

RULE 17, EXHIBIT 8

Cervical Spine Injury
Medical Treatment Guidelines

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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 qualifying under Colorado's Workers' Compensation Act as injured workers with cervical spine injuries.

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 nor 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 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** 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 cervical spine injuries and disability. Currently, practitioners often think of education last, after medications, manual therapy, and surgery. 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 inexpensive communication providing reassuring information to the patient. More in-depth education currently exists within a treatment regime employing functional restorative and innovative programs of prevention and rehabilitation. 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. **TREATMENT PARAMETER DURATION** Time frames for specific interventions commence once treatments have been initiated, not on the date of injury. Obviously, duration will be impacted by patient compliance, as well as availability of services. Clinical judgment may substantiate the need to accelerate or decelerate the time frames discussed in this document.
4. **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.
5. **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.
6. **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, strength, endurance, activities of daily living, 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.
7. **RE-EVALUATION TREATMENT EVERY 3 TO 4 WEEKS** If a given treatment or modality is not producing positive results within 3 to 4 weeks, the treatment should be

either modified or discontinued. Reconsideration of diagnosis should also occur in the event of poor response to a seemingly rational intervention.

8. **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. All operative interventions must be based upon positive correlation of clinical findings, clinical course and diagnostic tests. A comprehensive assimilation of these factors must lead to a specific diagnosis with positive identification of pathologic conditions.
9. **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.
10. **RETURN-TO-WORK** is therapeutic, assuming the work is not likely to aggravate the basic problem or increase long-term pain. The practitioner must provide specific written physical limitations and the patient should never be released to “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, data entry and other repetitive motion tasks, sustained grip, tool usage and vibration factors. Even if there is residual chronic pain, return-to-work is not necessarily 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.

11. **DELAYED RECOVERY** Strongly consider a psychological evaluation, if not previously provided, as well as initiating interdisciplinary rehabilitation treatment 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 3 to 10% of all industrially injured patients will not recover within the timelines outlined in this document despite optimal care. 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 upon prognosis.
12. **GUIDELINE RECOMMENDATIONS AND INCLUSION OF MEDICAL EVIDENCE**
Guidelines are recommendations based on available evidence and/or consensus recommendations. When possible, guideline recommendations will note the level of evidence supporting the treatment recommendation. When interpreting medical evidence statements in the guideline, the following apply:

Consensus means the opinion of experienced professionals based on general medical principles. Consensus recommendations are designated in the guideline as “generally well accepted,” “generally accepted,” “acceptable,” or “well-established.”

“Some” means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective.

“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.

“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.

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

13. **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. 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, that should be utilized when initially diagnosing a work-related lower extremity complaint, are listed below.

1. **HISTORY-TAKING AND PHYSICAL EXAMINATION (Hx & PE)** are generally accepted, well-established and widely used procedures that establish the foundation/basis for and dictate subsequent stages of diagnostic and therapeutic procedures. When findings of clinical evaluations and those of other diagnostic procedures are not complementing each other, the objective clinical findings should have preference. The medical records should reasonably document the following.
 - a. **History of Present Injury:**
 - i. Mechanism of injury. This includes details of symptom onset and progression;
 - ii. Relationship to work. This includes a statement of the probability that the illness or injury is work-related;
 - iii. Location of pain, nature of symptoms, and alleviating/exacerbating factors, especially if raising the arm over the head alleviates radicular-type symptoms;
 - iv. Presence of upper and/or lower extremity numbness, weakness, or paresthesias, 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 vehicles accidents may be helpful; and
 - vi. Ability to perform job duties and activities of daily living.
 - b. **Past History:**
 - i. Past medical history includes neoplasm, arthritis, and diabetes;
 - ii. Review of systems includes symptoms of rheumatologic, neurologic, endocrine, neoplastic, infectious, and other systemic diseases;
 - iii. Smoking history, and
 - iv. Vocational and recreational pursuits.
 - c. **Physical Examination:** This should include accepted tests and exam techniques applicable to the area being examined, including:
 - i. Visual inspection, including posture;

- ii. Cervical range of motion, quality of motion, and presence of muscle spasm. Motion evaluation of specific joints may be indicated. Range of motion should not be checked in acute trauma cases until fracture and instability have been ruled out on clinical examination, with or without radiographic evaluation;
- iii. Palpation of spinous processes, facets, and muscles noting myofascial tightness, tenderness, and trigger points
- iv. 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 2 cm difference in the circumferential measurements of the two upper extremities may indicate chronic muscle wasting; and
- v. Deep tendon reflexes. Asymmetry 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.

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:

- i. Sharp and light touch, deep pressure, temperature and proprioceptive sensory function;
- ii. Strength testing;
- iii. Anal sphincter tone and or perianal sensation;
- iv. Presence of pathological reflexes of the upper and lower extremities; or
- v. Presence of an Incomplete Spinal Cord Injury Syndrome—
 - A) 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 CT or MRI 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.
 - B) 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.

- C) 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. Surgery is not usually required.
- D) Posterior Cord Syndrome, a rare condition, is characterized by loss of sensation below the level of the injury, but intact motor function.

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 cervical strain is not associated with focal neurological symptoms or signs and pathophysiology of these injuries is 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 range of motion. Includes muscle spasm related to soft tissue injury, whiplash, cervical sprain, and cervicogenic headaches, sprained cervical facet joints and ligaments.
- iii. Grade III — Neck complaints, such as limited range of motion, combined with neurologic signs. Includes whiplash, cervicobrachialgia, herniated disc, cervicogenic headaches.
- iv. Grade IV — Neck complaints with fracture or dislocation.

2. **RADIOGRAPHIC IMAGING** of the cervical spine is generally accepted, well-established and widely used diagnostic procedure. Basic views are the anteroposterior (AP), lateral, right and left obliques, and odontoid. Lateral flexion and extension views are done to evaluate instability but may have a limited role in the acute setting. The mechanism of injury and specific indications for the radiograph should be listed on the request form to aid the radiologist and x-ray technician. Suggested indications include:

- a. History of significant trauma, especially blunt trauma, high impact motor vehicle accident, or fall from height where fracture, dislocation, instability, or neurologic deficit is suspected – Quebec Classification Grade III and IV. Alert, non-intoxicated patients who have isolated cervical complaints without palpable midline cervical tenderness or neurologic findings may not require radiographic imaging.
- b. Age over 55 years.

- c. Unexplained or persistent cervical pain for at least 6 weeks or that is worse with rest.
- d. Localized pain, fever, constitutional symptoms, suspected tumor, or suspected systemic illness such as a rheumatic/rheumatoid disorder or endocrinopathy.

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. Tests include, but are not limited to:

- a. Complete Blood Count (CBC) with differential can detect infection, blood dyscrasias, and medication side effects;
- b. Erythrocyte sedimentation rate, rheumatoid factor, Anti-Nuclear Antigen (ANA), Human Leukocyte Antigen(HLA), and C-reactive protein can be used to detect evidence of a rheumatologic, infection, or connective tissue disorder;
- c. Serum calcium, phosphorous, uric acid, alkaline phosphatase, and acid phosphatase can detect metabolic bone disease; and
- d. Liver and kidney function may be performed for prolonged anti-inflammatory use or other medications requiring monitoring.

D. FOLLOW-UP DIAGNOSTIC IMAGING AND TESTING PROCEDURES

One diagnostic imaging procedure may provide the same or distinctive information as obtained by other procedures. Therefore, prudent choice of procedure(s) for a single diagnostic procedure, a complementary procedure in combination with other procedures(s), or a proper sequential order in multiple procedures will ensure maximum diagnostic accuracy; minimize adverse effect to patients and cost effectiveness by avoiding duplication or redundancy.

All diagnostic imaging procedures have a significant percentage of specificity and sensitivity for various diagnoses. None is specifically characteristic of a certain diagnosis. Clinical information obtained by history taking and physical examination should be the basis for selection and interpretation of imaging procedure results.

