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 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 GUIDELINES 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:** Education of the patient and family, as well as the employer, insurer, policy makers, and the community should be the primary emphasis in the treatment of chronic pain and disability. Currently, practitioners often think of education last, after medications, manual therapy, and surgery. Practitioners must implement strategies to educate patients, employers, insurance systems, policy makers, and the community as a whole. An education-based paradigm should always start with inexpensive communication providing reassuring and evidence-based information to the patient. More in-depth patient education is currently a component of treatment regimens which employ functional, restorative, preventive, and rehabilitative programs. No treatment plan is complete without addressing issues of individual and/or group patient education as a means of facilitating self-management of symptoms and prevention.

3. **INFORMED DECISION MAKING:** Providers should implement informed decision making as a crucial element of a successful treatment plan. Patients, with the assistance of their health care practitioner, should identify their personal and professional functional goals of treatment at the first visit. Progress towards the individual's identified functional goals should be addressed by all members of the health care team at subsequent visits and throughout the established treatment plan. Nurse case managers, physical therapists, and other members of the health care team play an integral role in informed decision making and achievement of functional goals. Patient education and informed decision making should facilitate self-management of symptoms and prevention of further injury.

4. **TREATMENT 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.

5. **ACTIVE INTERVENTIONS:** Emphasizing patient responsibility, such as therapeutic exercise and/or functional treatment, is generally emphasized over passive modalities, especially as treatment progresses. Generally, passive interventions facilitate progress in an active rehabilitation program with concomitant attainment of objective functional gains.

6. **ACTIVE THERAPEUTIC EXERCISE PROGRAM:** Goals should incorporate patient strength, endurance, flexibility, coordination, and education. This includes functional application in vocational or community settings.

7. **POSITIVE PATIENT RESPONSE:** 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 quantifiable efficiency/velocity

measures. Subjective reports of pain and function should be considered and given relative weight when the pain has anatomic and physiologic correlation. Anatomic correlation must be based on objective findings.

8. **RE-EVALUATE TREATMENT EVERY 3 TO 4 WEEKS:** If a given treatment or modality is not producing positive results within three to four weeks, the treatment should be either modified or discontinued. Before discontinuing the treatment, the provider should have a detailed discussion with the patient to determine the reason for failure to produce positive results. Reconsideration of diagnosis should also occur in the event of a poor response to a seemingly rational intervention.

9. **SURGICAL INTERVENTIONS:** Surgical interventions 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 condition(s).

10. **SIX-MONTH TIME FRAME:** The prognosis drops precipitously for returning an injured worker to work once he/she has been temporarily totally disabled for more than six months. The emphasis within these guidelines is to move patients along a continuum of care and return to work within a six-month time frame, whenever possible. It is important to note that time frames may not be pertinent to injuries that do not involve work-time loss or are not occupationally related.

11. **RETURN-TO-WORK:** A 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 non-specific and vague descriptions such as "sedentary" or "light duty." The following physical limitations should be considered and modified as recommended: lifting, pushing, pulling, crouching, walking, using stairs, bending at the waist, awkward and/or sustained postures, tolerance for sitting or standing, hot and cold environments, 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, from including, but not limited to, an occupational health nurse, occupational therapist, vocational rehabilitation specialist, an industrial hygienist, or another professional.

12. **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 timelines discussed within this document, but such treatment requires clear documentation by the authorized treating practitioner focusing on objective functional gains afforded by further treatment and impact upon prognosis.

13. **GUIDELINES RECOMMENDATIONS AND INCLUSION OF MEDICAL EVIDENCE:** ***All recommendations are based on available evidence and/or consensus judgment***. When possible, guideline recommendations will note the level of evidence supporting the treatment recommendation. It is generally recognized that early reports of a positive

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

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

- “Some evidence” means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective. The Division recognizes that further research is *likely* to have an impact on the strength of the medical evidence.

- “Good evidence” means the recommendation considered the availability of multiple adequate scientific studies or at least one relevant high-quality scientific study, which reported that a treatment was effective. The Division recognizes that further research *may* have an impact on the strength of the medical evidence.

- “Strong evidence” means the recommendation considered the availability of multiple relevant and high-quality scientific studies, which arrived at similar conclusions about the effectiveness of a treatment. The Division recognizes that further research is *unlikely* to have an important impact on the strength of the medical evidence

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

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

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

C. INITIAL DIAGNOSTIC PROCEDURES

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

1. HISTORY-TAKING AND PHYSICAL EXAMINATION (HX & PE) are generally accepted, well-established and widely used procedures that establish the foundation/basis for and dictate subsequent stages of diagnostic and therapeutic procedures. When findings of clinical evaluations and 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. It should include such details as: the activity at the time of the injury, patient description of the incident, and immediate and delayed symptoms. The history should elicit as much detail about these mechanisms as possible.

For acute injuries:

- Did the patient hear a pop at the time of the injury?
- Was he or she able to bear weight immediately following the injury?
- Could he or she straighten the knee and did it swell immediately?

ii. Functional Assessment: Functional ability should be assessed and documented at the beginning of treatment. Periodic assessment should be recorded throughout the course of care to follow the trajectory of recovery. In addition to being more relevant to recovery from lower extremity pain, functional measures are likely to be more reliable over time than pain measures.

Patient-reported outcomes, whether of pain or function, are susceptible to a phenomenon called response shift. This refers to changes in self-evaluation, which may accompany changes in health status. Patient self-reports may not coincide with objective measures of outcome, due to reconceptualization of the impact of pain on daily function and internal recalibration of pain scales. Response shift may obscure treatment effects in clinical trials and clinical practice, and may lead to apparent discrepancies in patient-reported outcomes following treatment interventions. While methods of measuring and accounting for response shift are not yet fully developed, understanding that the phenomenon exists can help clinicians understand what is happening when some measures of patient progress appear inconsistent with other measures of progress.

iii. Relationship to work. This includes a statement of the probability that the illness or injury is work-related.

iv. History of locking, clicking, popping, giving way, acute or chronic swelling, crepitation, pain while ascending or descending stairs (e.g. handrail used, 'foot by foot' instead of 'foot over foot') inability to weight bear due to pain, intolerance for standing or difficulty walking distances on varied surfaces, difficulty crouching or stooping, and wear patterns on footwear. Patients may also report instability or mechanical symptoms. A history of grinding, locking of the knee, or instability are also useful diagnostic elements.

v. Any history of back and joint pain distal and proximal to the site of injury. The use of a patient completed pain drawing, Visual Analog Scale (VAS), is highly recommended, especially during the first two weeks following injury to assure that all work related symptoms are addressed. Location of hip pain may be useful for identifying the diagnosis. Anterior hip and groin are more likely to reflect intra-articular pathology whereas posterior or lateral hip pain may be present without hip pathology.

vi. Ability to perform job duties and activities of daily living; and

vii. Exacerbating and alleviating factors of the reported symptoms. The physician should explore and report on non-work related and work related activities.

viii. Prior occupational and non-occupational injuries to the same area, including specific prior diagnostic tests, treatment, and any prior bracing devices.

ix. Discussion of any symptoms present in the uninjured extremity.

x. Lower extremity injuries are frequently not isolated, but are accompanied by other injuries. In the setting of a traumatic brain injury (TBI), long bone fracture management must consider the effect of TBI on bone metabolism and may require more aggressive treatment. Refer to the Traumatic Brain Injury Medical Treatment Guidelines, Section H.5. Musculoskeletal Complications.

xi. Manifestations of a possible joint infection may include complaints of joint warmth, swelling, fever, or chills.

b. Past History:

i. Past medical history includes neoplasm, gout, arthritis, previous musculoskeletal injuries, and diabetes;

ii. Review of systems includes symptoms of rheumatologic, neurological, endocrine, neoplastic, and other systemic diseases;

iii. History of smoking, alcohol use, and substance abuse;

iv. History of corticosteroid use; and

v. Vocational and recreational pursuits.

c. **Physical Examination**: Examination of a joint should begin with examination of the uninjured limb and include assessment of the joint above and below the affected area of the injured limb. Physical examinations should include accepted tests as described in textbooks or other references and exam techniques applicable to the joint or region of the body being examined, including:

i. Visual inspection;

Swelling: may indicate joint effusion from trauma, infection or arthritis. Swelling or bruising over ligaments or bones can indicate possible fractures or ligament damage

The "sweep test" is useful for assessing the presence and degree of joint effusion in the knee. The examiner supports the medial tibiofemoral joint line, **and** strokes toward the suprapatellar bursa and then strokes downward toward lateral joint line. A positive test produces a bulge medially;

ii. Palpation: for joint line tenderness, effusion, and bone or ligament pain. Palpation may be used to assess tissue tone and contour; myofascial trigger points; and may be graded for intensity of pain. Palpation may be further divided into static and motion palpation. Static palpation consists of feeling bony landmarks and soft tissue structures and consistency. Motion palpation is commonly used to assess joint movement patterns and identify joint dysfunction;

iii. Assessment of activities of daily living including gait abnormalities, especially after ambulating a distance and difficulties ascending/descending stairs;

Assessment of activities such as the inability to crouch or stoop may give important indications of the patient's pathology and restrictions;

iv. Range-of-motion/quality-of-motion; should be assessed actively and passively;

v. Strength;

vi. Limb length (bilaterally to assess for limb length discrepancy);

vii. Height, weight, body mass index (BMI);

viii. Joint stability;

The following describe specific anatomic area exams.

ix. Hip exam: In general, multiple tests are needed to reliably establish a clinical diagnosis. Spinal pathology and groin problems should always be considered and ruled out as a cause of pain for patients with hip symptomatology. Providers should be aware that patients with osteoarthritis may have positive pain complaints with various maneuvers

based on their osteoarthritis rather than ligamentous or labral damage The following is a list of commonly performed tests;

A) Flexion-Abduction-External Rotation (FABER-aka Patrick's) test - is frequently used as a test for sacral pathology such as SI joint pain, but also may be positive with hip inflammation or pain;

B) Log roll test - may be used to assess iliofemoral joint laxity or intra-articular hip pain;

C) Ober's is used to test the iliotibial band;

D) Greater trochanter bursitis or femoral-acetabular impingement, with or without labral tear may be aggravated by external rotation and adduction and resisted hip abduction or external rotation.

Greater trochanter bursitis also presents with pain with direct palpation over the greater trochanter.

E) Iliopectineal bursitis may be aggravated by stretching the tendon in hip extension;

F) Internal and external rotation is usually painful in osteoarthritis or femoroacetabular impingement, with or without a labral tear;

G) The maneuvers of flexion, adduction and internal rotation (FADIR- also known as anterior impingement sign) will generally reproduce pain in cases of labral tears, femoral acetabular impingement, and with piriformis strain/irritation.

H) Anterior acetabular labrum testing: With the patient in a supine position, the hip is flexed, externally rotated, and abducted. The hip is then extended, internally rotated, and adducted. Groin pain reproduction with or without an audible click suggests a possible anterior labral tear.

x. Knee exam: In general multiple tests are needed to reliably establish a clinical diagnosis. The expertise of the physician performing the exam influences the predictability of the exam findings. Providers should be aware that patients with osteoarthritis may have positive pain complaints with various maneuvers based on their osteoarthritis rather than ligamentous or meniscal damage. The following is a partial list of commonly performed tests:

A) Bilateral thigh circumference measurement: assesses for quadriceps wasting which may occur soon after a knee injury. The circumferences of both thighs should be documented approximately 15 cm above a reference point, either the joint line or patella. It may be useful to assess multiple areas of atrophy and swelling: mid-calf; mid joint; suprapatella, 7 cm suprapatella and mid-thigh 15 cm.

B) Anterior Cruciate Ligament tests:

- Lachman's test;
- Anterior drawer test;
- Lateral pivot shift test.

C) Meniscus tests: Joint line tenderness and effusions are common with acute meniscal tears. Degenerative meniscal tears are fairly common in older patients with degenerative changes and may be asymptomatic.

- McMurray test;
- Apley compression test;
- Medial lateral grind test;
- Weight-bearing tests - include Thessaly and Ege's test.

D) Posterior Cruciate Ligament tests:

- Posterior drawer test;
- Extension lag may also be measured passively by documenting the heel height difference with the patient prone.
- Gravity or Posterior Sag Test (Godfrey): While supine, the patient's involved lower extremity is positioned with the thigh vertical to the floor and the lower leg perpendicular to the thigh. With the heel supported and the patient relaxed,.any posterior subluxation of the tibia on the femur is observed (movement caused by gravity).

E) Collateral Ligament tests:

- Medial stress test – Usually performed at 0 and 30 degrees flexion. A positive test in full extension may include both medial collateral ligament and cruciate ligament pathology;
- Lateral stress test-Usually performed at 0 and 30 degrees flexion. A positive test in full extension may include both lateral collateral ligament and cruciate ligament pathology

F) Patellar Instability tests:

- Apprehension test;
- J sign;
- Q angle.

G) Dial Test: May indicate a posterolateral corner injury. External rotation is compared at 30 and 90 degrees. The test is positive if it is greater on the injured side.

H) The “sweep test” is useful for assessing the presence and degree of joint effusion in the knee. The examiner supports the medial tibiofemoral joint line, **and** strokes toward the suprapatellar bursa and then strokes downward toward lateral joint line. A positive test produces a bulge medially.

xi. Foot and ankle exam: Providers should be aware that patients with osteoarthritis may have positive pain complaints with various maneuvers based on their osteoarthritis rather than ligamentous or cartilage damage.

In general, multiple tests are needed to reliably establish a clinical diagnosis. The expertise of the physician performing the exam influences the predictability of the exam findings. Lateral ankle assessments may include anterior drawer exam, talar tilt test. Syndesmotic exam may include external rotation stress test, cross leg stress test and the tibia-fibula squeeze test. Achilles tendon may be assessed with the Thompson's test. Foot examinations may include assessment of or for: subtalar, midtarsal, and metatarsal-phalangeal joints; and tarsal tunnel. Tendon assessments may include single to raise test for posterior tibial tendon pathology, as well as dorsiflexion eversion stress exam to assess for peroneal pathology and subluxation. Mulders test and side-to-side compression exam may be used to assess Morton's neuroma. The piano key push up test and Abduction Stress test may be utilized to assess Lisfranc injury.

xii. If applicable, full neurological exam including muscle atrophy and gait abnormality.

xiii. If applicable to injury, integrity of distal circulation, sensory, and motor function.

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 E. Specific Lower Extremity Injury Diagnosis, Testing and Treatment. Indications for initial imaging may include any of the following:

a. The inability to flex knee to 90 degrees or to transfer weight for four steps at the time of the immediate injury and at the initial visit, regardless of limping;

b. Bony tenderness on any of the following areas: over the head of the fibula; isolated to the patella; of the lateral or medial malleolus from the tip to the distal 6 cm; at the base of the 5th metatarsal; or at the navicular;

c. History of significant trauma, especially blunt trauma or fall from a height;

d. Age over 55 years;

e. History or exam suggestive of intravenous drug abuse or osteomyelitis;

f. Pain with swelling and/or range of motion (ROM) limitation localizing to an area of prior fracture, internal fixation, or joint prosthesis; or

g. 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, MRI and/or bone scan may be required to make the diagnosis.

Weight-bearing radiographs are used to assess osteoarthritis and alignment prior to some surgical procedures.

3. **LABORATORY TESTING** Laboratory tests are generally accepted, well-established and widely used procedures. They are, however, rarely indicated at the time of initial evaluation unless there is suspicion of systemic illness, infection, neoplasia, connective tissue disorder, or underlying arthritis or rheumatologic disorder based on history and/or physical examination. Laboratory tests can provide useful diagnostic information. The Division recommends that lab diagnostic procedures be initially considered the responsibility of the workers' compensation carrier to ensure that an accurate diagnosis and treatment plan can be established.

Tests include, but are not limited to:

a. Complete blood count (CBC) with differential can detect infection, blood dyscrasias, and medication side effects;

b. Erythrocyte sedimentation rate, rheumatoid factor, 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 evaluated 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 and for some acute injuries. Not all knee effusions require aspirations. 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.

Risk factors for septic arthritis include joint surgery, knee arthritis, joint replacement, skin infection, diabetes, age greater than 80, immunocompromised

states, and rheumatoid arthritis. More than 50% of patients with septic joints have a fever greater than 37.5 degrees centigrade and joint swelling. Synovial white counts of greater than 25,000 and polymorphonuclear cells of at least 90% increase the likelihood of a septic joint.

D. FOLLOW-UP DIAGNOSTIC IMAGING AND TESTING PROCEDURES

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

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.

Practitioners should be aware of the radiation doses associated with various procedures and provide appropriate warnings to patients. Coloradans have a background exposure to radiation, and unnecessary CT scans or X-rays increase the lifetime risk of cancer death.

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

1. **IMAGING STUDIES** 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 E. Specific Lower Extremity Injury Diagnosis, Testing, and Treatment. The studies below are listed in frequency of use, not importance.

a. **Magnetic Resonance Imaging (MRI)**: is a generally accepted, well-established, and widely used diagnostic procedure. It 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. It is also more helpful in the evaluation of traumatic or degenerative injuries. The addition of intravenous or intra-articular contrast can enhance the definition of selected pathologies.

The high field, closed MRI provides a 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 or with a reading by a musculoskeletal radiologist. All questions in this regard should be discussed with the MRI center and/or radiologist.

MRIs have high sensitivity and specificity for meniscal tears and ligamentous injuries. However, when physical exam findings and functional deficits indicate the need for surgery, an MRI may not be necessary. MRI is less accurate for articular cartilage defects (sensitivity 76%) than for meniscal and ligamentous injury (sensitivity greater than 90%).

MRIs have not been shown to be reliable for diagnosing symptomatic hip bursitis.

b. **MR Arthrography (MRA)**: This accepted investigation uses the paramagnetic properties of gadolinium to shorten T1 relaxation times and provide a more intense MRI signal. It should be used to diagnose hip labral tears. Pelvic MRIs are not sufficient for this purpose. Arthrograms are also useful to evaluate mechanical pathology in knees with prior injuries and/or surgery.

c. **Computed Axial Tomography (CT)**: is generally accepted and provides excellent visualization of bone. It is used to further evaluate bony masses and suspected fractures not clearly identified on a radiographic window evaluation. CT is also used for surgical management. For example, CT is also used for pre-operative planning in cases of hip fractures; femoroacetabular impingement (FAI). Instrument scatter-reduction software provides better resolution when metallic artifact is of concern.

d. **Diagnostic Sonography**: is an accepted diagnostic procedure. The performance of sonography is operator-dependent, and is best done by a specialist in musculoskeletal radiology. It may also be useful for postoperative pain after total knee arthroplasty (TKA), and for dynamic testing especially of the foot or ankle.

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

f. **Bone Scan (Radioisotope Bone Scanning)**: is generally accepted, well-established and widely used. 99MTechnecium 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.

g. **Other Radionuclide Scanning**: Indium and gallium scans are generally accepted, well-established, and widely used procedures usually to help diagnose lesions seen on other diagnostic imaging studies. 67Gallium citrate scans are used to localize tumor, infection, and abscesses. 111Indium-labeled leukocyte scanning is utilized for localization of infection or inflammation.

h. **Arthrogram**: is an accepted diagnostic procedure. It 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 when there are strong clinical indications.

2. **OTHER DIAGNOSTIC TESTS** The following diagnostic procedures listed in this subsection are listed in alphabetical order.

a. **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.

b. **Doppler Ultrasonography/Plethysmography**: is useful in establishing the diagnosis of arterial and venous disease in the lower extremity and should usually 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; a D-dimer, fibrin degradation product, test is positive; and symptoms continue, an ultrasound should usually be repeated 7 days later to rule out popliteal thrombosis. It is also useful for the diagnosis of popliteal mass when MRI is not available or is contraindicated.

c. **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.

d. **Personality/Psychological/Psychosocial Evaluations**: are generally accepted and well-established diagnostic procedures with selective use in the acute lower extremity population. These evaluations 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. These evaluations may also be used pre-operatively and have a possible predictive value for postoperative 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;

vii. History of smoking, alcohol use, and substance abuse; and

viii. Childhood history, including abuse and family history of disability.

