

RULE 17, EXHIBIT 6

Lower Extremity Injury Medical Treatment Guidelines

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DIVISION OF WORKERS' COMPENSATION**



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DEPARTMENT OF LABOR AND EMPLOYMENT

Division of Workers' Compensation

CCR 1101-3

RULE 17, EXHIBIT 6

LOWER EXTREMITY 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 Workers' Compensation Act as injured workers with lower extremity 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 THE 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 Workers' 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 lower extremity pain 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 (ROM), strength, endurance, activities of daily living (ADL), 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-EVALUATE 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 physical limitations and the patient should never be released to “sedentary” or “light duty.” The following functions 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)** 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 dictates 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. Prior occupational and non-occupational injuries to the same area including specific prior treatment and any prior bracing devices;
- iv. History of locking, clicking, giving way, acute or chronic swelling, crepitation, pain while ascending or descending stairs, or popping;
- v. Ability to perform job duties and activities of daily living; and
- vi. Exacerbating and alleviating factors of the injury.

- b. **Past History:**

- i. Past medical history includes neoplasm, gout, arthritis, and diabetes;
- ii. Review of systems includes symptoms of rheumatologic, neurologic, endocrine, neoplastic, and other systemic diseases;
- iii. Smoking history; and
- iv. Vocational and recreational pursuits.

- c. **Physical Examination:** Examination of a joint should include the joint above and below the affected area. Physical examinations should include accepted tests and exam techniques applicable to the joint or area being examined, including:

- i. Visual inspection;
- ii. Palpation;

- iii. Range of motion/quality of motion;
- iv. Strength;
- v. Joint stability;
- vi. If applicable to injury, integrity of distal circulation, sensory, and motor function; and
- vii. If applicable, full neurological exam including muscle atrophy and gait abnormality.

2. **RADIOGRAPHIC IMAGING** of the lower extremities is a generally accepted, well-established and widely used diagnostic procedure when specific indications based on history and/or physical examination are present. It should not be routinely performed. 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. For additional specific clinical indications, see Section D, "Specific Diagnosis, Testing and Treatment Procedures." Indications include:

- a. The inability to transfer weight for four steps at the time of the initial visit, regardless of limping;
- b. History of significant trauma, especially blunt trauma or fall from a height;
- c. Age over 55 years;
- d. Unexplained or persistent lower extremity pain over two weeks. (Occult fractures, especially stress fractures, may not be visible on initial x-ray. A follow-up radiograph and/or bone scan may be required to make the diagnosis);
- e. History or exam suggestive of intravenous drug abuse or osteomyelitis; and
- f. Pain with swelling and/or range of motion (ROM) limitation localizing to an area of prior fracture, internal fixation, or joint prosthesis.

3. **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, connective tissue disorder, or underlying arthritis or rheumatologic disorder based on history and/or physical examination. Laboratory tests can provide useful diagnostic information. Tests include, but are not limited to:

- a. Completed Blood Count (CBC) with differential can detect infection, blood dyscrasias, and medication side effects
- b. Erythrocyte sedimentation rate, rheumatoid factor, Antinuclear Antigen (ANA), Human Leukocyte Antigen (HLA), and C-reactive protein (CRP) 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;

- d. Liver and kidney function may be performed for prolonged anti-inflammatory use or other medications requiring monitoring; and
- e. Analysis of joint aspiration for bacteria, white cell count, red cell count, fat globules, crystalline birefringence and chemistry to evaluate joint effusion.

4. **OTHER PROCEDURES**

- a. **Joint Aspiration:** is a generally accepted, well-established and widely used procedure when specifically indicated and performed by individuals properly trained in these techniques. This is true at the initial evaluation when history and/or physical examination are of concern for a septic joint or bursitis. Particularly at the knee, aspiration of a large effusion can help to decrease pain and speed functional recovery. Persistent or unexplained effusions may be examined for evidence of infection, rheumatologic, or inflammatory processes. The presence of fat globules in the effusion strongly suggests occult fracture.

D. SPECIFIC LOWER EXTREMITY INJURY DIAGNOSIS, TESTING, AND TREATMENT

1. FOOT AND ANKLE

a. Ankle Sprain/Fracture:

- i. Description/Definition — An injury to the ankle joint due to abnormal motion of the talus that causes a stress on the malleoli and the ligaments. Instability can result from a fracture of a malleolus (malleoli), rupture of ligaments, or a combination. Circumstances surrounding the injury are of importance in consideration of other injuries and locations. Additionally, the position of the foot at the time of injury is helpful in determining the extent and type of injury. Grading of soft tissue injuries includes:
 - A) Grade 1 injuries are those with microscopic tears of the ligament, minimal swelling, normal stress testing, and the ability to bear weight.
 - B) Grade 2 injuries have partial disruption of the ligament, significant swelling, indeterminate results on stress testing, and difficulty bearing weight.
 - C) Grade 3 injuries have a ruptured ligament, swelling and ecchymosis, abnormal results on stress testing, and the inability to bear weight.
- ii. Occupational Relationship — Sudden twisting, direct blunt trauma, and falls.
- iii. Specific Physical Findings — Varies with individual: normal-appearing ankle or minimal tenderness on examination, ability/inability to bear weight, pain, swelling, ecchymosis. If the patient is able to transfer weight from one foot and has normal physical findings, then likelihood of fracture is reduced.
- iv. Diagnostic Testing Procedures — Ankle x-rays for bone tenderness, inability to bear weight, or significant edema/ecchymosis.
- v. Non-Operative Treatment — For patients able to bear weight: Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and rest, ice, compression, elevation (RICE) in first 24 hours. After the acute phase, isometric and range of motion exercises are recommended followed by strengthening exercises. Partial weight-bearing and splinting may be used in the initial stage of treatment. Active and/or passive therapy may be utilized to achieve optimal function.

For patients unable to bear weight: Bracing plus NSAIDs and RICE.

For patients with a clearly unstable joint: immobilization may be necessary for 4 to 6 weeks, with active and/or passive therapy to achieve optimal function.

- vi. Surgical Indications — Severe instability, failure of conservative treatment, chronic instability, displaced fracture.
- vii. Operative Treatment — Soft tissue: primary repair for acute and severe instability, delayed primary repair for chronic instability. Osseous: Open reduction internal fixation.
- viii. Post-Operative Therapy — Casting, bracing, active and/or passive therapy.

b. Talar Fracture:

- i. Description/Definition — Osseous fragmentation of talus confirmed by radiographic, CT or MRI evaluation.
- ii. Occupational Relationship — Usually occurs from a fall or crush injury.
- iii. Specific Physical Findings — Clinical findings consistent with fracture of talus: pain with range of motion, palpation, swelling, ecchymosis. Pain with weight-bearing attempt.
- iv. Diagnostic Testing Procedures — Radiographs, CT scans, MRI. CT scans preferred for spatial alignment.
- v. Non-Operative Treatment — Active and/or passive therapy, casting, non weight-bearing for 6 to 8 weeks for non-displaced fractures.
- vi. Surgical Indications — Osseous displacement, joint involvement and instability per physician discretion.
- vii. Operative Treatment — Open reduction internal fixation.
- viii. Post-Operative Therapy — Non weight-bearing 6 to 8 weeks followed by weight-bearing cast. MRI follow-up if suspect avascular necrosis. Active and/or passive therapy.

c. Calcaneal Fractures:

- i. Description/Definition — Osseous fragmentation/separation confirmed by diagnostic studies.
- ii. Occupational Relationship — Usually occurs by fall or crush injury.
- iii. Specific Physical Findings — Pain with range of motion and palpation of calcaneus. Inability to weight-bear, malpositioning of heel, possible impingement of sural nerve.
- iv. Diagnostic Testing Procedures — Radiographs/CT scans.