Magnetic resonance imaging (MRI), myelography, or CT scanning following myelography may provide useful information for many spinal disorders. 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** are generally accepted, well-established and widely used diagnostic procedures. In general, MRI is the preferred procedure for imaging of cervical nerve root compression or myelopathy. Imaging usually is not appropriate until conservative therapy has been tried and failed. Six to eight weeks of treatment are usually an adequate period of time before an imaging procedure is in order, but the clinician should use judgment in this regard. When the findings of the diagnostic imaging and testing procedures are not consistent with the clinical examination, the clinical findings should have preference. The studies below are listed in frequency of use, not importance:
 - a. **Magnetic Resonance Imaging (MRI):** is 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. It is contraindicated in patients with certain implanted devices.

In general, the high field, conventional, MRI provides better resolution. 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. **Computed Axial Tomography (CT):** provides 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. Plain CT scanning is poor for the C6-7 or C7-T1 levels because of shoulder artifact. Instrument-scatter reduction software provides better resolution when metallic artifact is of concern.

- c. **Myelography:** 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. Myelography is an invasive procedure with complications including nausea, vomiting, headache, convulsion, arachnoiditis, CSF leakage, allergic reactions, bleeding, and infection. Therefore, myelography should only be considered when CT and MRI are unavailable, for morbidly obese or multiple-operated patients, and when other tests prove non-diagnostic in the surgical candidate. The use of small needles and a less toxic, water-soluble, nonionic contrast is preferred.
- d. **CT Myelogram:** provides more detailed information about relationships between neural elements and surrounding anatomy and is appropriate in patients with multiple prior operations or tumorous conditions.
- e. **Lineal Tomography:** is infrequently used, yet may be helpful in the evaluation of bone surfaces, bony fusion, or pseudoarthrosis.
- f. **Bone Scan (Radioisotope Bone Scanning):** is generally accepted, well-established and widely used. Bone scanning is more sensitive but less specific than MRI. ^{99m}TcTechnecium diphosphonate uptake reflects osteoblastic activity and may be useful in metastatic/primary bone tumors, stress fractures, osteomyelitis, and inflammatory lesions, but cannot distinguish between these entities. In the cervical spine, the usual indication is for the evaluation of neoplastic conditions, but can also be used for occult fracture or infection.
- g. **Other Radionuclide Scanning:** Indium and gallium scans are generally accepted, well-established, and widely used procedures usually to help diagnose lesions seen on other diagnostic imaging studies. ⁶⁷Gallium citrate scans are used to localize tumor, infection, and abscesses. ¹¹¹Indium-labeled leukocyte scanning is utilized for localization of infection or inflammation and is usually not used for the cervical spine.

2. **OTHER TESTS**

The following studies are listed by frequency of use, not importance:

- a. **Personality/Psychological/Psychosocial/Evaluation:** are generally accepted and well-established diagnostic procedures with selective use in the acute cervical spine injury population, but have more widespread use in sub-acute and chronic cervical spine populations.

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 may perform initial evaluations, which are generally completed within one to two hours. 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.

- b. **Electrodiagnostic Testing:** include, but are not limited to, Electromyography (EMG), Nerve Conduction Velocities (NCV) and Somatosensory Evoked Potentials (SSEP). These are generally accepted, well-established and widely used diagnostic procedures. The SSEP study, although generally accepted, has limited use. Electrodiagnostic studies 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.

In general, these diagnostic procedures 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 standard radiologic studies.

c. Injections — Diagnostic:

- i. Description — Diagnostic cervical injections are generally accepted, well-established procedures. These injections may be useful for localizing the source of pain, and may have added therapeutic value when combined with injection of therapeutic medication(s). Each diagnostic injection has inherent risk and risk versus benefit should always be evaluated when considering injection therapy. Since these procedures are invasive, less invasive or non-invasive procedures should be considered first. 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) and the source of pain symptoms.

The interpretation of the test result is primarily based upon pain response; 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 are required to confirm a diagnosis. In some cases, injections at multiple levels may be required to accurately diagnose cervical pain. Refer to Section E.3, Injections – Therapeutic for information on specific injections.

- ii. Special Requirements for Diagnostic Injections — Since fluoroscopic, arthrographic and/or CT guidance during procedures is required to document technique and needle placement; an experienced physician should perform the procedure. The subspecialty disciplines of the physicians may be varied, including, but not limited to: anesthesiology, radiology, surgery, or physiatry. The practitioner should have experience in ongoing injection training workshops provided by organizations such as the International Spinal Injection Society (ISIS) and be knowledgeable in radiation safety. In addition, practitioners should obtain fluoroscopy training and radiation safety credentialing from their Departments of Radiology, as applicable.
- iii. Complications — General complications of diagnostic injections may include transient neurapraxia, nerve injury, infection, headache, vasovagal effects, as well as epidural hematoma, permanent neurologic damage, dural perforation and CSF leakage, and spinal meningeal abscess. Severe complications are remote but can include spinal cord damage, quadriplegia, and/or death.
- iv. Contraindications — Absolute contraindications of diagnostic injections include: (a) bacterial infection – systemic or localized to region of injection, (b) bleeding diatheses, (c) hematological conditions, and (d) possible pregnancy. Relative contraindications of diagnostic injections may include: (a) allergy to contrast, (b) poorly controlled Diabetes Mellitus or hypertension, (c) aspirin/antiplatelet therapy (drug may be held for 3 days prior to injection), and (d) shellfish allergy, if contrast to be used.

- v. Specific Diagnostic Injections — In general, relief should last for at least the duration of the local anesthetic used and give significant relief of pain. Refer to “Injections – Therapeutic” for information on specific therapeutic injections.
 - A) Medial Branch Blocks are primarily diagnostic, used to confirm the diagnosis of cervical facet pain. When used for diagnosis, two injections at different times with different duration of local anesthetic are recommended.
 - B) Intra-Articular Facet injections are principally diagnostic yet some patients may obtain therapeutic response. If the patient demonstrates definite short-term but not long-term response, confirmatory medial branch blocks and possible medial branch neurotomy should be considered.
 - C) Atlanto-Axial and Atlanto-Occipital injections are for diagnosis and treatment but do not lend themselves to denervation techniques owing to variable neuroanatomy. Injection of this articulation is complicated by the proximity of the vertebral artery. The vertebral artery may be tortuous at the level of the C1 joint. Inadvertent injection of the vertebral artery may cause respiratory arrest, seizure, stroke, or permanent neurological sequelae. Only practitioners skilled in these injections should perform them.

d. **Discography:**

- i. Description — Discography is a generally accepted, well-established invasive diagnostic procedure to identify a discogenic source of pain for patients who are surgical candidates. Discography should only be performed by physicians who are experienced and have been proctored in the technique.
- ii. Indications — Discography may be indicated when a patient has a history of unremitting cervical pain of greater than three months duration, with or without arm pain, which has been unresponsive to all conservative interventions. A patient who does not desire surgical intervention is not a candidate for an invasive non-therapeutic intervention, such as provocative discography. Discography may prove useful for the evaluation of the pre-surgical spine, such as pseudoarthrosis, discogenic pain at levels above or below a prior spinal fusion, annular tear, or internal disc disruption. Discography is not useful in previously operated discs. In addition, discography may prove useful in evaluation of the number of cervical spine levels that might require fusion. It has also been utilized to differentiate organic from psychogenic factors. CT-Discography provides further detailed information about morphological abnormalities of the disc and possible lateral disc herniations.
- iii. Preconditions for provocative discography include:

- A) A patient with unremitting neck and/or arm pain greater than 3 months duration in whom conservative treatment has been unsuccessful and in whom the specific diagnosis of the pain generator has not been made apparent on the basis of other noninvasive imaging studies (e.g., MRI, CT, plain films, etc.) and in whom a psychosocial evaluation has been considered.
 - B) Patients who are considered surgical candidates (e.g., symptoms are of sufficient magnitude and the patient has been informed of the possible surgical options that may be available based upon the results of discography). Discography should never be the sole indication for surgery.
 - C) Informed consent regarding the risks and potential diagnostic benefits of discography has been obtained.
- iv. Complications — Include, but are not limited to, discitis, nerve damage, retropharyngeal abscess, chemical meningitis, pain exacerbation, and anaphylaxis may occur with discography. Therefore, prior to consideration of discography, the patient should undergo other diagnostic modalities in an effort to define the etiology of the patient's complaint including psychological screening, myelography, CT and MRI.
- v. Contraindications — Contraindications for provocative discography may include: (a) active infection of any type or continuing antibiotic treatment for infection; and/or (b) bleeding diathesis or pharmaceutical anticoagulation with warfarin, etc.; and/or (c) significant spinal stenosis at the level being studied as visualized by MRI, myelography or CT scan; and/or (d) presence of clinical myelopathy; and/or (e) effacement of the cord, thecal sac or circumferential absence of epidural fat; and (f) known allergic reactions.
- vi. Special Considerations:
- A) Discography should not be done by the treating surgeon and the procedure should be carried out by an experienced individual who has received specialized training in the technique of provocative discography.
 - B) Discography should be performed in a blinded format that avoids leading the patient with anticipated responses. The procedure should always include one or more disc levels thought to be normal or nonpainful in order to serve as an internal control. The patient should not know what level is being injected in order to avoid spurious results. Adjacent discs may be identified as pain generators in more than half of cases in which discogenic pain is identified at one level. Because surgery is likely to fail in multi-level discogenic pain, injection of as many levels as feasible can prevent many operative failures.
 - C) Sterile technique should be utilized.

- D) Judicious use of sedation during the procedure is acceptable and represents the most common practice nationally at the current time and is recommended by most experts in the field.
- E) CT or MRI must have established cervical spinal dimensions and ruled out spinal stenosis.
- F) Intradiscal injection of local anesthetic should be carried out after the provocative portion of the examination and the patient's response.
- G) It is recommended that a post-discogram CT be considered as it frequently provides additional useful information about disc morphology or other pathology.

vii. Reporting of Discography — In addition to a narrative report, the discography report should contain a standardized classification of (a) disc morphology and (b) the pain response. Both results should be clearly separated in the report from the narrative portion. Asymptomatic annular tears are common and the concordant pain response is an essential finding for a positive discogram. Alternative reporting techniques using pressure monitors are being investigated and may prove useful in identifying patients with discogenic pain.

Caution should be used when interpreting results from discography. In one study of patients without lumbar pathology, 10 percent of pain-free patients experienced pain with discography and 83 percent of patients with somatization disorder experienced pain with lumbar discography. No studies have yet been published which measure the frequency of false-positive discography of the cervical spine.

- A) Reporting disc morphology as visualized by the post-injection CT scan (when available) should follow the Modified Dallas Discogram Scale where:

Grade 0 = Normal Nucleus

Grade 1 = Annular tear confined to inner one-third of annulus fibrosis.

Grade 2 = Annular tear extending to the middle third of the annulus fibrosis.

Grade 3 = Annular tear extending to the outer one-third of the annulus fibrosis.

Grade 4 = A grade 3 tear plus dissection within the outer annulus to involve more than 30 degrees of the disc circumference.

Grade 5 = Full thickness tear with extra-annular leakage of contrast, either focal or diffuse.

- B) Reporting of pain response should be according to the modified Aprill Scheme. In this scheme, codes are assigned a response during the initial injection (“P” provocative response) and the response to an injection of the local anesthetic (“R” response) where:

P₀ = No Pain

P₁ = Procedural pain, or pain that is nonconcordant with the patient’s familiar pain

P₂ = Concordant pain

R₀ = No pain relief with injection of local anesthetic

R₁ = Partial relief

R₂ = Complete relief

N = Non-diagnostic, non-physiologic injection. The final category of “N” is suggested when the discographer concludes that the provocative portion of the injection is non-diagnostic. For example, a patient with a morphologically normal disc who responds when typical pain is reproduced is considered to have a non-diagnostic or non-physiologic response. Other circumstances may occur that cause the discographer to conclude that the provocative portion of the injection is invalid. The category “N” should be used for these situations.

- ❖ Time to produce effect: Immediate
- ❖ Frequency: One time only
- ❖ Optimal duration: One time
- ❖ Maximum duration: Repeat discography is rarely indicated.

- e. **Thermography:** is an accepted and established procedure, but has limited use as a diagnostic test for cervical pain. It may be used to diagnose regional pain disorders and in these cases, refer to the Division’s Complex Regional Pain Syndrome/Reflex Sympathetic Dystrophy Medical Treatment Guidelines.

3. **SPECIAL TESTS** 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.

- a. **Computer-Enhanced Evaluations:** may include isotonic, isometric, isokinetic and/or isoinertial measurement of movement, range of motion, 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. Can monitor improvements in strength every 3 to 4 weeks up to a total of 6 evaluations.

b. Functional Capacity Evaluation (FCE): 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, coordination and strength, worker habits, employability and financial status, as well as psychosocial aspects of competitive employment may be evaluated. 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.

- ❖ Frequency: Can be used initially to determine baseline status. Additional evaluations can be performed to monitor and assess progress and aid in determining the endpoint for treatment.

c. Job site Evaluation: is 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) range of motion; (d) torque/force; (e) lifting/carrying; (f) cognitive demands; (g) social interactions; (h) visual perceptual; (i) environmental requirements of a job; (j) repetitiveness; and (k) essential functions of a job. Job descriptions provided by the employer are helpful but should not be used as a substitute for direct observation.

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

d. Vocational Assessment: Once an authorized practitioner has reasonably determined and objectively documented that a patient will not be able to return to his/her former employment and can reasonably prognosticate final restrictions, implementation of a timely vocational assessment can be performed. 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. If prognosis for return to former occupation is determined to be poor, except in the most extenuating circumstances, vocational assessment should be implemented within 3 to 12 months post-injury. Declaration of Maximum Medical Improvement 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: is a determination of an individual's tolerance for performing a specific job based on a job activity or task. 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. May be used when a full Functional Capacity Evaluation is not indicated.

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

E. THERAPEUTIC PROCEDURES — NON-OPERATIVE

Before initiation of any therapeutic procedure, the authorized treating provider, employer and insurer must consider these 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 “Return-to-Work” in this section 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 education to the patient. No treatment plan is complete without addressing issues of individual and/or group patient education as a means of facilitating self-management of symptoms.

Lastly, formal psychological or psychosocial screening 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 cases where a patient is unable to attend an outpatient center, home therapy may be necessary. Home therapy may include active and passive therapeutic procedures as well as other modalities to assist in alleviating pain, swelling, and abnormal muscle tone. Home therapy is usually of short duration and continues until the patient is able to tolerate coming to an outpatient center.

The following procedures are listed in alphabetical order.

1. **ACUPUNCTURE** is an accepted and widely used procedure for the relief of pain and inflammation and there is some scientific evidence to support its use. 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. While it is commonly used when pain medication is reduced or not tolerated, it may be used as an adjunct to physical rehabilitation and/or surgical intervention to hasten the return of functional activity. Acupuncture should be performed by credentialed practitioners.

a. **Acupuncture:** 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 can be used to reduce pain, reduce inflammation, increase blood flow, increase range of motion, decrease the side effect of medication-induced nausea, promote relaxation in an anxious patient, and reduce muscle spasm.

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

❖ Time to produce effect: 3 to 6 treatments

- ❖ Frequency: 1 to 3 times per week
- ❖ Optimum duration: 1 to 2 months
- ❖ Maximum duration: 14 treatments

b. **Acupuncture with Electrical Stimulation:** is the use of electrical current (micro- amperage or milli-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.

- ❖ Time to produce effect: 3 to 6 treatments
- ❖ Frequency: 1 to 3 times per week
- ❖ Optimum duration: 1 to 2 months
- ❖ Maximum duration: 14 treatments

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 Section E.11 and 12, Active Therapy (Therapeutic Exercise) and Passive Therapy sections (Massage and Superficial Heat and Cold Therapy) for a description of these adjunctive acupuncture modalities.