This information 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 (DSM) of Mental Disorders diagnosis should be determined and documented. An individual with a PhD, PsyD, or Psychiatric MD/DO credentials who is familiar with work injury care should perform initial evaluations, which are generally completed within one to two hours. When issues of chronic pain are identified, the evaluation should be more extensive and follow testing procedures as outlined in the Division's Chronic Pain Disorder Medical Treatment Guidelines. The evaluator should be aware that workers compensation insurers are not covered under HIPAA therefore, some information may need to be redacted when reports are forwarded.

- 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.

e. **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.

3. **SPECIAL TESTS** are generally well-accepted 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. The procedures in this subsection are listed in alphabetical order.

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

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

b. **Functional Capacity Evaluation (FCE)**: This is a comprehensive or modified evaluation of the various aspects of function as they relate to the worker's ability to return to work. Areas such as endurance, lifting (dynamic and static), postural tolerance, specific ROM, coordination and strength, worker habits, employability, as well as psychosocial aspects of competitive employment may be evaluated. Reliability of patient reports and overall effort during testing is also reported. Components of this evaluation may include: (a) musculoskeletal screen; (b) cardiovascular profile/aerobic capacity; (c) coordination; (d) lift/carrying analysis;

(e) job-specific activity tolerance; (f) maximum voluntary effort; (g) pain assessment/psychological screening; and (h) non-material and material handling activities. Standardized national guidelines (such as National Institute for Occupational Safety and Health (NIOSH) should be used as the basis for FCE recommendations.

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

A full review of the literature reveals no evidence to support the use of FCEs to prevent future injuries. There is some evidence in chronic low back pain patients that (1) FCE task performance is weakly related to time on disability and time for claim closure and (2) even claimants who fail on numerous physical performance FCE tasks may be able to return to work. These same issues may exist for lower extremity issues.

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

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

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

c. **Jobsite Evaluation**: 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) sensation; (j) coordination; (k) environmental requirements of a job; (l) repetitiveness; and (m) essential job functions, including job licensing requirements. Job descriptions provided by the employer are helpful but should not be used as a substitute for

direct observation.

A jobsite evaluation may include observation and instruction of how work is done, what material changes (desk, chair) should be made, and determination of readiness to return to work.

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

i. To determine if there are potential contributing factors to the person's condition and/or for the physician to assess causality;

ii. To make recommendations for, and to assess the potential for ergonomic changes;

iii. To provide a detailed description of the physical and cognitive job requirements;

iv. To assist the patients in their return to work by educating them on how they may be able to do their job more safely in a bio-mechanically appropriate manner; and/or

v. To give detailed work/activity restrictions.

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

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. The effectiveness of vocational rehabilitation may be enhanced when performed in combination with work hardening or work conditioning. 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 (Fitness for Duty)**: 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 initial screen. May monitor improvements in strength every 3 to 4 weeks up to a total of 6 visits.

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

1. FOOT AND ANKLE

a. Achilles Tendinopathy/or Injury and Rupture:

i. Description/Definition: Rupture or tear of Achilles tendon or insertional or non-insertional tendinopathy.

ii. Occupational Relationship: Tears or ruptures are related to a fall, twisting, jumping, or sudden load on ankle with dorsiflexion. Tendinopathy may be exacerbated by continually walking on hard surfaces, or repetitive motions such as jumping in and out of a vehicle or climbing up and down ladders.

iii. Specific Physical Exam Findings: Swelling and pain at tendon, sometimes accompanied by crepitus and pain with passive motion. Achilles tendinopathy can be palpated with a bulbous indurated tendon which is painful on side to side compression. Rupture or partial tear may present with palpable deficit in tendon. If there is a full tear, Thompson test will usually be positive. A positive Thompson's test is lack of plantar flexion with compression of the calf when the patient is prone with the knee flexed.

iv. Diagnostic Testing Procedures: Radiography may be performed to identify Haglund's deformity; however, many Haglund's deformities are asymptomatic. MRI or ultrasound may be performed if surgery is being considered for tendinopathy or rupture. Imaging may delay timely surgical care and some information indicates that a clinical examination by a specialist may be sufficient for appropriate diagnosis in the absence of imaging. Ultrasound may be more cost-effective than MRI in some instances, but the choice of the appropriate exam must be made by the treating provider taking into account the patient's clinical presentation. However, in the case of complete Achilles tendon ruptures, there may not be a need for imaging, at the discretion of the specialist.

v. Specialist Evaluation: It is important that individuals with complete Achilles tendon ruptures be evaluated by a specialist within 48 hours if conservative management is being considered. In those individuals, placement of a splint in plantar flexion should be considered until evaluation by a specialist to prevent solidification of the hematoma that may prevent opposition of the ruptured tendon.

vi. Non-operative Treatment Procedures:

A) Initial Treatment: For incomplete tears of the Achilles tendon, casting in non-weight-bearing is the treatment of choice.

There is some evidence that, for non-operatively treated complete Achilles tendon ruptures, immediate weight bearing with a flexible orthosis presents no disadvantages for return to function in comparison to delayed weight-bearing in a plaster cast. Additionally, there is some evidence that in the setting of

acute Achilles tendon rupture which is treated non-operatively with an orthotic, weight-bearing on the first day leads to outcomes equally favorable to those of delaying weight-bearing for six weeks after injury. However, this study indicates that the orthotic should provide equinus position of the foot and crutches should be available to the patient during the early phase of healing. In the setting of non-operative treatment of a complete Achilles tendon rupture, the efficacy of different immediate weight-bearing rehabilitation protocols remains unclear. However, weight-bearing in the first week is safe and appropriate.

Individuals undergoing conservative management for an Achilles tendon rupture will likely require much more imaging, typically dynamic ultrasounds, in order to ensure appropriate healing. The frequency of the ultrasounds is at the discretion of the specialist based upon the individual patient's clinical presentation.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Benefits for Achilles tendinopathy may be achieved through therapeutic rehabilitation and rehabilitation interventions. Eccentric training alone or with specific bracing may be used for tendinopathy. Manual therapy may also be used. Therapy will usually include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling.

There is some information from a recent clinical practice guideline by the American Physical Therapy Association (APTA) that iontophoresis with dexamethasone, soft tissue mobilization, foot orthoses, stretching, and taping may decrease pain and improve function in patients with Achilles tendinopathy.

Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by distal and proximal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) There is no evidence to support the use of injection therapies, including steroids, for treating Achilles tendinopathy. Steroid injections should generally be avoided in these patients since

they present a risk for later rupture. Therefore, steroid injections are ***not recommended*** for any pathology of the Achilles tendon.

F) There is insufficient evidence for or against the use of Platelet Rich Plasma (PRP) in the setting of Achilles tendinopathy. Another systematic review provided insufficient evidence to recommend for or against PRP injections for noninsertional Achilles tendinopathy. Therefore, PRP is ***not generally recommended***, but may be considered in unusual circumstances for cases which have not responded to appropriate conservative measures in order to forestall an invasive procedure with risk of significant complications. If PRP is found to be indicated in these select patients, the first injection may be repeated once after 4 weeks when significant functional benefit, such as increased walking tolerance, is reported but the patient has not returned to full function.

For more information, please refer to Section F.6.d. Platelet Rich Plasma.

G) Additionally, there is insufficient evidence to recommend for or against autologous blood injections, sclerosing agent injections, protease inhibitor injections, deproteinized hemodialysate injections, or prolotherapy for noninsertional Achilles tendinopathy. Therefore, these injections are ***not recommended*** for Achilles tendinopathy.

H) Animal studies have indicated that low level laser may reduce inflammatory factors, moderate growth factors and myogenic regulatory factors, and increase angiogenesis. Results of studies on humans have varied due to the the strength of the study and also the type and strength of the laser. There is no evidence that low level laser treatment is effective in the treatment of Achilles tendinopathy. Studies show that low level laser is largely absorbed within the first 1 mm of skin, thus meaningful therapy is extremely unlikely physiologically. Therefore, it is ***not recommended.***

I) An adequate systematic review failed to provide evidence that extracorporeal shockwave therapy (ESWT) is superior to sham ESWT for Achilles tendinopathy. This review examined the only two studies in the past 10 years that had adequate blinding of participants. However, a clinically important effect has not been ruled out and future research may change the unbiased estimate of the effect of ESWT. Additionally, there is some evidence that, in generally heathy patients with non-calcific insertional Achilles tendinopathy who have failed 6 months of prior treatment, three sessions of a moderate dose (flux density of 0.12 mJ/mm2) are likely to be more successful than a 12 week program of eccentric loading exercise. As such, providers may consider adding ESWT to their treatment options for insertional Achilles tendinopathy that has failed 6 months of conservative management or those for whom the next level of guideline-consistent therapy would involve an invasive procedure with risk of significant complications.

J) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

K) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vii. Surgical Indications/Considerations: Total or partial rupture.
Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

There have been recent studies suggesting that the effectiveness of non-operative treatment of complete Achilles tendon ruptures may be comparable to operative treatment. This has led some surgeons to offer non-operative treatment to patients who meet certain clinical criteria. This is consistent with the recent clinical practice guideline released by the AAOS indicating that non-operative treatment is an option for all patients with acute Achilles tendon rupture. However, there is good evidence from an adequate meta-analysis that operative repair of a complete Achilles tendon rupture does lower the re-rupture rate when compared to non-operative immobilization, but increases the rate of other complications including deep tissue infection. While the difference in re-rupture rates between surgically and conservatively treated Achilles tendon ruptures was recently contradicted in a meta-analysis, this is inadequate for evidence due to the use of an inappropriate statistical model. When the same data is examined appropriately, there is clearly a significant protective effect against re-rupture with surgical management. However, the need for surgery will depend on the individual case based upon individual functional goals. Consideration of conservative management is especially important for individuals who may be at risk of complications from surgery, such as smokers or diabetics.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

viii. Operative Procedures: Repair of tendons open or percutaneously with or without anchors may be required. Tendon grafts are used for chronic cases or primary surgery failures when tendon tissue is poor.

ix. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy. There is some evidence that in patients undergoing surgical repair of a ruptured Achilles tendon, a rehabilitation program involving immediate weight bearing with a flexible orthosis is more effective in returning patients to normal function than a program involving immobilization in a plaster cast.

C) Range of motion may begin at 3 weeks depending on wound healing. Therapy and some restrictions will usually continue for 6 to 8 weeks.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

b. **Aggravated Osteoarthritis**:

i. Description/Definition: Internal joint pathology of ankle.

ii. Occupational Relationship: The provider must establish the occupational relationship by establishing a change in the patient's baseline condition and a relationship to work activities, for example frequent jumping, climbing, or squatting.

Other causative factors to consider: Prior significant injury to the ankle may predispose the joint to osteoarthritis. In order to entertain previous trauma as a cause, the patient should have a medically documented injury with radiographs or MRI showing the level of anatomic change. The prior injury should have been at least 2 years from the presentation for the new complaints and there should be a significant increase of pathology on the affected side in comparison to the original imaging or operative reports and/or the opposite un-injured extremity.

iii. Specific Physical Exam Findings: Pain within joint, swelling. Crepitus, locking of the joint, reduced range of motion, pain with stress tests, angular deformities.

iv. Diagnostic Testing Procedures: X-ray – mechanical axis views, CT, MRI, diagnostic injection.

v. Non-operative Treatment Procedures:

A) Initial Treatment: May include orthoses, custom shoes with rocker bottom shoe inserts, and braces. Cane may also be useful. AFO (ankle foot orthosis) braces may also provide some benefit in end stage ankle osteoarthritis.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by distal and proximal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and range of motion. Steroid injections under significant pressure should be avoided as the needle may be penetrating the tendon and injection into the tendon can cause possible tendon breakdown, tendon degeneration, or rupture. Injections should be minimized for patients under 30 years of age. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

- ❖ Time to Produce Effect: One injection.
- ❖ Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

F) A recent meta-analysis has garnered a large amount of support for use of hyaluronic acid injections in the ankle. However, a major statistical error in the findings has been overlooked by many reviewers. The study, when examined appropriately, does not reveal a statistically significant difference between hyaluronic

acid and saline. Thus, there is inadequate evidence that HA is more effective than saline for treatment of ankle osteoarthritis. Hyaluronic acid injections are, therefore, ***not recommended*** for ankle osteoarthritis due to the small effect size documented in knee conditions and the lack of evidence supporting its use in the ankle.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) The patient is a good surgical candidate and pain continues to interfere with ADLs after non-surgical interventions including weight control, therapy with active patient participation, and medication.

B) Refer to Section G. for specific indications for osteotomy, ankle fusion or arthroplasty.

C) Implants are less successful than similar procedures in the knee or hip. While the volume of total ankle arthroplasty procedures is increasing, there are no high quality clinical trials comparing arthrodesis to ankle replacement. Patients with ankle fusions generally have good return to function and fewer complications than those with joint replacements. Salvage procedures for ankle replacement include revision with stemmed implant or allograft fusion. There is some retrospective information indicating that the intermediate-term clinical outcomes of total ankle replacement and ankle arthrodesis may be comparable. However, the rates of reoperation and major complications were more than two times higher after ankle replacement. Given these factors, an ankle arthroplasty requires prior authorization and a second opinion by a surgeon specializing in lower extremity surgery.

D) There is some concern that ankle arthrodesis may affect the development of adjacent-joint arthritis. However, a recent systematic review found no consensus in the literature as to the effects of ankle arthrodesis on biomechanics or whether ankle arthrodesis leads to adjacent-joint arthritis.

E) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

F) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

G) In cases where surgery is contraindicated due to obesity, it may be appropriate to recommend a weight loss program if the patient is unsuccessful losing weight on their own. Coverage for weight loss would continue only for motivated patients who have demonstrated continual progress with weight loss.

H) Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that carriers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Arthroscopy, ankle arthroplasty or fusion with appropriate ancillary procedures as necessary.

Ankle distraction arthroplasty requires an external fixator for 3 months and therefore a significant patient commitment. Arthroscopic debridement is usually performed at the same time as the procedure. There is some information that ankle distraction arthroplasty may be useful as an alternative to arthrodesis and joint replacement for the treatment of post traumatic ankle osteoarthritis in younger populations. This is because the procedure preserves the joint for more invasive later procedures. However, due to the limited amount of prospective literature addressing efficacy and long-term clinical results, there is insufficient information to recommend for or against the procedure. There is some information that ankle distraction arthroplasty may result in a decline in ankle function over time. There is some evidence that, when an external distractor is used to treat ankle osteoarthritis in patients under 60, a hinged device which allows for ankle flexion and extension is preferred over a fixed distractor which allows for no ankle motion. Given these factors, ankle distraction arthroplasty requires prior authorization and a second opinion by a surgeon specializing in lower extremity surgery.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

C) Treatment may include the following: restricted weight-bearing, bracing, gait training and other active therapy with or without passive therapy.

D) Refer to Section G. for Ankle Fusion, Osteotomy, or Arthroplasty for further specific information.

E) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

c. Ankle or Subtalar Joint Dislocation:

i. Description/Definition: Dislocation of ankle or subtalar joint.

ii. Occupational Relationship: Usually occurs with falling or twisting.

iii. Specific Physical Exam Findings: Disruption of articular arrangements of ankle, subtalar joint may be tested using ligamentous laxity tests.

iv. Diagnostic Testing Procedures: Radiographs, CT scans. MRI may be used to assess for avascular necrosis of the talus which may occur secondary to a dislocation.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Closed reduction under anesthesia with pre- and post-reduction neurovascular assessment followed by casting and weight-bearing limitations.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range of motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint

mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by distal and proximal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Inability to reduce closed fracture, association with unstable fractures.

vii. Operative Procedures: Open or closed reduction of dislocation.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment usually includes initial immobilization with restricted weight-bearing, followed by bracing and active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

d. 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 malleolus and the ligaments. Injured ligaments in order of disruption include the anterior talofibular

ligament (ATFL), calcaneofibular ligament (CFL), posterior talofibular ligament (PTFL), deltoid ligaments, and syndesmotic ligaments. Instability can result from a fracture of a malleolus (malleolli), rupture of ligaments, or a combination thereof. Circumstances surrounding the injury, including consideration of location and additional injuries are important. 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 Injury: those with overstretching or microscopic tears of the ligament, minimal swelling, normal stress testing, and the ability to bear weight.

B) Grade 2 Injury: have partial disruption of the ligament, significant swelling, indeterminate results on stress testing, and difficulty bearing weight.

C) Grade 3 Injury: have a ruptured ligament, swelling and ecchymosis, abnormal results on stress testing, and the inability to bear weight. May also include a chip avulsion fracture on x-ray.

ii. Occupational Relationship: sudden twisting, direct blunt trauma and falls. Inversion of the ankle with a plantar-flexed foot is the most common mechanism of injury.

iii. Specific Physical Exam Findings: varies with individual. With lower grade sprains the ankle may appear normal, with minimal tenderness on examination. The ability/inability to bear weight, pain, swelling, or ecchymosis should be noted. If the patient is able to transfer weight from one foot onto the affected foot and has normal physical findings, then likelihood of fracture is reduced. Stress testing using the anterior drawer stress test, the talar tilt test and the external rotation stress test may be normal or abnormal depending on the involved ligament.

Syndesmotic injury can occur with external rotation injuries and requires additional treatment. Specific physical exam tests include the squeeze test and external rotation at neutral.

iv. Diagnostic Testing Procedures: Radiographs. Refer to Initial Diagnostic Section which generally follows the Ottawa Ankle Rules. The Ottawa Ankle Rules are a decision aid for radiography. Commonly missed conditions include ankle syndesmosis injuries, osteochondral injuries, or fractures. The instrument has a sensitivity of almost 100% and a modest specificity, and its use should reduce the number of unnecessary radiographs by 30 to 40%.

For an acute, unstable ankle or a repeat or chronic ankle injury, a MRI and/or diagnostic injection may be ordered. Arthroscopy can be used in unusual cases with persistent functional instability and giving way of the ankle, after conservative treatment, to directly visualize the ruptured ligament(s).

v. Non-operative Treatment Procedures:

Initial treatment for patients able to bear weight: NSAIDs, RICE (rest, ice, compression and elevation), and early functional bracing is used. Oral and topical NSAIDs are likely to be beneficial in the short-term treatment of acute ankle sprains, but there is no evidence on long-term effects, and oral NSAIDs may be associated with possible adverse events. In addition, crutches may be beneficial for comfort. Early functional treatment, including range of motion and strengthening exercises along with limited weight-bearing, are preferable to strict immobilization with rigid casting for improving outcome and reducing time to return to work. Additionally, in the setting of a Grade 1 or Grade 2 acute ankle sprain, patients can be encouraged to begin mobilization and flexion/extension functional movement pattern exercises during the first week after the injury with instruction from a physical therapist or physician. Standard treatment generally includes protection, rest, ice, compression, and elevation. The injured joint need not be kept immobile in the first week after the sprain has occurred.

Initial treatment for patients unable to bear weight: bracing plus NSAIDs and RICE are used. When patient becomes able to bear weight, a walker boot is frequently employed. There is good evidence that use of either device combined with functional therapy results in similar long-term recovery. Small avulsion fractures of the fibula with minimal or no displacement can be treated as an ankle sprain.

There is good evidence that for ankle fractures immobilized with a removable boot, a below-the-knee ankle injury stocking is more effective than a tubular bandage in controlling swelling and in yielding functional gains six months after the initial injury. Therefore, tubular bandage is ***not recommended***.

For patients with a clearly unstable joint, immobilize with a short leg cast or splint for 2 to 6 weeks along with early weight-bearing.