- v. Non-Operative Treatment — Active and/or passive therapy, non weight-bearing 6 to 8 weeks, followed by weight-bearing cast at physician's discretion.
- vi. Surgical Indications — Displacement of fragments, joint depression, intra-articular involvement, malposition of heel.
- vii. Operative Treatment — Open reduction internal fixation.
- viii. Post-Operative Therapy — Non weight-bearing for 6 to 8 weeks followed by weight-bearing for approximately 6 to 8 weeks at physician's discretion. Active and/or passive therapy.

d. Midfoot (Lisfranc's) Fracture Dislocation:

- i. Description/Definition — Fracture/ligamentous disruption of the tarsal-metatarsal joints, i.e., metatarsal-cuneiform and metatarsal-cuboid bones.
- ii. Occupational Relationship — Usually occurs by a fall, crush, or sagittal plane hyperflexion/extension.
- iii. Specific Physical Findings — Fracture dislocation at Lisfranc's joint. CT scans usually needed to evaluate. Fracture at base of 2nd metatarsal commonly seen.
- iv. Diagnostic Testing Procedures — X-rays, CT scans, MRI, mid-foot stress x-rays.
- v. Non-Operative Treatment — Active and/or passive therapy. If minimal or no displacement (soft tissue) then casting, non weight-bearing 6 to 10 weeks.
- vi. Surgical Indications — If displacement of fragments or intra-articular. Most Lisfranc's fracture/dislocations are treated surgically.
- vii. Operative Treatment — Open reduction internal fixation with removal of hardware approximately 3 to 6 months afterwards, pending healing status.
- viii. Post-Operative Therapy — Active and/or passive therapy, foot orthoses, non weight-bearing 6 to 12 weeks.

e. Metatarsal-Phalangeal, Tarsal-Metatarsal, and Interphalangeal Joint Arthropathy:

- i. Description/Definition — Internal derangement of joint.
- ii. Occupational Relationship — Jamming, contusion, crush injury, or repetitive motion posttraumatic arthropathy.
- iii. Specific Physical Findings — Pain with palpation and ROM of joint, effusion.

- iv. Diagnostic Testing Procedures — Radiographs, diagnostic joint injection, MRI.
- v. Non-Operative Treatment — Active and/or passive therapy, joint splinting, injection therapy.
- vi. Surgical Indications — Pain, unresponsive to conservative care. Surgery may include athroplasty, implant, and fusion.
- vii. Operative Treatment — Fusion, arthroplasty, joint debridement.
- viii. Post-Operative Therapy — Active and/or passive therapy, early range of motion with arthroplasty, bracing-protected, weight-bearing with fusion.

f. Pilon Fracture:

- i. Description/Definition — Crush/comminution fracture of distal metaphyseal tibia that has intra-articular extensions into the weight-bearing surface of the tibio-talar joint.
- ii. Occupational Relationship — Usually from a fall.
- iii. Specific Physical Findings — Multiple fracture fragments at distal tibia with intra-articular extensions into the weight-bearing surface of the tibio-talar joint.
- iv. Diagnostic Testing Procedures — Radiographs, CT scans.
- v. Non-Operative Treatment — Active and/or passive therapy. Prolonged non weight-bearing at physician's discretion.
- vi. Surgical Indications — Displacement of fracture with viable attempt at joint salvage, severe comminution necessitating primary fusion.
- vii. Operative Treatment — Open reduction internal fixation, fusion, external fixation.
- viii. Post-Operative Therapy — Active and/or passive therapy.

g. Puncture Wounds of the Foot:

- i. Description/Definition — Penetration of skin by foreign object.
- ii. Occupational Relationship — Usually by stepping on foreign object, open wound.
- iii. Specific Physical Findings — Site penetration by foreign object consistent with history. In early onset, may show classic signs of infection.
- iv. Diagnostic Testing Procedures — X-ray, MRI, ultrasound.

- v. Non-Operative Treatment — Appropriate antibiotic therapy, tetanus toxoid booster, non weight-bearing at physician's discretion.
- vi. Surgical Indications — Cellulitis, retained foreign body suspected, abscess, compartmental syndrome, and bone involvement.
- vii. Operative Treatment — Incision and drainage with cultures.
- viii. Post-Operative Therapy — Non weight-bearing, antibiotic therapy based upon cultures, follow-up x-rays may be needed to evaluate for osseous involvement. Active and/or passive therapy.

h. Achilles Tendon Injury/Rupture:

- i. Description/Definition — Rupture, tear, or strain of Achilles tendon.
- ii. Occupational Relationship — Related to a fall, twisting, jumping, or sudden load on ankle with dorsiflexion.
- iii. Specific Physical Findings — Swelling and pain at tendon, palpable deficit in tendon.
- iv. Diagnostic Testing Procedures — MRI, ultrasound.
- v. Non-Operative Treatment — Cast, non weight-bearing, active and/or passive therapy.
- vi. Surgical Indications — Total rupture.
- vii. Operative Treatment — Repair of tendon by various methods, therapy.
- viii. Post-Operative Therapy — Non weight-bearing cast for 6 to 8 weeks followed by active and/or passive therapy.

i. Ankle Osteoarthropathy:

- i. Description/Definition — Internal joint pathology of ankle.
- ii. Occupational Relationship — Chronic: work activities exacerbating a pathologic condition. Acute: internal derangement of joint caused by trauma (twisting, fall).
- iii. Specific Physical Findings — Pain within joint, swelling.
- iv. Diagnostic Testing Procedures — X-ray, CT, MRI, diagnostic injection.
- v. Non-Operative Treatment — Injection therapy, bracing, active and/or passive therapy.
- vi. Surgical Indications — Pain and loss of joint function. Unresponsive to conservative care.
- vii. Operative Treatment — Arthroscopy, arthrotomy, fusion.

viii. Post-Operative Therapy — Active and/or passive therapy.

j. Ankle or Subtalar Joint Dislocation:

- i. Description/Definition — Dislocation of ankle or subtalar joint.
- ii. Occupational Relationship — Usually occurs by fall, twist.
- iii. Specific Physical Findings — Disruption of articular arrangements of ankle, subtalar joint.
- iv. Diagnostic Testing Procedures — Radiographs, CT scans.
- v. Non-Operative Treatment — Closed reduction under anesthesia with pre and post-reduction neurovascular assessment.
- vi. Surgical Indications — Inability to reduce closed fracture, association with unstable fractures.
- vii. Operative Treatment — Open reduction of dislocation.
- viii. Post-Operative Therapy — Immobilization, followed by active and/or passive therapy.

k. Heel Spur Syndrome/Plantar Fasciitis:

- i. Description — Pain along the inferior aspect of the heel at the attachment of the plantar fascia.
- ii. Occupational Relationship — Condition may be exacerbated by prolonged standing on hard surfaces. Acute injury may be caused by trauma. This may include jumping from a height or hyperextension of the forefoot upon the rear foot.
- iii. Specific Physical Findings — Pain with palpation at the inferior attachment of the plantar fascia to the os calcis. May be associated with calcaneal spur.
- iv. Diagnostic Testing — Standard radiographs to rule out fracture, identify spur after conservative therapy. Bone scans may be utilized to rule out stress fractures in chronic cases.
- v. Non-Operative Treatment — This condition usually responds to conservative management consisting of active and/or passive therapy, taping, injection therapy, non-steroidal anti-inflammatory drugs, and custom foot orthoses.
- vi. Surgical Indications — Surgery is usually employed only after failure of conservative management (3 to 6 months).
- vii. Operative Treatment — Plantar fascial release with or without calcaneal spur removal.

- viii. Post-Operative Therapy — Non weight-bearing 7 to 10 days followed by weight-bearing cast or shoe for four weeks. Active and/or passive therapy.

I. Tarsal Tunnel Syndrome:

- i. Description — Pain and paresthesias along the medial aspect of the ankle and foot due to nerve irritation and entrapment of the tibial nerve or its branches.
- ii. Occupational Relationship — Acute injuries may occur after blunt trauma along the medial aspect of the foot. Non-traumatic occurrences are determined at physician's discretion after review of environmental and biomechanical risk factors. Examples may include abnormal foot mechanics and excessive weight-bearing.
- iii. Specific Physical Findings — Positive Tinel's sign. Pain with percussion of the tibial nerve radiating distally or proximally. Pain and paresthesias with weight-bearing activities.
- iv. Diagnostic Testing Procedures — Nerve conduction velocity studies, MRI.
- v. Non-Operative Treatment — Active and/or passive therapy, injection therapy, cast immobilization, foot orthoses, non-steroidal anti-inflammatories.
- vi. Surgical Indications — Failure of condition to respond to conservative management (3 to 6 months).
- vii. Operative Treatment — Tarsal tunnel release.
- viii. Post-Operative Therapy — Active and/or passive therapy.

m. Neuroma:

- i. Description — This condition is a perineural fibrosis of the intermetatarsal nerve creating pain and/or paresthesias in the forefoot region. Symptoms appear with weight-bearing activities. Usually occurs between the third and fourth metatarsals or between the second and third metatarsals.
- ii. Occupational Relationship — Acute injuries may include excessive loading of the forefoot region caused from jumping or pushing down on the ball of the foot. Non-traumatic occurrences are determined at physician's discretion after review of environmental and biomechanical risk factors. Examples may include excessive weight-bearing on hard surfaces in conjunction with abnormal foot mechanics.
- iii. Specific Physical Findings — Paresthesias and or pain with palpation of the intermetatarsal nerve (Mulder's sign) diagnostic testing-radiographs to rule out osseous involvement. Diagnostic and therapeutic injections.

Diagnosis is usually made upon clinical judgment; however MRI and ultrasound imaging have also been employed in difficult cases.

