal musculature atrophy is likely to occur especially with repeat procedures as a rhizotomy denervates the multifidas muscle in patients. For this reason, repeated rhizotomies and multiple level rhizotomies can be harmful by decreasing supportive spinal musculature. This is especially problematic for younger patients who may engage in athletic activities or workers with strenuous job requirements as the atrophy could result in increased injuries or pain, although this has not been documented.
- v. Post-Procedure Therapy: Active therapy. Implementation of a gentle aerobic reconditioning program (e.g., walking, neck range of motion exercise) and neck education within the first post-procedure week, barring complications. Instruction and participation in a long-term home-based program of ROM, core strengthening, postural or neuromuscular re-education, endurance, and stability exercises should be accomplished over a period of four to ten visits post-procedure. Patients who are unwilling to engage in this therapy should not receive this procedure.
- vi. Requirements for Repeat Radiofrequency Medial Branch Neurotomy (or additional-level RF Neurotomies): In some cases pain may recur. Successful RF Neurotomy usually provides from six to eighteen months of relief.

Due to denervation of spinal musculature repeated rhizotomies should be limited. Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines for details.

Before a repeat RF Neurotomy is done, a confirmatory medial branch injection should be performed if the patient's pain pattern presents differently than the initial evaluation. In occasional patients, additional levels of RF neurotomy may be necessary. The same indications and limitations apply.

**f. Transdiscal Biacuplasty –**

- i. Description – cooled radiofrequency procedure intended to coagulate fissures in the disc and surrounding nerves which could be pain generators.

It is **not recommended** due to lack of published data demonstrating effectiveness (ISIS, 2013).

**g. Trigger Point Injections and Dry Needling Treatment:**

- i. Description: Trigger point injections are a generally accepted treatment. Trigger point treatment can consist of dry needling or injection of local anesthetic, with or without corticosteroid, into highly localized, extremely sensitive bands of skeletal muscle fibers that produce local and referred pain when activated. Medication is injected in a four-quadrant manner in the area of maximum tenderness. Injection efficacy can be enhanced if injections are immediately followed by myofascial therapeutic interventions, such as vapo-coolant spray and stretch, ischemic pressure massage (myotherapy), specific soft tissue mobilization and physical modalities. There is conflicting evidence regarding the benefit of trigger point injections ([Cochrane] Staal, 2008). A truly blinded study comparing dry needle treatment of trigger points is not feasible. There is no evidence that injection of medications improves the results of trigger-point injections ([Cochrane] Staal, 2008). Needling alone may account for some of the therapeutic response. Needling must be performed by practitioners with the appropriate credentials in accordance with state and other applicable regulations.

There is no indication for conscious sedation for patients receiving trigger point injections. The patient must be alert to help identify the site of the injection.

- ii. Indications: Trigger point injections may be used to relieve myofascial pain and facilitate active therapy and stretching of the affected areas. They are to be used as an adjunctive treatment in combination with other treatment modalities such as active therapy programs. Trigger point injections should be utilized primarily for the purpose of facilitating functional progress. Patients should continue in an aggressive aerobic and stretching therapeutic exercise program as tolerated throughout the time period they are undergoing intensive myofascial interventions. Myofascial pain is often associated with other underlying structural problems and any abnormalities need to be ruled out prior to injection.

Trigger point injections are indicated in those patients where well circumscribed trigger points have been consistently observed, demonstrating a local twitch response, characteristic radiation of pain pattern and local autonomic reaction, such as persistent hyperemia following palpation. Generally, these injections are not necessary unless consistently observed trigger points are not responding to specific, noninvasive, myofascial interventions within approximately a 6-week time frame. However, trigger point injections may be occasionally effective when utilized in the patient with immediate, acute onset of neck pain.

iii. **Complications:** Potential but rare complications of trigger point injections include infection, pneumothorax, anaphylaxis, penetration of viscera, neurapraxia, and neuropathy. If corticosteroids are injected in addition to local anesthetic, there is a risk of local myopathy. Severe pain on injection suggests the possibility of an intraneural injection, and the needle should be immediately repositioned.

- ❖ Time to produce effect: Local anesthetic 30 minutes; 24 to 48 hours for no anesthesia.
- ❖ Frequency: Weekly. Suggest no more than 4 injection sites per session per week to avoid significant post-injection soreness.
- ❖ Optimum duration: 4 Weeks.
- ❖ Maximum duration: 8 weeks. Occasional patients may require 2 to 4 repetitions of trigger point injection series over a 1 to 2 year period.

**5. INTERDISCIPLINARY REHABILITATION PROGRAMS:** This is the gold standard of treatment for individuals with chronic pain who have not responded to less intensive modes of treatment. There is good evidence that interdisciplinary programs which include screening for psychological issues, identification of fear-avoidance beliefs and treatment barriers, and establishment of individual functional and work goals, will improve function and decrease disability (Dobscha, 2009; Lambeek, 2010). These programs should assess the impact of pain and suffering on the patient's medical, physical, psychological, social, and/or vocational functioning. In general, interdisciplinary programs evaluate and treat multiple and sometimes irreversible conditions, including but not limited to painful musculoskeletal, neurological, and other chronic pain conditions and psychological issues, drug dependence, abuse or addiction high levels of stress and anxiety, failed surgery; and pre-existing or latent psychopathology. The number of professions involved on the team in a chronic pain program may vary due to the complexity of the needs of the person served. The Division recommends consideration of referral to an interdisciplinary program within 6 months post-injury in patients with delayed recovery unless successful surgical interventions or other medical and/or psychological treatment complications intervene.

Chronic pain patients need to be treated as outpatients within a continuum of treatment intensity. Outpatient chronic pain programs are available with services provided by a coordinated interdisciplinary team within the same facility (formal) or as coordinated among practices by the authorized treating physician (informal). Formal programs are able to provide coordinated, high intensity level of services and are recommended for most chronic pain patients who have received multiple therapies during acute management.

Patients with addiction problems or high dose opioid or other drugs of abuse use may require inpatient and/or outpatient chemical dependency treatment programs before or in conjunction with other interdisciplinary rehabilitation. Guidelines from the American Society of Addiction Medicine are available and may be consulted relating to the intensity of services required for different classes of patients in order to achieve successful treatment.

Informal interdisciplinary pain programs may be considered for patients who are currently

employed, those who cannot attend all day programs, those with language barriers, or those living in areas not offering formal programs. Before treatment has been initiated, the patient, physician, and insurer should agree on treatment approach, methods, and goals. Generally the type of outpatient program needed will depend on the degree of impact the pain has had on the patient's medical, physical, psychological, social and/or vocational functioning.

When referring a patient for formal outpatient interdisciplinary pain rehabilitation, an occupational rehabilitation or an opioid treatment program, the Division recommends the program meets the criteria of the Commission on Accreditation of Rehabilitation Facilities (CARF).

Inpatient pain rehabilitation programs are rarely needed but may be necessary for patients with any of the following conditions: (a) High risk for medical instability; (b) Moderate-to-severe impairment of physical/functional status; (c) Moderate-to-severe pain behaviors; (d) Moderate impairment of cognitive and/or emotional status; (e) Dependence on medications from which he or she needs to be withdrawn; and (f) the need for 24-hour supervised nursing.

Whether formal or informal programs, they should be comprised of the following dimensions (CARF 2010-11):

- **Communication:** To ensure positive functional outcomes, communication between the patient, insurer and all professionals involved must be coordinated and consistent. Any exchange of information must be provided to all professionals, including the patient. Care decisions should be communicated to all and should include the family or other support system.
- **Documentation:** Through documentation by all professionals involved and/or discussions with the patient, it should be clear that functional goals are being actively pursued and measured on a regular basis to determine their achievement or need for modification.
- **Treatment Modalities:** Use of modalities may be necessary early in the process to facilitate compliance with and tolerance to therapeutic exercise, physical conditioning, and increasing functional activities. Active treatments should be emphasized over passive treatments. Active treatments should encourage self-coping skills and management of pain, which can be continued independently at home or at work. Treatments that can foster a sense of dependency by the patient on the caregiver should be avoided. Treatment length should be decided based upon observed functional improvement. For a complete list of active and passive therapies, refer to F.12. Therapy – Active and F.13. Therapy - Passive. All treatment timeframes may be extended based upon the patient's positive functional improvement.
- **Therapeutic Exercise Programs:** A therapeutic exercise program should be initiated at the start of any treatment rehabilitation. Such programs should emphasize education, independence, and the importance of an on-going exercise regimen. There is good evidence that exercise alone or part of a multi-disciplinary program results in decreased disability for workers with non-acute low back pain (Oesch, 2010). Results could be similar with the cervical spine. There is not sufficient evidence to support the recommendation of any particular exercise regimen over any other exercise regimen.

- **Return-to-Work:** The authorized treating physician should continually evaluate the patient for their potential to return to work. For patients currently employed, efforts should be aimed at keeping them employed. Formal rehabilitation programs should provide assistance in creating work profiles. For more specific information regarding return-to-work, refer to F.11. Return-to-work in this guideline.
- **Patient Education:** Patients with pain need to re-establish a healthy balance in lifestyle. All providers should educate patients on how to overcome barriers to resuming daily activity, including pain management, decreased energy levels, financial constraints, decreased physical ability, and change in family dynamics.
- **Psychosocial Evaluation and Treatment:** Psychosocial evaluation should be initiated, if not previously done. Providers of care should have a thorough understanding of the patient's personality profile; especially if dependency issues are involved. Psychosocial treatment may enhance the patient's ability to participate in pain treatment rehabilitation, manage stress, and increase their problem-solving and self-management skills.
- **Vocational Assistance:** Vocational assistance can define future employment opportunities or assist patients in obtaining future employment. Refer to F.11. Return-to-work for detailed information.

Interdisciplinary programs are characterized by a variety of disciplines that participate in the assessment, planning, and/or implementation of the treatment program. These programs are for patients with greater levels of perceived disability, dysfunction, de-conditioning and psychological involvement. Programs should have sufficient personnel to work with the individual in the following areas: behavior, functional, medical, cognitive, pain management, psychological, social and vocational.

**a. Formal Interdisciplinary Rehabilitation Programs:**

- i. **Interdisciplinary Pain Rehabilitation:** An Interdisciplinary Pain Rehabilitation Program provides outcomes-focused, coordinated, goal-oriented interdisciplinary team services to measure and improve the functioning of persons with pain and encourage their appropriate use of health care system and services. The program can benefit persons who have limitations that interfere with their physical, psychological, social, and/or vocational functioning. The program shares information about the scope of the services and the outcomes achieved with patients, authorized providers, and insurers.

The interdisciplinary team maintains consistent integration and communication to ensure that all interdisciplinary team members are aware of the plan of care for the patient, are exchanging information, and implement the plan of care. The team members make interdisciplinary team decisions with the patient and then ensure that decisions are communicated to the entire care team.

The Medical Director of the pain program should ideally be board certified in pain management; or be board certified in his or her specialty area and have completed a one year fellowship in interdisciplinary pain



medicine or palliative care recognized by a national board, or have two years' experience in an interdisciplinary pain rehabilitation program. Teams that assist in the accomplishment of functional, physical, psychological, social and vocational goal must include: a medical director, pain team physician(s), and pain team psychologist. Other disciplines on the team may include, but are not limited to: Biofeedback Therapist, Occupational Therapist, Physical Therapist, Registered Nurse, case manager, exercise physiologist, psychologist, psychiatrist, and/or nutritionist.

- ❖ Time to Produce Effect: 3 to 4 weeks
- ❖ Frequency: Full time programs - No less than 5 hours/day, 5 days/week; part-time programs- 4 hours/day for 2-3 days per week.
- ❖ Optimum Duration: 3 to 12 weeks at least 2-3 times a week. With follow up visits weekly or every other week during the first one to two months after the initial program is completed.
- ❖ Maximum duration: 4 months for full time programs and up to 6 months for part-time programs. Periodic review and monitoring thereafter for one year, additional follow up based upon the documented maintenance of functional gains.

ii. Occupational Rehabilitation: This is a formal interdisciplinary program addressing a patient's employability and return-to-work. It includes a progressive increase in the number of hours per day that a patient completes work simulation tasks until the patient can tolerate a full workday. A full workday is case specific and is defined by the previous employment of the patient. Safe workplace practices and education of the employer and social support system regarding the person's status should be included. This is accomplished by addressing the medical, psychological, behavioral, physical, functional, and vocational components of employability and return-to-work.