Balance/coordination training is a well-established treatment which improves proprioception and may decrease incidence of recurrent sprains.

There is good evidence that, for chronic ankle instability, 4 weeks of neuromuscular training aimed at improving balance and proprioception are more effective than no training at producing functional recovery.

Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

There is some evidence that, for ankle sprains, a 4 week program of twice weekly manual physical therapy plus home exercise provides benefits in addition to home exercise alone at the end of treatment. However, these differences decrease over a 6 month period as the natural history of ankle sprains begins to resolve. Manual therapy may also improve motion in the setting of a degenerative joint and should be coupled with instruction on both self-mobilization and range of motion exercises.

Medications/Vitamins: All patients with conditions that require bone

healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

Heel wedges or other orthotics may be used for rear foot varus or valgus deformities.

There is also good evidence from an adequate systematic review that, in Grade 2 or Grade 3 ankle ligament injuries, external support with a semi-rigid brace or a short-term cast promotes injury healing more effectively than support with taping or with a tubular bandage. This is because a tubular bandage may not furnish adequate protection against inversion of the ankle joint. There is good evidence that in the setting of ankle instability, ankle taping and bracing has no influence on proprioception, and that their effect in reducing recurrent ankle injury probably arises from other mechanisms.

A) When fractures are involved refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

B) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

C) Return-to-work with appropriate restrictions should be considered early in the course of treatment. Refer to Section F.13. Return to Work.

D) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

E) Hyperbaric oxygen therapy is ***not recommended***.

vi. Surgical Indications/Considerations:

A) Acute surgical indications include sprains with displaced fractures, syndesmotic disruption or ligament sprain associated with a fracture causing instability. However, younger or more

active patients warrant consideration of operative treatment.

Weber type B fractures of the ankle demonstrate a widening of the radiographic interval between the medial edge of the talar dome and the lateral edge of the medial malleolus upon external rotation of the foot. These types of fractures generally have a positive manual external rotation stress test upon examination. There is some evidence that, in the setting of ankle fractures that meet these two criteria, functional outcomes and recovery times are similar with operative and with non-operative treatment.

B) There is no conclusive evidence that surgery as opposed to functional treatment for an uncomplicated Grade 1, 2, or 3 ankle sprain improves patient outcome. There is no indication to consider surgery for an acute ankle sprain.

C) Chronic indications are functional problems, such as recurrent instability remaining after at least 2 months of active participation in a non-operative therapy program including balance training.

D) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

E) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan, including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

There is some information from a single trial that does not rise to the level of evidence that providing educational pamphlets may not lead to improved functional outcomes but may improve patient satisfaction with the treating staff in the first three months following surgical stabilization of ankle fractures.

F) If injury is a sprain: Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

G) If injury is a fracture: Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that carriers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may

continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Treatment: Repair of fractures or other acute pathology as necessary. Primary ligament ankle reconstruction with possible tendon transplant.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

Treatment may include short-term post-surgical casting. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

For surgically treated ankle sprains: There is also good evidence that in patients who have undergone surgical repair of the ankle ligaments, early mobilization with a prefabricated walking boot leads to earlier return to work and activity than plaster immobilization for six weeks.

For surgically treated ankle fractures: There is some evidence that early mobilization done with a removable brace, after primary wound healing has taken place, improves range of motion more rapidly and results in an earlier return to work. However, there is some evidence that immediate mobilization with a brace on the day of fracture surgery leads to a higher risk of wound infection than with an immobilizing cast. Additionally, one high quality study provides good evidence that patients who undergo internal fixation of acute non-pathological ankle fractures do not need to remain at bed rest for the first postoperative day. There is also good evidence that mobilization can safely be started with gait aids on the first morning after surgery, leading to shorter length of hospital stay, no increase in the need for opioid analgesia, and equally satisfactory wound healing two weeks after surgery. However, early mobilization should not be confused with weight bearing. Weight bearing immediately following surgical fixation of an ankle fracture is ***not recommended***.

For acute syndesmotic injuries treated with a syndesmotic screw, there is a lack of evidence to recommend between mobilization within two weeks after surgery and a strategy which delays mobilization for six weeks. The decision regarding optimal timing of mobilization should be tailored to each individual patient.

B) The surgical procedures and the patient's individual results dictate the amount of time a patient has non weight-bearing restrictions. Fractures usually require 6 to 8 weeks while tendon transfers may be 6 weeks. Other soft tissue repairs, such as the Brostrom lateral ankle stabilization, may be as short as 3 weeks.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

e. **Calcaneal Fracture**:

i. Description/Definition: Osseous fragmentation/separation confirmed by diagnostic studies.

ii. Occupational Relationship: Usually occurs by fall or crush injury.

iii. Specific Physical Exam Findings: Pain with range of motion and palpation of calcaneus. Inability to bear weight, mal-positioning of heel, possible impingement of sural nerve.

iv. Diagnostic Testing Procedures: Radiographs and CT scan to assess for intra-articular involvement. Lumbar films and urinalysis are usually performed to rule out lumbar crush fractures when the mechanism of injury is a fall from a height.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Non weight-bearing 6 to 8 weeks, followed by weight-bearing cast at physician's discretion and active therapy with or without passive therapy.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the

healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Displacement of fragments, joint depression, intra-articular involvement, mal-position of heel. Historically, consensus opinion has recommended that calcaneal fractures of Sanders grade II or above be repaired surgically. However, two comparable studies in combination yield good evidence that the pain and functional difference between surgical and non-operative treatment of most calcaneal fractures at one to two years is small, and likely not to be clinically significant. A clinically significant difference in favor of surgery at 8 or more years in preventing subtalar arthritis requiring arthrodesis cannot be ruled out. Additionally, a recent Cochrane review found insufficient high quality evidence relating to current practice to establish whether surgical or conservative treatment is better for adults with displaced intra-articular calcaneal fracture. However, based on a single adequate study in a meta-analysis there is some evidence that, in the setting of displaced intra-articular calcaneal fractures, return to work is more likely with surgical than with nonsurgical treatment. There is also some evidence that a heavy workload makes return to work less likely than with a light or moderate workload. Surgical repair is generally favored to reestablish the general anatomy of the calcaneus, such as restoring height, width, length, and articular surface of the calcaneus, which would allow easier arthrodesis if needed in the future.

One systematic review does provide some pertinent information that the outcomes of calcaneal fractures depend greatly on the occurrence of complications, which do not commonly determine the outcome of most other fractures. This study suggests that this may be the reason for the ongoing controversy about the management of these fractures. Therefore, the need for surgery will depend on the individual case. Relative contraindications: smoking, diabetes, or immunosuppressive disease.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that carriers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Open reduction internal fixation. Subtalar fusion may be necessary in some cases when the calcaneus is extremely comminuted. External fixation has been used when the skin condition is poor. There is some information that a minimally invasive approach may have similar clinical results to open reduction and internal fixation and may be an option in less complex fractures. However, the need for open or minimally invasive surgery is dependent upon the individual patient presentation and the surgeon's clinical judgment.

One study provides some evidence that in the open reduction of intra-articular calcaneal fractures, allograft yields anatomic and functional outcomes equal to those achieved with iliac crest autograft, and that donor site morbidity can be avoided if this is done, but there is inadequate evidence that the addition of PRP enhances the outcomes in a clinically relevant manner. As such, PRP in the setting of open reduction internal fixation (ORIF) of calcaneal fractures is ***not generally recommended***. However, calcaneal fractures requiring allografts frequently also utilize advanced orthobiologics. Prior authorization should be obtained except in urgent open fracture repairs.

Complications may include wound infections requiring skin graft.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using the therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) The patient is usually non weight-bearing for 6 to 8 weeks followed by weight-bearing for approximately 6 to 8 weeks at physician's discretion.

C) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

f. Chondral and Osteochondral Defects:

i. Description/Definition: Cartilage or cartilage and bone defect of the talar surface. May be associated with ankle sprain or other injuries.

ii. Occupational Relationship: Usually caused by a traumatic ankle injury.

iii. Specific Physical Exam Findings: Ankle effusion, pain in joint and with walking.

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 Procedures:

A) Initial Treatment: Acute injuries may require immobilization followed by active therapy with or without passive therapy.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve

ROM, strength, and normal joint mechanics influenced by distal and proximal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Functional deficits not responsive to conservative therapy, or with evidence of anatomical derangement. Identification of an osteochondral lesion by diagnostic testing procedures should be done to determine the size of the lesion and stability of the joint.

B) Microfracture is the initial treatment unless there are other anatomic variants such as a cyst under the bone.

C) Osteochondral Autograft/Allograft Transfer System (OATS) may be effective in patients younger than 55, without other areas of osteoarthritis, a BMI of less than 35, and a failed microfracture. Additionally, newer techniques allow OATS replacement of failed microfractures without malleolar osteotomies. This procedure may be indicated when functional deficits interfere with activities of daily living and/or job duties at least 3 to 6 months after a failed microfracture with active patient participation in non-operative therapy and appropriate clinical indications. This procedure is only appropriate in a small subset of patients and requires prior authorization.

D) Autologous cartilage implants are not currently FDA approved for the ankle. Additionally, a Cochrane review examining the topic in 2010 indicated that there is currently insufficient evidence from randomized trials to determine which interventions are best for osteochondral defects of the talus in adults. These procedures do show some early promise for full-thickness defects that have not responded to debridement and microfracture. However, due to the small numbers of ankles treated with autologous cartilage implants represented in the current literature and the largely retrospective nature of the information, these are considered to be pilot studies, and these experimental procedures are therefore ***not recommended*** in the ankle.

E) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c

and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

F) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

G) Smoking may affect tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Arthroscopy with debridement or shaving of cartilage, microfracture, mosiacplasty, fixation of loose osteochondral fragments. Arthroscopic debridement followed by bone marrow stimulation is considered the primary means of treating osteochondral lesions of the talar dome.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

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

i. Description/Definition: Internal derangement of joint.

ii. Occupational Relationship: Jamming, contusion, crush injury, repetitive impact, or post-traumatic arthrosis.

iii. Specific Physical Exam Findings: Pain with palpation and ROM of joint, effusion. The piano key test may be used, where the examiner stabilizes the heel with one hand and presses down on the distal head of the metatarsals, assessing for pain proximally.

iv. Diagnostic Testing Procedures: Radiographs, diagnostic joint injection, CT, MRI.

v. Non-operative Treatment Procedures:

A) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

B) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

C) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Orthotics and iontophoresis are usually included. A carbon fiber Morton extension may be useful. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by distal and proximal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

D) Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and range of motion. Steroid injections under significant pressure should be avoided as the needle may be penetrating the tendon and injection into the tendon can cause possible tendon breakdown, tendon degeneration, or rupture. Steroid injections should also be used cautiously in hallux rigidus due to the potential for subluxation. Injections should be minimized for patients under 30 years of age. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

- Time to Produce Effect: One injection.
- Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Pain, unresponsive to conservative care and interfering with activities of daily living. Surgery is rarely indicated for a painless metatarsal-phalangeal joint.

B) First metatarsal arthritis or avascular necrosis can interfere with function and gait.

C) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

D) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

E) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: if debridement of the arthritic joint and other conservative treatment is unsuccessful in correcting gait and walking tolerance, other procedures may be considered. Other procedures include: fusion of first metatarsal-phalangeal joint, cheilectomy, osteotomies, Keller arthroplasty and soft tissue procedures.

There is some evidence that the first metatarsal-phalangeal joint arthritis is better treated with arthrodesis than arthroplasty for pain and functional improvement. Therefore, total joint arthroplasties are ***not recommended*** for any metatarsal-phalangeal joints due to less successful outcomes than fusions. There may be an exception for first and second metatarsal-phalangeal joint arthroplasties when a patient is older than 60, has low activity levels, and cannot tolerate non weight-bearing for prolonged periods or is at high risk for nonunion.

Metallic hemi-arthroplasties are still considered experimental as long-term outcomes remain unknown in comparison to arthrodesis, and there

is a significant incidence of subsidence. Therefore, these are ***not recommended*** at this time.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) For fusions and osteotomies, reduced weight-bearing and the use of special shoes will be necessary for at least 6 weeks postoperative. For other procedures early range-of-motion, bracing, and/or orthotics. Treatment usually also includes other active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

h. Midfoot (Lisfranc) 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 from a fall, crush, axial load with a plantar flexed foot, or abductory force on the forefoot.

iii. Specific Physical Exam Findings: Pain and swelling at the Lisfranc joint, first and/or second metatarsal cuneiform articulation, palpable dorsal dislocation, pain on forced abduction.

Dislocation may not always be apparent. Pronation and supination of the forefoot with the calcaneus fixed in the examiner's opposite hand may elicit pain in a Lisfranc injury. This may help distinguish a Lisfranc injury from an ankle sprain, in which this maneuver is expected to be painless. The piano key test may be used, where the examiner stabilizes the heel with one hand and presses down on the distal head of the metatarsal, assessing for pain proximally. The dorsalis pedis artery crosses the second metatarsal and may be disrupted. Therefore, the dorsalis pedis pulse and capillary filling should be assessed.

iv. Diagnostic Testing Procedures: X-rays, CT scans, MRI, mid-foot stress x-rays.

v. Non-operative Treatment Procedures:

A) Initial Treatment: If minimal or no displacement then casting, non-weight-bearing 6 to 8 weeks. Orthoses may be used later. There is some information that non-operative treatment for Lisfranc fractures should be reserved for those with stable Stage I injuries, and that good results may be achieved with a non-weight-bearing cast for 6 weeks or with immediate weight-bearing in an orthotic. In those treated non-operatively, an initial non-weight-bearing period of 2 weeks should be observed before reexamination. If, upon reevaluation, there is no tenderness or displacement on weight-bearing radiographs, protected weight bearing with a long walker-boot or orthotic support may be considered. Persistence of tenderness requires further immobilization.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Displacement of fragments or intra-articular fracture. Most Lisfranc fracture/dislocations are treated surgically.

In regards to timing of surgery, there is some information that significantly poorer results are seen if operative treatment is delayed for more than 6 months. However, a 1-2 week delay to allow reduction of soft-tissue swelling has not been shown to negatively affect outcomes of open reduction and internal fixation.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that carriers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

Due to higher rates of both infectious and non-infectious complications in the postoperative period following surgical correction of Lisfranc fractures, diabetes is also considered a relative contraindication.

vii. Operative Procedures: Open reduction internal fixation with possible removal of hardware at approximately 3 to 6 months, pending healing status. Alternatively, arthrodesis of the medial 2 or 3 metatarsals. There continues to be considerable debate regarding whether ORIF or arthrodesis is the most appropriate operative treatment of Lisfranc fractures. The most appropriate operative treatment must be decided upon by the surgeon after consideration of the patient’s presentation and functional goals.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using treatments as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) The patient is usually in cast or fracture walker for 6 to 8 weeks non weight-bearing. Orthoses may be indicated after healing.

C) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

i. Morton's 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 must be confirmed by a physician after review of environmental and biomechanical risk factors.

iii. Specific Physical Exam Findings: Paresthesias and/or pain with palpation of the inter-metatarsal nerve, Mulder's sign, a palpable click from compression of the nerve, or Tinel's sign.

iv. Diagnostic Testing Procedures: Radiographs to rule out osseous involvement. Diagnostic and therapeutic injections. Diagnosis is usually based on clinical judgment; however, MRI and ultrasound imaging have also been employed in difficult cases.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Nonsteroidal anti-inflammatories and foot orthoses are primary treatments.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories are usually helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and range of motion. There is some evidence that an ultrasound-guided injection of methylprednisolone improves global perception of foot health more effectively than an injection of local anesthetic at one month and at three months. However, there is no information regarding the effectiveness of an injection for preventing the need for surgery at a later date. Steroid injections under significant pressure should be avoided as the needle may be penetrating the tendon and injection into the tendon can cause possible tendon breakdown, tendon degeneration, or rupture. Injections should be minimized for patients under 30 years of age. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

- ❖ Time to Produce Effect: One injection.
- ❖ Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

E) Alcohol injections are thought to produce a chemical neurolysis. Alcohol injection with ultrasound guidance may be used to decrease symptoms.

- ❖ Optimum Duration: 4 treatments.
- ❖ Maximum Duration: 7 treatments.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Functional deficits persisting after 2 to 3 months of active participation in therapy.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Excision of the neuroma; nerve transection or transposition.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may involve a period of non-weight-bearing for up to two weeks, followed by gradual protected weight-bearing 4 to 6 weeks.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

j. 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 Exam Findings: Swelling, pain with weight-bearing, ecchymosis, and palpable tenderness.

iv. Diagnostic Testing Procedures: Radiographs, CT scans.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Prolonged non weight-bearing at physician's discretion.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Displacement of fracture, severe comminution necessitating primary fusion.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Open reduction internal fixation, fusion, external fixation. In some cases staged procedures may be necessary beginning with external fixation. In some cases, intramedullary nailing may also be a treatment of choice.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using treatment as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be

beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

k. Plantar Fasciitis/Plantar Fasciopathy/Plantar Fasciosis (aka Heel Spur Syndrome, or Chronic Plantar Heel Pain)

i. Description: Pain along the inferior aspect of the heel at the calcaneal attachment of the plantar fascia and/or along the plantar fascia. The most commonly reported symptom is “first-step pain,” that is, pain that is worst with the first steps of the day after arising from bed. Heel pain typically improves with walking but worsens again with prolonged weight bearing or after periods of inactivity.

ii. Occupational Relationship: Condition may be exacerbated by prolonged standing or walking 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 Exam Findings: Pain with palpation of the origin of the plantar fascia at the medial calcaneal tubercle is a typical exam finding. Gastrocnemius tightness may be tested with the Silfverskiöld test. The foot is passively dorsiflexed with the knee extended and then with knee flexed while stabilizing the subtalar joint in neutral position. The test is positive for gastrocnemius tightness if dorsiflexion is greater with the knee flexed than with the knee extended.

iv. Diagnostic Testing Procedures: Standard radiographs to rule out fracture. Bone scans and/or MRI may be used to rule out stress fractures in chronic cases.

v. Non-operative Treatment Procedures**:**

A) Initial Treatment: This condition usually responds to conservative management consisting of eccentric exercise and stretching of the gastrocnemius, plantar fascial stretching, taping, soft-tissue mobilization, and orthoses. Regardless of specific treatment, more than 80% of patients have resolution of symptoms within 12 months.

- Behavior Modification: Patients with plantar fasciitis often exhibit fear of movement (fear avoidance) behaviors associated with their plantar fasciitis pain. Behavioral modifications may produce some benefit in resolving these behaviors, such as positive encouragement and graded exposure to fearful activities. Providers and therapists should be aware of this and take it into consideration in developing the treatment plan.

- Stretching (Plantar Fascia Specific & Calf Stretching): Active stretching and strengthening of the entire lower extremity is appropriate in the initial treatment of plantar fasciitis.

  There is good evidence that, in the setting of plantar

fasciitis of recent onset, a program of home stretching exercises directed at the plantar fascia is more effective in reducing pain than radial shock wave therapy.

There is some evidence that, in workers who spend the majority of working hours on their feet and who have developed plantar fasciopathy, a physical therapy program consisting of exercises combining gastrocnemius stretching, plantar fascia stretching, balance exercises, and ankle inversion/eversion exercises produce functional and symptomatic benefits equal to those of a single injection of 4 mg of dexamethasone at 6 and at 12 weeks.

- Manual Therapy (Articular & Soft Tissue): There is some evidence that, in patients with plantar fasciitis, six sessions of individually tailored manual therapy with exercise more effectively improves pain six months later than six sessions of standardized program of exercise with ultrasound, dexamethasone iontophoresis, and ice.