- iv. Diagnostic Testing — Radiographs to rule out osseous involvement. Diagnostic and therapeutic injections. Diagnosis is usually made upon clinical judgment; however MRI and ultrasound imaging have also been employed in difficult cases.
- v. Non-Operative Treatment — Injection therapy, nonsteroidal anti-inflammatories, foot orthoses, active and/or passive therapy.
- vi. Surgical Indications — Failure of conservative management (2 to 3 months).
- vii. Operative Treatment — Excision of the neuroma.
- viii. Post-Operative Therapy — Active and/or passive therapy. May involve a period of non weight-bearing up to two weeks followed by gradual protected weight-bearing 4 to 6 weeks.

2. KNEE

a. Chondral Defects:

- i. Description/Definition — Cartilage or cartilage and bone defect at the articular or meniscal surface of a joint.
- ii. Occupational Relationship — Usually caused by a traumatic knee injury.
- iii. Specific Physical Findings — Knee effusion, pain in joint.
- iv. Diagnostic Testing Procedures — MRI may show bone bruising, osteochondral lesion, or possibly articular cartilage injury. Radiographs, contrast radiography, CT may also be used.
- v. Non-Operative Treatment — Limited indications. The size and extent of the injury should be determined first. This form of therapy is reserved for non-displaced, stable lesions. Immobilization (for acute injury), active and/or passive therapy.
- vi. Surgical Indications — Symptoms not responsive to conservative therapy. Identification of an osteochondral lesion by diagnostic testing procedures should be done to determine the size of the lesion and stability of the joint.
 - A) Cartilage grafts and or transplantations remain controversial and have some scientific evidence. These procedures are technically difficult and require specific physician expertise. Cartilage transplantation requires the harvesting and growth of patients' cartilage cells in a highly specialized lab and may incur extraneous laboratory charges.

Indications – They may be effective in patients less than 40 years of age, with a singular, traumatically caused grade III or IV femoral condyle deficit, and who plan to maintain an active lifestyle. The diameter of the deficit should not exceed 20 mm for osteochondral autograft transplant procedure.

Contraindications – Grafts and transplants are not recommended for individuals with obesity, inflammatory or osteoarthritis, or other chondral defects, associated ligamentous or meniscus pathology, or who are greater than 55 years of age. For cartilage grafts or transplants, prior authorization is required.

B) Cartilage repair involves the repair and or removal of torn cartilage.

- vii. Operative Treatment — Arthroscopy with debridement or shaving of cartilage, microfracture, mosaicplasty, fixation of loose osteochondral fragments and cartilage transplantation.
- viii. Post-Operative Therapy — May include restricted weight-bearing, bracing, active and/or passive therapy. Continuous passive motion is suggested after microfracture.

b. Aggravated Osteoarthritis:

- i. Description/Definition — Swelling and/or pain in a joint due to an aggravating activity in a patient with pre-existing degenerative change in a joint.
- ii. Occupational Relationship — May be caused by repetitive activity or constant position.
- iii. Specific Physical Findings — Increased pain and swelling in a joint.
- iv. Diagnostic Testing Procedures — Radiographs, MRI to rule out degenerative menisci tear.
- v. Non-Operative Treatment — NSAIDs, ice, bracing, active and/or passive therapy, therapeutic injections, restricted activity.
- vi. Surgical Indications — Symptoms not responsive to conservative therapy.
- vii. Operative Treatment — Arthroscopic joint lavage, debridement, removal of loose bodies. For symptoms not responsive to conservative measures, treatment may involve total joint replacement.
- viii. Post-Operative Therapy — Active and/or passive therapy.

c. Anterior Cruciate Ligament (ACL) Injury:

- i. Description/Definition — Rupture or partial rupture of the anterior cruciate ligament; may be associated with other internal derangement of the knee.
- ii. Occupational Relationship — May be caused by virtually any traumatic force to the knee but most often caused by a twisting or a hyperextension force.
- iii. Specific Physical Findings — Findings on physical exam include effusion or hemarthrosis, instability, Lachman's test, pivot shift test, and anterior drawer test.
- iv. Diagnostic Testing Procedures — MRI. Radiographs may show avulsed portion of tibial spine but this is a rare finding.
- v. Non-Operative Treatment — Active and/or passive therapy, bracing, therapeutic injection.
- vi. Surgical Indications — Physically active individual less than 50 years old or any individual with complaints of recurrent instability.
- vii. Operative Treatment — Diagnostic/surgical arthroscopy followed by ACL reconstruction using autograft. If meniscus repair is performed, an ACL repair should be performed concurrently.
- viii. Post-Operative Therapy — Active and/or passive therapy, bracing.

d. Posterior Cruciate Ligament (PCL) Injury:

- i. Description/Definition — Rupture of PCL; may have concurrent ACL rupture.
- ii. Occupational Relationship — Most often caused by a posterior directed force to flexed knee.
- iii. Specific Physical Findings — Findings on physical exam include acute effusion, instability, reverse Lachman's test, reverse pivot shift, posterior drawer test.
- iv. Diagnostic Testing Procedures — MRI, radiographs may reveal avulsed bone.
- v. Non-Operative Treatment — Active and/or passive therapy, bracing, therapeutic injection.
- vi. Surgical Indications — Complaints of instability. Carefully consider the patients' normal daily activity level before initiation of surgical intervention. Most commonly done when the PCL rupture is accompanied by multiligament injury.
- vii. Operative Treatment — Autograft or allograft reconstruction.

viii. Post-Operative Therapy — Active and/or passive therapy, bracing.

e. Meniscus Injury:

i. Description/Definition — A tear, disruption, or avulsion of medial or lateral meniscus tissue.

ii. Occupational Relationship — Trauma to the menisci from rotational, shearing, torsion, and/or impact injuries.

iii. Specific Physical Findings — Patient describes a popping, tearing, or catching sensation. Findings on physical exam may include joint line tenderness, locked joint, or occasionally, effusion.

iv. Diagnostic Testing Procedures — Radiographs including standing Posterior/Anterior (PA), lateral, tunnel, and Skyline views.

v. Non-Operative Treatment — Active and/or passive therapy, bracing.

vi. Surgical Indications — Symptoms not responsive to conservative therapy. Sustained marked reduction of ROM of joint; acute effusion with positive ligament laxity; recurrent effusions; infection; loose bodies.

vii. Operative Treatment — Debridement of meniscus, repair of meniscus, partial or complete excision of meniscus. Complete excision of meniscus should only be performed when clearly indicated due to the long-term risk of arthritis in these patients.

viii. Post-Operative Therapy — Active and/or passive therapy, bracing.

f. Patellar Subluxation:

i. Description/Definition — An incomplete subluxation or dislocation of the patella. Recurrent episodes can lead to subluxation syndrome that can cause frank dislocation of the patella.

ii. Occupational Relationship — Primarily associated with contusion, lateral force direct contact. Secondary causes associated with shearing forces on the patella.

iii. Specific Physical Findings — Patient may report buckling sensation. Findings on physical exam may include retinacular weakness, swelling, effusion, marked pain with patellofemoral tracking/compression and glides. In addition, other findings include atrophy of muscles, positive patellar apprehension test, patella alta.

iv. Diagnostic Testing Procedures — CT or Radiographs including Merchant views, Q-angle versus congruents.

v. Non-Operative Treatment — Active and/or passive therapy, bracing, therapeutic injection.

- vi. Surgical Indications — Symptoms not responsive to conservative therapy, fracture, recurrent subluxation or recurrent effusion.
- vii. Operative Treatment — Diagnostic arthroscopy with possible arthrotomy; debridement of soft tissue and articular cartilage disruption; open reduction internal fixation with fracture. Retinacular release, quadriceps reefing, and patellar tendon transfer should only be considered after 6 to 9 months of conservative therapy.
- viii. Post-Operative Therapy — Active and/or passive therapy, bracing.

g. Retropatellar Pain Syndrome:

- i. Description/Definition — A retropatellar pain syndrome lasting over three months. Retropatellar pathologies are associated with resultant weakening instability, and pain of the patellofemoral mechanism. Can include malalignment, persistent quadriceps tendonitis, distal patellar tendonitis, patellofemoral arthrosis, and symptomatic plica syndrome.
- ii. Occupational Relationship — Usually associated with contusion; repetitive patellar compressive forces, shearing articular injuries associated with subluxation or dislocation of patella, fractures, infection, and connective tissue disease.
- iii. Specific Physical Findings — Patient complains of pain, instability and tenderness that interfere with daily living and work functions. Findings on physical exam may include retinacular tenderness, pain with patellar compressive ranging, positive patellar glide test, atrophy of quadriceps muscles, positive patellar apprehensive test. Associated anatomical findings may include increased Q angle; rotational lower extremity joints; ligament laxity, and effusion.
- iv. Diagnostic Testing Procedures — Radiographs including tunnel, Merchant, or Laurin views. MRI rarely identifies pathology. Occasionally CT or Bone scan.
- v. Non-Operative Treatment — Active and/or passive therapy, bracing, orthotics, therapeutic injections.
- vi. Surgical Indications — Symptoms not responsive to conservative therapy, patellar tendon disruption, quadriceps tendon rupture/avulsion, fracture.
- vii. Operative Treatment — Arthroscopic debridement of articular surface, plica, synovial tissue, loose bodies, arthrotomy, open reduction internal fixation with fracture, patellar button (prosthesis) with grade III-IV OA, and possible patellectomy. Retinacular release, quadriceps reefing, and tibial transfer procedures should only be considered after 6 to 9 months of conservative therapy.
- viii. Post-Operative Therapy — Active and/or passive therapy; bracing.