- ❖ Time to produce effect: 3 to 6 treatments
- ❖ Frequency: 1 to 3 times per week
- ❖ Optimum duration: 1 to 2 months
- ❖ Maximum duration: 14 treatments

Any of the above acupuncture treatments may extend longer if objective functional gains can be documented or when symptomatic benefits facilitate progression in the patient's treatment program. Treatment beyond 14 treatments must be documented with respect to need and ability to facilitate positive symptomatic or functional gains. Such care should be re-evaluated and documented with each series of treatments.

2. **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. Electronic instrumentation is used to monitor the targeted physiology and then displayed or fed back to the patient visually, auditorially, or tactilely, with coaching by a biofeedback specialist. Biofeedback is provided by clinicians certified in biofeedback and/or who have documented specialized education, advanced training, or direct or supervised experience qualifying them to provide the specialized treatment needed (e.g., surface EMG, EEG, or other).

Treatment is individualized to the patient's work-related diagnosis and needs. Home practice of skills is required for mastery and may be facilitated by the use of home training tapes. The ultimate 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 must be motivated to learn and practice biofeedback and self-regulation techniques.

Indications for biofeedback include individuals who are suffering from musculoskeletal injury where 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 emotional stress/pain responses such as anxiety, depression, anger, sleep disturbance, and other central and autonomic nervous system imbalances. Biofeedback is often utilized along with other treatment modalities.

- ❖ Time to produce effect: 3 to 4 sessions
- ❖ Frequency: 1 to 2 times per week
- ❖ Optimum duration: 5 to 6 sessions
- ❖ Maximum duration: 10 to 12 sessions. Treatment beyond 12 sessions must be documented with respect to need, expectation, and ability to facilitate positive symptomatic or functional gains.

3. INJECTIONS — THERAPEUTIC

a. Therapeutic Spinal Injections:

Description — Therapeutic spinal injections are generally accepted well-established procedures. They may be used after initial conservative treatment, such as physical and occupational therapy, medication, manual therapy, exercise, acupuncture etc., has been undertaken. Therapeutic injections should be used only after pathology has been demonstrated. Injections are invasive procedures that can cause catastrophic complications thus clinical indications and contraindications should be closely adhered to. A concomitant therapeutic exercise program should be considered or may be appropriate for patients receiving therapeutic spinal injections.

Special Considerations — For all cervical injections (excluding trigger point and occipital nerve blocks) fluoroscopic, arthrographic and/or CT guidance during procedures is required to document technique and needle placement, and should be performed by a physician experienced in the procedure. The subspecialty disciplines of the physicians may be varied, including, but not limited to: anesthesiology, radiology, surgery, or physiatry. The practitioner should participate in ongoing injection training workshops such as those sponsored by the International Society for Injection Studies (ISIS) and be knowledgeable in

radiation safety. In addition, practitioners should obtain fluoroscopy training and radiation safety credentialing from their Departments of Radiology, as applicable.

Complications — General complications of spinal injections may include (a) transient neurapraxia, local pain, nerve injury, infection, headache, vasovagal effects; (b) epidural hematoma, permanent neurologic damage, dural perforation and CSF leakage, spinal meningeal abscess; and or (c) suppression of the hypothalamic pituitary adrenal axis, which may be steroid dose dependent. Severe complications are remote but can include spinal cord damage, quadriplegia, and/or death.

Contraindications — Absolute contraindications of therapeutic injections include: (a) bacterial infection – systemic or localized to region of injection, (b) bleeding diatheses, (c) hematological conditions, and (d) possible pregnancy. Relative contraindications of diagnostic injections may include: (a) allergy to contrast, (b) poorly controlled Diabetes Mellitus or hypertension, (c) aspirin/antiplatelet therapy (drug may be held for 3 days prior to injection), (d) shellfish allergy, if contrast to be used.

i. Cervical Epidural Steroid Injection (ESI)

- A) Description — Cervical ESIs are injections of corticosteroid into the epidural space. The purpose of ESI is to reduce pain and inflammation, restoring range of motion and thereby facilitating progress in more active treatment programs.
- B) Needle placement — Radiographic guidance with epidurogram is indicated to document placement and ensure maximal efficacy. Spinal imaging is required for all epidural steroid injections. Contrast epidurograms allow one to verify the flow of medication into the epidural space.
- C) Indications — Cervical ESIs are useful in patients with symptoms of cervical radicular pain syndromes. They have less defined usefulness in non-radicular pain. There is some evidence that epidural steroid injections are effective for patients with radicular pain or radiculopathy (sensory or motor loss in a specific dermatome or myotome). Although there is no evidence regarding the effectiveness of ESI for non-radicular pain, it is a generally accepted intervention. MRI or CT scans are required before thoracic and cervical ESIs to assure adequate epidural space.
 - ❖ Time to Produce Effect: Local anesthetic, approximately 30 minutes; corticosteroid, 48 to 72 hours for 80% of patients and 2 weeks for 20%.
 - ❖ 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 session. Subsequent injection sessions may occur after 1 to 2 weeks if patient response has been

favorable. Injections can be repeated after a hiatus of three months if the patient has demonstrated functional gain and pain returns or worsens. If ESIs are repeated in the future, there should be increasing duration of relief and continued functional gain.

- ❖ Optimal Duration: Usually 1 to 3 sessions of injection(s), depending upon each patient's response and functional gain.
- ❖ Maximum Duration: Up to 3 to 4 sessions of injections may be done as per the patient's response to pain and function. Patients should be reassessed after each injection session.

ii. Zygoapophyseal (Facet) Injection

- A) Description — Intra-articular or pericapsular injection of local anesthetic and corticosteroid. There is conflicting evidence to support long-term therapeutic effect using facet injections.
- B) Indications — Facet injections may be considered in those patients whose history and examination are suggestive of a facet pain generator. The therapeutic value of facet injections provides short-term pain relief for patients to progress through a functionally directed rehabilitation program. Facet injections determine level(s) of facet involvement and the degree of pain coming from the posterior elements. If the patient demonstrates definite short-term but not long-term response confirmatory medial branch blocks and possible medial branch neurotomy should be considered.

- ❖ Time to Produce Effect: Approximately 30 minutes for local anesthetic; 48 to 72 hours for corticosteroid.
- ❖ Frequency: 1 to 3 sessions for each joint.
- ❖ Optimal Duration: 1 to 3 sessions of injections for each joint.
- ❖ Maximum Duration: 3 intra-synovial or medial branch nerve injections per joint can be done for facilitating a therapeutic exercise program.

b. Facet Rhizotomy (Radio Frequency Medial Branch Neurotomy):

- i. Description — A procedure designed to denervate the facet joint by ablating the periarticular facet nerve branches. Percutaneous radio-frequency is the method generally used. There is good evidence to support this procedure in the cervical spine but benefits beyond one year are not yet established.

- ii. Indications — Pain of well-documented facet origin, unresponsive to active and/or passive therapy, manual therapy, and psychosocial evaluation. This procedure is commonly used to provide a window of pain relief allowing for participation in active therapy. All patients must have a successful response to diagnostic medial nerve branch blocks. A successful response is considered to be a 90 percent or greater relief of pain for the length of time appropriate to the local anesthetic used (i.e., bupivacaine greater than lidocaine). Radio-frequency rhizotomy is the procedure of choice over alcohol, phenol, or cryoablation. Precise positioning of the probe under fluoroscopic guidance is recommended, since the maximum effective radius of the device is 2 mm.
- iii. Complications — Bleeding, infection, or neural injury. The clinician must be aware of the risk of developing a deafferentation centralized pain syndrome as a complication of this and other neuroablative procedures.
- iv. Post-Procedure Therapy — Active and/or passive therapy. Implementation of a gentle reconditioning program within the first post-procedure week is recommended, barring complications. Instruction and participation in a long-term home-based program of ROM, strengthening, endurance and stability exercises should be done 3 to 4 weeks post-procedure.

c. Occipital Nerve Block:

- i. Description — Occipital nerve blocks are used both diagnostically and therapeutically in the treatment of occipital neuralgia. Target is the greater occipital nerve.
- ii. Indications — Diagnosis and treatment of occipital neuralgia/ cephalgia. Peripheral block of the greater occipital nerve may be appropriate as initial treatment. It may be indicated in patients unresponsive to peripheral nerve block or in need of additional diagnostic information may undergo this injection.
- iii. Complications — Bleeding, infection, neural injury. Post procedural ataxia is common and usually lasts 30 minutes post procedure. Because the occipital artery runs with the occipital nerve, inadvertent intravascular injection is a risk of this procedure and may lead to systemic toxicity and/or seizures.
 - ❖ Time to Produce Effect: Approximately 30 minutes for local anesthetic; 48 to 72 hours for corticosteroid.
 - ❖ Optimal Duration: 1 to 3 sessions for each joint.
 - ❖ Maximum Duration: Continue up to 3 injections if progressive symptomatic and functional improvement can be documented.

d. Trigger Point Injections:

- i. Description — Trigger point injection consists 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. The effectiveness of trigger point injection is uncertain, in part due to the difficulty of demonstrating advantages of active medication over injection of saline. Needling alone may be responsible for some of the therapeutic response.
- 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 functional restoration 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.