- Taping: There is some evidence for small to moderate short-term (1 week) pain reduction from calcaneal taping, low Dye taping (anti-pronation taping below the ankle), or elastic taping of both the plantar fascia and gastrocnemius. Evidence for duration of benefit after removal of tape is lacking. Evidence for effect on function is insufficient. Practical issues regarding taping are the considerable time and labor involved, the moderate complexity of the techniques which may be difficult to teach to patients, potential difficulty or inability of many patients to do self-taping because of physical limitations, and the need to change the tape at least weekly.

- Orthoses: There is good evidence that orthoses have a small, short-term (3 months) functional benefit compared to sham orthosis. There is also some evidence for overall subjective improvement from various types of orthoses plus stretching compared to stretching alone. Evidence does not support pain reduction from orthoses. There is strong evidence that the effectiveness of prefabricated orthoses is equivalent to, and possibly better than, custom-made orthoses. Generally, custom made orthoses are not necessary, except in specific cases, such significant anatomic or alignment abnormalities of the foot.

- Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

B) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F. 7, Medications and Medical Management.

C) Night Splinting: There is inadequate evidence regarding effectiveness of night splinting. A single randomized controlled trial of night splinting was identified but did not meet criteria for adequate evidence due to large risk of bias. However, night splinting is commonly used for plantar fasciitis and may be incorporated as a part of the stretching protocol.

D) Corticosteroid Injections: There is good evidence for a small to moderate reduction in pain from corticosteroid injection, whether guided by ultrasound or palpation. Tibial nerve block does not add benefit to the procedure. It is unclear whether factors such as the specific corticosteroid, the injection approach (e.g. medial vs. posterior), the injection target (e.g. parallel to the plantar fascia vs. into the plantar fascia), or mixing of local anesthetic with the steroid influence outcomes.

Safety concerns regarding steroid injection of the heel exist, including plantar fascia rupture and heel pad atrophy. Steroid injection under significant pressure should be avoided as the needle may be penetrating the tendon, and injection into the tendon could cause tendon breakdown, degeneration, or rupture. Injections should be minimized for patients under 30 years of age.

- Time to produce effect: 1 injection.
- Maximum Duration: 3 injections in 1 year spaced at least 4 to 8 weeks apart. No more than 4 steroid injections to all body parts should be performed in one year.

Steroid injections should be used cautiously in diabetic patients. Diabetic patients should be reminded to check their blood glucose levels at least daily for 2 weeks after injections. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater. For more information, please refer to Section F.6.a. Steroid Injections.

E) Platelet-Rich Plasma injections: There is inadequate evidence to recommend for the use of PRP in the setting of plantar fasciitis to improve pain, function, or alignment. Therefore, PRP is ***not generally recommended***. However, PRP may be considered in unusual circumstances for patients who have not responded to appropriate conservative measures for 4 to 6 months in order to forestall an invasive procedure with risk of significant complications. If PRP is found to be indicated in these select patients, the first injection may be repeated once after 4 weeks when significant functional benefit, such as increased walking tolerance, is reported but the patient has not returned to full function. ~~or full duty at work~~.

Refer to Section F.6.d Platelet Rich Plasma.

F) Botulinum Toxin Injections: There is some evidence that, in patients with plantar fasciitis lasting 3 months or more, botulinum toxin injected into the gastrocnemius-soleus complex combined with stretching produces greater pain reduction and greater functional improvement than corticosteroid injection into the heel combined with stretching. The effect sizes were clinically significant and lasted through 6 months. A therapeutic response to a botulinum toxin type A injection into the gastrocnemius-soleus complex may also be helpful in determining which patients would respond favorably to a gastrocnemius recession surgery. This is not a FDA approved indication. Thus, the evidence supports injections into the gastrocnemius-soleus complex and this is an accepted procedure.

There is insufficient evidence and no plausible physiological theory to support a botulinum toxin injection into the plantar fascia. Therefore, it is ***not recommended***.

Refer to Section F.6.h. Botulinum Toxin Injections for more information.

G) Extracorporeal Shock Wave Therapy (ESWT): There is good evidence from one high quality trial that high intensity ESWT is more effective than sham ESWT for improving pain and function in chronic plantar fasciitis which has not responded to conservative treatment after 6 months of symptoms. There is also some evidence from one adequate trial that high dose shock wave produces successful outcomes similar to those for endoscopic plantar fascia release in patients with persistent plantar fasciopathy which has not responded to more conservative treatment. However, two flawed meta-analyses failed to provide evidence that ESWT, regardless of energy level, produces a clinically meaningful reduction in pain or increase in function when compared to placebo for patients with plantar fasciitis lasting 6 months or more. While both meta-analyses did find a benefit for ESWT, the effect did not reach the level of clinical significance, and provided conflicting evidence for which energy level is more effective. However, there is good evidence that plantar fascia specific stretching as initial treatment is more effective than radial ESWT in reducing pain and increasing function. Therefore, only ESWT at high intensity (0.25 mJ/mm2) may be considered in patients who have failed 4 to 6 months of conservative treatment, including stretching, physical therapy, orthoses, ice, and NSAIDs, and have significant functional deficits. This may be attempted for a maximum of 3 sessions spaced at least a week apart.

Refer to Section F. 5. EXTRACORPOREAL SHOCK WAVE THERAPY (ESWT) for more details.

H) Radiation Therapy: There is inadequate evidence regarding effectiveness of radiation therapy for plantar fasciitis. Two randomized controlled trials were identified but neither included a placebo or “standard therapy” control group. They merely compared different doses of radiation therapy. Furthermore, one

study was stopped early for benefit, introducing a large risk of selective reporting bias. Therefore, it is ***not recommended***.

I) Dry Needling: There is some evidence that, in the setting of plantar fasciitis, six weekly sessions of dry needling have a small benefit for pain in the first steps in the morning, but no measurable effects on foot function. Frequent local pain during the treatment sessions and mild bruising at the insertion site are common complications of dry needling for plantar fasciitis.

J) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

K) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F. 13, Return to Work.

vi. Surgical Indications/Considerations:

A) Surgery is employed only after failure of at least 6 months of active patient participation of non-operative treatment.

B) Indications for gastrocnemius recession include a positive Silfverskiöld test, but a negative Silfverskiöld test does exclude gastrocnemius contracture as a causal factor. Gastrocnemius recession does not weaken the arch as may occur with a plantar fascial procedure. While some observational studies have reported positive results of gastrocnemius recession in plantar fasciitis patients no randomized controlled trials have been published. Furthermore, consensus on the best specific procedure for gastrocnemius recession is lacking.

C) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

D) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan, including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

E) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Treatment Procedures: Plantar fascial release with or without calcaneal spur removal, endoscopic or open gastrocnemius recession.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outline in Section F, Therapeutic Procedures, Non-operative.

Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy. Usually non-weight-bearing for 7 to 10 days followed by weight-bearing cast or shoe for 4 weeks; however, depending on the procedure, some patients may be restricted from weight-bearing for 4 to 6 weeks.

I. Posterior Tibial Tendon Dysfunction:

i. Description/Definition: Pain in the posteromedial ankle with plantar flexion.

ii. Occupational Relationship: Repetitive or forced plantar flexion after an ankle sprain or athletic activity.

iii. Specific Physical Exam Findings: Painful posterior tibial tendon with active and passive non weight-bearing motion, reproduction of pain with forced plantar flexion and inversion of the ankle, difficulty performing single heel raise, pain with palpation from the posterior medial foot along the medial malleous to the navicular greater tuberosity. The patient should also be evaluated for a possible weak gluteus medius as a contributing factor.

iv. Diagnostic Testing Procedures: X-ray, MRI may be used to rule out other diagnoses.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Short ankle articulated orthosis and therapy including low-load strengthening or eccentric training exercises with progression to home program. Other active and passive therapy including iontophoresis, orthotics and possible strengthening for the gluteus medius.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be

appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

E) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Failure of non-operative treatment. Surgery is rarely necessary as success rate for non-operative treatment is around 90%. Generally speaking, for Stage I and Stage II, non-operative treatment should continue for 6 to 12 months prior to the need for MRI or consideration of surgical intervention. An exception to waiting for 6 to 12 months might be if a specialist finds that a delay greater than 6 months is contraindicated after consideration of particular patient needs based on examination and functional conditions. Stage III and Stage IV, which result in an inflexible flat foot deformity that cannot be reduced, may require arthrodesis or other surgical correction significantly sooner.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Resection of anomolous muscle segments or tenolysis. In severe cases, tendon transfer, osteotomies and/or arthrodesis may be necessary.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

m. 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 Exam 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 Procedures:

A) Initial Treatment: Appropriate antibiotic therapy, tetanus toxoid booster, non-weight-bearing at physician's discretion.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

E) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Cellulitis, retained foreign body suspected, abscess, compartmental syndrome, and bone involvement.

Smoking may affect soft tissue healing through tissue hypoxia. Patients

should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Incision and drainage with cultures.

viii. Postoperative Treatment:

A) Patient is usually non-weight-bearing with antibiotic therapy based upon cultures. Follow-up x-rays and/or MRI may be needed to evaluate for osseous involvement.

B) An individualized rehabilitation program based upon communication between the surgeon and the therapist using treatment as outlined in Section F. Therapeutic Procedures, Non-operative.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

n. Severe Soft Tissue Crush Injuries:

i. Description/Definition: Soft tissue damage to the foot.

ii. Occupational Relationship: Crush injury or heavy impact to the foot or ankle.

iii. Specific Physical Exam Findings: Pain and swelling over the foot.

iv. Diagnostic Testing Procedures: X-ray and other tests as necessary to rule out other possible diagnoses such as compartment syndrome which requires emergent compartment pressure assessment.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Usually needs initial rest from work with foot elevation and compression wraps.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by distal and proximal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: If compartmental pressures are elevated, emergent fasciotomy is warranted.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Emergency fasciotomy. In some cases a delayed primary closure is necessary.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using

therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include the following: elevation, restricted weight-bearing, active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

o. **Stress Fracture**:

i. Description/Definition: Fracture without displacement usually to metatarsals, talus, navicular or calcaneus.

ii. Occupational Relationship: May be related to repetitive, high impact walking; running; or jumping.

iii. Specific Physical Exam Findings: Pain over the affected bone with palpation or weight-bearing.

iv. Diagnostic Testing Procedures: X-ray, CT, MRI, bone scan

v. Non-operative Treatment Procedures:

A) Initial Treatment: Immobilization for 4 to 8 weeks with limited weight-bearing may be appropriate.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours

after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) There is some evidence that shock absorbing boot inserts may decrease the incidence of stress fractures in military training. Shock absorbing boot inserts of other orthotics may be used in some cases after a stress fracture has occurred or to prevent stress fractures in appropriate work settings.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Fractures that have not responded to conservative therapy.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-

term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Most commonly percutaneous screws or plate fixation.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

p. **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 Exam 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 Procedures:

A) Initial Treatment: Non weight-bearing for 6 to 8 weeks for non-displaced fractures. Monitoring for avascular necrosis (AVN) should be considered, including serial x-rays.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Osseous displacement, joint involvement and instability.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the

amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that carriers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Open reduction internal fixation.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include the following: Non weight-bearing 6 to 8 weeks followed by weight-bearing cast. MRI follow-up if avascular necrosis is suspected. Active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

q. 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. These symptoms can also be caused by radiculopathy.

ii. Occupational Relationship: Acute injuries may occur after blunt trauma along the medial aspect of the foot. Non-traumatic occurrences are confirmed by a physician after review of environmental and biomechanical risk factors. Non work related causes include space occupying lesions.

iii. Specific Physical Exam 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 of both sides for comparison to normal side. EMGs may be needed to rule out radiculopathy. MRI to rule out space occupying lesions. Diagnostic injections to confirm the diagnosis.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Cast or bracing, immobilization and foot orthoses are appropriate initial management.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications.

Orthotics or accommodative footwear is usually necessary before workers can be returned to walking on hard surfaces. Refer to Section F.13. Return to Work.

E) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

Nerve mobilization exercise may be used by some therapists though it lacks evidence to support it.

vi. Surgical Indications/Considerations:

A) Continued functional deficits after active participation in therapy for 3 to 6 months.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially

careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Tarsal tunnel release with or without a plantar fascial release.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include the following: restricted weight-bearing, orthotics, bracing, active therapy with or without passive therapy.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

r. Tendinopathy:

For Achilles Tendinopathy, Refer to Section E.1.a. for other types of tendinopathy of the foot and ankle. General recommendations can be found in Section E.2.k. Tendinopathy of the Knee.

2. KNEE

a. Aggravated Osteoarthritis (OA):

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. Age greater than 50 and morning stiffness lasting less than 30 minutes are frequently associated with this condition. The lifetime risk for symptomatic knee arthritis is probably around 45% and is higher among obese persons. Radiographic findings do not correlate well with clinical symptoms. Loss of range of motion, muscle strength reduction, laxity of the knee joint, proprioceptive problems, and other health co-morbidities are risk factors for functional decline. Although functional loss is common over time, approximately 30% of patients do improve.

ii. Occupational Relationship: The provider must establish the occupational relationship by establishing a change in the patient's baseline condition and a relationship to work activities including but not limited to physical activities such as repetitive kneeling or crawling, squatting and climbing, or heavy lifting.

There is also good evidence that intensive physical work more than doubles the risk of symptomatic knee OA with knee replacement, and that there is a dose-response relationship between work load and the development of knee OA with knee replacement. Intensive physical labor is defined as job categories such as forestry employee, dockworker, farm worker, or ditch digger.

iii. Non-occupational Risk Factors: Body mass index (BMI) of 25 or greater is a significant risk factor for eventual knee replacement. There is good evidence that obesity increases the risk of symptomatic knee OA resulting in knee replacement six fold in men and eleven fold in women. There is strong evidence of increased BMI as a significant risk factor for the occurrence of onset of knee OA. Numerous studies document an increased odds ratio for developing knee osteoarthritis for BMIs greater than 30. Progression of symptomatic knee osteoarthritis is variable. In one study over a two year span, 70% of patients showed no significant joint space narrowing, 20% showed slow progression and only 9% had more significant changes.

There is strong evidence for hand OA as a significant marker of risk for knee OA.

Other causative factors to consider - Previous meniscus or ACL damage may predispose a joint to degenerative changes. There is strong evidence that an ACL injury increased the ten-year risk of developing Kellgren-Lawrence defined osteoarthritic changes compared to the uninjured knee. This risk is approximately fourfold both for minimal OA and for moderate to severe OA. There is good evidence that meniscal damage, even in the absence of knee surgery, is associated with a significantly increased risk of development of radiographic tibiofemoral OA within 30 months of its detection on MRI. There is strong evidence for previous knee injury as a significant risk factor for OA. A number of studies indicate that patients with ACL injuries and meniscus pathology are likely to develop degenerative osteoarthritis. Percentages range from approximately 25% to 50%. It is unclear whether the repair of ACLs significantly decreases the degenerative pathology. One study found more severe arthritis present in those with an ACL repair. In order to entertain previous trauma as a cause, the patient should have medical documentation of the following: menisectomy; hemarthrosis at the time of the original injury; or evidence of MRI or arthroscopic meniscus or ACL damage. The prior injury should have been at least 2 years from the presentation for the new complaints. In addition, there should be a significant increase of pathology on the affected side in comparison to the original imaging or operative reports and/or the opposite un-injured side or extremity.

iv. Specific Physical Exam Findings: Increased pain and/or swelling in a joint with joint line tenderness; joint crepitus; and/or joint deformity.

v. Diagnostic Testing Procedures: Radiographs, The Kellgren-Lawrence Scale is the standard radiographic scale for knee osteoarthritis. It is based on the development of osteophytes, on bone sclerosis, and on joint space narrowing. The degree of joint space narrowing may not predict disability.

Grade 1: doubtful narrowing of joint space, and possible osteophytic lipping.

Grade 2: definite osteophytes, definite narrowing of joint space.

Grade 3: moderate multiple osteophytes, definite narrowing of joint space, some sclerosis and possible deformity of bone contour.

Grade 4: large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformity of bone contour.

MRI to rule out degenerative menisci tears. MRI may identify bone marrow lesions which are correlated with knee pain or trauma and instability. These lesions may reflect increased water, blood, or other fluid inside bone and may contribute to the causal pathway of pain. These are incidental findings and should not be used to determine a final diagnosis or make decisions regarding surgery. Knee pain from osteoarthritis is most clearly associated with bone marrow lesions and effusion synovitis identified on MRI.

vi. Synovial fluid testing is rarely appropriate.

vii. Non-operative Treatment Procedures:

A) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management developed through shared decision making. There is good evidence for self-management using weight loss, exercise, pacing of activities, unloading the joint with braces, taping, and medications as needed. Programs should be individually tailored with short and long-term goals. Patients should be encouraged to perform aerobic activity such as walking or biking. However, activities such as ladders, stairs and kneeling may be restricted. Weight loss of at least 5% of body weight is encouraged when BMI is greater than 25.

B) Medications such as analgesics and anti-inflammatories may be helpful.

- There is good evidence that duloxetine more effectively decreases knee OA pain in older adults than placebo. However, the side effect profile of constipation and other symptoms should be considered if the drug is given to older adults.

- Glucosamine and chondroitin are sold in the United States as dietary supplements. Their dosage, manufacture, and purity are not regulated by the Food

and Drug Administration.

There is good evidence that glucosamine sulfate and glucosamine hydrochloride are ineffective for relieving pain in patients with knee or hip OA. There is some evidence that glucosamine sulfate treatment for more than 6 months shows a small improvement in joint function compared to placebo controls in people with osteoarthritis of the knee or hip. One study purported to show chondroitin sulfate and glucosamine equivalence to celecoxib, however, celecoxib was actually superior at 4 months.

Pharmaceutical grade versions are not available in the United States and thus, these medications are ***not recommended***.

- For occasional patients Tramadol may be used. Refer to Chronic Pain Guidelines

- Outpatient fentanyl use is ***not recommended*** for work related osteoarthritis.

- There is good evidence that oral doxycycline has no therapeutic effect on knee OA.

- There is good evidence that acetaminophen is not more effective than placebo for the treatment of knee osteoarthritis. A trial of acetaminophen may be done when the patient has a contraindication to or an intolerance of oral and topical NSAIDs.

- For occasional patients topical capsaicin may be used. Refer to Chronic Pain Guidelines.

Refer to medication discussions in Section F.7, Medications and Medical Management.

C) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal to proximal structures.

There is good evidence that exercise shows moderate, clinically important reductions in pain and disability in people with osteoarthritis of the knee. An optimal exercise program for knee OA should focus on improving aerobic capacity, quadriceps muscle strength, or lower extremity performance. This exercise program should be supervised, carried out 3 times weekly, and consist of at least 12 sessions. It is suggested that aerobic exercise and strength training should be performed in different sessions in order to achieve the greatest effect.

There is good evidence that land-based exercise shows a moderate clinically important benefit for the relief of pain and improvement in function at the completion of a supervised exercise program. The evidence shows that somewhat smaller benefits are sustained for at least another two to six months among people with symptomatic osteoarthritis of the knee.

There is good evidence that 4 weeks of resistance training is effective for improving maximal strength, functional ability, and reducing pain when used as a therapeutic rehabilitation program for various musculoskeletal conditions including chronic tendinopathy, knee osteoarthritis, and after hip replacement surgery.

There is good evidence that exercise programs based on tai chi, aerobic, and mixed exercise, and not hydrotherapy programs, are effective in improving functional aerobic capacity in patients with hip and knee osteoarthritis.

Results for the cost-effectiveness of exercise and lifestyle treatment for hip and knee osteoarthritis are mixed. One study showed an improvement in function with a supervised exercise and diet program.

Low impact aerobic exercise should be encouraged.