h. Tendonitis/Tenosynovitis:

- i. Description/Definition — Inflammation of the lining of the tendon sheath or of the enclosed tendon. Usually occurs at the point of insertion into bone or a point of muscular origin. Can be associated with bursitis, or calcium deposits or systemic connective diseases.
- ii. Occupational Relationship — Extreme or repetitive trauma, strain, or excessive unaccustomed exercise or work.
- iii. Specific Physical Findings — Involved tendons may be visibly swollen with possible fluid accumulation and inflammation; popping or crepitus; and decreased ROM.
- iv. Diagnostic Testing Procedures — Rarely indicated.
- v. Non-Operative Treatment — Active and/or passive therapy, including ergonomic changes at work station(s), NSAIDs, therapeutic injections.
- vi. Surgical Indications — Suspected avulsion fracture, severe functional impairment unresponsive to conservative therapy.
- vii. Operative Treatment — Rarely indicated and only after extensive conservative therapy.
- viii. Post-Operative Therapy — Active and/or passive therapy.

i. Bursitis of the Lower Extremity:

- i. Description/Definition — Inflammation of bursa tissue. Can be precipitated by tendonitis, bone spurs, foreign bodies, gout, arthritis, muscle tears, or infection.
- ii. Occupational Relationship — Sudden change in work habits, frequent repetitive motions in non-routine work profile, postural changes, contusion, frequent climbing, soft tissue trauma, fracture, continuous work on uneven surfaces, sustained compression force.
- iii. Specific Physical Findings — Palpable, tender and enlarged bursa, decreased ROM, warmth. May have increased pain with ROM.
- iv. Diagnostic Testing Procedures — Bursal fluid aspiration with testing for connective tissue, rheumatic disease, and infection. Radiographs, CT, MRI are rarely indicated.
- v. Non-Operative Treatment — Active and/or passive therapy, ice, therapeutic injection, treatment of an underlying infection, if present.
- vi. Surgical Indications — Bursa excision after failure of conservative therapy.
- vii. Operative Treatment — Surgical excision of the bursa.

- viii. Post-Operative Therapy — Active and/or passive therapy.

3. **HIP AND LEG**

a. **Hip Fracture:**

- i. Description/Definition — Fractures of the neck and peri-trochanteric regions of the proximal femur.
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush. Patients with intracapsular femoral fractures have a risk of developing avascular necrosis of the femoral head requiring treatment months to years after the initial injury.
- iii. Specific Physical Findings — Often a short, and externally rotated lower extremity.
- iv. Diagnostic Testing Procedures — Radiographs. Occasional use of tomography, CT scanning or MRI.
- v. Non-Operative Treatment — Rarely indicated. May be considered in a stable, undisplaced fracture.
- vi. Surgical Indications — Unstable peritrochanteric fractures with potential for displacement; femoral neck fracture to be considered for pinning or prosthetic replacement based upon pattern and displacement of fracture. Open fracture.
- vii. Operative Treatment — Prosthetic replacement for displaced neck fractures. Closed reduction, and internal fixation for peri-trochanteric fractures and undisplaced or minimally displaced neck fractures.
- viii. Post-Operative Therapy — Active and/or passive therapy. Weight-bearing progression based upon fracture pattern and stability. In all cases, communication between the physician and physical therapist is important to the timing of weight-bearing and exercise progressions.

b. **Pelvic Fracture:**

- i. Description/Definition — Fracture of one or more components of the pelvic ring (sacrum and iliac wings).
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush.
- iii. Specific Physical Findings — Displaced fractures may cause pelvic deformity and shortening or rotation of the lower extremities.
- iv. Diagnostic Testing Procedures — Radiographs, CT scanning. Occasionally MRI, angiogram, urethrogram.

- v. Non-Operative Treatment — For stable, undisplaced or minimally displaced fractures. May include analgesics, a limited period of bed rest, limited weight-bearing and passive therapy.
- vi. Surgical Indications — Unstable fracture pattern, open fracture.
- vii. Operative Treatment — External or internal fixation dictated by fracture pattern.
- viii. Post-Operative Therapy — Graduated weight-bearing according to fracture healing. Active and/or passive therapy for gait, pelvic stability and strengthening and restoration of joint and extremity function.

c. Acetabulum Fracture:

- i. Description/Definition — Subgroup of pelvic fractures with involvement of the hip articulation.
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush.
- iii. Specific Physical Findings — Displaced fractures may have short and/or abnormally rotated lower extremity.
- iv. Diagnostic Testing Procedures — Radiographs, CT scanning.
- v. Non-Operative Treatment — May be considered for undisplaced fractures or minimally displaced fractures that do not involve the weight-bearing surface of the acetabular dome.
- vi. Surgical Indications — Displaced or unstable fracture pattern associated femoral head fracture, open fracture.
- vii. Operative Treatment — Usually open reduction internal fixation.
- viii. Post-Operative Therapy — Active and/or passive therapy for early range of motion and weight-bearing progression, strengthening, flexibility, and neuromuscular training. In all cases, communication between the physician and physical therapist is important to the timing of weight-bearing and exercise progressions.

d. Hamstring Tendon Rupture:

- i. Description/Definition — Most commonly, a disruption of the muscular portion of the hamstring. Extent of the tear is variable. Occasionally a proximal tear or avulsion. Rarely a distal injury.
- ii. Occupational Relationship — Excessive tension on the hamstring either from an injury or from a rapid, forceful contraction of the muscle.
- iii. Specific Physical Findings — Local tenderness, swelling, ecchymosis.

- iv. Diagnostic Testing Procedures — Occasionally radiographs or MRI for proximal tears/possible avulsion.
- v. Non-Operative Treatment — Usual treatment is local ice followed by heat in 24 to 48 hours, protected weight-bearing, active and/or passive therapy, nonsteroidal anti-inflammatory drugs.
- vi. Surgical Indications — Usually for proximal or distal injuries only if significant functional impairment is expected without repair, open fracture.
- vii. Operative Treatment — Occasionally re-attachment of proximal avulsions and repair of distal tendon disruption.
- viii. Post-Operative Therapy — Active and/or passive therapy, protected weight-bearing.

e. Hip Dislocation:

- i. Description/Definition — Disengagement of the femoral head from the acetabulum.
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush.
- iii. Specific Physical Findings — Most commonly a short, internally rotated, adducted lower extremity with a posterior dislocation. A short externally rotated extremity with an anterior dislocation.
- iv. Diagnostic Testing Procedures — Radiographs, occasionally CT scanning.
- v. Non-Operative Treatment — Urgent closed reduction. Sedation or general anesthesia usually required.
- vi. Surgical Indications — Failure of closed reduction. Associated fracture of the acetabulum or femoral head, open fracture.
- vii. Operative Treatment — Open reduction of the femoral head.
- viii. Post-Operative Therapy — Active and/or passive therapy for early range of motion, protected weight-bearing.

f. Trochanteric Fracture:

- i. Description/Definition — Fracture of the greater trochanter of the proximal femur.
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush.
- iii. Specific Physical Findings — Local tenderness over the greater trochanter. Sometimes associated swelling, ecchymosis.