- 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 developing. 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; no anesthesia 24 to 48 hours.
 - ❖ Frequency: Weekly, suggest no more than 4 injection sites per session per week to avoid significant post-injection soreness.
 - ❖ Optimal 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.

e. **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. There is no evidence that prolotherapy is effective in cervical pain. The injections are invasive, may be painful to the patient, are not generally accepted or widely used. Therefore, the use of prolotherapy for cervical pain is not recommended.

4. **MEDICATIONS** Medication use in the treatment of cervical 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. All drugs should be used according to patient needs. 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.

Nonsteroidal anti-inflammatory drugs (NSAIDs) and acetaminophen are useful in the treatment of inflammation. These same medications can be used for pain control.

Narcotic 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 narcotic prescribed. Tramadol, a centrally acting non-narcotic, can be useful to provide pain relief. Other medications, including antidepressants, may be useful in selected patients with chronic pain.

The following are listed in alphabetical order:

a. **Acetaminophen**: is an effective analgesic with antipyretic but not anti-inflammatory activity. Acetaminophen is generally well tolerated, causes little or no gastrointestinal irritation and is not associated with ulcer formation. Acetaminophen has been associated with liver toxicity in overdose situations or in chronic alcohol use.

- ❖ Optimal duration: 7 to 10 days

- ❖ Maximum duration: Chronic use as indicated on a case-by-case basis

b. **Minor Tranquilizer/Muscle Relaxants**: are appropriate for muscle spasm, mild pain and sleep disorders.

- ❖ Optimal duration: 1 week

- ❖ Maximum duration: 4 weeks

c. **Narcotics**: should be primarily reserved for the treatment of post-surgical or severe cervical pain. There are circumstances where prolonged use of narcotics is justified based upon specific diagnosis, and in these cases, it should be documented and justified. Adverse effects include respiratory depression, the development of physical and psychological dependence, and impaired alertness.

- ❖ Optimal duration: 3 to 7 days
- ❖ Maximum duration: 2 weeks. Use beyond two weeks is acceptable in appropriate cases.

d. **Nonsteroidal Anti-Inflammatory Drugs (NSAIDs):** are 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. Intervals for metabolic screening are dependent upon the patient's age, general health status and should be within parameters listed for each specific medication. Liver and renal function should be monitored at least every six months in patients on chronic NSAIDs.

i. Non-Selective Nonsteroidal Anti-Inflammatory Drugs

Includes Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) and acetylsalicylic acid (aspirin). Serious gastrointestinal (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 gastrointestinal 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.

Due to the cross-reactivity between aspirin and NSAIDs. NSAIDs should not be used in aspirin-sensitive patients, and 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. Certain NSAIDs may have interactions with various other medications. Individuals may have adverse events not listed above.

- ❖ Optimal duration: 1 week
- ❖ Maximum duration: 1 year

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

Selective cyclo-oxygenase-2 (COX-2) inhibitors are more recent NSAIDs and differ in adverse side effect profiles from the traditional NSAIDs. The major advantages of selective COX-2 inhibitors over traditional NSAIDs are that they have less gastrointestinal toxicity and no platelet effect. 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 whom traditional NSAIDs are not tolerated or in certain high-risk patients. Patients most at risk of having a complication from traditional NSAIDs include patients with a prior history of peptic ulcer disease,

gastrointestinal bleeding, gastrointestinal perforation, or hemophilia, as well as patients with thrombocytopenia or systemic anticoagulation. Celecoxib is Food and Drug Administration (FDA) approved for osteoarthritis and rheumatoid arthritis. Rofecoxib is FDA approved for acute pain and osteoarthritis. Celecoxib is contraindicated in sulfonamide allergic patients.

- ❖ Optimal duration: 7 to 10 days
- ❖ Maximum duration: Chronic use is appropriate in individual cases.

e. **Oral Steroids:** have limited use but are accepted in cases requiring potent anti-inflammatory drug effect and should not be routinely recommended except in cases of suspected spinal cord compression. There is strong evidence to support the use of intravenous steroids in blunt spinal cord injury. The risks of permanent neurological damage from acute spinal cord compression generally outweigh the risks of pharmacologic side effects of steroids in an emergent situation.

f. **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 dose, are useful for chronic pain 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.

- ❖ Optimal Duration: 1 to 6 months
- ❖ Maximum duration: 6 to 12 months, with monitoring

g. **Tramadol:** is useful in relief of pain and has been shown to provide pain relief equivalent to that of commonly prescribed NSAIDs. Although Tramadol may cause impaired alertness, it is generally well tolerated, does not cause gastrointestinal ulceration, or 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, and tricyclic antidepressants. This medication has physically addictive properties and withdrawal may follow abrupt discontinuation and is not recommended for those with prior opioid addiction.

- ❖ Optimal Duration: 3 to 7 days
- ❖ Maximum Duration: 2 weeks. Use beyond 2 weeks is acceptable in appropriate cases.

- h. **Topical Drug Delivery:** may be an alternative treatment for localized musculoskeletal disorders and is an acceptable form of treatment in selected patients although there is no scientific evidence to support its use in cervical injury. It is necessary that all topical agents be used with strict instructions for application as well as maximum number of applications per day to obtain the desired benefit and avoid potential toxicity. As with all medications, patient selection must be rigorous to select those patients with the highest probability of compliance. Refer to Section E.12.c, Iontophoresis in the Passive Therapy section for information regarding topical iontophoretic agents.

5. **OCCUPATIONAL REHABILITATION PROGRAMS**

- a. **Non-Interdisciplinary:** These 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 passive modalities with progression to achieve treatment and/or simulated/real work.

- i. Work Conditioning

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.

- ii. 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 and/or Job site 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 six weeks must be documented with respect to need and the ability to facilitate positive symptomatic or functional gains.

b. Interdisciplinary: programs are characterized by a variety of disciplines that participate in the assessment, planning, and/or implementation of an injured workers program with the goal for patients to gain full or optimal function and return to work. There should be close interaction and integration among the disciplines to ensure that all members of the team interact to achieve team goals. These programs are for patients with greater levels of perceived disability, dysfunction, deconditioning and psychological involvement. For patients with chronic pain, refer to Division's Chronic Pain Disorder Medical Treatment Guidelines.

i. Work Hardening

Work Hardening is an 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. This is accomplished by addressing the medical, psychological, behavioral, physical, functional, and vocational components of employability and return-to-work.

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 with documented training in occupational rehabilitation, team physicians having experience in occupational rehabilitation, occupational therapy, physical therapy, case manager, and psychologist. As appropriate, the team may also include: chiropractor, RN, or vocational specialist.

- ❖ Length of visit: up to 8 hours/day
- ❖ Frequency: 2 to 5 visits per week
- ❖ Optimal 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.

ii. Spinal Cord Programs

Spinal Cord Systems of Care provide coordinated, case-managed, and integrated service 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 and 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, occupational therapy, physical therapy, psychologist, rehabilitation RN and MD, and therapeutic recreation specialist. As appropriate, the team may also include: rehabilitation counselor, respiratory therapist, social worker, or speech-language pathologist.