There is some evidence that 12 weeks of behavioral graded activity does not result in better long-term effectiveness in reducing pain or improving function at 5 years than usual exercise therapy in patients with osteoarthritis (OA) of the hip or knee. Behavioral graded activity (BGA) uses operant behavior principles within an individually tailored exercise program in which patients' most problematic physical activities are gradually increased in a time-contingent manner to improve impairments limiting the performance of these activities .
There is good evidence that aquatic exercise and land-based exercise show comparable outcomes for function and mobility among people with symptomatic osteoarthritis of the knee or hip. Aquatic therapy may be used as a type of active intervention when land-based therapy is not well-tolerated. Proprioceptive exercises may also have some short-term benefit.

Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

D) Manipulation / Manual Therapy: There is good evidence that supervised exercise therapy with added manual mobilization

shows moderate, clinically important reductions in pain compared to non-exercise controls in people with osteoarthritis of the knee.

E) Acupuncture: This is a high quality study that provides good evidence that neither laser nor needle acupuncture reduces pain or improves function in patients older than 50 years with moderate to severe chronic knee pain.

There is good evidence that, in people with osteoarthritis of the knee or hip, the effects of true needle acupuncture treatment relative to sham acupuncture may be too small to be perceived by participants as beneficial. Therefore, true needle acupuncture may not actually result in significant, clinically relevant functional improvement or significant pain reduction. Thus, there is strong evidence that acupuncture is not effective for osteoarthritis pain relief. Acupuncture is performed with a variety of techniques and to date none have been shown to have superior clinical results. It is ***not generally recommended*** but may be used in some patients if functional gains are demonstrated and it would be beneficial to delay arthroplasty. Refer to Section F.1. Acupuncture for more information.

F) A Cochrane meta-analysis supports good evidence that pulsed electromagnetic field or electrical stimulation treatment has a small clinical pain relief benefit in people with osteoarthritis of the knee. However, the effect on function is very uncertain. If used, it must be accompanied by an exercise program and should be limited to 6-8 total sessions.

G) Bracing and Insoles:

There is good evidence that valgus knee bracing provides moderate improvement in pain and function compared to those that do not use another type of orthosis. There is also good evidence that this type of bracing provides a small improvement in pain associated with medial knee osteoarthritis as compared to another type of orthosis. Thus, valgus knee bracing is a reasonable treatment for medial knee osteoarthritis.

There is some evidence that conservative management using either the valgus knee brace or the lateral wedged insole reduces pain and improves function in adults with medial tibiofemoral osteoarthritis of the knee. There were no significant differences between the two orthoses in any of the clinical outcomes. Participants wore the insoles more consistently than the braces, and this may reflect convenience and greater acceptance of use. There is some evidence that laterally elevated wedged insoles are more effective in reducing pain, improving function, and reducing NSAID usage than neutrally wedged insoles in adults with medial compartment knee osteoarthritis. Participants wore the neutral insoles more consistently than the elevated insoles, and this may reflect comfort and greater acceptance of use. Thus, there is good evidence for the use of laterally elevated wedged soles for those

with medial osteoarthritis. Insoles are not required prior to use of a brace.

Patellar taping may also provide short-term relief.

H) Functional tests should always be used to track progress of therapy. The Osteoarthritis Research Society International (OARSI) recommends the following tests for those with knee or hip osteoarthritis: 30 second chair stand, 40 meter fast paced walk, a stair climb, timed up-and-go, and 6 minute walk test.

I) Therapeutic Injections –

- Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and ROM.

  Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

  There is good evidence that steroid injection in the setting of knee osteoarthritis produces rapid but short-lasting pain relief compared to placebo, likely to last at least one week but not likely to last 4 weeks or longer.

  - ❖ Time to Produce Effect: One injection.
  - ❖ Maximum Duration: 3 injections in one year at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

  Steroid injections should be avoided if arthroplasty is planned within 3 months.

- Viscosupplementation - There is strong evidence that, in the setting of knee osteoarthritis, the effectiveness of viscosupplementation is clinically unimportant, and may impose a risk of adverse events on the patient. Therefore, it is ***generally not recommended***. It may occasionally be appropriate for patients with significant functional deficits who are not yet eligible for or wish to delay an arthroplasty. Refer to Section F.6.e. Viscosupplementation for more information.

- PRP Injection - There is some evidence that, in the setting of knee OA, intra-articular injection with PRP is more effective than Hyaluronic acid or placebo in improving knee function and pain. There is some evidence that in patients with knee OA, a single PRP injection is more beneficial than a saline injection, and that more than one PRP injection is likely to be more beneficial than a single PRP injection when the Kellgren-Lawrence grade is less than Grade IV, and that a single PRP injection is as beneficial as three hyaluronic acid

injections for knee OA. Therefore, it may be used for patients with significant functional deficits who are not yet eligible for or wish to delay an arthroplasty when authorized by a knee specialist with familiarity with PRP preparation .Refer to Section F.6.d. Platelet Rich Plasma (PRP) for more information.

J) Neurotomy -

There is currently inadequate evidence to support radiofrequency neurotomy for knee osteoarthritis failing conservative therapy. The one randomized controlled study identified was inadequate to support this invasive procedure. Therefore, it is ***not recommended***.

K) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

L) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

viii. Surgical Indications/Considerations:

A) Arthroscopic Debridement and/or Lavage. There is good evidence from a randomized controlled trial that arthroscopic debridement alone provides no benefit over recommended therapy for patients with uncomplicated Grade 2 or higher arthritis. The comparison recommended treatment in the study followed the American College of Rheumatology guidelines, including: patient education, supervised therapy with a home program, instruction on ADLs, and stepwise use of analgesics and hyaluronic acid injections if desired. Complicated arthritic patients excluded from the study included patients who required other forms of intervention due to the following conditions: large meniscal bucket handle tears, inflammatory or infectious arthritis, more than 5 degrees of varus or valgus deformity, previous major knee trauma, or Grade 4 arthritis in 2 or more compartments.

Therefore, arthroscopic debridement and/or lavage are ***not recommended*** for patients with arthritic findings, continual pain and functional deficits unless there is meniscal or cruciate pathology or a large loose body causing locking. Refer to the specific conditions in this Section E, for specific diagnostic recommendations.

B) There is inadequate evidence of the effectiveness of PRP in the setting of microfracture in patients with knee OA over the age of 40. Therefore, it is ***not recommended***.

C) Osteotomy and joint replacement are indicated when conservative treatment, including active participation in non-operative treatment has failed to result in sufficient functional improvement (Refer to

Sections G. 4., Knee Arthroplasty, and G. 8., Osteotomy). Tibial osteotomy is a choice for younger patients with unicompartmental disease who have failed conservative therapy.

D) In cases where surgery is contraindicated due to obesity, it may be appropriate to recommend a weight loss program if the patient is unsuccessful losing weight on their own. Coverage for weight loss would continue only for motivated patients who have demonstrated continual progress with weight loss.

E) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

F) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

G) Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that carriers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

ix. Operative Procedures: Total or unicompartmental joint replacement, and osteotomy.

Free-floating interpositional unicompartmental replacement is ***not recommended*** for any patients due to high revision rate at 2 years and less than optimal pain relief. Refer also to Section G.4., Knee Arthroplasty, or G. 8, Osteotomy as appropriate.

x. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and therapist and using the treatments found in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

b. 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, with a valgus stress. The foot is usually planted and the patient frequently experiences a “popping” feeling and “giving way” sensation.

iii. Specific Physical Exam Findings: Findings on physical exam include effusion or hemarthrosis, instability, positive Lachman’s test, positive pivot shift test, and/or positive anterior drawer test. The Lachman’s test has the highest sensitivity at 0.81 with equal specificity.

iv. Diagnostic Testing Procedures: MRI is the imaging modality of choice for detecting ACL rupture. Radiographs may show avulsed portion of the lateral tibial plateau (Segond sign), but this is a rare finding. MRI is also a good test for detecting associated meniscal lesions. The overall sensitivity and specificity for detecting meniscus tears in chronic ACL-deficient knees on MRI were 90% and 89%, respectively, when verified with results of arthroscopy.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

B) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures bracing may be beneficial. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee (Refer to Section F. Therapeutic Procedures,

Non-operative). Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

Elastic knee braces may be useful for increasing postural stability.

C) There is some evidence that, in the setting of acute ACL tears, a treatment plan which refers the patient to physical therapy with an option for delayed surgery can be expected to be as successful at 5 years as a treatment plan which refers the patient for early surgery. This delayed surgery treatment plan may make some ACL operations unnecessary. However, over 1/3 of patients eventually had an ACL reconstruction and it is possible that delaying reconstruction may increase osteoarthritis and meniscus tears in the long-term.

A recent systematic review found good function for non-operated partial ACL tears for patients with limited sports activities with an average of 5.2 years of follow-up.

Outside of the setting where the patient has a locked knee, an ACL rupture does not require emergent treatment. The decision to provide immediate surgical reconstruction should depend on patient preference and work and recreational activities. Young active patients 18-35 years are likely to prefer surgical reconstruction.

A six-week course of progressive rehabilitation with a focus on strengthening the quadriceps muscles may lead to improved knee function and self-reported outcomes postoperatively. The quadriceps and hamstring muscles provide dynamic stabilization of the knee while the ACL typically provides passive stabilization. Adequate pre-operative rehabilitation will poise the affected knee for postoperative rehabilitation success.

Eccentric exercise may provide better results than concentric exercise.

D) Delaying surgery until full, symmetric range of motion is restored, the effusion is resolved, the patient demonstrates good quadriceps muscle control, and has a normal gait pattern may be a reasonable pre-operative approach.

E) Medications such as analgesics and anti-inflammatories may be helpful. Refer to Section F.7, Medications and Medical Management.

F) Regardless of the chosen intervention, patients should be encouraged to remain physically active and maintain a healthy body weight.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative, may be employed in individual cases.

H) Platelet Rich Plasma:

There is no evidence showing improved clinical outcome with use of PRP for augmentation of ACL reconstruction. Therefore, it is ***not recommended***.

I) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

J) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: an individual with complaints of recurrent instability interfering with function, physical findings, and imaging consistent with an ACL partial or complete tear, and who has failed initial treatment. Surgery may also be performed without delay if other pathology requiring surgery is present or if the patient is engaged in work or job related activity which requires knee stability.

A detailed occupational history, documenting the circumstances under which ACL rupture occurred, will provide a sense for the physical demands of the patient's job, which may affect injury management. Occupations that rely heavily on ACL stability might involve squatting, pivoting, twisting, climbing and stepping laterally or on uneven ground. Construction is an example of an occupation that might fit this criterion. Persons in occupations that are sedentary in nature or involve predominantly straight-line activities (i.e. standing, walking on even surfaces, running, cycling, etc.) may benefit from rehabilitation with no need for surgical intervention. It is equally important to consider the patient's typical recreational activities. If the patient is involved in sports or other hobbies requiring cutting and pivoting actions of the knee (i.e. soccer, basketball, etc.), then early surgery before 5 months may be the preferable approach to ACL rupture.

Patients who undergo early ligament reconstruction for ACL rupture are more likely to have tibiofemoral stability on clinical testing, and a lower incidence of subsequent meniscal surgery. However, however knee function does not appear to be greater and there is no clear evidence that early reconstruction either increases return to pre-injury levels of activity or prevents later development of osteoarthritis.

A) There is some evidence that, in the setting of an acute ACL injury not complicated by high grade chondral defects, surgical repair performed an any time in the first six weeks is as effective as immediate surgery. However, this is true only if the preoperative period is accompanied by an exercise rehabilitation and by a locking knee brace to support any weight-bearing.

B) There was some evidence based on two studies reviewed, that undergoing non-operative initial treatment is as likely to be successful as an initial plan for prompt surgery. However, about half of individuals who initially delay surgery will have persistent

symptomatic instability that interferes with function, necessitating referral to orthopedics and possible surgery.

C) Adverse events at two years were not significantly different between the group randomly assigned to receive rehabilitation with early reconstruction (three with graft rupture and one with arthrofibrosis) as compared to those assigned to receive rehabilitation with an option for delayed repair (one graft rupture). However, the patients who did not have surgery were more likely to have instability and meniscus issues. Current long-term studies indicate that a difference in rates of radiographic osteoarthritis between operative versus non-operative treatments has not been demonstrated after ten years.

D) There is no clear evidence that surgery decreases the likelihood of developing osteoarthritis secondary to the original injury.

E) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

G) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

H) Patient education should include a discussion regarding realistic expectations for return to pre-injury level of function with early surgery (within 10 weeks of injury) versus with rehabilitation and an option for delayed reconstruction. The studies reviewed examined physically active, athletically inclined populations. In this population return to pre-injury sports level was the exception rather than the rule. At five-years follow up, the percentage of subjects capable of return to pre-injury activity levels were similar for the early ACL reconstruction and the delayed reconstruction groups (23% and 20%, respectively), and down from two-year follow up of 44% and 36%, respectively. Although this highly active group was unable to return to their previous level of physical activity, the patients were by no means disabled from their full range of daily activities, such as walking, climbing stairs, cycling, or jogging.

At two- and five-year follow up, patient-reported functional outcomes as measured by the Knee Injury and Osteoarthritis

Outcome Score (KOOS) were similar in the early ACL reconstruction group and the rehabilitation with option for delayed repair groups. Knee laxity, as measured by physical exam and arthrometry, however, were significantly less in the early ACL surgical group.

vii. Operative Procedures:

Diagnostic/surgical arthroscopy followed by ACL reconstruction using autograft or allograft. If a meniscus repair is performed, the ACL repair is preferably performed concurrently.

There is good evidence that medial meniscal tears are more commonly present when ACL reconstruction is done more than 12 months after injury than when it is done within 12 months of injury. Thus, surgery should be performed before one year and preferably by 5 months if the patient chooses an operative procedure after conservative treatment failure.

Patients tend to have more pain associated with patellar grafts while patients with hamstring replacement seem to have an easier rehabilitation. Choice of graft is made by the surgeon and patient on an individual basis.

One study found no evidence for improvement when bone marrow stem cells were added to an ACL reconstruction. Therefore, stem cells are ***not recommended***.

There is good evidence that computer assisted surgery does not improve outcomes over conventional surgery for knee ligament reconstruction, but may add to operating time. Therefore, it is ***not recommended***.

viii. Complications: graft rupture, arthrofibrosis, continued instability. The overall failure rate is about 12%.

ix. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include the following: active therapy with or without passive therapy and bracing. Early active extension does not cause increased laxity at 2 years.

Initiation of a graduated physical therapy program, as early as the first postoperative day, is as safe and effective as delayed rehabilitation.

There is some evidence that rehabilitation can begin safely as early as the immediate postoperative period with weight-bearing, flexion up to 90 degrees, and quadriceps strengthening.

One study found a 12 week program beginning 3 weeks

postoperatively focusing on eccentric exercise improved function and muscle volume more than standard rehabilitation when assessed one year postoperatively.

There is good evidence that, in the setting of postoperative ACL rehabilitation, knee bracing is not always necessary; continuous passive motion has no benefits; and home exercises may be as effective as outpatient rehabilitation in motivated patients. Therefore, continuous passive motion is ***not recommended***.

C) A structured postoperative rehabilitation program incorporating whole body conditioning, range of motion exercises, and neuromuscular training is appropriate. Proprioception undoubtedly enhances the physiologic function of dynamic stabilizers of the knee. While recognizing that proprioception is integral to proper knee function, the current body of literature limits the ability to make an evidence-based recommendation for a specific method of neuromuscular training.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine, in consultation with the surgeon or by the surgeon. In general, the patient may reasonably return to sedentary work within two weeks of surgery.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

c. **Bursitis of the Lower Extremity**:

i. Description/Definition: Inflammation of bursa tissue. Bursitis can be precipitated by tendonitis, bone spurs, foreign bodies, gout, arthritis, muscle tears, or infection.

ii. Occupational Relationship: Soft tissue trauma, contusion, or physical activities of the job such as sustained direct compression force, or other repetitive forceful activities affecting the knee.

iii. Specific Physical Exam Findings: Palpable, tender and enlarged bursa, decreased ROM, warmth. The patient may have increased pain with ROM.

iv. Diagnostic Testing Procedures: Lab work may be done to rule out inflammatory disease. Bursal fluid aspiration with testing for connective tissue, rheumatic disease, and infection may be necessary. Radiographs, CT, MRI are rarely indicated.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Diagnostic/therapeutic aspiration, ice, therapeutic injection, treatment of an underlying infection, if present. Aspirations may be repeated as clinically indicated.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, including a home exercise program. Active therapies include, proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal joints. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee. Refer to Section F. Therapeutic Procedures, Non-operative.

   Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

E) Steroid Injections- Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and ROM. Steroid injections may be useful for aseptic bursitis. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

   - Time to Produce Effect: One injection.
   - Maximum Duration: 3 injections in one year. Not to exceed 4 injections of any body part in one year.

   For more information, please refer to Section F.6.a. Steroid Injections.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical indications/Considerations:

A) Failure of conservative therapy.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Surgical excision of the bursa.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

d. Chondral and Osteochondral Defects:

i. Description/Definition: Cartilage or cartilage and bone defect at the articular surface of a joint. Deficits may be identified in up to 60% of arthroscopies; however, only around 30% of these lesions are isolated deficits and even fewer are Grade III or IV deficits which might qualify for cartilage grafts.

Defects in cartilage and bone are common at the femoral condyles and patella. The Outerbridge classification grades these defects according to their size and depth.

Grade 0: normal cartilage.

Grade I: softening and swelling of cartilage.

Grade II: partial-thickness defects with surface fissures that do not exceed 1.5 cm in diameter and do not reach subchondral bone.

Grade III: fissuring that reaches subchondral bone in an area with a diameter greater than 1.5 cm.

Grade IV: exposed subchondral bone.

Chondral deficits can be asymptomatic. In a study of professional athletes, full thickness chondral deficits were present in 36% of the population, however half of these were not symptomatic.

ii. Occupational Relationship: Typically caused by a traumatic knee injury. Chondral deficits can also be present secondary to osteoarthritis.

iii. Specific Physical Exam Findings: Knee effusion, joint line tenderness.

iv. Diagnostic Testing Procedures: MRI may show bone bruising, osteochondral lesion, or possibly articular cartilage injury. The mere presence of a full thickness deficit does not confirm the diagnosis as some deficits are asymptomatic. Radiographs, contrast radiography, or CT may also be used. Diagnostic arthroscopy may be performed when surgical indications listed in Section VI are met.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Non-operative treatment may be indicated for chondral lesions associated with 1) degenerative changes, refer to aggravated osteoarthritis (Section E.2., a); 2) other knee lesions not requiring surgery (refer to Specific Diagnosis); and/or 3) non-displaced stable lesions. Acute injuries may require immobilization followed by active therapy with or without passive therapy.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include, proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program

targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

Surgery for isolated chondral defects may be indicated when functional deficits interfere with activities of daily living and/or job duties after 6 to 12 weeks of active patient participation in non-operative therapy. Identification of the lesion should have been accomplished by diagnostic testing procedures which describe the size of the lesion and stability of the joint.

If a lesion is detached or has fluid underlying the bone on MRI, in some cases surgery may be necessary before a trial of conservative therapy is completed. Early surgery may consist of fixation, grafts, microfracture and removal of the fragment.

A systematic review of autologous chondrocyte implantation (ACI) found that ACI, as well as microfracture and osteochondral autograft provides short-term success. Another systematic review found microfracture to be successful for smaller lesions and matrix-associated autologous chondrocyte implantation more effective for lesions greater than 4 square cm than microfracture.

A) Microfractures: Normally the first line of surgical treatment.

Indications: An isolated small full-thickness articular chondral defect with normal joint space, when the patient has not recovered functionally after active participation in therapy. Microfracture is likely ineffective for large lesions. Patients 45 or younger are likely to have better results.