- iv. Diagnostic Testing Procedures — Radiographs. Occasionally tomograms or CT scans.
- v. Non-Operative Treatment — Active and/or passive therapy for protected weight-bearing.
- vi. Surgical Indications — Large, displaced fragment, open fracture.
- vii. Operative Treatment — Open reduction, internal fixation.
- viii. Post-Operative Therapy — Active and/or passive therapy for protected weight-bearing. Full weight-bearing with radiographic and clinical signs of healing.

g. Femur Fracture:

- i. Description/Definition — Fracture of the femur distal to the lesser trochanter.
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush.
- iii. Specific Physical Findings — May have a short, abnormally rotated extremity. Effusion if the knee joint involved.
- iv. Diagnostic Testing Procedures — Radiographs. Occasionally, tomography or CT scanning, particularly, if the knee joint is involved.
- v. Non-Operative Treatment — Active and/or passive therapy for functional bracing, protected weight-bearing.
- vi. Surgical Indications — Unstable fracture pattern, displaced fracture, especially if the knee joint is involved, open fracture.
- vii. Operative Treatment — Often closed, rodding for shaft fractures. Open reduction and internal fixation more common for fractures involving the knee joint.
- viii. Post-Operative Therapy — Active and/or passive therapy for protected weight-bearing, early range of motion if joint involvement.

h. Tibia Fracture:

- i. Description/Definition — Fracture of the tibia proximal to the malleoli.
- ii. Occupational Relationship — Usually from a traumatic injury such as a fall or crush.
- iii. Specific Physical Findings — May have a short, abnormally rotated extremity. Effusion if the knee joint involved.
- iv. Diagnostic Testing Procedures — Radiographs. Occasionally tomography, or CT scanning particularly, if the knee joint is involved.

- v. Non-Operative Treatment — Active and/or passive therapy for functional bracing, protected weight-bearing.
- vi. Surgical Indications — Unstable fracture pattern, displaced fracture (especially if the knee joint is involved), open fracture.
- vii. Operative Treatment — Often closed rodding for shaft fractures. Open reduction and internal fixation more common for fractures involving the knee joint.
- viii. Post-Operative Therapy — Active and/or passive therapy for protected weight-bearing, early range of motion if joint involvement.

E. 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.

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** Imaging studies are generally accepted, well-established and widely used diagnostic procedures. When indicated, the following additional imaging studies can be utilized for further evaluation of the lower extremity, based upon the mechanism of injury, symptoms, and patient history. For specific clinical indications, see Section D₁ Specific Diagnosis, Testing, and Treatment Procedures. The studies below are listed in frequency of use, not importance.

a. **Magnetic Resonance Imaging (MRI):** provides a more definitive visualization of soft tissue structures, including ligaments, tendons, joint capsule, menisci and joint cartilage structures, than x-ray or Computed Axial Tomography-in the evaluation of traumatic or degenerative injuries. The addition of intravenous or intra-articular contrast can enhance definition of selected pathologies.

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 window evaluation. Instrument scatter-reduction software provides better resolution when metallic artifact is of concern.

c. **Lineal Tomography:** is infrequently used, yet may be helpful in the evaluation of joint surfaces and bone healing.

d. **Bone Scan (Radioisotope Bone Scanning):** is generally accepted, well-established and widely used. Bone scanning is more sensitive but less specific than MRI. ^{99m}Tc-Technecium 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.

Bone scanning is more sensitive but less specific than MRI. It is useful for the investigation of trauma, infection, stress fracture, occult fracture, Charcot joint, Complex Regional Pain Syndrome, and suspected neoplastic conditions of the lower extremity.

- e. **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.
- f. **Arthrograms:** may be useful in the evaluation of internal derangement of a joint, including when MRI or other tests are contraindicated or not available. Potential complications of this more invasive technique include pain, infection, and allergic reaction. Arthrography gains additional sensitivity when combined with CT in the evaluation of internal derangement, loose bodies, and articular cartilage surface lesions. Diagnostic arthroscopy should be considered before arthrogram with strong clinical correlation.
- g. **Diagnostic Arthroscopy (DA):** allows direct visualization of the interior of a joint, enabling the diagnosis of conditions when other diagnostic tests have failed to reveal an accurate diagnosis. DA may also be employed in the treatment of joint disorders. In some cases, the mechanism of injury and physical examination findings will strongly suggest the presence of a surgical lesion. In those cases, it is appropriate to proceed directly with the interventional arthroscopy.

2. **OTHER TESTS** The studies below are listed by frequency of use, not importance.

- a. **Personality/Psychological/Psychosocial Evaluations:** are generally accepted and well-established diagnostic procedures with selective use in the acute lower extremity population, but have more widespread use in sub-acute and chronic lower extremity 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 for 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 "Psychosocial Evaluation," 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:** Electrodiagnostic tests include, but are not limited to, Electromyography (EMG), Nerve Conduction Studies (NCS) 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 in the evaluation of patients with suspected involvement of the neuromuscular system, including disorder of the anterior horn cell, radiculopathies, peripheral nerve entrapments, peripheral neuropathies, neuromuscular junction and primary muscle disease.

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. **Doppler Ultrasonography/Plethysmography:** is useful in establishing the diagnosis of arterial and venous disease in the lower extremity and should be considered prior to the more invasive venogram or arteriogram study. Doppler is less sensitive in detecting deep-vein thrombosis in the calf muscle area. If the test is initially negative, an ultrasound should be repeated 7 days post initial symptoms to rule out popliteal thrombosis. It is also useful for the diagnosis of popliteal mass when MRI is not available or contraindicated.
- d. **Venogram/Arteriogram:** is useful for investigation of vascular injuries or disease, including deep-venous thrombosis. Potential complications may include pain, allergic reaction, and deep-vein thrombosis.

e. **Compartment Pressure Testing and Measurement Devices:** such as pressure manometer, are useful in the evaluation of patients who present symptoms consistent with a compartment syndrome.

3. **SPECIAL TESTS** are generally well-accepted tests and are performed as part of a skilled assessment of the patient's capacity to return-to-work, his/her strength capacities, and physical work demand classifications and tolerances.

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 her/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 FCE 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.

F. 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, restricted, or full duty during their rehabilitation at the earliest appropriate time. Refer to F 10 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 F 11 Active Therapy (Therapeutic Exercise) and F 12 Passive Therapy sections (Massage and Superficial Heat and Cold Therapy) for a description of these adjunctive acupuncture modalities.

- ❖ Time to produce effect: 3-6 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

Description — Therapeutic injection procedures are generally accepted, well-established procedures that may play a significant role in the treatment of patients with lower extremity pain or pathology. Therapeutic injections involve the delivery of anesthetic and/or anti-inflammatory medications to the painful structure. Therapeutic injections have many potential benefits. Ideally, a therapeutic injection will: (a) reduce inflammation in a specific target area; (b) relieve secondary muscle spasm; (c) allow a break from pain; and (d) support therapy directed to functional recovery. Diagnostic and therapeutic injections should be used early and selectively to establish a diagnosis and support rehabilitation. If injections are overused or used outside the context of a monitored rehabilitation program, they may be of significantly less value.

Indications — Diagnostic injections are procedures which may be used to identify pain generators or pathology. For additional specific clinical indications, see Specific Diagnosis, Testing and Treatment Procedures.

Special Considerations — The use of injections has become progressively sophisticated. Each procedure considered has an inherent risk, and risk versus benefit should be evaluated when considering injection therapy. In addition, all injections must include sterile technique.

Contraindications — General contraindications include local or systemic infection, bleeding disorders, allergy to medications used and patient refusal. Specific contraindications may apply to individual injections.

- a. **Joint Injections:** are generally accepted, well-established procedures that can be performed as analgesic or anti-inflammatory procedures.

- ❖ Frequency: Not more than 3 to 4 times annually. Usually 1 or 2 injections adequate.
 - ❖ Time to produce effect: Immediate with local anesthesia, or within 3 days if no anesthesia
 - ❖ Optimum/maximum duration: Varies
- b. **Soft Tissue Injections:** include bursa and tendon insertions. When performing tendon insertion injections, the risk of tendon rupture should be discussed with the patient and the need for restricted duty emphasized.
- ❖ Frequency: Not more than 3 to 4 times annually. Usually 1 or 2 injections adequate.
 - ❖ Time to produce effect: Immediate with local anesthesia, or within 3 days if no anesthesia
 - ❖ Optimum/maximum duration: Varies
- c. **Trigger Point Injections:** although generally accepted, have only rare indications in the treatment of lower extremity disorders. Therefore, the Division does not recommend their routine use in the treatment of lower extremity injuries.
- d. **Prolotherapy:** (also known as sclerotherapy) consists of intra-articular injections of hypertonic dextrose with or without phenol with the goal of inducing an inflammatory response that will recruit cytokine growth factors involved in the proliferation of connective tissue. Advocates of prolotherapy propose that these injections will alleviate complaints related to joint laxity by promoting the growth of connective tissue and stabilizing the involved joint.

Laboratory studies may lend some biological plausibility to claims of connective tissue growth, but high quality published clinical studies are lacking. The dependence of the therapeutic effect on the inflammatory response is poorly defined, raising concerns about the use of conventional anti-inflammatory drugs when proliferant injections are given. The evidence in support of prolotherapy is insufficient and therefore, its use is not recommended in lower extremity injuries.