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

6. **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 are associated with delayed recovery. There is no evidence that their use promotes recovery from 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 following motor vehicle crashes.
 - ii. Rigid Collars, such as a Philadelphia Orthosis, are useful post-operative 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 upon the surgeon and degree of cervical healing but is generally not used beyond 8 weeks.
 - b. **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 fuller degree than the Philadelphia collar and to a better degree lateral bending and rotation. Not recommended in sprain or strain type injuries.

- d. **Halo Devices:** are used in the treatment of cervical fracture, dislocation, and instability at the discretion of the treating surgeon. Refer to Halo Devices in the Operative Treatment section.
 - 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 would be in a structured rehabilitation setting as part of a comprehensive rehabilitation program.
7. **PATIENT EDUCATION** No treatment plan is complete without addressing issues of individual and/or group patient education as a means of prolonging the beneficial effects of treatment, as well as facilitating self-management of symptoms and injury prevention. The patient should be encouraged to take an active role in the establishment of functional outcome goals. They should be educated on their specific injury, assessment findings, and plan of treatment. Instruction on proper body mechanics and posture, positions to avoid, self-care for exacerbation of symptoms, and home exercise should also be addressed.
- ❖ Time to produce effect: Varies with individual patient
 - ❖ Frequency: Should occur at each visit
8. **PERSONALITY/PSYCHOLOGICAL/PSYCHOSOCIAL INTERVENTION** is generally accepted widely used and well established intervention. This group of therapeutic and diagnostic modalities includes, but is not limited to, individual counseling, group therapy, stress management, psychosocial crises intervention, hypnosis and meditation. Any screening or diagnostic workup should clarify and distinguish between pre-existing versus aggravated versus purely causative psychological conditions. Psychosocial intervention is recommended as an important component in the total management program that should be implemented as soon as the problem is identified. This can be used alone or in conjunction with other treatment modalities. Providers treating patients with chronic pain should refer to Division's Chronic Pain Disorder Medical Treatment Guidelines.
- ❖ Time to produce effect: 2 to 4 weeks
 - ❖ Frequency: 1 to 3 times weekly for the first 4 weeks (excluding hospitalization, if required), decreasing to 1 to 2 times per week for the second month. Thereafter, 2 to 4 times monthly.
 - ❖ Optimum duration: 6 weeks to 3 months
 - ❖ Maximum duration: 3 to 12 months. Counseling is not intended to delay but to enhance functional recovery. For select patients, longer supervised treatment may be required, and if further counseling beyond 3 months is indicated, extensive documentation addressing which pertinent issues are preexisting versus aggravated versus causative, as well as projecting a realistic functional prognosis, should be provided by the authorized treating practitioner every 4 to 6 weeks during treatment.
9. **RESTRICTION OF ACTIVITIES** There is some evidence to support the continuation of normal daily activities as the recommended treatment for acute and chronic cervical

injuries without neurologic symptoms. Complete work cessation should be avoided, if possible, since it often further aggravates the pain presentation. Modified return-to-work is almost always more efficacious and rarely contraindicated in the vast majority of injured workers with cervical spine injuries.

10. **RETURN-TO-WORK** Early return-to-work should be a prime goal in treating occupational injuries given the poor return-to-work prognosis for an injured worker who has been out of work for more than six months. It is imperative that the patient be educated regarding the benefits of return-to-work, restrictions, and follow-up if problems arise. When attempting to return a patient to work after a specific injury, clear objective restrictions of activity level should be made. An accurate job description may be necessary to assist the physician in making return-to-work recommendations.

Return-to-work is defined as any work or duty that the patient is able to perform safely, and it may not be the patient's regular work. Due to the large spectrum of injuries of varying severity and varying physical demands in the work place, it is not possible to make specific return-to-work guidelines for each injury. Therefore, the Division recommends the following:

- a. **Establishment of a Return-To-Work Status:** Ascertaining a return-to-work status is part of medical care, should be included in the treatment and rehabilitation plan, and addressed at every visit. A description of daily activity limitations is part of any treatment plan and should be the basis for restriction of work activities. In most non-surgical cases, the patient should be able to return to work in some capacity or in an alternate position consistent with medical treatment within several days unless there are extenuating circumstances. Injuries requiring more than two weeks off work should be thoroughly documented.
- b. **Establishment of Activity Level Restrictions:** Communication is essential between the patient, employer and provider to determine appropriate restrictions and return-to-work dates. It is the responsibility of the physician to provide clear concise restrictions, and it the employer's responsibility to determine if temporary duties can be provided within the restrictions. For cervical spine extremity injuries, the following should be addressed when describing the patient's activity level:
 - i. Total body position including upper trunk, especially rotation and flexion. To include duration and frequency.
 - ii. Upper extremity requirements including reaching above the shoulder, repetitive motions, and lifting or carrying requirements. Duration and frequency should be included.
 - iii. Sitting duration and frequency with regard to posture, work height(s), and movements of the head and neck.
 - iv. Visual field requirements in respect to limitations in head and neck movements.
 - v. Use of adaptive devices or equipment for proper office ergonomics or to enhance capacities can be included.

- c. **Compliance with Activity Restrictions:** In some cases, compliance with restriction of activity levels may require a complete job site evaluation, a functional capacity evaluation (FCE), or other special testing. Refer to the “Special Tests” section of this guideline.

- 11. **THERAPY — ACTIVE** The following active therapies have some evidence to support their use and 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, range of motion, 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.

Patients should be instructed to continue active therapies at home as an extension of the treatment process in order to maintain improvement levels. Home exercise can include exercise with or without mechanical assistance or resistance and functional activities with assistive devices.

The following active therapies are listed in alphabetical order:

- a. **Activities of Daily Living (ADL):** are 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:** are the use of therapeutic activities to enhance mobility, body mechanics, employability, coordination, 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:** is the application of electrical current to elicit involuntary or assisted contractions of atrophied and/or impaired muscles. Indications include muscle atrophy, weakness, and sluggish muscle contraction secondary to pain, injury, neuromuscular dysfunction, peripheral nerve lesion, or radicular symptoms.

- ❖ 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. **Cervical Lumbar Stabilization:** is a therapeutic program whose goal is to strengthen the spine in its neural and anatomic position. The stabilization is dynamic which allows whole body movements while maintaining a stabilized spine. It is the ability to move and function normally through postures and activities without creating undue vertebral stress.
- ❖ 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. **Neuromuscular Re-education:** is the skilled application of exercise with manual, mechanical or electrical facilitation to enhance strength, movement patterns, neuromuscular response, proprioception, kinesthetic sense, coordination, education of movement, balance and posture. Indications include the need to promote neuromuscular responses through carefully timed proprioceptive stimuli, to elicit and improve motor activity in patterns similar to normal neurologically developed sequences, and improve neuromotor response with independent control.
- ❖ Time to produce effect: 2 to 6 treatments
 - ❖ Frequency: 3 times per week
 - ❖ Optimum duration: 4 to 8 weeks
 - ❖ Maximum duration: 8 weeks
- f. **Therapeutic Exercise:** with or without mechanical assistance or resistance, may include 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, increased range of motion and are used to promote normal movement patterns. Can also include complementary/alternative exercise movement therapy.
- ❖ 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

12. **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 to help control swelling, pain and inflammation during the rehabilitation process. They may be used intermittently as a therapist deems appropriate or regularly if there are specific goals with objectively measured functional improvements during treatment.

While protocols for 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 comorbidities may extend durations of care. Having specific goals with objectively measured functional improvement during treatment can support extended durations of care. It is recommended that if after 6 to 8 visits no treatment effect is observed, alternative treatment interventions, further diagnostic studies or further consultations should be pursued.