B) Osteochondral Autograft/Allograft Transfer System (OATS) or Allograft

One non-controlled study followed patients less than 50 years of age with OAT mosiacplasty or microfracture for 5 years. Outcomes were similar except for athletes. There is some evidence that, in highly athletic patients with osteochondritis dissecans or with posttraumatic full-thickness chondral lesions of the knee who are fully compliant with an active postoperative

rehabilitation program, an OAT procedure is more likely than a microfracture procedure to lead to return to sports, higher functional knee scores, and fewer reoperations during the ten years following treatment of the injury.

Indications: The knee must be stable with intact ligaments and menisci, normal joint space and a large full-thickness defect less than 3 square cubic cm and 1 cm depth. The patient should be 55 years old or younger, with a BMI less than 35, and engaged in athletics and/or an equally physically demanding occupation. Lesions should be unipolar. Surgery may be indicated when functional deficits interfere with activities of daily living and/or job duties after 6 to 12 weeks of active patient participation in non-operative therapy. Occasionally, surgery may also be indicated as an initial procedure for chondral defects of traumatic origin in patients with very active physical job duties. This procedure may be appropriate in a small subset of patients and requires prior authorization.

C) Autologous chondrocyte implantation (ACI) with or without matrices: 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. This procedure also carries significant laboratory charges.

In one observation study of patients receiving autologous chrondrocyte implantation after failing microfractures, 76% were deemed successful although 49% had subsequent surgical procedures. Follow up studies of first generation and matrix induced ACI demonstrated significant functional improvement over baseline for up to 10 years. Per one systematic review, lesions with 4 cubic cm or greater had better outcomes with ACI. One study showed better results with matrices versus microfracture. However, the review showed no evidence for one matrix over another. A meta-analysis suggests that second and third generation ACI are superior to microfracture for five years after the procedure and for larger lesions. A cohort study suggests that early ACI before microfracture may provide better overall results, although there was no difference in the activities participated in. In one follow up study, 50% of patients did not complete the procedure due to relief from the initial harvesting procedure. However, one Cochrane study found insufficient evidence to support autologous chrondrocyte implantation.

This procedure is controversial but may be appropriate in a small subset of patients with physically rigorous employment or recreational activities. It requires prior authorization.

Indications: The area of the lesion should be between 2 square cm and 4 square cm. The patient should have failed 4 or more months of active participation in therapy and a microfracture, abrasion, arthroplasty or drilling with healing time from 4 months to over one year. Those with lesions greater than 4 square cm may have ACI as a primary procedure. The knee must be stable

with intact ligaments and meniscus, and normal joint space. Patients should be 55 years old or younger, with a BMI less than 35, and engaged in athletics and/or an equally physically demanding occupation.

Contraindications: General contraindications for grafts and transplants are individuals with obesity, inflammatory or osteoarthritis with multiple chondral defects, associated ligamentous or meniscus pathology, or who are older than 55 years of age.

D) Prior to either graft or implantation intervention the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work. The patient should agree to comply with the pre- and post-operative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of post-operative therapy required and the length of partial- and full-disability expected post-operatively.

E) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Arthroscopy with debridement or shaving of cartilage, microfracture, drilling, abrasion arthroplasty, mosiacplasty or osteochondral autograft/allograft (OATS), fixation of loose osteochondral fragments and autologous chondrocyte implantation (ACI).

There is inadequate evidence of the effectiveness of PRP in the setting of microfracture in patients with knee OA over the age of 40. Therefore, it is ***not recommended***.

Biologics such as stem cell or PRP have been used, however, their efficacy is currently unproven. Prior authorization is required for their use. They may be most appropriate for patients with complex cases or otherwise at high risk.

Complications: Graft hypertrophy especially with periosteal ACI, arthrofibrosis, graft failure, infection, need for repeat procedures.

viii. Post-operative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include the following: restricted weight-bearing, bracing, active therapy with or without passive therapy. Full weight-bearing usually occurs by or before 8 weeks. Full recovery may take up to 12 months.

C) Continuous passive motion is used postoperatively for microfractures and ACI. Refer to section F.16.a Continuous Passive Motion, for more details.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon. Return to full-duty usually occurs by between four and six months.

An FCE and/or a job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

e. Collateral Ligament Pathology:

i. Description/Definition: Strain or tear of medial or lateral collateral ligaments which provide some stabilization for the knee.

ii. Occupational Relationship: Typically a result of forced abduction and external rotation to an extended or slightly flexed knee. A direct blow to the lateral aspect of the knee may cause a medial collateral ligament strain.

iii. Specific Physical Exam Findings: Swelling or ecchymosis over the collateral ligaments and increased laxity or pain with applied stress. Laxity with the knee in full extension suggests severe injury to the ligament and likely associated injuries.

iv. Diagnostic Testing Procedures: X-rays to rule out fracture. Imaging is more commonly ordered when internal derangement is suspected. Bilateral stress x-rays may be useful.

v. Non-operative Treatment Procedures:

A) Initial Treatment: braces, ice, and protected weight-bearing.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions area in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. Early functional rehabilitation is encouraged. Treatment should include early range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal

structures. Bracing may be beneficial for Grades II-III. A light weight hinged knee brace may be used to protect valgus stress. For more severe isolated injuries a mid-weight polycentric hinged brace should be used to maximize ligament healing. Passive as well as active therapies may be used to control pain and swelling. Cryotherapy and leg elevation is useful for the first 48 hours. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Surgery is rarely necessary except when functional instability persists after active participation in non-operative treatment or indications for surgery exist due to other accompanying injuries. Such accompanying injuries may include a large bony avulsion, tibial plateau fracture or cruciate ligament tear. MCL repair is usually not required, but may be done in conjunction with an ACL reconstruction at the surgeon's discretion. When Lateral collateral ligament (LCL) injuries are associated with other knee pathology, repair is indicated.

A) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

B) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and post-operative treatment plan, including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

C) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Surgical repair with graft reconstruction.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using procedures as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

f. Meniscus Injury:

i. Description/Definition: A tear, disruption, or avulsion of medial or lateral meniscus tissue. Locking of the knee or clicking is frequently reported. Patients may describe a popping, tearing, or catching sensation followed by stiffness.

ii. Occupational Relationship: Trauma to the menisci from rotational shearing, torsion, and/or impact injuries while in a flexed position.

There is good evidence from a meta-analysis of observational studies that there is an increased risk of degenerative meniscal tears with age over 60; BMI over 25; male gender; work-related kneeling and squatting; and regularly climbing greater than 30 flights of stairs per day for 12 months.

There is also good evidence that acute meniscal tears occur more frequently in soccer and rugby.

iii. Specific Physical Exam Findings: Joint line tenderness, Positive McMurray's test; Thessaly test, locked joint, or, occasionally, effusion. The joint line tenderness in one study had a diagnostic accuracy of 81% for medial meniscus and 90% for lateral meniscus. The Thessaly test at 20º of flexion has also been found highly diagnostic for lateral or medial meniscus tears. The Apley's compression test is also used.

iv. Diagnostic Testing Procedures: Radiographs including standing Posterior/Anterior (PA), lateral, tunnel, and skyline views. MRI is the definitive imaging test. MRI is sensitive and specific for meniscal tear. However, meniscal MRI is frequently abnormal in asymptomatic patients. In one study of volunteers without a history of knee pain, swelling, locking, giving way, or any knee injury, 16% of the volunteers had MRI-evident meniscal tears; and 36% of volunteers older than 45 had MRI-

evident meniscal tears. Therefore, clinical correlation with history and physical exam findings specific for meniscus injury is critically important.

Providers planning treatment should therefore consider the patient's complaints and presence of arthritis on MRI carefully, because not all meniscus tears in the middle aged and older populations are related to the patients' complaints of pain.

MRI arthrograms may be used to diagnose recurrent meniscal tears, particularly after previous surgery.

v. Non-operative Treatment:

A) Initial Treatment: ice, bracing, and protected weight-bearing.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee. Refer to Section F. Therapeutic Procedures, Non-operative.

There is some evidence that, for many patients with non-traumatic degenerative tears of the medial meniscus, an exercise program alone will be an adequate treatment for up to 5 years post initiation of symptoms. However, one third of patients initially treated conservatively may go on to require surgery and will have an outcome similar to patients treated with early surgery.

There is some evidence that, in patients with degenerative tears of the medial meniscus, a conservative treatment plan may yield substantial functional and symptomatic benefits similar to arthroscopic meniscectomy when measured 2 years after the beginning of treatment. This conservative treatment plan must include both supervised physical therapy and a home exercise program.

There is good evidence that, in the initial management of knee OA with a torn meniscus, it is reasonable to start with non-operative physical therapy. There is also good evidence that about 30% of patients may not respond to PT alone. The appropriate treatment changes for the patients who do not do well

with PT are not evident from the study, since little is known about what accounts for their lack of benefit from the PT program.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

G) Surgical Indications/Considerations:

1) Locked or blocked knee precluding active therapy;

2) Isolated acute meniscus tear with appropriate physical exam findings;

3) Isolated degenerative meniscal tear is not an indication without locking or other major functional symptoms

Multiple studies note increased osteoarthritis in knees with menisectomy, with a greater incidence in patients who have had a total menisectomy, allograft, lateral menisectomy, or degenerative tear.

There is some evidence that, in patients with degenerative tears of the medial meniscus, a conservative treatment plan may yield substantial functional and symptomatic benefits similar to arthroscopic meniscectomy when measured 2 years after the beginning of treatment. The conservative treatment plan must include both supervised physical therapy and a home exercise program

There is some evidence that, in the setting of non-traumatic meniscal tears, a treatment plan focusing on supervised exercise followed by home exercise has an equal probability of success as a treatment plan involving early arthroscopic partial meniscectomy. This assumes that a surgical option is offered to patients who have persistent knee limitations after several months of exercise therapy.

There is good evidence that, in the initial management of knee OA with a torn meniscus, it is reasonable to start with non-operative physical therapy. There is also good evidence that about 30% of patients may not respond to PT alone. The appropriate treatment changes for the patients who do not do well with PT are not evident from the study, since little is known about what accounts for their lack of benefit from the PT program.

There is good evidence that, in patients with non-traumatic degenerative meniscal tears who have full knee range of motion and mild or no osteoarthritis, whose symptoms have not resolved with three months of conventional conservative treatment, both arthroscopic partial meniscectomy and a sham diagnostic arthroscopic intervention are followed by clinically important improvements in pain and function, and that arthroscopic meniscotomy is not superior to the sham diagnostic procedure which leaves the meniscus intact.

In summary, there is strong evidence that partial menisectomy provides no clear benefit over initial exercise therapy for patients with an isolated degenerative meniscal tear. Therefore, it is ***not recommended***. It may be appropriate for the patients who continue to have significant functional deficits of activities of daily living or work duties after 6 weeks of therapy. It requires prior authorization.

Meniscal repair is appropriate for tears in the red-red zone or red-white zone as these areas have better vascular supply for healing.

One case series of the patients receiving meniscus allograft demonstrated increased graft failure in the patients with grade 3b or higher articular damage.

H) Meniscal allograft should only be performed on patients with a stable knee, previous meniscectomy with 2/3 removed, lack of function despite active therapy, BMI less than 30, and sufficient joint surface to support repair.

I) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

J) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

K) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vi. Operative Treatment: Repair of meniscus, partial or complete excision of meniscus, or meniscus allograft. Debridement of the meniscus is ***not recommended*** in patients with severe arthritis as it is unlikely to alleviate

symptoms. Complete excision of meniscus should only be performed when clearly indicated due to the long-term risk of arthritis in these patients.

vii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using the treatments found in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include the following: Passive therapy progressively moving toward active therapy, bracing, cryotherapy and other treatments found in Section F.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon. Return initially with restrictions 2-6 weeks.

An FCE and/or a job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

g. Patellar Fracture:

i. Description/Definition: Fracture of the patella.

ii. Occupational Relationship: Usually from a traumatic injury such as a fall or direct blow. An indirect force may cause minimally displaced transverse fracture.

iii. Specific Physical Exam Findings: Significant hemarthrosis/effusion usually present. Extension may be limited and may indicate disruption of the extensor mechanism. It is essential to rule out open fractures; therefore a thorough search for lacerations is important.

iv. Diagnostic Testing Procedures: Aspiration of the joint and injection of local anesthetic may aid the diagnosis. A saline load injected in the joint can also help rule out an open joint injury. Radiographs are performed, including tangential (sunrise) or axial views and x-ray of the opposite knee in many cases. CT or MRI is rarely needed.

v. Non-operative Treatment Procedures:

A) Initial Treatment: For non-displaced closed fractures, protected weight-bearing and functional bracing or a hinged knee brace locked in extension for 4 to 6 weeks. When radiographs demonstrate consolidation, active motion and strengthening exercise may begin.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Based on this evidence smoking is likely to affect nonunion of all fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions, after bony union has been achieved. They should include bracing then range-of-motion (ROM), active therapies including proprioception training, restoring normal joint mechanics, clearing dysfunctions from adjacent structures, and a home exercise program. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, restoring normal joint mechanics, influenced by proximal and distal structures. Therapy should include training on the use of adaptive equipment and home and work site evaluations when appropriate. Bracing may be appropriate. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Open fractures require immediate intervention and may need repeat debridement. Internal fixation is usually required for comminuted or displaced fractures. Nonunion may also require surgery.

There is no adequate level of evidence to guide the choice of treatment for patellar fractures.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively. Many patients continue to have symptomatic and functional complaints post-surgery.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: internal fixation; partial patellectomy, or total patellectomy. Total patellectomy results in instability with running or stairs and significant loss of extensor strength. Therefore, this is usually a salvage procedure.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of fractures.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include protected weight-bearing and active therapy with or without passive therapy for early range of motion if joint involvement. A hinged brace may be used with some weight bearing for 6 weeks.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

D) Hardware removal may be necessary after 3 to 6 months.

h. **Patellar Subluxation**:

i. Description/Definition: Incomplete subluxation or dislocation of the patella. Recurrent episodes can lead to subluxation syndrome that can cause frank dislocation of the patella. Patient may report a buckling sensation, pain with extension, or a locking of the knee with exertion.

ii. Occupational Relationship: Primarily associated with a direct contact lateral force or the leg rotating around a planted foot. Secondary causes associated with shearing forces on the patella.

iii. Specific Physical Exam Findings: Lateral retinacular tightness with associated medial retinacular weakness, swelling, effusion, and marked pain with patellofemoral tracking/compression and glides. In addition, other findings may include atrophy of muscles, positive patellar apprehension test, and patella alta.

iv. Diagnostic Testing Procedures: CT or Radiographs including Merchant views, and MRI for loose bodies or chondral pathology. A recent systematic review found insufficient evidence to support the reliability of isolated radiologic findings.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Reduction if necessary, ice, taping, and bracing followed by active therapy. For those with more instability, a knee immobilizer, patella stabilizing brace, or hinged brace may be used.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures. Taping the patella or bracing may be beneficial. Passive as well as active therapies can be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee. Specific strengthening should be done to optimize patellofemoral mechanics and address distal foot mechanics that influence the patellofemoral joint. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Fracture, loose bodies, and recurrent dislocation. Surgical repair of first-time dislocation in young adults generally is ***not recommended***. A Cochrane review does not indicate a clear advantage for repair in first time dislocations. Retinacular release, quadriceps reefing, and patellar tendon transfer should only be considered for subluxation after 4 to 6 months of active patient participation in non-operative treatment.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or

work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: arthroscopy with possible arthrotomy; debridement of soft tissue and articular cartilage disruption; open reduction internal fixation of an osteochondral fracture; quadriceps reefing; medial retinaculum reefing and/or repair; lateral release with or without medial soft-tissue realignment; and medial patellofemoral ligament (mPFL) reconstruction with grafts with or without tibial tubercle osteotomy. The patients with a mPFL repair [1] have a higher rate of failure (27%) vs mPFL reconstruction (6.6%).

Complications: Infection, secondary complications at graft site. Recurrence may be up to 33% with some procedures.

viii. Postoperative Treatment:

A) Individualized rehabilitation program based upon communication between the surgeon and the therapist using the treatments found in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include active therapy with or without passive therapy, bracing. Therapy usually lasts 12 weeks.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or a job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.(

i. Patellofemoral Pain Syndrome (aka Retropatellar Pain Syndrome) and Patellar Tendinopathy:

i. Description/Definition: Patellofemoral pathologies are associated with resultant weakening, instability, and pain of the patellofemoral mechanism. Diagnoses can include patellofemoral chondromalacia, malalignment, persistent quadriceps tendonitis, distal patellar tendonitis, patellofemoral arthrosis, and symptomatic plica syndrome. Patient complains of pain, instability and tenderness that interfere with daily living and work functions such as sitting with bent knees, climbing stairs,

squatting, running or cycling. About 60% of patients will recover by 12 months. Those with worse knee pain and symptoms and longer duration at base-line are likely to have poor recovery.

ii. Occupational Relationship: Usually associated with contusion; repetitive patellar compressive forces; shearing articular injuries associated with subluxation or dislocation of patella; fractures; and/or infection. Most commonly occurs in young patients who participate in athletic activities involving jumping.

iii. Specific Physical Exam Findings: Findings on physical exam may include retinacular tenderness, pain with patellar compressive ranging, positive patellar glide test, atrophy of quadriceps muscles, and positive patellar apprehensive test. Associated anatomical findings may include increased Q angle, ligament laxity, and effusion. Some studies suggest that the patellar tilt test (assessing the patella for medial tilt) and looking for active instability with the patient supine and knee flexed to 15 degrees and an isometric quad contraction, may be most useful for distinguishing normal from abnormal findings. A recent systematic review suggested a relationship between loss of strength in hip abduction and external rotations as well as knee extension torque. In addition, a larger Q-angle, sulcus angle, and patellar tilt were thought to be associated. A recent systematic review found no evidence to support any specific tests and noted the need to rule out other diagnoses such as osteoarthritis, plica syndrome, and subluxation before the diagnosis of patellofemoral pain syndrome is strongly considered.

iv. Diagnostic Testing Procedures: Radiographs including tunnel view, axial view of patella at 30 degrees, lateral view and. Merchant views. MRI rarely identifies pathology. Occasional CT or bone scans.

v. Non-operative Treatment Procedures:

A) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

B) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

C) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. The program should include bracing and/or patellar taping, prone quad stretches, hip external rotation, balanced strengthening, range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures. Passive as well as active therapies may be used to control pain and swelling.

D) Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee.

- There is good evidence that the addition of hip muscle strengthening exercises to knee-focused strengthening and stretching exercises results in greater improvements in pain and function. The addition of hip muscle strengthening exercises is also more effective than knee-strengthening exercises alone in individuals with patellofemoral pain syndrome (PFPS).

- There is some evidence that, in the setting of patellar tendinopathy, a home program beginning with eccentric exercise is as effective as one beginning with referral to surgery, although referral to surgery in the first six months may be necessary for some patients. Although heavy slow resistance training may be an acceptable alternative to eccentric exercise, it requires special equipment, and has no advantage over eccentric exercise which can be done at home with a simple 25° decline squat board.

- Proprioception neuromuscular education may be useful.

- It may be that women and those with longer duration of pain will benefit the most from exercise therapy. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative. Orthotics may be useful in some cases.

E) Knee pain, when associated with abnormal foot mechanics, may be favorably treated with appropriate orthotics. There is some evidence that off the shelf foot orthoses were found to be better than flat foot inserts in the short-term. In this study both physiotherapy and foot orthoses had similar outcomes at 52 weeks. Physiotherapy once each week for 6 weeks included joint mobilization, taping and quadriceps muscle strengthening. Although foot orthoses added to PT did not appear to change long-term outcome, it is possible they may hasten return to work. In another study, patients who benefited most from orthoses had 3 of the following: older than 25; height less than 165cm; worst pain less than 5.3/10, and mid foot width difference from non-weight bearing to weight bearing greater than 10.96mm.

F) Botulinum toxin injections for the relief of patellofemoral pain are considered experimental and are ***not generally recommended***.