There is some evidence that an integrated care program, consisting of workplace interventions and graded activity teaching that pain need not limit activity, is effective in returning patients with chronic low back pain to work, even with minimal reported reduction of pain (Lambeek, 2010).

The occupational medicine rehabilitation interdisciplinary team should, at a minimum, be comprised of a qualified medical director who is board certified with documented training in occupational rehabilitation, team physicians having experience in occupational rehabilitation, occupational therapy and physical therapy.

As appropriate, the team may also include: chiropractor, registered nurse (RN), case manager, psychologist and vocational specialist or certified biofeedback therapist.

- ❖ Time to Produce Effect: 2 weeks.
- ❖ Frequency: 2 to 5 visits per week, up to 8 hours/day.
- ❖ Optimum Duration: 2 to 4 weeks.
- ❖ Maximum Duration: 6 weeks. Participation in a program beyond six weeks must be documented with respect to need and the ability to facilitate positive symptomatic and functional gains.

iii. Spinal Cord Programs:

Spinal Cord Systems of Care provide coordinated, case-managed, and integrated services for people with spinal cord dysfunction, whether due to trauma or disease. The system includes an inpatient component in an organization licensed as a hospital, as well as an outpatient component. Each component endorses the active participation and choice of the persons served throughout the entire program. The Spinal Cord System of Care also provides or formally links with key components of care that address the lifelong needs of the persons served.

This can include a highly structured program involving a team approach or can involve any of the components thereof. The interdisciplinary team should, at a minimum, be comprised of a qualified medical director who is board certified and trained in rehabilitation, a case manager, an occupational therapist, a physical therapist, a psychologist, a rehabilitation RN and MD/DO, and a therapeutic recreation specialist. As appropriate, the team may also include: a rehabilitation counselor, a respiratory therapist, a social worker, or a speech-language pathologist.

Timeframe durations for any spinal cord program should be determined based on the extent of the patient's injury and at the discretion of the rehabilitation physician in charge.

iv. Opioid/Chemical Treatment Programs: Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines.

b. Informal Interdisciplinary Rehabilitation Program: A coordinated interdisciplinary pain rehabilitation program is one in which the authorized treating physician coordinates all aspects of care. This type of program is similar to the formal programs in that it is goal oriented and provides interdisciplinary rehabilitation services to manage the needs of the patient in the following areas: (a) functional, (b) medical, (c) physical, (d) psychological, (e) social, and (f) vocational.

This program is different from a formal program in that it involves lower frequency and intensity of services/treatment. Informal rehabilitation is geared toward those patients who do not need the intensity of service offered in a formal program or who cannot attend an all-day program due to employment, daycare, language or other barriers.

Patients should be referred to professionals experienced in outpatient treatment of chronic pain. The Division recommends the authorized treating physician consult with physicians experienced in the treatment of chronic pain to develop the plan of care. Communication among care providers regarding clear objective goals and progress toward the goals is essential. Employers should be involved in return to work and work restrictions and the family/social support system should be included in the treatment plan. Other disciplines likely to be involved include biofeedback therapist, occupational therapist, physical therapist, registered nurse, psychologist, case manager, exercise physiologist, psychiatrist, and/or nutritionist.

- ❖ Time to Produce Effect: 3 to 4 weeks
- ❖ Frequency: Full time programs - no less than 5 hours/day, 5 days/week; Part time programs - 4 hours/day for 2-3 days per week.
- ❖ Optimum Duration: 3 to 12 weeks at least 2-3 times a week. With follow up visits weekly or every other week during the first one to two months after the initial program is completed.
- ❖ Maximum duration: 4 months for full time programs and up to 6 months for part-time programs. Periodic review and monitoring thereafter for one year, additional follow up based upon the documented maintenance of functional gains.

**6. MEDICATIONS:** Use in the treatment of cervical spine injuries is appropriate for controlling acute and chronic pain and inflammation. Use of medications will vary widely due to the spectrum of injuries, from simple strains to post-surgical healing. A thorough medication history, including use of alternative and over-the-counter medications, should be performed at the time of the initial visit and updated periodically. Treatment for pain control is initially accomplished with acetaminophen and/or nonsteroidal anti-inflammatory drugs (NSAIDs). The patient should be educated regarding the interaction of prescription and over-the-counter medications as well as the contents of over-the-counter herbal products. The medication lists below do not provide complete information on side effects or drug interactions. Providers should seek information from other sources for details.

The following are listed in alphabetical order:

**a. Acetaminophen:** An effective analgesic with anti-pyretic but not anti-inflammatory activity. Acetaminophen is generally well-tolerated, causes little or no gastrointestinal (GI) irritation, and is not associated with ulcer formation. Acetaminophen has been associated with liver toxicity in overdose situations or in chronic alcohol use. Patients may not realize that many over-the-counter preparations contain acetaminophen. The total daily dose of acetaminophen is recommended not to exceed three grams per 24-hour period, from all sources, including narcotic-acetaminophen combination preparations.

- ❖ Optimum Duration: 7 to 10 days.
- ❖ Maximum Duration: Extended use as indicated on a case-by-case basis. Use of this substance long-term (for 3 days per week or greater) may be associated with rebound pain upon cessation.

- b. Intravenous Steroids:** The benefits of preventing neurological damage from acute spinal cord compression in an emergent situation generally outweigh the risks of pharmacologic side effects from steroids.
- c. Muscle Relaxants:** Appropriate for muscle spasm with pain. There is strong evidence that non-benzodiazepine muscle relaxants are more effective than placebo for providing short-term pain relief in acute low back pain ([Cochrane] van Tulder, 2003). Thus, use for patients with acute neck pain due to spasm is also accepted. When prescribing these agents, physicians must seriously consider all central nervous system (CNS) side effects including drowsiness or dizziness and the fact that benzodiazepines may be habit-forming. Carisoprodol should not be used as its active metabolite, meprobamate is commonly abused. Use of benzodiazepines should be limited to the acute phase only. Due to their habit-forming potential, seizure risk following abrupt withdrawal, and documented contribution to deaths of patients on opioids due to respiratory depression extended use of muscle relaxants, particularly during the day, should be avoided. The physician should also consider interactions with other medications.

- ❖ Optimum Duration: 1 week.
- ❖ Maximum Duration: 2 weeks (or longer if used only at night).

- d. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs):** Useful for pain and inflammation. In mild cases, they may be the only drugs required for analgesia. There are several classes of NSAIDs, and the response of the individual injured worker to a specific medication is unpredictable. For this reason, a range of NSAIDs may be tried in each case, with the most effective preparation being continued. Patients should be closely monitored for adverse reactions. The FDA advises that many NSAIDs may cause an increased risk of serious cardiovascular thrombotic events, myocardial infarction, and stroke, which can be fatal. There is good evidence that naproxen has the least risk for cardiovascular events when compared to other NSAIDs (Trelle, 2011). Administration of proton pump inhibitors, Histamine 2 Blockers or prostaglandin analog misoprostol along with these NSAIDs may reduce the risk of duodenal and gastric ulceration, in those at higher risk for this adverse event (e.g. age > 60, concurrent antiplatelet or corticosteroid therapy). They do not impact possible cardiovascular complications (Hooper, 2004). Due to the cross-reactivity between aspirin and NSAIDs, NSAIDs should not be used in aspirin-sensitive patients, and it should be used with caution in all asthma patients. NSAIDs are associated with abnormal renal function, including renal failure, as well as, abnormal liver function. Patients with renal or hepatic disease may need increased dosing intervals with chronic NSAID use. Chronic use of NSAIDs is generally **not recommended** due to increased risk of cardiovascular events and GI bleeding.

Certain NSAIDs may have interactions with various other medications. Individuals may have adverse events not listed above. Intervals for metabolic screening are dependent on the patient's age and general health status and should be within parameters listed for each specific medication. Complete blood count (CBC) and liver and renal function should be monitored at least every six months in patients on chronic NSAIDs and initially when indicated.

- i. Non-Selective Non-Steroidal Anti-Inflammatory Drugs:**

Includes NSAIDs and acetylsalicylic acid (aspirin). Serious GI toxicity, such as bleeding, perforation, and ulceration can occur at any time, with

or without warning symptoms, in patients treated with traditional NSAIDs. Physicians should inform patients about the signs and/or symptoms of serious GI toxicity and what steps to take if they occur. Anaphylactoid reactions may occur in patients taking NSAIDs. NSAIDs may interfere with platelet function. Fluid retention and edema have been observed in some patients taking NSAIDs.

- ❖ Optimal Duration: 1 week.
- ❖ Maximum duration: 1 year. Use of these substances long-term (3 days per week or greater) is associated with rebound pain upon cessation.

ii. Selective Cyclo-oxygenase-2 (COX-2) Inhibitors:

COX-2 inhibitors differ from the traditional NSAIDs in adverse side effect profiles. The major advantages of selective COX-2 inhibitors over traditional NSAIDs are that they have less GI toxicity and no platelet effects. COX-2 inhibitors can worsen renal function in patients with renal insufficiency; thus, renal function may need monitoring.

COX-2 inhibitors should not be first-line for low risk patients who will be using an NSAID short-term but are indicated in select patients for whom traditional NSAIDs are not tolerated. Serious upper GI adverse events can occur even in asymptomatic patients. Patients at high risk for GI bleed include those who use alcohol, smoke, are older than 65, take corticosteroids or anti-coagulants, or have a longer duration of therapy. Celecoxib is contraindicated in sulfonamide allergic patients.

- ❖ Optimal Duration: 7 to 10 days.
- ❖ Maximum Duration: Chronic use is appropriate in individual cases. Use of these substances long-term (3 days per week or greater) is associated with rebound pain upon cessation.

- e. **Opioids:** Should be reserved for the treatment of acute severe neck pain. There are circumstances where prolonged use of opioids is justified based on diagnosis and severity of functional deficits, and in these cases, it should be documented and justified. In mild to moderate cases of neck pain, opioid medication should be used cautiously on a case-by-case basis. Adverse effects include respiratory depression, the development of physical and psychological dependence, and impaired alertness.

Opioid medications should be prescribed with strict time, quantity, and duration guidelines, and with definitive cessation parameters. Pain is subjective in nature and should be evaluated using a scale to rate effectiveness of the opioid prescribed. Any use beyond the maximum should be documented and justified based on the diagnosis and/or invasive procedures.

- ❖ Optimum Duration: 3 to 7 days.
- ❖ Maximum Duration: 2 weeks. Use beyond 2 weeks is acceptable in appropriate cases. Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines, which give a detailed discussion regarding medication use in chronic pain management. Use beyond 30 days after

non-traumatic injuries, or 6 weeks post-surgery after the original injury or post operatively is **not recommended**. If necessary the physician should access the Colorado Prescription Drug Monitoring Program (PDMP) and follow recommendations in Chronic Pain Guideline. This system allows the prescribing physician to see most of the controlled substances prescribed by other physicians for an individual patient.

**f. Oral Steroids:** Have limited use but are accepted in cases requiring potent anti-inflammatory drug effect. Two studies were identified for the treatment of herniated discs that did not qualify for evidence however both used comparison placebo groups and neither showed any long-term benefit regarding pain or disability (Holve, 2008; Haimovic, 1985). There is no adequate evidence supporting oral steroids for patients with low back or neck pain with or without radiculopathy, significant side effects are possible, and they are **not generally recommended** (Hopwood, 1993).

**g. Psychotropic/Anti-Anxiety/Hypnotic Agents:** May be useful for treatment of mild and chronic pain, dysesthesias, sleep disorders, and depression. Antidepressant medications, such as tricyclics and selective serotonin reuptake inhibitors (SSRIs), are useful for affective disorder and chronic pain management. Tricyclic antidepressant agents, in low doses, are useful for chronic neurogenic pain with difficulty sleeping but have more frequent side effects.

Anti-anxiety medications are best used for short-term treatment (i.e., less than 6 months). Accompanying sleep disorders are best treated with sedating antidepressants prior to bedtime. Frequently, combinations of the above agents are useful. As a general rule, physicians should assess the patient's prior history of substance abuse or depression prior to prescribing any of these agents. Due to the habit-forming potential of the benzodiazepines and other drugs found in this class, they are **not generally recommended**. Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines, which give a detailed discussion regarding medication use in chronic pain management.