The following passive therapies are listed in alphabetical order:

- a. **Electrical Stimulation (Unattended):** Electrical stimulation, once applied, requires minimal on-site supervision by the physical or nonphysical provider. Indications include pain, inflammation, muscle spasm, atrophy, decreased circulation, and the need for osteogenic stimulation.
- ❖ Time to produce effect: 2 to 4 treatments
 - ❖ Frequency: Varies, depending upon indication, between 2 to 3 times/day to 1 time/week. Provide home unit if frequent use.
 - ❖ Optimum duration: 1 to 3 months
 - ❖ Maximum duration: 3 months
- b. **Infrared Therapy:** is a radiant form of heat application. Indications include the need to elevate the pain threshold before exercise and to alleviate muscle spasm to promote increased movement.
- ❖ Time to produce effect: 2 to 4 treatments
 - ❖ Frequency: 3 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

c. **Iontophoresis:** is the transfer of medication, including, but not limited to, steroidal anti-inflammatories and anesthetics, through the use of electrical stimulation. Indications include pain (Lidocaine), inflammation (hydrocortisone, salicylate), edema (mecholy, hyaluronidase, salicylate), ischemia (magnesium, mecholy, iodine), muscle spasm (magnesium, calcium), calcific deposits (acetate), scars and keloids (chlorine, iodine, acetate).

- ❖ Time to produce effect: 1 to 4 treatments
- ❖ Frequency: 3 times per week with at least 48 hours between treatments
- ❖ Optimum duration: 4 to 6 weeks
- ❖ Maximum duration: 6 weeks

d. **Manipulation:** is a generally accepted, well-established, and widely used therapeutic intervention. Manipulation can include high velocity, low amplitude (HVLA) technique, chiropractic manipulation, osteopathic manipulation, muscle energy techniques and non-force techniques. It is performed by taking a joint to its end range of motion and moving the articulation into the zone of accessory joint movement, well within the limits of anatomical integrity.

There is good scientific evidence to suggest that manipulation can be effective for relieving pain, decreasing muscle spasm, and to increase range of motion for patients with cervical pain. There is some evidence to show that manipulation of the cervical spine can be beneficial for relief of tension-type, cervicogenic, and migraine headaches. Contraindications include joint instability, fractures, severe osteoporosis, infection, metastatic cancer, active inflammatory arthritides, and signs of progressive neurologic deficits, vertebrobasilar insufficiency, or carotid artery disease.

- ❖ Time to produce effect: 1 to 6 treatments.
- ❖ Frequency: 1 to 5 times per week for the first 2 weeks as indicated by the severity of involvement and the desired effect, then 2 to 3 treatments per week for the next 4 weeks, then 1 to 2 treatments per week for the next 6 weeks.
- ❖ Optimum duration: 8 to 12 weeks
- ❖ Maximum duration: 3 months. 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 comorbidities. Care beyond 3 months is indicated for certain chronic syndromes in which manipulation is helpful in improving function, decreasing pain and improving quality of life. Such care should be re-evaluated and documented on a monthly basis. Treatment may include visits 2 times a month through the 7th month post-injury, then on a monthly basis thereafter through the 10th month post-injury. Care beyond the 10th month should be reviewed and allowed on a case-by-case basis according to the unique needs of the patient with chronic and/or permanent injury.

- e. **Massage — Manual or Mechanical:** Massage is 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 practitioners hands. Indications include edema (peripheral or hard and non-pliable edema), muscle spasm, adhesions, the need to improve peripheral circulation and range of motion, or to increase muscle relaxation and flexibility prior to exercise.
- ❖ Time to produce effect: Immediate
 - ❖ Frequency: 1 to 2 times per week
 - ❖ Optimum duration: 6 weeks
 - ❖ Maximum duration: 2 months
- f. **Mobilization (Joint):** is 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 of the maneuver. 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. Contraindications include joint instability, fractures, severe osteoporosis, infection, metastatic cancer, active inflammatory arthritides, aortic aneurysm, and signs of progressive neurologic deficits.
- ❖ Time to produce effect: 6 to 9 treatments
 - ❖ Frequency: 3 times per week
 - ❖ Optimum duration: 4 to 6 weeks
 - ❖ Maximum duration: 6 weeks
- g. **Mobilization (Soft Tissue):** Mobilization of soft tissue is the skilled application of manual techniques designed to normalize movement patterns through the reduction of soft tissue pain and restrictions. Indications include muscle spasm around a joint, trigger points, adhesions, and neural compression.
- ❖ Time to produce effect: 2 to 3 weeks
 - ❖ Frequency: 2 to 3 times per week
 - ❖ Optimum duration: 4 to 6 weeks
 - ❖ Maximum duration: 6 weeks
- h. **Superficial Heat and Cold Therapy:** Superficial heat and cold are thermal agents applied in various manners that lowers or raises the body tissue temperature for the reduction of pain, inflammation, and/or effusion resulting from injury or induced by exercise. Includes application of heat just above the surface of the skin at acupuncture points. Indications include acute pain, edema and

hemorrhage, 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

i. **Short-Wave Diathermy:** 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. **Traction — Manual:** is 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.

- ❖ Time to produce effect: 1 to 3 sessions
- ❖ Frequency: 2 to 3 times per week
- ❖ Optimum duration: 30 days
- ❖ Maximum duration: 1 month

k. **Traction — Mechanical:** is indicated for decreased joint space, muscle spasm around joints, and the need for increased synovial nutrition and response. Traction modalities are contraindicated in patients with tumor, infections, fracture or fracture dislocation. Non-oscillating inversion traction methods are contraindicated in patients with glaucoma or hypertension.

- ❖ 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
- ❖ Optimum duration: 4 weeks

- ❖ Maximum duration: 1 month

I. Transcutaneous Electrical Nerve Stimulation (TENS): should include least one instructional session for proper application and use. Indications include muscle spasm, atrophy, and decreased circulation and pain control. Minimal TENS unit parameters should include pulse rate, pulse width and amplitude modulation.

- ❖ Time to produce effect: Immediate
- ❖ Frequency: Variable
- ❖ Optimum duration: 3 sessions.
- ❖ Maximum duration: 3 sessions. If beneficial, provide with home unit or purchase if effective.

m. Ultrasound: uses sonic generators to deliver acoustic energy for therapeutic thermal and/or nonthermal soft tissue effects. Indications include scar tissue, adhesions, collagen fiber and muscle spasm, and the need to extend muscle tissue or accelerate the soft tissue healing. Ultrasound with electrical stimulation is concurrent delivery of electrical energy that involves dispersive electrode placement. Indications include muscle spasm, scar tissue, pain modulation and muscle facilitation. Phonophoresis is the transfer of medication through the use of sonic generators to the target tissue to control inflammation and pain. These topical medications include, but are not limited to, steroidal anti-inflammatory and anesthetics.

- ❖ Time to produce effect: 6 to 15 treatments
- ❖ Frequency: 3 times per week
- ❖ Optimum duration: 4 to 8 weeks
- ❖ Maximum duration: 2 months

13. VOCATIONAL REHABILITATION 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 highest functional level, motivation and achievement of maximum medical improvement. Vocational rehabilitation may be as simple as returning to the original job or as complicated as being retrained for a new occupation.

F. THERAPEUTIC PROCEDURES — OPERATIVE

All operative interventions should be based on a positive correlation with clinical findings, the natural history of the disease, the clinical course, and diagnostic tests. A comprehensive assimilation of these factors should have led to a specific diagnosis with positive identification of the pathologic condition(s). It is imperative for the clinician to rule out non-physiologic modifiers of pain presentation, or non-operative conditions mimicking radiculopathy or instability (peripheral compressive neuropathy, chronic soft tissue injuries, and psychological conditions), prior to consideration of elective surgical intervention. Patients who are not candidates for or refuse surgical treatment should be treated with non-operative therapy as indicated.

In situations requiring the possible need for re-surgery, a second opinion may be necessary. Psychological evaluation is strongly encouraged to determine if the patient will likely benefit from the treatment. Structured rehabilitation and psychological evaluation should be strongly considered in patients not making expected functional progress in the immediate post-operative period.