G) Autologous blood and platelet-rich plasma are considered experimental and ***not recommended***.

H) Steroid Injections:

Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and ROM. Steroid

injections under significant pressure should be avoided as the needle may be penetrating the tendon. Injection into the tendon can cause possible tendon breakdown, tendon degeneration, or rupture. Injections near the patellar tendon should generally be avoided. Injections should be minimized for patients less than 30 years of age. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater. There is no evidence that steroid injections are more effective than eccentric exercise.

- ❖ Time to Produce Effect: One injection.
- ❖ Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

I) Sclerosing Injections:

Sclerosing injections have not been compared with exercise and there is no evidence to support their use.

J) Extracorporeal Shock Wave Therapy (ESWT): There is no evidence that ESWT is effective for patellar tendinopathy. Therefore, it is ***not recommended***.

K) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: patellar tendon disruption, quadriceps tendon rupture/avulsion, fracture. The majority of patients with anterior knee pain will improve over time without surgery.

A) Retinacular release, quadriceps reefing, and tibial transfer procedures should only be considered after 4 to 6 months of active participation in non-operative treatment by young active patients. There is no evidence that arthroscopy for patellofemoral syndrome is more efficacious than exercise.

B) Lateral release and reconstruction is ***not recommended*** for patellofemoral arthritis or middle aged adults.

C) In cases of severe Grade III-IV isolated patellofemoral arthritis where walking, steps, and other functional activities are significantly impacted after adequate conservative treatment, prosthesis may be considered in those less than 55 years. A

patellofemoral arthroplasty is generally contraindicated if there is patellofemoral instability or malalignment, tibiofemoral mechanical malalignment, fixed loss of knee motion (greater than 10 degrees extension or less than 110 degrees flexion), inflammatory arthritis, and other systemic related issues. For patellar resurfacing, refer to Section G. 4. Knee Arthroplasty.

D) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

E) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

F) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Arthroscopic debridement of articular surface, plica, synovial tissue, loose bodies; arthrotomy; open reduction internal fixation with fracture; patellar prosthesis with isolated Grade III-IV OA, and possible patellectomy for young active patients with isolated arthritis.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include active therapy with or without passive therapy; and bracing.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

j. **Posterior Cruciate Ligament (PCL) Injury**:

i. Description/Definition: Rupture of PCL. May be associated with concurrent ACL rupture or collateral ligament injury.

ii. Occupational Relationship: Most often caused by a posterior force directed to flexed knee, such as a dashboard injury, or by a fall on the knee with the foot plantar flexed.

iii. Specific Physical Exam 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 including kneeling view, may reveal avulsed bone. MRI is very sensitive to identifying a tear but less likely to differentiate partial from complete tears.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Ice, bracing, and protected weight-bearing followed by active therapy.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include bracing then range-of-motion (ROM), active therapies, and a home exercise program. Eighty percent of isolated Grade I or II PCL injuries will improve without surgery. Open kinetic chain flexion exercises should generally be avoided, due to increased PCL stress. Resisted motion including weight bearing should be limited to a flexion range of 0-60 degrees. Closed chain exercises are recommended. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures.

Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint structures distal and proximal to the knee. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Carefully consider the patients' normal daily activity level before initiation of surgical intervention. Isolated Grade 1 instability does not require surgical intervention. Grades 2 or 3 may have surgical intervention if there remains demonstrable instability which interferes with athletic or work pursuits of the patient. In a second degree strain there is significant posterior motion of the tibia on the femur in active testing. A third degree strain demonstrates rotary instability due to medial or lateral structural damage. Surgery is most commonly done when the PCL rupture is accompanied by multi-ligament injury or accompanying an avulsion of bone. ***Not recommended*** as an isolated procedure in patients over 50 with Grade 3 or 4 osteoarthritis.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Autograft or allograft reconstruction or augmentation. There is good evidence that computer assisted surgery does not improve outcomes over conventional surgery for knee ligament reconstruction, but may add to operating time. Therefore, it is ***not recommended***.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using

therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Treatment may include active therapy with or without passive therapy, bracing.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or a job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

k. **Tendinopathy**:

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, calcium deposits, or systemic connective diseases. Patellar and quadriceps tendinopathy are most common in the knee. The patellar tendon may be also referred to as the patellar ligament.

ii. Occupational Relationship: Extreme or repetitive trauma, strain, or excessive unaccustomed exercise or work. Patellar tendinitis, also called jumper's knee, is associated with volleyball and basketball.

iii. Specific Physical Exam Findings: Involved tendons may be visibly swollen with possible fluid accumulation and inflammation; popping or crepitus; and decreased ROM.

iv. Diagnostic Testing Procedures: Lab work may be done to rule out inflammatory disease. Other tests are rarely indicated.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Ice, protected weight-bearing and/or restricted activity, possible taping and/or bracing.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7, Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, including a home exercise program.

Active therapies include, proprioception training, restoring normal joint mechanics, and clearing dysfunctions from distal and proximal structures. Quadriceps stretching is particularly important for this condition. The use of outcome measures, supervised rehabilitation, therapeutic exercise, neuromuscular electrical stimulation, neuromuscular reeducation, and eccentric strengthening is recommended. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by structures distal and proximal to the knee. Refer to Section F. Therapeutic Procedures, Non-operative.

There is good evidence that 4 weeks of resistance training is effective for improving maximal strength, functional ability, and reducing pain. This training should be used as a therapeutic rehabilitation program for various musculoskeletal conditions, including chronic tendinopathy and knee osteoarthritis, as well as after hip replacement surgery.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

E) For isolated patellar tendinopathy, patellar tendon strapping or taping may be appropriate.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

H) Therapeutic Injections:

Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and ROM. Steroid injections under significant pressure should be avoided as the needle may be penetrating the tendon. Injection into the tendon can cause possible tendon breakdown, tendon degeneration, or rupture. Injections should be minimized for patients less than 30 years of age. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

- Time to Produce Effect: One injection.
- Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

vi. Surgical Indications/Considerations:

A) Complete ruptures are uncommon but require early repair. Quadriceps/Patellar tendon rupture presents with inability to completely extend the knee

B) Suspected avulsion fracture, or severe functional impairment unresponsive to a minimum of 4 months of active patient participation in non-operative treatment. There is no evidence that surgery is better than eccentric training for patellar tendinopathy of the inferior pole (jumper's knee).

C) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

D) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

E) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Tendon repair. Rarely indicated and only after extensive conservative therapy.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

B) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be

beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

3. HIP AND LEG

a. Acetabular 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 Exam Findings: Displaced fractures may have short and/or abnormally rotated lower extremity.

iv. Diagnostic Testing Procedures: Radiographs, CT scanning.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Although surgery is frequently required, protected weight-bearing may be considered for un-displaced fractures or minimally displaced fractures that do not involve the weight-bearing surface of the acetabular dome.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments on osteoporosis in Section E.1.d, Ankle Sprain/Fracture.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures,

and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Based on this evidence smoking is likely to affect nonunion of all fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions, after bony union has been achieved. They should include bracing then range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include ambulation with appropriate assistive device, proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Therapy should include training on the use of adaptive equipment and home and work site evaluations when appropriate. Bracing may be appropriate. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Displaced or unstable fracture.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some

progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Usually open reduction and internal fixation or total hip replacement. Percutaneous fixation is possible in some cases.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures. They are ***not recommended*** for acetabular fractures.

Complications: infection, nonunion, nerve damage.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist, and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing, and exercise progressions.

B) Treatment usually includes active therapy with or without passive therapy for early range of motion and weight-bearing then progression to, strengthening, flexibility, neuromuscular training, and gait training with appropriate assistive devices.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

b. Aggravated Osteoarthritis:

i. Description/Definition: hip pain with radiographic evidence of joint space narrowing or femoral acetabular osteophytes, and sedimentation rate less than 20mm/hr with symptoms. Patients usually have gradual onset of pain increasing with use and relieved with rest, progressing to morning stiffness and then to night pain. About 5% of the population 60 or older will have symptomatic hip osteoarthritis but few will need surgery. Reduced muscle strength, proprioceptive inaccuracy, standing balance,

range of hip motion, and co-morbid diagnosis all contribute to functional decline.

ii. Occupational Relationship: The provider must establish the occupational relationship by showing a change in the patient's baseline condition and a relationship to work activities or specific injury to the hip. The work activities include, but are not limited to repetitive heavy lifting (25 kg) or heavy physical workload such as farming. Obesity is a risk factor for hip osteoarthritis but it is of lower importance for hip osteoarthritis than knee osteoarthritis.

Other causative factors to consider: Prior significant injury to the hip may predispose the joint to osteoarthritis. In order to entertain previous trauma as a cause, the patient should have a medically documented injury with radiographs or MRI showing the level of anatomic change. The prior injury should have been at least 2 years from the presentation for the new complaints and there should be a significant increase of pathology on the affected side in comparison to the original imaging or operative reports and/or the opposite un-injured side or extremity.

iii. Specific Physical Exam Findings: Bilateral exam including knees and low back is necessary to rule out other diagnoses. Pain with the hip in external and/or internal hip rotation with the knee in extension is the strongest indicator. One study suggests that, if the following 5 findings are present on exam, osteoarthritis is the likely diagnosis: Patrick's, squatting pain, range of motion active flexion causing lateral hip pain, internal rotation less than 25º, active hip extension causing pain, and scour test with adduction causing lateral hip or groin aggravation pain.

iv. Diagnostic Testing Procedures: standing pelvic radiographs demonstrating joint space narrowing to 2 mm or less, osteophytes or sclerosis at the joint. MRI may be ordered to rule out other more serious disease. One meta-analysis found no support for using a hip injection as a diagnostic procedure.

v. Non-operative Treatment Procedures:

A) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management developed through shared decision making. Programs should be individually tailored with short and long-term goals. Patients should be encouraged to perform aerobic activity such as walking or biking. However, activities such as ladders, stairs and kneeling may be restricted. Weight loss of at least 5% of body weight is encouraged when BMI is greater than 25.

B) Medications such as analgesics and anti-inflammatories may be helpful. There is good evidence that glucosamine sulfate and glucosamine hydrochloride are ineffective for relieving pain in patients with knee or hip OA. There is some evidence that glucosamine sulfate treatment for more than 6 months shows a small improvement in joint function compared to placebo controls in people with osteoarthritis of the knee or hip. However, due to investigations finding that 79% of herbal supplements did not

contain the substance listed on the label, these supplements are ***not recommended***.

Outpatient fentanyl use is ***not recommended*** for work related osteoarthritis. Refer to medication discussions in Section F.7, Medications and Medical Management.

C) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies, including flexibility and strength exercise, and a home exercise program. Active therapies include gait training with appropriate assistive devices, proprioception training restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Therapy should include training on the use of adaptive equipment and home and work site evaluations when appropriate, Refer to Section F. Therapeutic Procedures, Non-operative.

There is strong evidence that land-based supervised exercise program shows small, but clinically important benefits for the relief of pain and improvement in function. These benefits are sustained for at least another three to six months among people with symptomatic osteoarthritis of the hip.

There is some evidence that 12 weeks of supervised exercise therapy in addition to patient education results in better long-term cumulative survival of the native hip and reduces the need for surgery compared with patient education alone in patients with osteoarthritis (OA) of the hip.

There is some evidence that a 12-week multimodal physical therapy program, consisting of a combination of manual therapy, exercise, and education, provides no additional reductions in pain or improvements in physical function than sham physical therapy among people with hip osteoarthritis. However, the sham therapy group appeared to have a more active lifestyle at baseline.

D) There is good evidence that aquatic exercise and land-based exercise show comparable outcomes for function and mobility among people with symptomatic osteoarthritis of the knee or hip. Aquatic therapy may be used as a type of active intervention to improve muscle strength and range of motion when land-based therapy is not well-tolerated.

There is good evidence that exercise programs based on tai chi, aerobic, and mixed exercise, and not hydrotherapy programs, are effective in improving functional aerobic capacity in patients with hip and knee osteoarthritis.

There is some evidence that 12 weeks of behavioral graded activity does not result in better long-term effectiveness in reducing pain or improving function at 5 years than usual exercise therapy in patients with osteoarthritis (OA) of the hip or knee. Behavioral graded activity is defined as an exercise/behavioral treatment integrating operant behavioral principles, and additional booster sessions.Overall there is strong evidence supporting exercise programs for most patients with hip osteoarthritis.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

E) The use of insoles, adaptive equipment, cane, may be beneficial.

F) Acupuncture –Refer to Section F. Therapeutic Procedures, Non-operative.

G) Manual Therapy – There is some evidence that a 6-week patient education and manual therapy (PE and MT) intervention is more effective in reducing pain in patients with hip osteoarthritis than a control group receiving a minimal intervention of home stretching.

There is some evidence that in the setting of symptomatic hip OA of Kellgren-Lawrence grades 0 to 3, nine 30 minute sessions of manual and manipulative therapy (MMT) targeted at the hip are as beneficial as nine 30 minute sessions of MMT with additional manipulations of joints in the kinetic chain. The kinetic chain may include the lumbar, knee, ankle, and foot joints. Both programs are accompanied by gradually increasing exercise instructions. Generally, manipulation may be limited to 4 areas.

There is some evidence that, in the setting of hip OA with Kellgren-Lawrence grades 0 through 3, a short 5 week course of 9 sessions of manual therapy yields better overall improvement and hip function in daily activities than a supervised exercise program of similar duration and number of supervised sessions.

In addition to the above evidence manual therapy is recommended by other guidelines and therefore is appropriately used for hip osteoarthritis. Refer to Sections F.16.i Manipulation and F.16.l Mobilization (Joint) for more information.

H) Functional tests should always be used to track progress of therapy. The following tests are recommended for those with knee or hip osteoarthritis: 30 second chair stand, 40 meter fast paced walk, a stair climb, timed up-and-go, and 6 minute walk test.

I) Steroid Injections - Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and ROM. Caution should be used when considering steroid

injections for patients with an A1c level of 8% or greater.

There is some evidence that a fluoroscopically guided injection of triamcinolone into an osteoarthritic hip relieves pain and improves function for up to three months.

- ❖ Time to Produce Effect: One injection.
- ❖ Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

J) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify aggravating factors and to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

K) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Refer to Section G.5. Hip Arthroplasty.

c. Femoral Osteonecrosis (Avascular Necrosis (AVN) of the Femoral Head):

i. Description/Definition: Death of the bone tissue of the femoral head following loss of blood supply to the area. Destruction of the articular surfaces of the hip joint may lead to arthritis.

ii. Occupational Relationship: Trauma resulting in displaced subcapital fracture of the hip or hip dislocation may cause AVN. Previous surgical procedures and systemic steroids may also lead to AVN. In the general population, risk factors include, but are not limited to alcohol abuse, smoking, Caisson disease (also known as the bends), sickle cell anemia, autoimmune disease, and hypercoagulable states. Often, the cause cannot be identified. Involvement of the opposite hip may occur in more than half of cases not caused by trauma.

iii. Specific Physical Exam Findings: Hip or groin pain made worse by motion or weight-bearing and alleviated by rest is the classical presentation. Symptoms may begin gradually, often months after the vascular compromise of blood flow. A limp may result from limited tolerance for weight-bearing.

iv. Diagnostic Testing Procedures: X-ray abnormalities include sclerotic changes, cystic lesions, joint space narrowing, and degeneration of the acetabulum. The x-ray may be normal in the first several months of the disease process. AVN should be suspected when hip pain occurs and risk factors are present. X-rays should be done first, but may be followed by an MRI. When AVN is not due to trauma, both hips should be imaged.

MRI is extremely sensitive. Lesions usually progress over time. Bone marrow edema on imaging and location and extent of the lesion are prognostic signs for femoral head collapse. Frequently pre collapse signs of osteonecrosis are asymptomatic. Osteonecrosis should be differentiated from the self-limited condition of transient osteoporosis.

v. Non-operative Treatment Procedures:

A) Initial Treatment: protected weight-bearing and bracing followed by active therapy with or without passive therapy. Conservative approaches may suffice when the lesion is small, but larger lesions are expected to require surgical intervention when symptoms are disabling.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management. Weight-bearing restrictions may be appropriate.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Smoking may affect bone healing. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to identify job tasks that stress the hip joint and to provide recommendations for modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative, may be employed in individual cases.

vi. Surgical Indications/Considerations: Core decompression may be appropriate for some patients with early disease (Stages 1 and 2A) who have functionally disabling symptoms. Femoral head osteotomies or resurfacing hemiarthroplasties may also be appropriate for younger patients when disease is limited to the femoral head. Those 50 or older and patients with total joint collapse or severely limiting disease will usually require an implant arthroplasty.

Some authors suggest preoperative digital subtraction angiography prior to a core decompression as arterial supply insufficiency leads to poor results.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should

identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Osteotomy, core decompression with or without bone graft, arthroplasty. Refer to Section G., Therapeutic Procedures-operative for details.

Core decompression appears to yield the best results for the patients with necrotic lesions less than 50% of the total lesion. On average, almost 26% of patients who had a core decompression required eventual arthroplasty.

There is some evidence from one study that, in the setting of core decompression, the use of bone marrow derived mesenchymal stem cells, taken from subtrochanteric marrow, cultured in vitro for two weeks, and implanted back into the necrotic lesion, greatly reduces the rate of progression of the disease process over the following five years. The procedure similarly reduces the need for total hip replacement. Core decompression has been tried with mesenchymal stem cells and bone marrow derived cells. However, currently stem cells cannot be cultured in the United States. Due to differing techniques and study methodology these continue to be considered experimental and are ***not generally recommended***.

viii. Postoperative Treatment:

A) Anticoagulant therapy to prevent deep venous thrombosis for most procedures. Refer Section F. Therapeutic Procedures, Non-operative.

B) Treatment usually includes active therapy with or without passive therapy. Refer to section G and specific procedures for further details.

C) An individualized rehabilitation program based upon communication between the surgeon and the therapist using the treatments found in Section F. Therapeutic Procedures, Non-operative.

D) Treatment should include gait training with appropriate assistive devices.

E) Therapy should include training on the use of adaptive equipment and home and work site evaluation when appropriate.

F) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

d. **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 Exam Findings: May have a short, abnormally rotated extremity. Effusion if the knee joint is involved.

iv. Diagnostic Testing Procedures: Radiographs. Occasionally CT scan or MRI particularly if the knee joint is involved.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Although surgery is usually required, non-operative procedures may be considered in stable, non-displaced fractures and will require protected weight-bearing.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, weight management. Weight-bearing restrictions may be appropriate.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be

helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Back pain may occur after femur fracture and should be addressed and treated as necessary.

E) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

F) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

G) Orthotics such as heel lifts and custom shoe build-ups may be required when leg-length discrepancy persists.

H) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

I) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Supracondylar femur fracture with joint incongruity or displaced subtrochanteric fractures.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some

progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Rod placement or open reduction/internal fixation.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist, using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and the therapist is important to the timing of weight-bearing and exercise progression.

B) Treatment usually includes active therapy with or without passive therapy for protected weight-bearing, early range of motion if joint involvement.

C) Refer to bone-growth stimulators in Section F. Therapeutic Procedures, Non-operative.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

e. 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, excessive stretching or from a rapid, forceful contraction of the muscle.

iii. Specific Physical Exam Findings: Local tenderness, swelling, ecchymosis, weakness.

iv. Diagnostic Testing Procedures: Occasionally radiographs, MRI or ultrasound for proximal tears/possible avulsion fracture.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Protected weight-bearing and ice.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Most hamstring injuries do not involve avulsions and can be resolved with non-operative therapy. Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They may include range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. One study suggested that stretching four times per day could reduce time to full activity. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Bracing may be appropriate. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

E) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

F) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations:

A) Surgery is indicated for proximal or distal injuries only when significant functional impairment is expected without repair. If surgery is indicated, it is preferably performed within three months.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

vii. Operative Procedures: Re-attachment of proximal avulsions and repair of distal tendon disruption. Achilles allograph may be required for chronic repairs with functional deficits.