- ❖ Optimum Duration: 1 to 6 months.
- ❖ Maximum Duration: 6 to 12 months, with monitoring.

**h. Tramadol:** May be useful in the relief of neck pain and has been shown to provide pain relief equivalent to that of commonly prescribed NSAIDs. Tramadol is an atypical opioid with norepinephrine and serotonin reuptake inhibition. It is not considered a controlled substance in the U.S. Although tramadol may cause impaired alertness, it is generally well-tolerated, does not cause GI ulceration, and does not exacerbate hypertension or congestive heart failure. Tramadol should be used cautiously in patients who have a history of seizures or who are taking medication that may lower the seizure threshold, such as monoamine oxidase (MAO) inhibitors, SSRIs, some muscle relaxants, and tricyclic antidepressants. Because it inhibits the reuptake of norepinephrine and serotonin, use with other agents that increase norepinephrine and/or serotonin (e.g. SNRIs, mirtazapine, TCAs, SSRIs) can result in serotonin syndrome. This medication has physically addictive properties, and withdrawal may follow abrupt discontinuation; thus, it is **not generally recommended** for those with prior opioid addiction.

- ❖ Optimum Duration: 3 to 7 days.

- ❖ Maximum Duration: 2 weeks. Use beyond 2 weeks is acceptable in appropriate cases.

**7.** **ORTHOTICS:** Primary principles and objectives of the application of cervical orthosis include: (a) control of the position through the use of control forces; (b) application of corrective forces to abnormal curvatures; (c) aid in spinal stability when soft tissues or osteoligamentous structures cannot sufficiently perform their role as spinal stabilizers; and (d) restrict spinal segment movement after acute trauma or surgical procedure. In cases of traumatic cervical injury, the most important objective is the protection of the spinal cord and nerve root.

**a. Cervical Collars:**

- i. Soft collars are well-tolerated by most patients but may not significantly restrict motion in any plane and may be associated with delayed recovery. There is no evidence that their use promotes recovery from isolated cervical sprain. In acute strain/sprain type injuries, use of cervical collars may prolong disability, limit early mobilization, promote psychological dependence, and limit self-activity. There is some evidence that patients encouraged to continue usual activity have less neck stiffness and headache than patients placed in cervical collars and placed on sick leave following motor vehicle crashes (Borchgrevink, 1998).

There is some evidence that semi-hard collars worn during the day for 3 weeks and then weaned over three weeks may hasten resolution of recent onset cervical radiculopathy (Kuijper, 2009).

- ii. Rigid collars, such as a Philadelphia Orthosis, are useful post-operatively or in emergency situations. These collars restrict flexion and extension motion, and to a lesser degree, lateral bending and rotation. Duration of wear post-surgery is dependent on the surgeon and degree of cervical healing, but it is generally not used beyond eight weeks.

- b. **Poster Appliances:** Poster appliances, such as the Miami brace, restrict flexion and extension motion to about the same degree as a Philadelphia collar, and to a greater degree, lateral bending and rotation. **Not recommended** in sprain or strain injuries.

- c. **Cervicothoracic Orthosis:** such as Yale and sternal occipital mandibular immobilization (SOMI) type braces, restrict flexion and extension motion to a greater degree than the Philadelphia collar and more efficiently restrict lateral bending and rotation. **Not recommended** in sprain or strain type injuries.

- d. **Halo Devices:** Used in the treatment of cervical fracture, dislocation, and instability at the discretion of the treating surgeon. Refer to halo devices in [Section G.1.a. Halo Immobilization](#).

- e. **Other Orthosis Devices and Equipment:** Special orthosis or equipment may have a role in the rehabilitation of a cervical injury, such as those injuries to a cervical nerve root resulting in upper extremity weakness or a spinal cord injury with some degree of paraparesis or tetraparesis. Use of such devices should be in a structured rehabilitation setting as part of a comprehensive rehabilitation program.

**8. EDUCATION/INFORMED DECISION MAKING** of the patient and family, as well as the employer, insurer, policy makers and the community should be the primary emphasis in the treatment of low back/neck pain and disability. Unfortunately, practitioners often think of education and informed decision making last, after medications, manual therapy, and surgery.

Informed decision making is the hallmark of a successful treatment plan. In most cases the continuum of treatment from the least invasive to the most invasive (e.g. surgery) should be discussed. The intention is to find the treatment along this continuum which most completely addresses the condition. Patients should identify their personal functional goals of treatment at the first visit. It is recommended that specific individual goals are articulated at the beginning of treatment as this is likely to lead to increased patient satisfaction above that achieved from improvement in pain or other physical function (Hazard, 2009). There is some evidence that a 2 day course focusing on the biopsychosocial model with an emphasis on the goals of returning to usual activities and fitness is as effective in reducing disability as six sessions of manual therapy sessions provided by physiotherapists and more limited patient education (Hay, 2005). Progress toward the individual functional goals identified should be addressed at follow up-visits and throughout treatment by other members of the health care team as well as the authorized physicians.

Documentation of this process should occur whenever diagnostic tests or referrals from the authorized treating physician are contemplated. The informed decision making process asks the patient to set their personal functional goals of treatment, describe their current health status and any concerns they have regarding adhering to the diagnostic or treatment plan proposed. The provider should clearly describe the following:

- The expected functional outcomes from the proposed treatment, or expected results and plan of action if diagnostic tests are involved.
- Any side effects and risks to the patient.
- Required post treatment rehabilitation time and impact on work, if any.
- Alternative therapies or diagnostic testing.

Before diagnostic tests or referrals for invasive treatment take place the patient should be able to clearly articulate the goals of the intervention, the general side effects and risks associated with it and their decision regarding compliance with the suggested plan. One study indicated that information provided only by video might not be sufficient education (Newcomer, 2008).

Practitioners must develop and implement an effective strategy and skills to educate patients, employers, insurance systems, policy makers, and the community as a whole. An education-based paradigm should always start with providing reassuring information to the patient and informed decision making. More in-depth education currently exists within a treatment regimen employing functional restoration, prevention, and cognitive behavioral techniques. Patient education and informed decision making should facilitate self-management of symptoms and prevention.

- ❖ Time to produce effect: Varies with individual patient
- ❖ Frequency: Should occur at every visit.



## **9. PERSONALITY/PSYCHOLOGICAL/PSYCHOSOCIAL INTERVENTION**

Psychosocial treatment is a well-established therapeutic and diagnostic intervention with selected use in acute pain problems, and more widespread use in sub-acute and chronic pain populations. Psychosocial treatment is recommended as an important component in the total management of a patient with chronic pain and should be implemented as soon as the problem is identified.

If a diagnosis consistent with the standards of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM) has been determined, the patient should be evaluated for the potential need for psychiatric medications. Use of any medication to treat a diagnosed condition may be ordered by the authorized treating physician or by the consulting psychiatrist. Visits for management of psychiatric medications are medical in nature and are not a component of psychosocial treatment. Therefore, separate visits for medication management may be necessary, depending on the patient and medications selected

Psychosocial interventions include psychotherapeutic treatments for mental health conditions, as well as behavioral medicine treatments. These interventions may similarly be beneficial for patients without psychiatric conditions, but who may need to make major life changes in order to cope with pain or adjust to disability. Examples of these treatments include cognitive behavioral therapy, relaxation training, mindfulness training, and sleep hygiene training.

The screening or diagnostic workup should clarify and distinguish between pre-existing, aggravated, and/or purely causative psychological conditions. Therapeutic and diagnostic modalities include, but are not limited to, individual counseling, and group therapy. Treatment can occur within an individualized model, a multi-disciplinary model, or within a structured pain management program.

A psychologist with a PhD, PsyD, EdD credentials, or a psychiatric MD/DO may perform psychosocial treatments. Other licensed mental health providers or licensed health care providers with training in cognitive behavior therapy (CBT), or certified as CBT therapists working in consultation with a PhD, PsyD, EdD, or psychiatric MD/DO; and with experience in treating chronic pain disorders in injured workers may also perform treatment.

Cognitive behavioral therapy (CBT) refers to a group of psychological therapies that are sometimes referred to by more specific names, such as Rational Emotive Behavior Therapy, Rational Behavior Therapy, Rational Living Therapy, Cognitive Therapy, and Dialectic Behavior Therapy. Variations of CBT methods can be used to treat a variety of conditions, including chronic pain, depression, anxiety, phobias and post-traumatic stress disorder (PTSD). For patients with multiple diagnoses, more than one type of CBT might be needed. The CBT used in research studies is often "manualized CBT", meaning that the treatment follows a specific protocol in a manual (Thorn, 2004). In clinical settings, CBT may involve the use of standardized materials, but is also commonly adapted by a psychologist or psychiatrist to the patient's unique circumstances. If the CBT is being performed by a non-mental health professional, a manual approach would be strongly recommended. CBT must be distinguished from neuropsychological therapies used to teach compensatory strategies to brain injured patients, which are also called "cognitive therapy."

It should be noted that most clinical trials on CBT exclude subjects who have significant psychiatric diagnoses. Consequently, the selection of patients for CBT should include the following considerations. CBT is instructive and structured, using an educational model

with homework to teach inductive rational thinking. Because of this educational model, a certain level of literacy is assumed for most CBT protocols. Patients who lack the cognitive and educational abilities required by a CBT protocol are unlikely to be successful. Further, given the highly structured nature of CBT, it is more effective when a patient's circumstances are relatively stable. For example, if a patient is about to be evicted, is actively suicidal, or coming to sessions intoxicated, these matters will generally preempt CBT treatment for pain, and require other types of psychotherapeutic response. Conversely, literate patients whose circumstances are relatively stable, but catastrophize or cope poorly with pain or disability are often good candidates for CBT for pain. Similarly, literate patients whose circumstances are relatively stable, but who exhibit unfounded medical phobias are often good candidates for CBT for anxiety.

There is good evidence that psychological interventions, especially CBT, are superior to no psychological intervention for chronic low back pain, and that self-regulatory interventions such as biofeedback and relaxation training may be equally effective (Hoffman, 2007). There is good evidence that 6 sessions of 1.5 hour group therapy focused on CBT skills improved function and alleviated pain in uncomplicated subacute and chronic low back pain patients (Lamb, 2010). There is some evidence that CBT provided in seven two-hour small group sessions can reduce the severity of insomnia in chronic pain patients (Currie, 2000). A Cochrane meta-analysis grouped very heterogeneous behavioral interventions and concluded that there was good evidence that CBT may reduce pain and disability but the effect size was uncertain ([Cochrane] Eccleston, 2009). In total, the evidence clearly supports cognitive behavioral therapy and it should be offered to all chronic pain patients who do not have other serious issues, as discussed above.

CBT is often combined with active therapy in an interdisciplinary program formal or informal. It must be coordinated with a psychologist or psychiatrist. Cognitive behavioral therapy can be done in a small group or individually and the usual number of treatments varies between 8 and 16 sessions. There is some evidence that cognitive behavioral intervention with or without physical therapy reduces neck related disability in the long term, sick leave and health care utilization. The therapy consisted of 6 2-hour sessions given weekly (Linton, 2005).

Before CBT is done, the patient must have a full psychological evaluation. The CBT program must be done under the supervision of a PhD, PsyD, EdD, or psychiatric MD/DO.

Psychological DSM Axis I disorders are common in chronic pain. One study demonstrated that the majority of patients who had failed other therapy and participated in an active therapy also suffered from major depression. However, in a program which included CBT and other psychological counseling the success rate for return to work was similar for those with and without a DSM IV diagnosis. This study further strengthens the argument for having some psychological intervention included in all chronic pain treatment plans (Gatchel, 1994).

For all psychological/psychiatric interventions, an assessment and treatment plan with measurable behavioral goals, time frames, and specific interventions planned, **must** be provided to the treating physician prior to initiating treatment. A status report **must** be provided to the authorized treating physician every two weeks during initial more frequent treatment and monthly thereafter. The report should provide documentation of progress towards functional recovery and discussion of the psychosocial issues affecting the patient's ability to participate in treatment. The report should also address pertinent issues such as pre-existing, aggravated, and/or causative, as well as realistic functional prognosis.

**a. Cognitive Behavioral Therapy (CBT) or similar treatment:**

- ❖ Time to Produce Effect: 6 to 8 1-2 hour session, group or individual, 1 hour individual or two-hour group.
- ❖ Maximum Duration: 16 sessions.