Return to work activity restrictions should be specific according to the recommendations in section E 10, Return to Work. Most cervical non-fusion surgical patients can return to a limited level of duty between 3 to 6 weeks. Full activity is generally achieved between 6 weeks to 6 months, depending on the procedure and healing of the individual.

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.
 - 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 malalignment or pseudoarthrosis. 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 Therapy — Traction may be required for re-alignment and or fracture reduction (amount to be determined by surgeon), active and/or passive therapy, pin care.

b. Anterior or Posterior Decompression with Fusion:

- i. Description — To provide relief of pressure on the cervical spinal column and alignment and stabilization of the spine. May involve the use of bone grafts, sometimes combined with metal devices, 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), 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 or progressive neurological deficit exists in the presence of spinal canal compromise. Whether early decompression and reduction of neural structures enhances neurological recovery continues to be debated. Currently, a reasonable approach would be to treat non-progressive neurological deficits on a semiurgent basis, when the patient's systemic condition is medically stable.
- 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, or be performed posteriorly if the compressive pathology arises posteriorly. The posterior approach is indicated in radiculopathy in the absence of myelopathy and with evidence of pseudoarthrosis on radiographs.

The number of levels involved in the fracture pattern determines the choice between use of wire techniques versus spinal plates. In injuries treated with an anterior decompression procedure, anterior bone grafting alone does not provide immediate internal fixation and an anterior cervical plate is significantly beneficial. Patients who undergo surgery for significant fracture dislocations of the spine (three column injury) with canal compromise are best managed with anterior cervical decompression, fusion, and plating but in some cases posterior stabilization and fusion are also considered. Allografts may be used for single bone graft fusion; however autografts are generally preferable for multi-level fusions unless a strut graft is required.

- v. Post-Operative Treatment — Active and/or passive therapy, cervical bracing. Referral to a formal rehabilitation program may be appropriate once participation in a home-based fitness program has been completed. Home programs should include instruction in ADL's, stretching, and sitting, and a daily walking program.

2. **DISC HERNIATION AND OTHER CERVICAL CONDITIONS** Operative treatment is indicated only when the natural history of a treatable problem is better than the natural history of benign neglect. 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 some evidence to suggest that recovery from cervical radiculopathy in patients without clinical signs of spinal cord compression at one year is similar with one-level fusion, physical therapy, or rigid cervical collar use. For patients with whiplash injury (Quebec Classification Grade Levels I or II), there is no evidence of any beneficial effect of operative treatment. If cervical fusion 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.

General Indications for Surgery — Operative intervention should be considered and a consultation obtained when improvement of symptoms has plateaued and the residual symptoms of pain and functional disability are unacceptable at the end of six weeks of treatment, or at the end of longer duration of nonoperative intervention for debilitated patients with complex problems. Choice of hardware instrumentation is based on anatomy, the patient's pathology, and surgeon's experience and preference.

General indications include:

- a. **For Patients with Myelopathy:** immediate surgical evaluation and treatment is indicated.
- b. **For Patients with Cervical Radiculopathy:** specific indications include:
 - I. Persistence or recurrent arm pain with functional limitations, unresponsive to conservative treatment after six weeks; or
 - II. Progressive functional neurological deficit; or
 - III. Static neurological deficit associated with significant radicular pain; and
 - IV. Confirmatory imaging studies consistent with clinical findings.
- c. **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 4 to 5 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:
 - i. All pain generators are identified and treated; and
 - ii. All physical medicine and manual therapy interventions are completed; and
 - iii. X-ray, MRI, or CT/discography demonstrating disc pathology or spinal instability; and
 - iv. Spine pathology limited to two levels; and

- v. Psychosocial evaluation for confounding issues addressed.
- vi. For any potential surgery, it is recommended that the injured worker refrain from smoking for at least six weeks prior to surgery and during the period of healing.

d. Cervical Discectomy with or without Fusion:

- i. Description — Procedure to relieve pressure on one or more nerve roots or spinal cord.
- ii. Complications — May include strut graft dislodgment (multi-level decompression), infection, hemorrhage, CSF leak, hematoma, catastrophic spinal cord injury causing varying degrees of paralysis, pseudoarthrosis, in-hospital mortality, non-union of fusion, donor site pain (autograft only). Anterior approach: permanent or transient dysphonia, permanent or transitory dysphagia, denervation, esophageal perforation, and airway obstruction.
- iii. Surgical Indications — Radiculopathy from ruptured disc or spondylosis, spinal instability, or patients with non-radicular neck pain meeting fusion criteria. There is no evidence that discectomy with fusion versus discectomy without fusion has superior long-term results. Discectomy alone is generally considered in patients with pure radicular symptoms from their herniated disc and who have sufficiently large foramen that disc space collapse is unlikely to further compromise the nerve root. Failure rates increase with disease at more than two levels.
- iv. Operative Treatment — 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. Cervical plating may be used to prevent graft dislodgment especially for multi-level disease.
- v. Post-Operative Therapy — Long-term neck bracing (6 to 12 weeks) with fusion. Active and/or passive therapy. Initial home rehabilitation programs should include instruction in ADL's, posture, and contain a daily walking program. Referral to a formal rehabilitation program may be appropriate for most patients at 8 to 16 weeks post-operatively and should be strongly considered in patients not making expected functional progress in the immediate post-operative period.

e. Cervical Corpectomy:

- i. Description — Removal of a portion or the entire vertebral body from the front of the spine. May also include removal of the adjacent discs. Usually involves fusion.
- ii. Complications — May include strut graft dislodgment (multi-level decompression), infection, hemorrhage, CSF leak, hematoma, catastrophic spinal cord injury causing varying degrees of paralysis, pseudoarthrosis, in-hospital mortality, non-union of fusion, donor site pain (autograft only). Anterior approach: permanent or transient dysphonia,

permanent or transitory dysphagia, denervation, esophageal perforation, and airway obstruction.

- iii. Surgical Indications — Single or two-level spinal stenosis, spondylothesis, or severe kyphosis with cord compression.
- iv. Operative Treatment — Neural decompression, fusion with instrumentation, or halo vest placement to maintain cervical position. Hemisectorpomy 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.
- v. Post-Operative Therapy — Dependent upon number of vertebral bodies involved, healing time longer than discectomy. Active and/or passive therapy, halo vest care. Initial home rehabilitation programs should include instruction in ADL's, posture, and contain a daily walking program. Referral to a formal rehabilitation program may be appropriate for most patients at 8 to 16 weeks post-operatively and should be strongly considered in patients not making expected functional progress in the immediate post-operative period.

f. Cervical Laminectomy with or without Foraminotomy or Fusion:

- i. Description — Surgical removal of the posterior portion of a vertebrae in order to gain access to the spinal cord or nerve roots.
- ii. 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).
- iii. Surgical Indications — Neural decompression.
- iv. Operative Treatment — Laminotomy, partial discectomy, and nerve root decompression.
- v. Post-Operative Therapy — Neck bracing, active and/or passive therapy. Initial home rehabilitation programs should include instruction in ADL's, posture, and contain a daily walking program. Referral to a formal rehabilitation program may be appropriate for most patients at 8 to 16 weeks post-operatively and should be strongly considered in patients not making expected functional progress in the immediate post-operative period.

g. Cervical Laminoplasty:

- i. Description — Technique that increases anterior or posterior dimensions of the spinal canal while leaving posterior elements partially intact.
- ii. Complications — Loss of cervical motion, especially extension.

- iii. Surgical Indications — Multi-level disease: cervical spinal stenosis or spondylitic myelopathy. Not indicated in cervical kyphosis.
- iv. Operative Treatment — Posterior approach, with or without instrumentation.
- v. Post-Operative Therapy — Active and/or passive therapy. May include 4 to 12 weeks of bracing. Initial home rehabilitation programs should include instruction in ADL's, posture, and contain a daily walking program. Referral to a structured rehabilitation program may be appropriate for most patents at 8 to 16 weeks post-operatively and should be strongly considered in patients not making expected functional progress in the immediate post-operative period.