- e. **Intra-Capsular Acid Salts:** or viscosupplementation, are an accepted form of treatment for osteoarthritis or degenerative changes in the knee joint. While there is good scientific evidence to support their use, studies have not included patients with severe (Grade 4) degenerative changes. It is recommended that these injections can be considered a therapeutic alternative in patients who have failed non-pharmacological and analgesic treatment, and particularly, if non-steroidal anti-inflammatory drug treatment is contraindicated or surgery is not an option. The utility of viscosupplementation in severe osteoarthritis and its efficacy beyond 6 months is not well known.
- ❖ Time to produce effect: After 1 or 2 series of injections
 - ❖ Frequency: 1 series (3 to 5 injections, generally spaced 1 week apart)

- ❖ Optimum/maximum duration: Varies. Efficacy beyond 6 months is not well known.

4. **MEDICATIONS** Medication use in the treatment of lower extremity injuries is appropriate for controlling acute pain and inflammation. Use of medications will vary widely due to the spectrum of injuries from simple strains to complicated fractures. 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 injuries associated with degenerative joint disease and/or 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. Severe pain associated with fractures and other major joint derangements should be treated with narcotics pending a surgical evaluation. 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.

Topical agents can be beneficial for pain management in lower extremity injuries. This includes topical capsaicin, nonsteroidals, as well as topical iontophoresis/phonophoresis, such as steroid creams and lidocaine.

Glucosamine and chondroitin, dietary supplements, may have potential in the treatment of degenerative joint conditions of the knee but high quality, long-term studies demonstrating objective improvement or side effects are lacking at this time. Long-term side effects of these dietary supplements are unknown.

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 severe lower extremity 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. In mild to moderate cases of lower extremity pain, narcotic medication should be used cautiously on a case-by-case basis. Adverse effects include respiratory depression, the development of physical and psychological dependence, and impaired alertness.

- ❖ 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. The US Food and Drug Administration advises that many NSAIDs may cause an increased risk of serious cardiovascular thrombotic events, myocardial infarction, and stroke, which can be fatal. Naproxen sodium does not appear to be associated with increased risk of vascular events. Administration of proton pump inhibitors, histamine 2 blockers, or prostaglandin analog misoprostol along with these NSAIDs may reduce the risk of duodenal and gastric ulceration but do not impact possible cardiovascular complications. 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. Intervals for metabolic screening are dependent upon the patient's age, general health status and should be within parameters listed for each specific medication. Complete Blood Count (CBC) and liver and renal function should be monitored at least every six months in patients on chronic NSAIDs and initially when indicated.

i. Non-selective Nonsteroidal Anti-Inflammatory Drugs:

Includes NSAIDs and acetylsalicylic acid (aspirin). Serious GI toxicity, such as bleeding, perforation, and ulceration can occur at any time, with or without warning symptoms in patients treated with traditional NSAIDs. Physicians should inform patients about the signs and/or symptoms of serious 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.

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

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

COX-2 inhibitors 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 effects. COX-2 inhibitors can worsen renal function in patients with renal insufficiency, thus renal function may need monitoring.

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

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

- e. **Oral Steroids:** have limited use but are accepted in cases requiring potent anti-inflammatory drug effect in carefully selected patients. A one-week regime of steroids may be considered in the treatment of patients who have arthritic flare-ups with significant inflammation of the joint. The physician must be fully aware of potential contraindications for the use of all steroids such as hypertension, diabetes, glaucoma, peptic ulcer disease, etc., which should be discussed with the patient.

- ❖ Optimal duration: 3 to 7 days
- ❖ Maximum duration: 7 days

- 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 lower extremity 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 MAO inhibitors, SSRIs, and tricyclic antidepressants. This medication has physically addictive properties and withdrawal may follow abrupt discontinuation and is not recommended for patients 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 of localized musculoskeletal disorders. 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 “Iontophoresis” in the F 12 Passive Therapy of this section for information regarding topical iontophoretic agents.

i. Topical Salicylates and Nonsalicylates: have been shown to be effective in relieving pain in acute and chronic musculoskeletal conditions. Topical salicylate and nonsalicylates achieve tissue levels that are potentially therapeutic, at least with regard to COX inhibition. Other than local skin reactions, the side effects of therapy are minimal, although not nonexistent, and the usual contraindications to use of these compounds needs to be considered. Local skin reactions are rare and systemic effects were even less common. Their use in patients receiving warfarin therapy may result in alterations in bleeding time. Overall, the low level of systemic absorption can be advantageous; allowing the topical use of these medications when systemic administration is relatively contraindicated such as is the case in patients with hypertension, cardiac failure, or renal insufficiency.

- ❖ Optimal duration: 1 week
- ❖ Maximal duration: 2 weeks per episode

ii. Capsaicin: is another medication option for topical drug use in lower extremity injury. Capsaicin offers a safe and effective alternative to systemic NSAID therapy. Although it is quite safe, effective use of capsaicin is limited by the local stinging or burning sensation that typically dissipates with regular use, usually after the first 7 to 10 days of treatment. Patients should be advised to apply the cream on the affected area with a plastic glove or cotton applicator and to avoid inadvertent contact with eyes and mucous membranes.

- ❖ Optimal duration: 1 week
- ❖ Maximal duration: 2 weeks per episode

iii. Other Agents: Other topical agents, including prescription drugs (i.e., lidocaine), prescription compound agents, and prescribed over-the-

counter medications (i.e., blue ice), may be useful for pain and inflammation. These drugs should be used according to patient needs.

- ❖ Optimal duration: varies with drug or compound
- ❖ Maximal duration: varies with drug or compound

iv. Iontophoretic Agents: Refer to “Iontophoresis,” in F 12 under Passive Therapy of this section.

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: 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: These 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, de-conditioning and psychological involvement. For patients with chronic pain, refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines.

i 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 therapist, physical therapist, case manager, and psychologist. As appropriate, the team may also include: chiropractor, RN, or vocational specialist.

- ❖ Length of visit: Up to 8 hours each 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.

6. **ORTHOTICS AND PROSTHETICS**

a. Fabrication/Modification of Orthotics: would be used when there is need to normalize weight-bearing, facilitate better motion response, stabilize a joint with insufficient muscle or proprioceptive/reflex competencies, to protect subacute conditions as needed during movement, and correct biomechanical problems. For specific types of orthotics/prosthetics see Section D, "Specific Diagnosis, Testing and Treatment Procedures."

- ❖ Time to produce effect: 1 to 3 sessions (includes wearing schedule evaluation)

- ❖ Frequency: 1 to 2 times per week
 - ❖ Optimum/maximum duration: 4 sessions of evaluation, casting, fitting, and re-evaluation
- b. **Orthotic/Prosthetic Training:** is the skilled instruction (preferably by qualified providers) in the proper use of orthotic devices and/or prosthetic limbs including stump preparation, donning and doffing limbs, instruction in wearing schedule and orthotic/prosthetic maintenance training. Training can include gait, mobility, transfer and self-care techniques.
- ❖ Time to produce effect: 2 to 6 sessions
 - ❖ Frequency: 3 times per week
 - ❖ Optimum/maximum duration: 2 to 4 months
- c. **Splints or Adaptive Equipment:** design, fabrication and/or modification indications include the need to control neurological and orthopedic injuries for reduced stress during functional activities and modify tasks through instruction in the use of a device or physical modification of a device, which reduces stress on the injury. Equipment should improve safety and reduce risk of re-injury. This includes high and low technology assistive options such as workplace modifications, computer interface or seating, crutch or walker training, and self-care aids.
- ❖ Time to produce effect: Immediate
 - ❖ Frequency: 1 to 3 sessions or as indicated to establish independent use
 - ❖ Optimum/maximum duration: 1 to 3 sessions
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/PSYCHOSOCIAL/PSYCHOLOGICAL INTERVENTION** Psychosocial treatment 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 preexisting 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 the 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, documentation addressing which pertinent issues are pre-existing versus aggravated versus causative, as well as projecting a realistic functional prognosis, should be provided by the authorized treating provider every 4 to 6 weeks during treatment.

9. **RESTRICTION OF ACTIVITY** 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 lower extremity 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 cases the patient should be able to return to work in some capacity or in an alternate position consistent with medical treatment within two weeks unless there are extenuating circumstances. Injuries requiring more than two weeks off work should be thoroughly documented. (Some of these diagnoses are listed in Section D, Specific Diagnosis, Testing, and Treatment).
- 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 lower extremity injuries, the following should be addressed when describing the patient's activity level:

- i. Lower body postures such as squatting, kneeling, crawling, stooping, or climbing should include duration and frequency.
- ii. Ambulatory level for distance, frequency and terrain should be specified.
- iii. Standing duration and frequency with regard to balance issues.
- iv. Use of adaptive devices or equipment for proper ergonomics to enhance capacities can be included.