NOTE: Before CBT is done, the patient must have a full psychological evaluation. The CBT program must be done under the supervision of a PhD, PsyD, EdD, or Psychiatric MD/DO.

**b. Other psychological/psychiatric interventions:**

- ❖ Time to Produce Effect: 6 to 8 weeks.
- ❖ Frequency: 1 to 2 times weekly for the first 2 weeks (excluding hospitalization, if required), decreasing to 1 time per week for the second month. Thereafter, 2 to 4 times monthly with the exception of exacerbations which may require increased frequency of visits. Not to include visits for medication management
- ❖ Optimum Duration: 2 to 6 months.
- ❖ Maximum: 6 months. Not to include visits for medication management. For select patients, longer supervised psychological/psychiatric treatment may be required, especially if there are ongoing medical procedures or complications. If counseling beyond 6 months is indicated, the management of psychosocial risks or functional progress must be documented. Treatment plan/progress must show severity.

- 10. RESTRICTION OF ACTIVITIES** Continuation of normal daily activities is the recommendation for chronic pain patients since immobility will negatively affect rehabilitation. Prolonged immobility results in a wide range of deleterious effects, such as a reduction in aerobic capacity and conditioning, loss of muscle strength and flexibility, increased segmental stiffness, promotion of bone demineralization, impaired disc nutrition, and the facilitation of the illness role.

Immobility may range from bed rest to the continued use of orthoses, such as cervical collars. While these interventions may occasionally have been ordered in the acute phase, the provider should be aware of their impact on the patient's ability to adequately comply with and successfully complete rehabilitation. With cervical pain it is generally recommended that returning to stretching and range of motion early is likely to be beneficial. Significant restriction of range of motion may render the worker unsafe for driving.

Patients should be educated regarding the detrimental effects of immobility versus the efficacious use of limited rest periods. Adequate rest allows the patient to comply with active treatment and benefit from the rehabilitation program. In addition, complete work cessation should be avoided, if possible, since it often further aggravates the pain presentation and promotes disability. Modified return-to-work is almost always more efficacious and rarely contraindicated in the vast majority of injured workers with neck pain.

- 11. RETURN-TO-WORK**, and/or work-related activities whenever possible is one of the major components in chronic pain management and rehabilitation. There is some evidence that an integrated care program including workplace interventions and graded activity teaching that pain need not limit activity, is effective in returning patients with chronic low back pain to work, even with minimal reduction of pain (Lambeek, 2010). The effect may be similar for uncomplicated neck pain. Return-to-work is a subject that should be addressed by each workers' compensation provider at the first meeting with the injured employee, and be updated at each additional visit. A return-to-work format should be part of a company's health plan, knowing that return-to-work can decrease anxiety, reduce the possibility of depression, and reconnect the worker with society.

Because a prolonged period of time off work will decrease the likelihood of return to work, the first weeks of treatment are crucial in preventing and/or reversing chronicity and disability mindset. In complex cases, experienced nurse case managers may be required to assist in return-to-work. Other services, including psychological evaluation and/or treatment, jobsite analysis, and vocational assistance may be employed.

The following should be considered when attempting to return an injured worker with chronic pain to work.

- a. Job History Interview:** The authorized treating physician should perform a job history interview at the time of the initial evaluation and before any plan of treatment is established. Documentation should include the workers' job demands, stressors, duties of current job, and duties of job at the time of the initial injury. In addition, cognitive and social issues should be identified and treatment of these issues should be incorporated into the plan of care.
- b. Coordination of Care:** Management of the case is a significant part of return-to-work and may be the responsibility of the authorized treating physician, occupational health nurse, risk manager, or others. Case management is a method of communication between the primary provider, referral providers, insurer, employer, and employee. Because case management may be coordinated by a variety of professionals, the case manager should be identified in the medical record.
- c. Communication:** This is essential between the patient, authorized treating physician, employer, and insurer. Employers should be contacted to verify employment status, job duties and demands, and policies regarding injured workers. In addition, availability of temporary and permanent restrictions, for what duration, as well as other placement options should be discussed and documented. All communications in the absence of the patient are required to be documented and made available to the patient.
- d. Establishment of Return-To-Work Status:** Return-to-work for persons with chronic pain should be considered therapeutic, assuming that work is not likely to aggravate the basic problem or increase the discomfort. In most cases of chronic pain, the worker may not be currently working or even employed. The goal of return-to-work would be to implement a plan of care to return the worker to any level of employment with the current employer or to return them to any type of new employment.
- e. Establishment of Activity Level Restrictions:** A formal job description for the injured worker is necessary to identify physical demands at work and assist in the creation of modified duty. A jobsite evaluation may be utilized to identify applicable tasks such as pushing, pulling, lifting, reaching above shoulder level,

grasping, pinching, sitting, standing, posture, ambulatory distance and terrain, and if applicable, environment for temperature, air flow, noise and the number of hours that may be worked per day. Due to the lack of predictability regarding exacerbation of symptoms affecting function, an extended, occupationally focused functional capacity evaluation may be necessary to determine the patient's tolerance for job type tasks over a continued period of time. Job requirements should be reviewed for the entire 8 hours or more of the working day. Between one and three days after the evaluation, there should be a follow-up evaluation by the treating therapist and/or the authorized treating physician to assess the patient's status. When prescribing the FCE, the physician must assess the probability of return to work against the potential for exacerbation of the work related condition. Work restrictions assigned by the authorized treating physician may be temporary or permanent. The case manager should continue to seek out modified work until restrictions become less cumbersome or as the worker's condition improves or deteriorates.

- f. Rehabilitation and Return-To-Work:** As part of rehabilitation, every attempt should be made to simulate work activities so that the authorized treating physician may promote adequate job performance. The use of ergonomic or adaptive equipment, therapeutic breaks, and interventional modalities at work may be necessary to maintain employment.
- g. Vocational Assistance:** Formal vocational rehabilitation is a generally accepted intervention and can assist disabled persons to return to viable employment. Assisting patients to identify vocational goals will facilitate medical recovery and aid in the achievement of maximum medical improvement (MMI) by 1) increasing motivation towards treatment and 2) alleviating the patient's emotional distress. Chronic pain patients will benefit most if vocational assistance is provided during the interdisciplinary rehabilitation phase of treatment. To assess the patient's vocational capacity, a vocational assessment utilizing the information from occupational and physical therapy assessments may be utilized to identify rehabilitation program goals, as well as optimize both patient motivation and utilization of rehabilitation resources. This may be extremely helpful in decreasing the patient's fear regarding an inability to earn a living which can add to their anxiety and depression.

Recommendations to employers and employees of small businesses: employees of small businesses who are diagnosed with chronic pain may not be able to perform any jobs for which openings exist. Temporary employees may fill those slots while the employee functionally improves. Some small businesses hire other workers and if the injured employee returns to the job, the supervisor/owner may have an extra employee. To avoid this, it is suggested that case managers be accessed through their payer or third party administrator. Case managers may assist with resolution of these problems, as well as assist in finding modified job tasks, or find jobs with reduced hours, etc., depending upon company philosophy and employee needs.

Recommendations to Employers and Employees of mid-sized and Large Businesses – Employers are encouraged by the Division to identify modified work within the company that may be available to injured workers with chronic pain who are returning to work with temporary or permanent restrictions. To assist with temporary or permanent placement of the injured worker, it is suggested that a program be implemented that allows the case manager to access descriptions of all jobs within the organization.

**12. THERAPY – ACTIVE:** The following active therapies are widely used and accepted methods of care for a variety of work-related injuries. They are based on the philosophy that therapeutic exercise and/or activity are beneficial for restoring flexibility, strength, endurance, function, ROM, and can alleviate discomfort. Active therapy requires an internal effort by the individual to complete a specific exercise or task. This form of therapy requires supervision from a therapist or medical provider, such as verbal, visual, and/or tactile instruction(s). At times, the provider may help stabilize the patient or guide the movement pattern but the energy required to complete the task is predominately executed by the patient.

Education and counseling should include 1) understanding of the strength inherent in the human spine, spinal neutral postures, and stabilization musculature (e.g., multifidus muscles), 2) how neuroscience explains pain perception, 3) the favorable prognosis of neck pain, 4) use of active pain coping strategies that decrease fear and catastrophizing, 5) early resumption of normal activities while still experiencing pain, and 6) the importance of increasing activity levels. Patients should be instructed to continue active therapies at home as an extension of the treatment process in order to maintain improvement levels (Delitto, 2012). Follow-up visits to reinforce and monitor progress and proper technique are recommended. Home exercise can include exercise with or without mechanical assistance or resistance and functional activities with assistive devices. The patient's baseline and progress should be measured using validated tools such as the Neck Disability Index and the Patient –Specific Functional Scale for patient with neck pain.

Therapists should notify the authorized treating physician when 1) clinical findings suggest serious medical or psychological pathology, 2) reported activity limitations are not consistent with the diagnosis, or 3) symptoms are not improving subjectively or objectively after 4 weeks or resolving with interventions focused on normalizing body function. Various means can be used to measure the functional success of treatment however it appears that an increase of 5kg lifting or 7 points on the pain disability index may be useful (Gross, 2012).

On occasion, specific diagnoses and post-surgical conditions may warrant durations of treatment beyond those listed as "maximum." Factors such as exacerbation of symptoms, re-injury, interrupted continuity of care and co-morbidities may also extend durations of care. Specific goals with objectively measured functional improvement during treatment must be cited to justify extended durations of care. It is recommended that, if no functional gain is observed after the number of treatments under "time to produce effect" have been completed, then alternative treatment interventions, further diagnostic studies, or further consultations should be pursued.

The following active therapies are listed in alphabetical order:

**a. Activities of Daily Living (ADLs):** Well-established interventions that involve instruction, active-assisted training, and/or adaptation of activities or equipment to improve a person's capacity in normal daily activities such as self-care, work re-integration training, homemaking, and driving.

- ❖ Time to Produce Effect: 4 to 5 treatments.
- ❖ Frequency: 3 to 5 times per week.
- ❖ Optimum Duration: 4 to 6 weeks.
- ❖ Maximum Duration: 6 weeks.

**b. Functional Activities:** These are well-established interventions that involve the use of therapeutic activities to enhance mobility, body mechanics, employability, coordination, balance, and sensory motor integration.

- ❖ Time to Produce Effect: 4 to 5 treatments.
- ❖ Frequency: 3 to 5 times per week.
- ❖ Optimum Duration: 4 to 6 weeks.
- ❖ Maximum Duration: 6 weeks.

**c. Functional Electrical Stimulation:** This is an accepted treatment in which the application of electrical current elicits involuntary or assisted contractions of atrophied and/or impaired muscles. It may be indicated for muscle atrophy due to radiculopathy.

- ❖ Time to Produce Effect: 2 to 6 treatments.
- ❖ Frequency: 3 times per week.
- ❖ Optimum Duration: 8 weeks.
- ❖ Maximum Duration: 8 weeks. If beneficial, provide with home unit.

**d. Neuromuscular Re-education:** It is the skilled application of exercise with manual, mechanical, or electrical facilitation to enhance strength; movement patterns; neuromuscular response; proprioception, kinesthetic sense, and coordination; and education of movement, balance, and posture. Indications include the need to promote neuromuscular responses through carefully timed proprioceptive stimuli, elicit and improve motor activity in patterns similar to normal neurologically developed sequences, and improve neuromotor response with independent control. There are multiple types of neuromuscular education. Two specific types are described below.

**i. Spinal Stabilization:** is a type of neuromuscular re-education. The goal of this therapeutic program is to facilitate the attainment and maintenance of the spine in its patient-specific neutral and anatomically correct position. The stabilization is dynamic, which allows whole body movements while maintaining a stabilized spine. Progression of the program includes controlled movement of the spine to approximate normal biomechanical motions. It is the ability to move and function normally through postures and activities without creating undue vertebral stress. There is some evidence that an exercise program which includes resistance training of the cervical and scapulothoracic muscles, combined with stretching of the same muscles, is likely to be beneficial for mechanical neck pain ([Cochrane] Kay, 2012). There is some evidence that cervico-scapular endurance exercises are beneficial for chronic cervicogenic headache ([Cochrane] Kay, 2012).

**ii. Directional Preference:** This involves testing directional preference and incorporating the findings into exercise programs, commonly used in McKenzie therapy. Directional preference relies on a technique which tests the patient for a particular direction or directions of motion which,

on repetition, causes a centralization of pain toward the midline from pain which has peripheral components. It may be used for herniated discs and mechanical neck pain (May, 2012). There appears to be good interexaminer reliability within credentialed and diplomated therapists for classifying patients into main syndromes and subgroups (Kilpikoski, 2002; Clare, 2005). Most patients (70%) will be classified into the reducible derangement syndrome which relies on directional preference (May 2012). Seven visits may provide sufficient information for this evaluation (Werneke, 1999). There is some evidence that the McKenzie approach provides similar outcomes in improving pain, disability and ability to carry out “work activities” in comparison with cognitive behavioral therapy (Klaber Moffett, 2006). The studies taken as a group provide good evidence in support of the McKenzie therapy for neck pain.

Patients with a directional preference should engage in exercise regimens emphasizing the preferred position(s)/posture(s)/plane(s) and receive the appropriate education to facilitate its usage across a spectrum of activities including those at work. Following documented improvement of at least two weeks, gentle exercises moving against the original plane (or planes) of directional preference should be initiated., but always followed by exercises in the direction of the directional preference. Progression to the movements necessary to successfully perform the specific tasks necessary to resume full duty labor should occur according to the tolerance of the patient.

#### **Total Time Frames for all Neuromuscular Re-education**

- ❖ Time to Produce Effect: 4 to 8 treatments.
- ❖ Frequency: 3 to 5 times per week.
- ❖ Optimum Duration: 4 to 8 weeks.
- ❖ Maximum Duration: 8 weeks

**e. Therapeutic Exercise:** Therapeutic exercise with or without mechanical assistance or resistance, may include the following: isoinertial, isotonic, isometric and isokinetic types of exercises. Indications include the need for cardiovascular fitness, reduced edema, improved muscle strength, improved connective tissue strength and integrity, increased bone density, promotion of circulation to enhance soft tissue healing, improvement of muscle recruitment, improved proprioception and coordination, and increased ROM.

There is good evidence that adding exercise in combination with other interventions such as: 1) manipulation alone, or 2) manipulation and mobilization, or 3) mobilization, muscle energy, and stretching, is more effective than manipulation alone, mobilization alone, exercise alone, and other minimal intervention or education alone in reducing neck pain and disability (Bronfort, 2001; Walker, 2008; Miller, 2010; Cross, 2011). There is some evidence that mobilization, manipulation, and exercise does not provide greater long-term pain relief when compared to exercise alone (Miller, 2010).

There is good evidence that manipulation alone or mobilization alone provides immediate, short-term, and intermediate term relief for acute, subacute, and chronic neck pain ([Cochrane] Gross, 2010).



There is some evidence that cervico-scapular endurance exercise are beneficial for chronic cervicogenic headache ([Cochrane] Kay, 2012).

There is some evidence that a program of 2 sessions of thoracic thrust manipulation followed by a cervical exercise program is more effective than a cervical exercise program alone (Cross, 2011).

Therapeutic exercise programs should be specific to the injury and address general functional deficits as identified in the diagnosis and clinical assessment. Patients should be instructed in and receive a home exercise program that is progressed as their functional status improves. Upon discharge, the patient should be independent in the performance of the home exercise program and should have been educated in the importance of continuing such a program. Educational goals include the development of strategies to maintain or further improve function and to minimize the risk for aggravation of symptoms in the future.

For spinal stabilization or directional preference, McKenzie, refer to F.13.e. Neuromuscular Re-education. Therapeutic exercise can also include complementary/alternative exercise movement therapy (with oversight of a physician or appropriate healthcare professional).

- ❖ Time to Produce Effect: 2 to 6 treatments.
- ❖ Frequency: 3 to 5 times per week.
- ❖ Optimum Duration: 4 to 8 weeks.
- ❖ Maximum Duration: 8 weeks.

**f. Work Conditioning:** These generally accepted programs are work-related, outcome-focused, individualized treatment programs. Objectives of the program include, but are not limited to, improvement of cardiopulmonary and neuromusculoskeletal functions (strength, endurance, movement, flexibility, stability, and motor control functions), patient education, and symptom relief. The goal is for patients to gain full or optimal function and return to work. The service may include the time-limited use of modalities, both active and passive, in conjunction with therapeutic exercise, functional activities, general conditioning, body mechanics, and lifting techniques re-training.

These programs are usually initiated once reconditioning has been completed but may be offered at any time throughout the recovery phase. It should be initiated when imminent return of a patient to modified or full duty is not an option, but the prognosis for returning the patient to work at completion of the program is at least fair to good.

- ❖ Length of Visit: 1 to 2 hours per day.
- ❖ Frequency: 2 to 5 visits per week.
- ❖ Optimum Duration: 2 to 4 weeks.

- ❖ Maximum Duration: 6 weeks. Participation in a program beyond six weeks must be documented with respect to need and the ability to facilitate positive symptomatic or functional gains.

**g. Work Simulation:**

Work simulation is a program where an individual completes specific work-related tasks for a particular job and return to work. Use of this program is appropriate when modified duty can only be partially accommodated in the work place, when modified duty in the work place is unavailable, or when the patient requires more structured supervision. The need for work place simulation should be based upon the results of a functional capacity evaluation (FCE) and/or jobsite analysis.

- ❖ Length of Visit: 2 to 6 hours per day.
- ❖ Frequency: 2 to 5 visits per week.
- ❖ Optimum Duration: 2 to 4 weeks.
- ❖ Maximum Duration: 6 weeks. Participation in a program beyond 6 weeks must be documented with respect to need and the ability to facilitate positive symptomatic or functional gains.

- 13. THERAPY – PASSIVE:** Most of the following passive therapies and modalities are generally accepted methods of care for a variety of work-related injuries. Passive therapy includes those treatment modalities that do not require energy expenditure on the part of the patient. They are principally effective during the early phases of treatment and are directed at controlling symptoms such as pain, inflammation, and swelling and to improve the rate of healing soft tissue injuries. They should be used adjunctively with active therapies such as postural stabilization and exercise programs to help control swelling, pain, and inflammation during the active rehabilitation process. Please refer to F.12. Therapy - Active. Passive therapies may be used intermittently as a therapist deems appropriate or regularly if there are specific goals with objectively measured functional improvements during treatment.

The following passive therapies are listed in alphabetical order:

- a. Electrical Stimulation (Unattended):** An accepted treatment. Once applied, unattended electrical stimulation requires minimal on-site supervision by the physical therapist, occupational therapist, or other provider. Indications include, muscle spasm, atrophy, and the need for osteogenic stimulation. A home unit should be purchased if treatment is effective, and frequent use is recommended.

- ❖ Time to Produce Effect: 2 to 4 treatments.
- ❖ Frequency: Varies, depending on indication, from between 2 to 3 times per day to 1 time per week. A home unit should be purchased if treatment is effective, and frequent use is recommended.
- ❖ Optimum Duration: 4 treatments for clinic use.
- ❖ Maximum Duration: 8 treatments for clinic use.

**b. Iontophoresis:** There is no proven benefit for this therapy in the neck. **Not recommended** due to lack of evidence in the cervical spine.

**c. Manipulation:** Manipulative treatment (not therapy) is defined as the therapeutic application of manually guided forces by an operator to improve physiologic function and/or support homeostasis that has been altered by the injury or occupational disease, and has associated clinical significance.

There is good evidence that manipulation alone or mobilization alone provides immediate, short-term, and intermediate term relief for acute, subacute, and chronic neck pain ([Cochrane] Gross, 2010).

There is good quality evidence that adding exercise in combination with other interventions such as: 1) manipulation alone, or 2) manipulation and mobilization, or 3) mobilization, muscle energy, and stretching, is more effective than manipulation alone, mobilization alone, and other minimal intervention or education alone in reducing neck pain (Bronfort, 2001; Walker, 2008; Miller, 2010; Cross, 2011). There is some evidence that a three week program of twice weekly exercise with manual therapy excluding mobilization and stretching reduces neck pain and disability compared to minimal interventions (Walker, 2008). There is some evidence that mobilization, manipulation, and exercise does not provide greater long-term pain relief when compared to exercise alone (Miller, 2010).

There is some evidence that thoracic thrust manipulation may improve pain and function for mechanical neck pain ([Cochrane] Gross, 2010).

There is some evidence that a program of 2 session of thoracic thrust manipulation followed by a cervical exercise program is more effective than a cervical exercise program alone (Cross, 2011).

There is some evidence that spinal manipulation is effective for treatment of cervicogenic headaches ([Cochrane] Bronfort, 2004). There is some evidence that exercise is equally efficacious as manipulation and can be used in combination with manipulation ([Cochrane] Bronfort, 2004). The usual course of treatment was 3-6 weeks and effects were still found at one year ([Cochrane] Bronfort, 2004).

Manipulative treatments may be applied by osteopathic physicians (D.O.), chiropractors (D.C.), properly trained physical therapists (P.T.), properly trained occupational therapists (O.T.), or properly trained medical doctors (M.D.). Some popular and useful techniques include, but are not limited to, high velocity, low amplitude (HVLA), muscle energy (ME), strain-counterstrain, a balanced ligamentous tension (BLT) and myofascial release (MFR). Under these different types of manipulation exist many subsets of techniques that can be described as: (a) direct- a forceful engagement of a restrictive/pathologic barrier, (b) indirect- a gentle/non-forceful disengagement of a restrictive/pathologic barrier, (c) the patient actively assists in the treatment and (d) the patient relaxing, allowing the practitioner to move and balance the body tissues. When the proper diagnosis is made and coupled with the appropriate technique, manipulation has no contraindications and can be applied to all tissues of the body, including muscles, tendons, ligaments, joints, fascia, and viscera. Pre-treatment assessment should be performed as part of each manipulative treatment visit to ensure that the correct diagnosis and correct treatment are employed.

Contraindications to HVLA manipulation include joint instability, fractures, severe

osteoporosis, infection, metastatic cancer, active inflammatory arthritides, and signs of progressive neurologic deficits, myelopathy, vertebrasilar insufficiency, or carotid artery disease. Relative contraindications include stenosis, spondylosis, and disc herniation.

- ❖ Time to Produce Effect: 4 to 6 treatments.
- ❖ Frequency: 1 to 2 times per week for the first 2 weeks as indicated by the severity of the condition. Treatment may continue at 1 treatment per week for the next 6 weeks.
- ❖ Optimum Duration: 8 weeks.
- ❖ Maximum Duration: 8 weeks. At week 8, patients should be re-evaluated. Care beyond 8 weeks may be indicated for certain chronic pain patients in whom manipulation is helpful in improving function, decreasing pain, and improving quality of life. In these cases, treatment may be continued at one treatment every other week until the patient has reached MMI and maintenance treatments have been determined. Extended durations of care beyond what is considered "maximum" may be necessary in cases of re-injury, interrupted continuity of care, exacerbation of symptoms, and in those patients with co-morbidities. Such care should be re-evaluated and documented on a monthly basis.

**d. Manipulation under General Anesthesia (MUA):** Refers to manual manipulation of the cervical spine in combination with the use of a general anesthetic or conscious sedation. It is intended to improve the success of manipulation when pain, muscle spasm, guarding, and fibrosis appear to be limiting its application in patients otherwise suitable for its use. There have been no high quality studies to justify MUAs benefits. Given the risks of general anesthetic and conscious sedation, it is ***not recommended***.

**e. Manipulation under Joint Anesthesia (MUJA):** Refers to manipulation of the cervical spine in combination with a fluoroscopically guided injection of anesthetic with or without corticosteroid agents into the facet joint at the level being manipulated. There are no controlled clinical trials to support its use. It is ***not recommended***.

**f. Massage – Manual or Mechanical:** Massage is a generally well-accepted treatment consisting of manipulation of soft tissue with broad ranging relaxation and circulatory benefits. This may include stimulation of acupuncture points and acupuncture channels (acupressure), application of suction cups and techniques that include pressing, lifting, rubbing, pinching of soft tissues by or with the practitioner's hands. Indications include edema (peripheral or hard and non-pliable edema), muscle spasm, adhesions, the need to improve peripheral circulation and ROM, or to increase muscle relaxation and flexibility prior to exercise.

As with all passive therapies, massage must be accompanied by exercise and patient education.