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

11. **THERAPY-ACTIVE** Most of the following active therapies have some evidence 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 activity 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 or peripheral nerve lesion.
- ❖ 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. **Gait Training:** is crutch walking, cane or walker instruction to a person with lower extremity injury or surgery. Indications include the need to promote normal gait pattern with assistive devices; instruct in the safety and proper use of assistive devices; instruct in progressive use of more independent devices (i.e., platform-walker, to walker, to crutches, to cane); instruct in gait on uneven surfaces and steps (with and without railings) to reduce risk of fall, or loss of balance; and/or instruct in equipment to limit weight-bearing for the protection of a healing injury or surgery.
- ❖ Time to produce effect: 2 to 6 treatments
 - ❖ Frequency: 2 to 3 times per week
 - ❖ Optimum duration: 2 weeks
 - ❖ Maximum duration: 2 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

g. **Wheelchair Management and Propulsion:** is the instruction and training of self-propulsion and proper use of a wheelchair. This includes transferring and safety instruction. This is indicated in individuals who are not able to ambulate due to bilateral lower extremity injuries, inability to use ambulatory assistive devices, and in cases of multiple traumas.

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

12. **THERAPY-PASSIVE** Most of the following passive therapies and modalities are generally well-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 use 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 co-morbidities 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 and modalities are listed in alphabetical order.

- a. **Continuous Passive Movement (CPM):** is a form of passive motion using specialized machinery that acts to move a joint and may also pump blood and edema fluid away from the joint and periarticular tissues. CPM is effective in preventing the development of joint stiffness if applied immediately following surgery. It should be continued until the swelling that limits motion of the joint no longer develops. ROM for the joint begins at the level of patient tolerance and is increased twice a day as tolerated. Use of this equipment may require home visits.
- ❖ Time to produce effect: Immediate
 - ❖ Frequency: Up to 4 times a day
 - ❖ Optimum duration: Up to 3 weeks post surgical
 - ❖ Maximum duration: 3 weeks
- b. **Contrast Baths:** can be used for alternating immersion of extremities in hot and cold water. Indications include edema in the sub-acute stage of healing, the need to improve peripheral circulation and decrease joint pain and stiffness.
- ❖ Time to produce effect: 3 treatments
 - ❖ Frequency: 3 times per week
 - ❖ Optimum duration: 4 weeks
 - ❖ Maximum duration: 1 month
- c. **Electrical Stimulation (Unattended):** once applied, requires minimal on-site supervision by the physician or non-physician 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 per day to 1 time a week. Provide home unit if frequent use.
 - ❖ Optimum duration: 1 to 3 months
 - ❖ Maximum duration: 3 months
- d. **Fluidotherapy:** employs a stream of dry, heated air that passes over the injured body part. The injured body part can be exercised during the application of dry heat. Indications include the need to enhance collagen extensibility before stretching, reduce muscle guarding, or reduce inflammatory response.
- ❖ Time to produce effect: 1 to 4 treatments
 - ❖ Frequency: 1 to 3 times per week
 - ❖ Optimum duration: 4 weeks

- ❖ Maximum duration: 1 month
- e. **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 up to 2 months if used intermittently as an adjunct to other therapeutic procedures
 - ❖ Maximum duration: 2 months
- f. **Iontophoresis:** is the transfer of medication, including, but not limited to, steroidal anti-inflammatory 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: 8 to 10 treatments
 - ❖ Maximum duration: 10 treatments
- g. **Manipulation:** is manual therapy that moves a joint beyond the physiologic range of motion but not beyond the anatomic range of motion. It is indicated for pain and adhesions.
- ❖ Time to produce effect: Immediate or up to 10 treatments
 - ❖ Frequency: 1 to 5 times per week as indicated by the severity of involvement and the desired effect
 - ❖ Optimum duration: 10 treatments
 - ❖ Maximum duration: 10 treatments
- h. **Manual Electrical Stimulation:** is used for peripheral nerve injuries or pain reduction that requires continuous application, supervision, or involves extensive teaching. Indications include muscle spasm (including TENS), atrophy, decreased circulation, osteogenic stimulation, inflammation, and the need to facilitate muscle hypertrophy, muscle strengthening, muscle responsiveness in Spinal Cord Injury/Brain Injury (SCI/BI), and peripheral neuropathies.
- ❖ Time to produce effect: Variable, depending upon use.
 - ❖ Frequency: 3 to 7 times per week

- ❖ Optimum duration: 8 weeks
 - ❖ Maximum duration: 2 months
- i. **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. In cases with edema, deep vein thrombosis should be ruled out prior to treatment.
- ❖ Time to produce effect: Immediate
 - ❖ Frequency: 1 to 2 times per week
 - ❖ Optimum duration: 6 weeks
 - ❖ Maximum duration: 2 months
- j. **Mobilization (Joint):** is passive movement, which may include passive range of motion performed in such a manner (particularly in relation to the speed of the movement) that it is, at all times, within the ability of the patient to prevent the movement if they so choose. It may include skilled manual joint tissue stretching. Indications include the need to improve joint play, improve intracapsular arthrokinematics, or reduce pain associated with tissue impingement/maltraction.
- ❖ Time to produce effect: 6 to 9 treatments
 - ❖ Frequency: 3 times per week
 - ❖ Optimum duration: 6 weeks
 - ❖ Maximum duration: 2 months
- k. **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
- l. **Paraffin Bath:** is a superficial heating modality that uses melted paraffin (candle wax) to treat irregular surfaces such as the foot or ankle. Indications include the

need to enhance collagen extensibility before stretching, reduce muscle guarding, or reduce inflammatory response.

- ❖ Time to produce effect: 1 to 4 treatments
- ❖ Frequency: 1 to 3 times per week
- ❖ Optimum duration: 4 weeks
- ❖ Maximum duration: 1 month

m. **Superficial Heat and Cold Therapy:** Superficial heat and cold therapies are thermal agents applied in various manners that lower or raise the body tissue temperature for the reduction of pain, inflammation, and/or effusion resulting from injury or induced by exercise. It may be used acutely with compression and elevation. Indications include acute pain, edema and hemorrhage, need to increase pain threshold, reduce muscle spasm and promote stretching/flexibility. Includes portable cryotherapy units and application of heat just above the surface of the skin at acupuncture points.

- ❖ Time to produce effect: Immediate
- ❖ Frequency: 2 to 5 times per week
- ❖ Optimum duration: 3 weeks as primary, or up to 2 months if used intermittently as an adjunct to other therapeutic procedures
- ❖ Maximum duration: 2 months

n. **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 re-absorption 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

o. **Traction:** Manual traction 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.

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

p. **Transcutaneous Electrical Nerve Stimulation (TENS):** should include at 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.

q. **Ultrasound:** Ultrasound includes ultrasound with electrical stimulation and Phonophoresis. Ultrasound uses sonic generators to deliver acoustic energy for therapeutic thermal and/or non-thermal 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 a dispersive electrode placement. Indications include muscle spasm, scar tissue, pain modulation and muscle facilitation.

Phonophoresis is the transfer of medication to the target tissue to control inflammation and pain through the use of sonic generators. 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

r. **Vasopneumatic Devices:** are mechanical compressive devices used in both in-patient and outpatient settings to reduce various types of edema. Indications include pitting edema, lymphedema and venostasis. Maximum compression should not exceed minimal diastolic blood pressure. Use of a unit at home should be considered if expected treatment is greater than two weeks.

- ❖ Time to produce effect: 1 to 3 treatments
- ❖ Frequency: 3 to 5 times per week
- ❖ Optimum duration: 1 month
- ❖ Maximum duration: 1 month. If beneficial, provide with home unit.

s. **Whirlpool/Hubbard Tank:** is conductive exposure to water at temperatures that best elicits the desired effect (cold vs. heat). It generally includes massage by water propelled by a turbine or Jacuzzi jet system and has the same thermal effects as hot packs if higher than tissue temperature. It has the same thermal effects as cold application if comparable temperature water used. Indications include the need for analgesia, relaxing muscle spasm, reducing joint stiffness, enhancing mechanical debridement and facilitating and preparing for exercise.

- ❖ Time to produce effect: 2 to 4 treatments
- ❖ Frequency: 3 to 5 times per week
- ❖ Optimum duration: 3 weeks as primary, or up to 2 months if used intermittently as an adjunct to other therapeutic procedures
- ❖ 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.

G. THERAPEUTIC PROCEDURES — OPERATIVE

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 condition(s). It is imperative to rule out non-physiologic modifiers of pain presentation or non-operative conditions mimicking radiculopathy or instability (e.g., peripheral neuropathy, piriformis syndrome, myofascial pain, scleratogenous or sympathetically mediated pain syndromes, sacroiliac dysfunction, psychological conditions, etc.) prior to consideration of elective surgical intervention.