- ❖ Time to Produce Effect: Immediate.
- ❖ Frequency: 1 to 2 times per week.

- ❖ Optimum Duration: 6 weeks.
- ❖ Maximum Duration: 2 months.

**g. Mobilization (Joint):** A mobilization treatment consisting of passive movement involving oscillatory motions to the vertebral segment(s). The passive mobility is performed in a graded manner (I, II, III, IV, or V), which depicts the speed and depth of joint motion during the maneuver.

There is good evidence that manipulation alone or mobilization alone provides immediate, short-term, and intermediate term relief for acute, subacute, and chronic neck pain ([Cochrane] Gross, 2010).

There is good quality evidence that adding exercise in combination with other interventions such as: 1) manipulation alone, or 2) manipulation and mobilization, or 3) mobilization, muscle energy, and stretching, is more effective than manipulation alone, mobilization alone, and other minimal intervention or education alone in reducing neck pain (Bronfort, 2001; Walker, 2008; Miller, 2010; Cross, 2011). There is some evidence that a three week program of twice weekly exercise with manual therapy excluding mobilization and stretching reduces neck pain and disability compared to minimal interventions (Walker, 2008). There is some evidence that mobilization, manipulation, and exercise does not provide greater long-term pain relief when compared to exercise alone (Miller, 2010).

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There is some evidence that spinal manipulation is effective for treatment of cervicogenic headaches ([Cochrane] Bronfort, 2004). There is some evidence that exercise is equally efficacious as manipulation and can be used in combination with manipulation ([Cochrane] Bronfort, 2004). The usual course of treatment was 3-6 weeks and effects were still found at one year ([Cochrane] Bronfort, 2004).

For further discussion on grade V joint mobilization, please refer to F.13.c. Manipulation for HVLA manipulation. It may include skilled manual joint tissue stretching. Indications include the need to improve joint play, segmental alignment, improve intracapsular arthrokinematics, or reduce pain associated with tissue impingement. Mobilization should be accompanied by active therapy.

For grade V mobilization, contraindications include joint instability, fractures, severe osteoporosis, infection, metastatic cancer, active inflammatory arthritides, and signs of progressive neurologic deficits, myelopathy, vertebrobasilar insufficiency, or carotid artery disease. Relative contraindications include stenosis, spondylosis, and disc herniation.

- ❖ Time to Produce Effect: 6 to 9 treatments.
- ❖ Frequency: Up to 3 times per week.

- ❖ Optimum Duration: 4 to 6 weeks.
- ❖ Maximum Duration: 6 weeks.

**h. Mobilization (Soft Tissue):** A generally well-accepted treatment. Mobilization of soft tissue is the skilled application of muscle energy, strain/counter strain, myofascial release, manual trigger point release, and other manual therapy techniques designed to improve or normalize movement patterns through the reduction of soft tissue pain and restrictions. These can be interactive with the patient participating or can be with the patient relaxing and letting the practitioner move the body tissues. Indications include muscle spasm around a joint, trigger points, adhesions, and neural compression. Mobilization should be accompanied by active therapy.

- ❖ Time to Produce Effect: 4 to 9 treatments.
- ❖ Frequency: Up to 3 times per week.
- ❖ Optimum Duration: 4 to 6 weeks.
- ❖ Maximum Duration: 6 weeks.

**i. Short-Wave Diathermy:** An accepted treatment that involves the use of equipment that exposes soft tissue to a magnetic or electrical field. Indications include enhanced collagen extensibility before stretching, reduced muscle guarding, reduced inflammatory response, and enhanced reabsorption of hemorrhage/hematoma or edema.

- ❖ Time to Produce Effect: 2 to 4 treatments.
- ❖ Frequency: 2 to 3 times per week up to 3 weeks.
- ❖ Optimum Duration: 3 to 5 weeks.
- ❖ Maximum Duration: 5 weeks.

**j. Superficial Heat and Cold Therapy (Excluding Infrared Therapy):** A generally accepted treatment. Superficial heat and cold are thermal agents applied in various manners that lower or raise the body tissue temperature for the reduction of pain, inflammation, and/or effusion resulting from injury or induced by exercise. It includes application of heat just above the surface of the skin at acupuncture points. Indications include acute pain; edema and hemorrhage; and the need to increase pain threshold, reduce muscle spasm, and promote stretching/flexibility. Cold and heat packs can be used at home as an extension of therapy in the clinic setting.

- ❖ Time to Produce Effect: Immediate.
- ❖ Frequency: 2 to 5 times per week.
- ❖ Optimum Duration: 3 weeks as primary or intermittently as an adjunct to other therapeutic procedures up to 2 months.
- ❖ Maximum Duration: 2 months.

**k. Traction – Manual:** This is an accepted treatment and an integral part of manual manipulation or joint mobilization. Indications include decreased joint space, muscle spasm around joints, and the need for increased synovial nutrition and response. Manual traction is contraindicated in patients with tumor, infection, fracture, or fracture dislocation. Best practice suggests that this modality be accompanied by active therapy.

- ❖ Time to Produce Effect: 1 to 3 sessions.
- ❖ Frequency: 2 to 3 times per week.
- ❖ Optimum Duration: 30 days.
- ❖ Maximum Duration: 1 month.

**l. Traction – Mechanical:** This is an accepted treatment and most commonly used for patients with radicular findings. There is some evidence that intermittent cervical traction does not add therapeutic benefit to a brief course of individualized manual therapy combined with exercise for patients with cervical radiculopathy (Young, 2009). A Cochrane review on the topic was unable to determine lack of effect or likely effect. Most studies have shown minimal or no benefit ([Cochrane] Graham, 2008). It is **not generally recommended** but may be useful in some cases.

It is sometimes used for patients with continuing radicular symptoms. If successful it should be shifted to home traction. Traction modalities are contraindicated in patients with other related diagnosis, such as tumor, infections, fracture, fracture/dislocation, or spinal instability. Non-oscillating inversion traction methods are contraindicated in patients with glaucoma or hypertension. A home cervical traction unit may be purchased if therapy proves effective. Time to Produce Effect: 1 to 3 sessions up to 30 minutes. If response is negative after 3 treatments, discontinue this modality.

- ❖ Frequency: 2 to 3 times per week. A home cervical traction unit may be purchased if therapy proves effective.
- ❖ Optimum Duration: 4 weeks.
- ❖ Maximum Duration: 4 weeks.

**m. Transcutaneous Electrical Nerve Stimulation (TENS):** A generally accepted treatment that should include at least one instructional session for proper application and home use. Indications include muscle spasm, atrophy, and decreased circulation and pain control. Minimal transcutaneous electrical nerve stimulation (TENS) unit parameters should include pulse rate, pulse width, and amplitude modulation. Consistent, measurable, functional improvement must be documented prior to the purchase of a home unit.

- ❖ Time to Produce Effect: Immediate.
- ❖ Frequency: Variable.
- ❖ Optimum Duration: 3 sessions.

- ❖ Maximum Duration: 3 sessions. Purchase or provide with home unit if effective.

**n. Ultrasound (Including Phonophoresis):** There is no proven benefit for this therapy in the neck. ***Not recommended*** due to lack of evidence in the cervical spine.

**14. VOCATIONAL REHABILITATION:** This is a generally accepted intervention, but Colorado limits its use as a result of Senate Bill 87-79. Initiation of vocational rehabilitation requires adequate evaluation of patients for quantification of highest functional level, motivation, and achievement of MMI. Vocational rehabilitation may be as simple as returning to the original job or as complicated as being retrained for a new occupation.

It may also be beneficial for full vocational rehabilitation to be started before MMI if it is evident that the injured worker will be unable to return to his/her previous occupation. A positive goal and direction may aid the patient in decreasing stress and depression and promoting optimum rehabilitation.

REFERENCED VERSION



## G. THERAPEUTIC PROCEDURES – OPERATIVE

In order to justify operative interventions, clinical findings, clinical course, and diagnostic tests must **all** be consistent resulting in a reasonable likelihood of at least a measurable and meaningful functional and symptomatic improvement. A comprehensive assimilation of these factors must lead to a specific diagnosis with positive identification of pathologic conditions and in most cases a specific site of nerve root compression, spinal cord compression, or spinal instability. It is imperative to rule out non-physiologic modifiers of pain presentation or non-operative conditions mimicking radiculopathy or instability (e.g., psychological conditions, peripheral neuropathy, myofascial pain, rheumatologic, or other pain syndromes, etc.) prior to consideration of elective surgical intervention.

Operative treatment is indicated when the natural history of surgically treated lesions is better than the natural history for non-operatively treated lesions. All patients being considered for surgical intervention should first undergo a comprehensive neuro-musculoskeletal examination to identify mechanical pain generators that may respond to non-surgical techniques or may be refractory to surgical intervention (Donelson, 2012; Wetzel et al, Skytte, 2005). Patients who demonstrate centralization on directional preference testing may not need surgery when treated with directional preference neuromuscular educations (May, 2012). Refer to F.12.f. Therapeutic Exercise.

While sufficient time allowances for non-operative treatment are required to determine the natural cause and response to non-operative treatment of cervical pain disorders, an accurate diagnosis and timely decision making for operative intervention are critical. Thorough neurologic exams should be performed periodically to assure timely treatment; to avoid de-conditioning and increased disability; and to treat emergent pathology or neurologically compromising conditions which may require early surgery.

Brief psychological screening tools, or more frequently full evaluations, are done to predict surgical success (Trief, 2000; Daubs, 2011). Psychological screening is indicated for all patients with continuing pain who are considering surgical interventions as indicated under the specific surgical procedure. Lower patient satisfaction after repeat surgical procedures and other treatment are related to pre-existing depression (Adogwa, 2013; Desai, 2005; Haviland, 2003).

In general, if the program of non-operative treatment fails, operative treatment is indicated when symptoms and findings suggest a surgically amenable problem and:

- Improvement of the symptoms has plateaued and the residual symptoms of pain and functional disability are unacceptable at the end of 6 to 12 weeks of active therapy and manual treatment. (Mere passage of time with poorly guided treatment is not considered an active treatment program.) In cases of myelopathy and some cases of severe nerve root compression, earlier intervention is indicated or
- Frequent recurrences of symptoms cause serious functional limitations, even if a non-operative active treatment program provides significant improvement of symptoms, and restoration of function on each recurrence; and
- The patient and treating physician have identified functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work activities. The patient should agree to comply with the pre- and post-operative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of post-operative treatment required and the length of partial- and full-disability expected post-operatively. The patient should have committed

to the recommended post-operative treatment plan and fully completed the recommended active, manual and pre-operative treatment plans.

There are some clinical scenarios which necessitate surgical interventions. Surgical workup and implementation of decompression of patients with herniated nucleus pulposus and radiculopathy should occur within six to twelve weeks, at the latest, after injury within the above stated contingencies. Small herniations and most protrusions are often not pain generators, however small foraminal disc herniations are likely to compress the nerve root and may require surgical removal.

In order to qualify for surgery for nerve root compression, the patient should exhibit the following signs of radiculopathy before invasive procedures are considered:

- pain in the arms greater than in the neck which interferes with function, return to work and/or active therapy; **and**
- physical exam findings of abnormal reflexes, motor weakness or radicular sensation deficits; **and**
- findings on the MRI which indicate impingement of nerves or the spinal cord corresponding to reproducible physical exam findings.

Treatment of myelopathy may occur earlier. Surgical procedures should be directed toward neurological findings which correlate with MRI imaging. For the unusual patients with refractory cervical pain in whom fusion is being considered, it is strongly recommended that a decisive commitment to surgical or non-surgical interventions occur within five months following injury.

Re-operation is indicated only when the functional outcome following the re-operation is expected to be better, within a reasonable degree of certainty, than the outcome of other non-invasive or less invasive treatment procedures. "Functional outcomes" refer to the patient's ability to improve functional tolerances such as, standing, walking, strength, endurance, functional cervical range of motion, and/or vocational status. While timely surgical decision-making is critical to avoid de-conditioning and increased disability, a time limited trial of reconditioning should be tried prior to re-operation. Re-operation has a high rate of complications and failure and may lead to disproportionately increased disability.

Every post-operative patient should be involved in an active treatment program after clearance by the surgeon (refer to [F.12. Therapy – Active](#)). Interdisciplinary interventions should be strongly considered post-operatively in any patient not making functional progress within expected time frames (refer to [F.5. Interdisciplinary Rehabilitation Programs](#)).

Informed decision making should be documented for all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. Since most patients with the most common conditions will improve significantly over time, without invasive interventions, patients must be able to make well-informed decisions regarding their treatment.

Return to work restrictions should be specific according to the recommendations in [Section F.11. Return to Work](#). Most surgical patients can return to a limited level of duty between three to six weeks. Full activity is generally achieved between three months to one year, depending on the procedure, the type of duties performed, and healing of the individual. Patient should be informed of expected time off work.

1. **ACUTE FRACTURES & DISLOCATIONS:** Decisions regarding the need for surgery in acute traumatic injury will depend on the specific injury type and possibility of long-term neurologic damage. Acute disc herniations may occur in the presence of traumatic injury.

a. **Halo Immobilization:**

- i. **Description:** Intervention that restricts flexion-extension motion. Halo vest will provide significant but not complete rotational control and is the most effective device for treating unstable injuries to the cervical spine.
- ii. **Complications:** May include pin infection, pin loosening, and palsy of the sixth cranial nerve.
- iii. **Surgical Indications:** Cervical fractures requiring the need for nearly complete restriction of rotational control, and to prevent graft dislodgment, spine mal-alignment, or pseudarthrosis. Decision for use of halo is at the discretion of the surgeon based upon the patients' specific injury. Not indicated for unstable skull fractures or if skin overlying pin sites is traumatized.
- iv. **Operative Treatment:** Placement of the pins and apparatus.
- v. **Post-Operative Treatment:** An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. Traction may be required for re-alignment and/or fracture reduction (amount to be determined by surgeon), active and/or passive therapy, and pin care.

b. **Anterior or Posterior Decompression with Fusion:**

- i. **Description:** To provide relief of pressure on the cervical spinal cord and nerve roots, and improve alignment and stabilization of the spine. May involve the use of bone grafts, sometimes combined with instrumentation, to produce a rigid connection between two or more adjacent vertebrae.
- ii. **Complications:** Instrumentation failure, such as screw loosening, plate failure, or dislodgement (more common in posterior instrumentation), incomplete decompression, bone graft donor site pain, in-hospital mortality, deep wound infection, superficial infection, graft extrusion, cerebral spinal fluid (CSF) leak, laryngeal nerve damage (anterior approach), and iatrogenic kyphosis.
- iii. **Surgical Indications:** When a significant neurological deficit exists in the presence of spinal canal compromise or nerve root pressure.
- iv. **Operative Treatment:** Both anterior and posterior surgical decompression of the cervical spine are widely accepted. The approach is guided by location of the compressive pathology as well as the presence of other concomitant injuries. Posterior stabilization and fusion alone may be indicated for patients who have been realigned with traction and do not have significant canal compromise. The anterior approach is acceptable

if there is disc and/or vertebral body anteriorly compromising the canal. The posterior approach may be indicated in radiculopathy in the absence of myelopathy and with evidence of pseudarthrosis on radiographs, or if the compression pathology is arising posteriorly.

Choice of instrumentation is based on the patient's anatomy, the patient's pathology, and surgeon's experience and preference.

- v. **Post-Operative Treatment:** An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. Cervical bracing may be appropriate, usually for 6–12 weeks with fusion. Home programs with instruction in activities of daily living (ADLs), limitations in range of motion, posture, and a daily walking program should be an early part of the rehabilitation process. Referral to a formal rehabilitation program, with emphasis on cervical, scapular, and thoracic strengthening, and restoration of range of motion (ROM), is appropriate once the fusion is solid and without complication. Post-operative active treatment will frequently require a repeat of the therapy sessions previously ordered. If it is performed, care should be taken not to overly mobilize the section above and below the fusion at that time. The goals of the therapy program should include instruction in a long-term home-based exercise program. Refer to [F.13. Therapy – Active](#)

- c. **Recombinant Human Bone Morphogenetic Protein (rhBMP-2):** is a member of a family of cytokines capable of inducing bone formation. It is produced from genetically modified cell lines using molecular cloning techniques. Use of rhBMP-2 in the cervical spine may carry a risk of swelling and ectopic bone formation which can encroach on neurovascular structures and on the esophagus. A retrospective analysis comparing anterior cervical fusion (ACF) and posterior cervical fusion for myelopathy or radiculopathy with and without rhBMP found that use of rhBMP increased rates of dysphagia in ACFs and increased costs for both types of fusions. The study did not report on long-term outcomes (Fineberg, 2013a). There is good evidence that rhBMP increases the likelihood of dysphagia, dysphonia and other postoperative complications when used with anterior cervical fusions (Fu, 2013) of the date of adoption the Food and Drug Administration (FDA) has not approved its use in the cervical spine. At the time of this guideline, cervical application of rhBMP-2 is **not recommended**. If the FDA approves its use in the cervical spine, prior authorization is required. The patient must meet all indications on the device manufacturer's list and have no contraindications.

2. **DISC HERNIATION AND OTHER CERVICAL CONDITIONS:** Operative treatment is indicated only when the natural history of an operatively treatable problem is better than the natural history of the problem without operative treatment. All patients being considered for surgical intervention should undergo a comprehensive neuromuscular examination to identify pain generators that may respond to nonsurgical techniques or may be refractory to surgical intervention. Timely decision making for operative intervention is critical to avoid deconditioning, and increased disability of the cervical spine.

General Recommendations: There is insufficient evidence due to weak quality of studies to determine whether recovery from cervical radiculopathy in patients without clinical

signs of spinal cord compression at one year is similar for one-level discectomy and fusion; physical therapy; or rigid cervical collar use. Some non-surgical patients will recover over time (Persson, 1977). For patients with whiplash injury (Quebec Classification Grade Levels I or II), there is no evidence of any beneficial effect of operative treatment. Refer to [D.1.e. Soft Tissue Injury Evaluation](#) for a discussion on Quebec Classification Levels.

If cervical fusion with discectomy is being considered, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the time of healing. Because smokers have a higher risk of non-union and higher post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively.

General Indications for Surgery: Operative intervention should be considered and a consultation obtained when improvement of radicular symptoms has plateaued and the residual symptoms of pain and functional disability are unacceptable at the end of six weeks of treatment. In cases of multiple trauma or complex injuries, the procedure may be delayed due to lack of early recognition or the need to treat other conditions first. Choice of operative approach and hardware instrumentation is based on anatomy, the patient's pathology, and the surgeon's experience and preference.

**a. Specific Indications:** Specific indications include:

- i. For Patients with Myelopathy: Expedited surgical evaluation and treatment are indicated.
- ii. For Patients with Cervical Radiculopathy (Refer to radiculopathy as described at the beginning of this section G).
  - A) Early intervention may be required for acute incapacitating pain in the presence of progressive neurological deficits, persistent motor deficit or
  - B) Persistent or recurrent arm pain with functional limitations, unresponsive to conservative treatment after six weeks; or
  - C) Progressive functional neurological deficit; or
  - D) Static neurological deficit associated with significant radicular pain; **and**
  - E) Confirmatory imaging studies (usually MRI) consistent with clinical findings, demonstrating nerve root or spinal cord compromise
- iii. For Patients with Persistent Non-Radicular Cervical Pain: In the absence of a radiculopathy, it is recommended that a decisive commitment to surgical or nonsurgical interventions be made within four to five months following injury. The effectiveness of three-level cervical fusion for non-radicular pain has not been established. In patients with non-radicular cervical pain for whom fusion is being considered, required pre-operative indications include all of the following:
  - A) When the program of non-operative treatment fails **and:**

- Improvement of the symptoms has plateaued, and the residual symptoms of pain and signs of functional disability are unacceptable at the end of 6 months of active treatment; **or**
- Frequent recurrences of symptoms cause serious functional limitations even if a non-operative active treatment program provides satisfactory relief of symptoms, and restoration of function on each recurrence.

Mere passage of time with poorly guided treatment is not considered an active treatment program.

- B) All pain generators are adequately defined and treated; **and**
- C) All physical medicine and appropriate manual therapy interventions are completed; **and**
- D) X-ray, MRI, or CT demonstrating spinal instability or positive CT discography; **and**
- E) Spine pathology limited to one and rarely two levels; **and**
- F) Psychosocial evaluation for confounding issues addressed; **and**
- G) For any potential surgery, particularly fusions, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the period of healing. Because smokers have a higher risk of non-union and higher post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively.

**b. Surgical Procedures:** Surgical procedures include:

**i. Anterior Cervical Discectomy with or without Fusion:**

- A) Description: Procedure to relieve pressure on one or more nerve roots or the spinal cord. It may be performed with or without the use of a microscope, but generally with some form of magnification.
- B) Complications: May include strut graft dislodgment (multi-level decompression), infection, hemorrhage, CSF leak, hematoma, catastrophic spinal cord injury causing varying degrees of paralysis, pseudarthrosis, in-hospital mortality, non-union of fusion, and donor site pain (autograft only). Anterior approach: complications increase permanent or transient dysphonia, permanent or transitory dysphagia, denervation, esophageal perforation, and airway obstruction. There is some evidence that morbid obesity increases hospital length of stay, mortality and postoperative complications of spinal fusion surgery and results in concomitant increases in cost (Kalanithi, 2012). Dysphagia is common and fusions may result in more frequent episodes of

dysphagia than artificial disc replacement (McAfee, 2010; Lu, 2007; Bazaz, 2002; Kalb, 2012; Lee, 2005). There is an increased number of cardiac complications with cervical fusions in patients older than 65, who have congestive heart failure, hypertension, pulmonary circulatory abnormalities, anemia, and other cardiac comorbidities. This should be considered when determining eligibility for the procedure (Fineberg, 2013b).

C) Surgical Indications: Radiculopathy from ruptured disc or spondylosis, spinal instability, or patients with non-radicular neck pain meeting fusion criteria. There are no well-done studies addressing the question of whether discectomy without fusion has similar long-term results as discectomy with fusion for specific radiculopathy cases. Anterior discectomy as an isolated procedure is rarely performed in the cervical spine but may be considered by some surgeons for patients with pure radicular symptoms from their herniated disc who have sufficiently large foramen that disc space collapse is unlikely to further compromise the nerve root ([Cochrane] Jacobs, 2011). Failure rates of non-fusion cases increase with disease at more than two levels. For any potential surgery, particularly fusions, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the period of healing. Because smokers have a higher risk of non-union and higher post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively.

D) Operative Treatment: Complete disc excision is usually performed. Cervical plating may be used to prevent graft dislodgment or collapse especially for multi-level disease, and to provide higher fusion rates, decreased kyphosis and increased lordosis. There does not appear to be a difference in outcome between anterior cervical discectomy and fusion performed with allograft, autograft, cage or arthroplasty for safety (Miller, 2011). There is some evidence that in cervical fusion for degenerative disease, iliac crest autograft provides greater fusion rates, but cages are a valid alternative as cages result in fewer complications from surgery ([Cochrane] Jacobs, 2011).

Recombinant Human Bone Morphogenetic Protein (rhBMP-2):  
**Not recommended.** See section 1.c. Recombinant Human Bone Morphogenetic Protein (rhBMP-2).