In addition, operative treatment is indicated when the natural history of surgically treated lesions is better than the natural history for non-operatively treated lesions. All patients being considered for surgical intervention should first undergo a comprehensive neuromusculoskeletal examination to identify mechanical pain generators that may respond to non-surgical techniques or may be refractory to surgical intervention.

Structured rehabilitation interventions should be strongly considered post-operative in any patient not making expected functional progress within three weeks post-operative.

Return-to-work restrictions should be specific according to the recommendation in the Section F 10 Therapeutic Procedures – Non-Operative.

1. ANKLE AND SUBTALAR FUSION

- a. **Description/Definition:** Surgical fusion of the ankle or subtalar joint.
- b. **Occupational Relationship:** Usually post-traumatic arthritis or residual deformity.
- c. **Specific Physical Findings:** Painful, limited range of motion of the joint(s). Possible fixed deformity.
- d. **Diagnostic Testing Procedures:** Radiographs. Sometimes tomography, CT scan, bone scan.
- e. **Non-Operative Treatment:** Active and/or passive therapy for bracing, NSAIDs.
- f. **Surgical Indications:** All reasonable conservative measures have been exhausted and other reasonable surgical options have been seriously considered or implemented. Patient has disabling pain or deformity.
- g. **Operative Treatment:** Usually open reduction, grafting and internal fixation. External fixation may be used in some cases.
- h. **Post-Operative Therapy:** Protected weight-bearing. Active and/or passive therapy for gait training, ADLs. May require non-weight-bearing and modified duty up to 4 to 6 months.

2. KNEE FUSION

- a. **Description/Definition:** Surgical fusion of femur to tibia at the knee joint.

- b. **Occupational Relationship:** Usually from post-traumatic arthritis or deformity.
- c. **Specific Physical findings:** Stiff, painful, sometime deformed limb at the knee joint.
- d. **Diagnostic Testing Procedures:** Radiographs.
- e. **Non-Operative Treatment:** Active and/or passive therapy for weight sharing braces, NSAIDs.
- f. **Surgical Indications:** All reasonable conservative measures have been exhausted and other reasonable surgical options have been seriously considered or implemented. Fusion is a consideration particularly in the young patient who desires a lifestyle that would subject the knee to high mechanical stresses.
- g. **Operative Treatment:** Usually open reduction, grafting, internal fixation. External fixation or intramedullary rodding may also be used.
- h. **Post-Operative Therapy:** Active and/or passive therapy for protected weight-bearing.

3. **TOTAL KNEE REPLACEMENT**

- a. **Description/Definition:** Prosthetic replacement of the articulating surfaces of the knee joint.
- b. **Occupational Relationship:** Usually from post-traumatic arthritis.
- c. **Specific Physical Findings:** Stiff, painful knee.
- d. **Diagnostic Testing Procedures:** Radiographs.
- e. **Non-Operative Treatment:** Active and/or passive therapy, NSAIDs.
- f. **Surgical Indications:** Severe arthritis plus all reasonable conservative measures have been exhausted and other reasonable surgical options have been considered or implemented.
- g. **Operative Treatment:** Prosthetic replacement of the articular surfaces of the knee.
- h. **Post-Operative Therapy:** Active and/or passive therapy for graduated weight-bearing, range of motion.

4. **TOTAL HIP REPLACEMENT**

- a. **Description/Definition:** Prosthetic replacement of the articulating surfaces of the hip joint.
- b. **Occupational Relationship:** Usually from post-traumatic arthritis. Patients with intracapsular femoral fractures have a risk of developing avascular necrosis of the femoral head requiring treatment months to years after the initial injury.

- c. **Specific Physical Findings:** Stiff, painful hip.
- d. **Diagnostic Testing Procedures:** Radiographs.
- e. **Non-Operative Treatment:** Active and/or passive therapy, NSAIDs.
- f. **Surgical Indications:** All reasonable conservative measures have been exhausted and other reasonable surgical options have been seriously considered or implemented. Severe arthritis.
- g. **Operative Treatment:** Prosthetic replacement of the articular surfaces of the hip.
- h. **Post-Operative Therapy:** Active and/or passive therapy for graduated weight-bearing, range of motion.

5. **AMPUTATION**

- a. **Description/Definition:** Surgical removal of a portion of the lower extremity.
- b. **Occupational Relationship:** Usually secondary to post-traumatic bone, soft tissue, vascular or neurologic compromise of part of the extremity.
- c. **Specific Physical Findings:** Non-useful or non-viable portion of the lower extremity.
- d. **Diagnostic Testing Procedures:** Radiographs, vascular studies.
- e. **Non-Operative Treatment:** None.
- f. **Surgical Indications:** Non-useful or non-viable portion of the extremity.
- g. **Operative Treatment:** Amputation.
- h. **Post-Operative Therapy:** Active and/or passive therapy for prosthetic fitting, construction and training, protected weight-bearing.

6. **MANIPULATION UNDER ANESTHESIA**

- a. **Description/Definition:** Passive range of motion of a joint under anesthesia.
- b. **Occupational Relationship:** Joint stiffness that usually results from a traumatic injury, compensation related surgery, or other treatment.
- c. **Specific Physical Findings:** Joint stiffness in both active and passive modes.
- d. **Diagnostic Testing Procedures:** Radiographs.
- e. **Non-Operative Treatment:** Active and/or passive therapy for active and passive range of motion exercises.
- f. **Surgical Indications:** Consider if routine therapeutic modalities, including physical therapy and/or dynamic bracing, do not restore the degree of motion

that should be expected after a reasonable period of time, usually at least 12 weeks.

- g. **Operative Treatment:** Not applicable.
- h. **Post-Operative Therapy:** Active and/or passive therapy for active and passive range of motion.

7. **BURSECTOMY**

- a. **Description/Definition:** Surgical removal of peri-articular bursa.
- b. **Occupational Relationship:** Usually a traumatic local injury or repetitive minor local irritation.
- c. **Specific Physical Findings:** Swelling, tenderness over the bursa.
- d. **Diagnostic Testing Procedures:** Radiographs.
- e. **Non-Operative Treatment:** Active and/or passive therapy for splinting, rest, NSAIDs, steroid injection.
- f. **Surgical Indications:** Persistent pain, swelling despite treatment.
- g. **Operative Treatment:** Surgical removal of the bursa.
- h. **Post-Operative Therapy:** Active and/or passive therapy for graduated range of motion exercises.

8. **OSTEOTOMY**

- a. **Description/Definition:** A reconstructive procedure involving the surgical cutting of bone for realignment and is useful in patients that would benefit from realignment in lieu of total joint replacement.
- b. **Occupational Relationship:** Post-traumatic arthritis or deformity.
- c. **Specific Physical Findings:** Painful decreased range of motion and/or deformity.
- d. **Diagnostic Testing Procedures:** Radiographs, MRI scan, CT scan.
- e. **Non-Operative Treatment:** Active and/or passive therapy for activity modification, bracing, NSAIDs.
- f. **Surgical Indications:** Failure of non-surgical treatment. Avoidance of total joint arthroplasty desirable.
- g. **Operative Treatment:** Peri-articular opening or closing wedge of bone, usually with grafting and internal or external fixation.
- h. **Post-Operative Therapy:** Active and/or passive therapy for protected weight-bearing, progressive range of motion.

9. **HARDWARE REMOVAL**

- a. **Description/Definition:** Surgical removal of internal or external fixation device.
- b. **Occupational Relationship:** Usually following healing of a post-traumatic injury that required fixation or reconstruction using instrumentation.
- c. **Specific Physical Findings:** Local pain to palpation, swelling, erythema.
- d. **Diagnostic Testing Procedures:** Radiographs, tomography, CT scan, MRI.
- e. **Non-Operative Treatment:** Active and/or passive therapy for local modalities, activity modification. NSAIDs.
- f. **Surgical Indications:** Persistent local pain, irritation around hardware.
- g. **Operative Treatment:** Removal of instrumentation. Some instrumentation may be removed in the course of standard treatment without local irritation.
- h. **Post-Operative Therapy:** Active and/or passive therapy for progressive weight-bearing, range of motion.

10. **RELEASE OF CONTRACTURE**

- a. **Description/Definition:** Surgical incision or lengthening of contracted tendon or peri-articular soft tissue.
- b. **Occupational Relationship:** Usually following a post-traumatic injury.
- c. **Specific Physical Findings:** Shortened tendon or stiff joint.
- d. **Diagnostic Testing Procedures:** Radiographs, CT scan, MRI scan.
- e. **Non-Operative Treatment:** Active and/or passive therapy for stretching, range of motion exercises.
- f. **Surgical Indications:** Persistent shortening or stiffness associated with pain and/or altered function.
- g. **Operative Treatment:** Surgical incision or lengthening of involved soft tissue.
- h. **Post-Operative Therapy:** Active and/or passive therapy for stretching, range of motion exercises.