E) Post-Operative Treatment: An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. Cervical bracing may be appropriate (usually 6–12 weeks with fusion). Home programs with instruction in ADLs, limitation in range of motion, posture, and a daily walking program should be an early part of the rehabilitation process. Core strength should be emphasized. Referral to a formal rehabilitation program, with emphasis on cervical, scapular, and thoracic strengthening and restoration of

functional ROM is appropriate, once fusion is solid and without complication. Post-operative active treatment will frequently require a repeat of the therapy sessions previously ordered, with an emphasis on core strengthening. Manual therapy, excluding joint mobilization or manipulation may be used at the discretion of the surgeon after complete healing of the tissue and bone. If it is performed, care should be taken not to overly mobilize the section above and below the fusion at that time. The goals of the therapy program should include instruction in a long-term home-based exercise program. Refer to [F.13. Therapy – Active](#).

ii. Anterior Cervical Corpectomy:

- A) Description: Anterior removal of a portion of or the entire vertebral body to decompress the spinal canal. This usually includes removal of the adjacent discs. By definition, this always involves fusion.
- B) Complications: May include strut graft dislodgment (multi-level decompression), infection, hemorrhage, CSF leak, hematoma, catastrophic spinal cord injury causing varying degrees of paralysis, pseudarthrosis, in-hospital mortality, non-union of fusion, and donor site pain (autograft only). Anterior approach: complications increase permanent or transient dysphonia, permanent or transitory dysphagia, denervation, esophageal perforation, and airway obstruction. There is some evidence that morbid obesity increases hospital length of stay, mortality and postoperative complications of spinal fusion surgery and results in concomitant increases in cost (Kalanithi, 2012). Dysphagia is common and fusions may result in more frequent episodes of dysphagia than artificial disc replacement (McAfee, 2010; Lu, 2007; Bazaz, 2002; Kalb, 2012; Lee, 2005). There is an increased number of cardiac complications with cervical fusions in patients older than 65, who have congestive heart failure, hypertension, pulmonary circulatory abnormalities, anemia, and other cardiac comorbidities. This should be considered when determining eligibility for the procedure (Fineberg, 2013b).
- C) Surgical Indications: Single or two-level spinal stenosis, spondylolisthesis, or severe kyphosis, with cord compression. For any potential surgery, particularly fusions, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the period of healing. Because smokers have a higher risk of non-union and higher post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively.
- D) Operative Treatment: Neural decompression, fusion with instrumentation, or halo vest placement to maintain cervical position. Hemisectomy may be done when only a portion of the vertebral body needs to be resected. Allografts may be used for single bone graft fusion; however, autografts are generally preferable for multi-level fusions unless a large strut graft is required.



- E) Post-Operative Treatment: An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. Cervical bracing may be appropriate (usually 6–12 weeks with fusion). Home programs with instruction in ADLs, limitation in range of motion, posture, and a daily walking program should be an early part of the rehabilitation process. Core strength should be emphasized. Referral to a formal rehabilitation program, with emphasis on cervical, scapular, and thoracic strengthening and restoration of functional ROM is appropriate, once fusion is solid and without complication. Post-operative active treatment will frequently require a repeat of the therapy sessions previously ordered, with an emphasis on core strengthening. If it is performed, care should be taken not to overly mobilize the section above and below the fusion at that time. The goals of the therapy program should include instruction in a long-term home-based exercise program. Refer to [F.13. Therapy – Active](#).

iii. Posterior Cervical Laminectomy, foraminotomy, discectomy with or without Fusion:

- A) Description: Surgical removal of a portion of the lamina in order to gain access to the spinal cord or nerve roots with or without fusion. Posterior partial laminectomy without fusion is frequently considered for lateral disc herniation.
- B) Complications: May include perineural fibrosis, kyphosis in fractures without fusion or with failed fusion, nerve injury, post-surgical instability (with foraminotomies), CSF leak, infection, in-hospital mortality, non-union of fusion, donor site pain (autograft only). There is some evidence that morbid obesity increases hospital length of stay, mortality and postoperative complications of spinal fusion surgery and results in concomitant increases in cost (Kalanithi, 2012). There is an increased number of cardiac complications with cervical fusions in patients older than 65, who have congestive heart failure, hypertension, pulmonary circulatory abnormalities, anemia, and other cardiac comorbidities. This should be considered when determining eligibility for the procedure (Fineberg, 2013b).
- C) Surgical Indications: Neural compression. For any potential surgery, particularly fusions, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the period of healing. Because smokers have a higher risk of non-union and higher post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively.
- D) Operative Treatment: Laminotomy, laminectomy, partial discectomy, foraminotomy and spinal cord and/or nerve root decompression with or without fusion and instrumentation. There is some evidence that in cervical fusion for degenerative

disease, iliac crest autograft provides greater fusion rates, but cages are a valid alternative as cages result in fewer complications from surgery ([Cochrane] Jacobs, 2011).

- E) Post-Operative Treatment: An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. Cervical bracing may be appropriate (usually 6–12 weeks with fusion). Home programs with instruction in ADLs, limitation in range of motion, posture, and a daily walking program should be an early part of the rehabilitation process. Core strength should be emphasized. Referral to a formal rehabilitation program, with emphasis on cervical, scapular, and thoracic strengthening and restoration of functional ROM is appropriate, once fusion is solid and without complication. Post-operative active treatment will frequently require a repeat of the therapy sessions previously ordered, with an emphasis on core strengthening. If it is performed, care should be taken not to overly mobilize the section above and below the fusion at that time. The goals of the therapy program should include instruction in a long-term home-based exercise program. Refer to [F.13. Therapy – Active](#).

iv. Posterior Cervical Laminoplasty:

- A) Description: Technique that increases anterior or posterior dimensions of the spinal canal while leaving posterior elements partially intact. It may be performed with or without the use of a microscope.
- B) Complications: Loss of cervical motion, especially extension.
- C) Surgical Indications: Multi-level disease: cervical spinal stenosis or spondylitic myelopathy. Not indicated in cervical kyphosis. For any potential surgery, particularly fusions, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the period of healing. Because smokers have a higher risk of non-union and higher post-operative costs, it is recommended that insurers cover a smoking cessation program peri-operatively.
- D) Operative Treatment: Posterior approach, with or without instrumentation.
- E) Post-Operative Treatment: An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. May include 4 to 12 weeks of cervical bracing. Home programs with instruction in ADLs, limitation in range of motion, posture, and daily walking program should be an early part of the rehabilitation process.

Referral to a formal rehabilitation program with emphasis on cervical, scapular, and thoracic strengthening and restoration of ROM is appropriate once the cervical spine is stable and without complication. Patients should have had active therapy prior to surgery. Post-operative active treatment will frequently require a repeat of the therapy sessions previously ordered. The goals of the therapy program should include instruction in a long-term, home-based exercise program. Refer to [F.13. Therapy – Active](#).

v. Percutaneous Discectomy:

- A) Description: An invasive operative procedure to accomplish partial removal of the disc through a needle, which allows aspiration of a portion of the disc under imaging control.
- B) Complications: Include, but are not limited to, injuries to the esophagus, injuries to the nerve or vessel, infection, and hematoma.
- C) Surgical Indications: Percutaneous discectomy is indicated only in cases of suspected septic discitis in order to obtain diagnostic tissue. The procedure is **not recommended** for contained disc herniations or bulges with associated radiculopathy due to lack of evidence to support long-term improvement.
- D) Operative Treatment: Partial discectomy.

**3. TOTAL ARTIFICIAL CERVICAL DISC REPLACEMENT (TDR):** Involves the insertion of a prosthetic device into the cervical intervertebral space with the goal of maintaining physiologic motion at the treated cervical segment. The use of artificial discs in motion-preserving technology is based on the surgeons preference and training. One advantage of disc replacement over fusion is the generally shorter recovery time. Two systematic reviews comparing replacement and fusion showed a tendency, but not statistically significant toward earlier return to work, and good long-term return to work for both procedures (Steinmetz, 2008; Traynelis, 2012). There is strong evidence that in patients with single level radiculopathy or myelopathy cervical artificial disc produces 2 year success rates at least equal to those of anterior cervical discectomy and fusion (ACDF) with allograft interbody fusion and an anterior plate (McAfee, 2012). There is some evidence that TDR requires fewer revision operations than ACDF after the first two years of treatment and that TDR slightly decreases neck pain at 5 years compared to ACDF. Half of the reoperations in the ACDF group were at adjacent levels (Zigler, 2013). There is good evidence that arthroplasty produces greater segmental range of motion after 1-2 years than fusion but its clinical significance is unknown (Boselie, 2013). Another study following disc replacement patients noted symptomatic recurrent radiculopathy at the same or adjacent segments with an annual rate of 3.1%. The rate of recurrence was higher for those with pre-existing degenerative disc disease at other levels or those with significant osteopenia (Nunley, 2013).

- a. Description:** involves the insertion of a prosthetic device into an intervertebral space from which a degenerated disc has been removed, sparing only the peripheral annulus. The endplates are positioned under intraoperative fluoroscopic guidance for optimal placement in the sagittal and frontal planes. The prosthetic device is designed to distribute the mechanical load of the vertebrae in a physiologic manner and maintain ROM.

General selection criteria for cervical disc replacement includes symptomatic one level degenerative disc disease with radiculopathy. The patient must also meet fusion surgery criteria, and if the patient is not a candidate for fusion, a disc replacement procedure should not be considered. Additionally, the patient should be able to comply with pre-and post-surgery protocol.

The theoretical advantage of total disc arthroplasty is that it preserves range of motion and physiologic loading of the disc. This could be an advantage for adults who are physically active. Studies do not demonstrate a long-term advantage of measured function or pain over comparison groups undergoing fusion. The longevity of this prosthetic device has not yet been determined. Significant technical training and experience is required to perform this procedure successfully. Surgeons must be well-versed in anterior spinal techniques and should have attended appropriate training courses, or have undergone training during a fellowship. Mentoring and proctoring of procedures is highly recommended. Reasonable pre-operative evaluation may include an angiogram. The angiogram may be either with contrast or with magnetic resonance imaging.

**b. Complications:**

- Nerve and vascular injury.
- Dural tears.
- Mal-positioning of the prosthesis.
- Suboptimal positioning of the prosthetic may compromise the long-term clinical result.
- Re-operation due to complications.

**c. Surgical Indications: Patient meets one of the 2 sets of indications:**

- 1) Symptomatic one-level degenerative disc disease (on MRI) with established radiculopathy or myelopathy and not improved after 6 weeks of therapy; **and**

Radiculopathy or myelopathy documented by EMG or MRI with correlated objective findings or positive at one level; **or**

- 2) **All of the following:**

- Symptoms unrelieved after six months of active non-surgical treatment and **one** painful disc established with discogram; **and**
- All pain generators are adequately defined and treated; **and**
- All physical medicine and manual therapy interventions **are** completed; **and**
- Spine pathology limited to one level; **and**
- Psychosocial evaluation with confounding issues addressed.

**d. Contraindications:**

- Osteopenia, Osteoporosis, or any metabolic bone disease
- Significant spinal deformity/scoliosis.
- Symptomatic facet joint arthrosis – If imaging findings and physical findings of pain on extension and lateral bending are present, exploration of facetogenic pain should be completed prior to disc replacement for axial pain.
- Spinal instability.
- Deficient posterior elements.
- Infection.
- Previous compression or burst fracture.
- Multiple-level degenerative disc disease (DDD).
- Spondylolisthesis greater than 3 mm.
- Chronic steroid use or use of other medication known to interfere with bone or soft tissue healing.
- Allergy to device components/materials.
- Active malignancy.
- Generalized chronic pain

**e. Post-Operative Treatment:** An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-Operative. In all cases, communication between the physician and therapist is important to the timing of exercise progressions. Bracing may be appropriate. A formal physical therapy program should be implemented post-operatively. Active treatment, which patients should have had prior to surgery, will frequently require a repeat of the sessions previously ordered. The implementation of a gentle aerobic reconditioning program and neck education within the first post-operative week is appropriate in uncomplicated post-surgical cases. Some patients may benefit from several occupational therapy visits to improve performance of ADLs. Participation in an active therapy program which includes restoration of ROM, core stabilization, strengthening, and endurance is recommended to be initiated at the discretion of the surgeon. Full range of motions is limited initially. Sedentary duty may be able to begin within six weeks in uncomplicated cases. The goals of the therapy program should include instruction in a long-term home based exercise program (refer to [F.13. Therapy – Active](#)).

**4. PERCUTANEOUS RADIOFREQUENCY DISC DECOMPRESSION:** Percutaneous radiofrequency disc decompression of the cervical spine is an investigational procedure that introduces a 19-gauge cannula under local anesthesia and fluoroscopic guidance

into the nucleus pulposus of a contained herniated disc, using radiofrequency energy to dissolve and remove disc material. Pressure inside the disc is lowered as a result. The only trial was limited to a population not likely to apply to the workers' compensation population (van Middelkoop, 2013). It is **not recommended**.

5. **EPIDUROSCOPY AND EPIDURAL LYSIS OF ADHESIONS**: Refer to [F.4.b. Epiduroscopy and Epidural Lysis of Adhesions](#).
6. **INTRAOPERATIVE MONITORING**: A common intraoperative electrodiagnostic technique that may include somatosensory evoked potentials (SSEP), motor evoked potentials (MEP), or pedicle screw monitoring. The monitoring procedure may be used to evaluate spinal cord integrity and screw placement during the operative procedure.

REFERENCED VERSION