Complications: Uncommon however, may include re-rupture, thrombosis, or infection. Some patients report residual pain.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include protected weight-bearing for 6 – 8 weeks. Splinting in a functional brace may reduce time off work. Active therapy is usually progressed at 5 – 8 weeks. A number of strength and balance maneuvers may be done at 8 – 12 weeks depending on the patient's functional goals.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

f. **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 Exam Findings: Most commonly a short, internally rotated, adducted lower extremity with a posterior dislocation and a short externally rotated extremity with an anterior dislocation.

iv. Diagnostic Testing Procedures: Radiographs, CT scanning.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Urgent closed reduction with sedation or general anesthesia.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

D) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include bracing then range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, gait training with appropriate assistive devices, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Therapy should include training on the use of adaptive equipment and home and work site evaluations when appropriate. Bracing may be appropriate Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician when a fracture is involvled.

F) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

G) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Failure of closed reduction. Associated fracture of the acetabulum or femoral head, loose fragments in joint or open fracture.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, when a fracture is involved it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Open reduction of the femoral head or acetabulum and possible internal fixation.

viii. Postoperative Treatment Procedures:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment should include gait training with appropriate assistive devices.

C) Treatment may include protected weight-bearing and active therapy with or without passive therapy for early range of motion.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

g. 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.

Non Occupational Relationship: There is strong evidence that in adults at risk of hip fracture, obesity, defined as a BMI of 30 or greater, is associated with a substantial reduction in the risk of hip fracture compared to non-obese persons. Osteoporosis predisposes to hip fracture.

iii. Specific Physical Exam Findings: Often a short and externally rotated lower extremity.

iv. Diagnostic Testing Procedures: Radiographs. Occasional use of CT scan or MRI.

v. Non-operative Treatment Procedures:

A) Initial Treatment: protected weight-bearing and bracing followed by active therapy with or without passive therapy. Although surgery is usually required, non-operative procedures may be considered in stable, non-displaced fractures. In cases of intracapsular femoral neck fractures of the hip, monitoring for avascular necrosis (AVN) should be considered, including serial X-rays.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management. Weight-bearing restrictions may be appropriate.

C) Medications/Vitamins All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Back pain may occur after hip fracture and should be addressed and treated as necessary.

E) Refer to comments on osteoporosis in Section E.1, d. Ankle Sprain/Fracture.

F) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative, may be employed in individual cases.

vi. Surgical Indications/Considerations: Surgery is indicated for unstable peritrochanteric fractures and femoral neck fractures.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative

costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Prosthetic replacement for displaced femoral neck fractures. Reduction and internal fixation for peritrochanteric fractures, and un-displaced, or minimally-displaced neck fractures. May include hemiarthroplasty or total hip arthroplasty for older workers.

There is inadequate evidence to support the effect of pre-operative traction for the relief of pain in people with a fractured hip. Therefore, it is ***not recommended***.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures.

viii. Postoperative Treatment:

A) Anti-coagulant therapy to prevent deep vein thrombosis. Refer to Section F. 9. c. Deep Venous Thrombosis Prophylaxis.

B) Treatment usually includes active therapy with or without passive therapy.

C) An individualized rehabilitation program based upon communication between the surgeon and the therapist using the treatments found in Section F. Therapeutic Procedures, Non-operative.

D) Treatment should include gait training with appropriate assistive devices.

E) Therapy should include training on the use of adaptive equipment and home and work site evaluation when appropriate.

F) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

h. **Impingement/Labral Tears**:

i. Description/Definition: Two types of impingement are described. Pincer-type impingement results from over- coverage of the acetabulum. Cam-type impingement, results from the head of the femur being misshapen at the junction of the head and neck of the femur. Labral tears can also be isolated; however, they are frequently accompanied by bony abnormalities. Patients usually complain of catching or painful clicking which should be distinguished from a snapping iliopsoas tibial tendon. A pinch while sitting may be reported and hip or groin pain. Patients frequently complain of difficulty squatting or using stairs.

ii. Occupational Relationship: Impingement abnormalities are usually congenital; however, they may be aggravated by repetitive rotational force or trauma. Labral tears may accompany impingement or result from high energy trauma.

iii. Specific Physical Exam Findings: Positive labral tests. May have some range of motion deficits with impingement. No physical exam tests can reliably identify impingement or labral pathology in isolation.

iv. Diagnostic Testing Procedures: Cross table laterals, standing AP pelvis and frog leg lateral x-rays. In young healthy adults, some cam impingement findings occur in up to 50% of males and slightly fewer females. Physical exam findings of impingement along with x-ray findings are much lower, 7.3% in males. Cam deformity alpha angles can vary. However, among a large sample, greater than 60 º was unusual, and 78º was considered pathological in a middle aged population.

MRI may reveal abnormality; however, false positives and false negatives are also possible. MRI arthrogram with gadolinium should be performed to diagnose labral tears, not a pelvic MRI. Intra-articular injection should help rule out extra-articular pain generators.

To confirm the diagnosis of labral tear, the patient should demonstrate changes on a pain scale accompanied by recorded functional improvement post-injection. This is important, as labral tears do not always cause pain and over-diagnosis is possible using imaging alone).

v. Non-operative Treatment Procedures:

A) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, reducing hip adduction and internal rotation home exercise, joint protection, and weight management.

B) Medications such as analgesics and anti-inflammatories may be helpful. Refer to medication discussions in Section F.7. Medications and Medical Management.

C) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions. They should include range-of-motion (ROM), active therapies and a home exercise program. Active therapies include proprioception training, neuromuscular re-

education, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Manual therapy may be appropriate for some patients. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

vi. Steroid Injections - Steroid injections may decrease inflammation and allow the therapist to progress with functional exercise and ROM. To confirm the diagnosis of labral tear, the patient should demonstrate changes on a pain scale accompanied by recorded functional improvement post-injection. This is important, as labral tears do not always cause pain and over-diagnosis is possible using imaging alone).

Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

- Time to Produce Effect: One injection.
- Maximum Duration: 3 injections in one year spaced at least 4 to 8 weeks apart. Not to exceed 4 injections of any body part in one year.

For more information, please refer to Section F.6.a. Steroid Injections.

vii. Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

viii. Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

ix. Surgical Indications/Considerations:

A) Surgery is indicated when 1) functional limitations persist after 8 weeks of active patient participation in treatment, 2) there are clinical signs and symptoms suggestive of the diagnosis and 3) other diagnoses, such as trochanteric bursitis or iliotibial band snapping have been ruled out. Iliotibial band pathology usually responds to physiotherapy. Bursitis is treated with lifestyle changes and steroid injections. Surgery is rarely required for these diagnoses.

B) Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c

and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

C) Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

D) In cases where surgery is contraindicated due to obesity, it may be appropriate to recommend a weight loss program if the patient is unsuccessful losing weight on his or her own. Coverage for weight loss would continue only for motivated patients who have demonstrated continual progress with weight loss.

E) Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

x. Operative Procedures: Debridement or repair of labrum and removal of excessive bone. There is some evidence that, in women with pincer or combined cam-pincer femoroacetabular impingement, surgery which repairs the labrum is more likely to lead to normal hip function at one year than surgery which debrides part of the labrum. One study noted slightly better outcomes with a complete versus partial capsular repair. No research studies have been completed that are of sufficient quality to accurately determine the benefit and safety of surgery for femoroacetabular impingement. There is no evidence that surgical treatment provides a clear benefit. However, it may improve range of motion and hip function.

Complications- low rate of minor and major complications, revision surgery may be necessary.

xi. Postoperative Treatment:

A) When bone is removed and/or the labrum is repaired, weight-bearing restrictions usually apply for debridement for 2 weeks with at least 4 weeks of restricted hip rotation. For labral repair up to 6 weeks of weight bearing restrictions may apply.

B) An individualized rehabilitation program based upon communication between the surgeon and the therapist that includes gait training with appropriate assistive devices. Refer to Section F., Therapeutic Procedures Non-operative.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

i. **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 Exam 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, emergent sonogram.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Protected weight-bearing. Although surgery is usually required, non-operative procedures may be considered in a stable, non-displaced fracture.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Based on this evidence smoking is likely to affect nonunion of all fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions, after bony union has been achieved. They should include bracing then range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include, proprioception training, gait training with appropriate assistive devices, restoring normal joint mechanics, and clearing dysfunctions from adjacent structures. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Therapy should include training on the use of adaptive equipment and home and work site evaluations when appropriate. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Unstable fracture pattern, or open fracture.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work , as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider

should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: External or internal fixation dictated by fracture pattern.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures or pelvic fractures.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment usually includes active therapy with or without passive therapy for gait, pelvic stability, strengthening, and restoration of joint and extremity function. Treatment should include gait training with appropriate assistive devices.

C) Graduated weight-bearing according to fracture healing.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

j. **Tendinopathy**: Refer to Section E.2.k., Tendinopathy for general recommendations.

k. **Tibial Fracture**:

i. Description/Definition: Fracture of the tibia proximal to the malleoli.

Open tibial fractures are graded in severity according to the Gustilo-Anderson Classification:

- Type I: Less than 1 cm (puncture wounds).
- Type II: 1 to 10 cm.
- Type III-A: Greater than 10 cm, sufficient soft tissue preserved to cover the wound (includes gunshot wounds and any injury in a contaminated environment).
- TYPE III-B: Greater than 10 cm, requiring a soft tissue coverage procedure.
- TYPE III-C: With vascular injury requiring repair.

ii. Occupational Relationship: Usually from a traumatic injury such as a fall or crush.

iii. Specific Physical Exam Findings: May have a short, abnormally rotated extremity. Effusion if the knee joint involved.

iv. Diagnostic Testing Procedures: Radiographs. CT scanning or MRI.

v. Non-operative Treatment Procedures:

A) Initial Treatment: Protected weight-bearing; functional bracing. There is some evidence for use of pneumatic braces with stress fractures.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during

the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions, after bony union has been achieved. They should include bracing then range-of-motion (ROM), active therapies including proprioception training, restoring normal joint mechanics, clearing dysfunctions from adjacent structures, and a home exercise program. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, restoring normal joint mechanics, influenced by proximal and distal structures. Therapy should include training on the use of adaptive equipment and home and work site evaluations when appropriate. Bracing may be appropriate. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

G) Orthotics such as heel lifts and custom shoe build-ups may be required when leg-length discrepancy persists.

There is some evidence that, in the setting of tibial fractures which have delayed union at 16 weeks, low-intensity pulsed ultrasound may accelerate gains in bone mineral density and fracture gap area when used daily for 16 weeks. However, there is strong evidence that LIPUS has no clinical efficacy in returning fracture patients to normal activities. There is also strong evidence that the estimates of effectiveness in accelerating radiographic fracture healing are likely to be biased and inaccurate. Numerous other reviews have identified only low quality studies. Thus, evidence does not support the clinical effectiveness of ultrasound for delayed union and therefore it is ***not recommended***.

There is good evidence that, in the setting of acute tibial shaft fractures, pulsed electromagnetic field devices provide no benefits in terms of reducing the rate of secondary surgical

procedures in the first twelve months following the acute fracture. Therefore, it is ***not recommended***.

H) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

I) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Unstable fracture pattern, displaced fracture (especially if the knee joint is involved), open fracture, and nonunion.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Often closed rodding for shaft fractures. Open reduction and internal fixation is more common for fractures involving the knee joint or pilon fractures of the distal tibia. Procedures may include plate fixation, intramedullary nailing, and external fixation.

Local antibiotics, sometimes in the form of bead chains, may be used particularly with intramedullary nailing.

Human bone morphogenetic protein (RhBMP): this material is used for surgical repair of open tibial fractures. Refer to Section G, 11 Therapeutic Procedures, Operative for further specific information. There is some evidence that, in the setting of open tibial fractures treated with reamed intramedullary nailing, the use of rh-BMP at the time of fracture fixation does not measurably improve fracture healing, and may increase risks of infection. There is good evidence that there are no measureable

benefits of BMP over standard of care without BMP for tibial fractures. There is good evidence that, for open tibial shaft fractures, BMP does not enhance fracture healing at 20 weeks when used to augment with intramedullary nailing. Therefore, it is ***not recommended***.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures.

Complications: infections, nonunion, residual knee and ankle pain which is unlikely to interfere with employment.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Treatment may include protected weight-bearing and active therapy with or without passive therapy for early range of motion if joint involvement.

C) Negative pressure wound therapy may decrease the infection rate of open grade III-b fractures.

D) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

I. 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 Exam Findings: Local tenderness over the greater trochanter. Sometimes associated swelling, ecchymosis.

iv. Diagnostic Testing Procedures: Radiographs, CT scans or MRI.

v. Non-operative Treatment Procedures:

A) Initial Treatment: protected weight-bearing.

B) Patient education should include instruction in self-management techniques, ergonomics, body mechanics, home exercise, joint protection, and weight management.

C) Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

Medications such as analgesics and anti-inflammatories may be helpful. There is some evidence that, in the setting of long bone fractures of the femur, tibia and humerus, administration of non-steroid anti-inflammatory drugs (NSAIDs) in the first 48 hours after injury is associated with poor healing of the fracture. Therefore, NSAID use is ***not generally recommended*** during the healing time for fractures of the lower extremity fractures or immediately after the injury. Refer to medication discussions in Section F.9. Medications and Medical Management.

D) Refer to comments related to osteoporosis in Section F.7.h. Therapeutic Procedures, Non-operative, Osteoporosis Management.

E) There is good evidence that smoking significantly increases the risk of nonunion of long bone fractures overall, tibial fractures, and open fractures compared to nonsmokers following operative treatment of long-bone fractures. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician.

F) Benefits may be achieved through therapeutic rehabilitation and rehabilitation interventions, after bony union has been achieved. They should include bracing then range-of-motion (ROM), active therapies, and a home exercise program. Active therapies include proprioception training, restoring normal joint mechanics, clearing dysfunctions from adjacent structures, and a home exercise program. Passive as well as active therapies may be used to control pain and swelling. Therapy should progress to strengthening and an independent home exercise program targeted to further improve ROM, strength, and normal joint mechanics influenced by proximal and distal structures. Bracing may be appropriate. Refer to Section F. Therapeutic Procedures, Non-operative.

Passive modalities are most effective as adjunctive treatments to improve the results of active treatment. They may be used as found as adjunctive in Section F. Therapeutic Procedures, Non-operative.

G) Return to work with appropriate restrictions should be considered early in the course of treatment. A job site evaluation may be appropriate to provide suggestions for work task modifications. Refer to Section F.13. Return to Work.

H) Other therapies in Section F. Therapeutic Procedures, Non-operative may be employed in individual cases.

vi. Surgical Indications/Considerations: Large, displaced fragment, open fracture.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should agree to comply with the pre- and postoperative treatment plan including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative therapy required and the length of partial- and full-disability expected postoperatively.

Because smokers have a higher risk of nonunion and postoperative costs, it is recommended that insurers cover a smoking cessation program peri-operatively. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels for long-term cessation. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

vii. Operative Procedures: Open reduction, internal fixation.

Stem cell injections: Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures.

viii. Postoperative Treatment:

A) An individualized rehabilitation program based upon communication between the surgeon and the therapist using therapies as outlined in Section F. Therapeutic Procedures, Non-

operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

B) Protected weight-bearing is usually needed. Full weight-bearing with radiographic and clinical signs of healing.

C) Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

F. THERAPEUTIC PROCEDURES — NON-OPERATIVE

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

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

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

Third, providers should provide and document patient education. Functional progression is expected through prescribed activity such as neuromuscular and postural re-education/re-patterning exercises. Before diagnostic tests or referrals for invasive treatment take place, the patient should be able to clearly articulate the goals of the intervention, the general side effects and associated risks, and his or her agreement with the expected treatment plan.

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

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

The following procedures are listed in alphabetical order.

1. **ACUPUNCTURE:** When acupuncture has been studied in randomized clinical trials, it is often compared with sham acupuncture and/or no acupuncture (usual care). The differences between true acupuncture and usual care have been moderate, but clinically important. These differences can be partitioned into two components: non-specific effects and specific effects. Non-specific effects include patient beliefs and expectations, attention from the acupuncturist, administration of acupuncture in a relaxing setting, and other components of what is often called the placebo effect. Specific effects refer to any additional effects which occur in the same setting of expectations and attention, but they are attributable to the penetration of the skin in the specific, classic acupuncture points on the surface of the body by the needles themselves.

A sham procedure is a non-therapeutic procedure that appears similar to the patient as the purported therapeutic procedure being tested. In most controlled studies, sham and classic acupuncture have produced similar effects. However, the sham controlled studies have shown consistent advantages of both true and sham acupuncture over no acupuncture when the studies have included a third comparison group that was randomized to usual medical care. Having this third comparison group has been advantageous in the interpretation of the non-specific effects of acupuncture, since the third comparison group controls for some influences on study outcome. These influences include more frequent contact with providers, the natural history of the condition, regression to the mean, the effect of being observed in a clinical trial, and, if the follow-up observations are done consistently in all three treatment groups, for biased reporting of outcomes. Controlling for these factors enables researchers to more closely estimate the contextual and personal interactive effects of acupuncture as it is generally practiced.

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

Another study provides good evidence that true acupuncture at traditional meridians is marginally better than sham acupuncture with blunt needles in reducing pain, but effects on disability are unclear. In these studies, 5–15 treatments were provided. Comparisons of acupuncture and sham acupuncture have been inconsistent, and the advantage of true over sham acupuncture has been small in relation to the advantage of sham over no acupuncture.

A recent study of acupuncture use for knee osteoarthritis casts doubt on the actual biological effects of acupuncture versus the effect of positive provider patient visits. It is generally agreed from multiple low quality studies that acupuncture can provide short-term pain relief and functional improvement with a small effect size. The physiologic response has been attributed to changes in brain activity on functional MRI's with acupuncture, sham acupuncture, and in response to painful stimulus.

Acupuncture is recommended for subacute or chronic pain patients who are trying to increase function and/or decrease medication usage and have an expressed interest in this modality. It is also recommended for subacute or acute pain for patients who cannot tolerate NSAIDs or other medications.

Acupuncture is not the same procedure as dry needling for coding purposes; however, some acupuncturists may use acupuncture treatment for myofascial trigger points. Dry needling is performed specifically on myofascial trigger points. Refer to F.5.c. Trigger Point Injections and Dry Needling Treatment.

Acupuncture should generally be used in conjunction with manipulative and physical therapy/rehabilitation.

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

There is good evidence that the small therapeutic effects of needle acupuncture, active laser acupuncture, and sham acupuncture for reducing pain or improving function among patients older than 50 years with moderate to severe chronic knee pain from symptoms of osteoarthritis are due to non-specific effects similar to placebo. Therefore, acupuncture should only be offered as an option to patients who independently express interest in receiving it, and who expect to benefit from it.

There is good evidence that, in people with osteoarthritis of the knee or hip, the effects of true needle acupuncture treatment relative to sham acupuncture may be too small to be

perceived by participants as beneficial. Therefore, true needle acupuncture may not actually result in significant, clinically relevant functional improvement or significant pain reduction. Thus, there is strong evidence that acupuncture is not effective for osteoarthritis pain relief and it is ***not generally recommended***. It may be appropriate in cases where arthroplasty is being delayed and patients request acupuncture for temporary relief.

Indications: All patients being considered for acupuncture treatment should have subacute or chronic pain (lasting approximately 3-4 weeks depending on the condition) and meet the following criteria:

- they should have participated in an initial active therapy program; and
- they should show a clear preference for this type of care or previously have benefited from acupuncture; and
- they must continue to be actively engaged in physical rehabilitation therapy and return to work.

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.

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.

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

- ❖ Time to Produce Effect: 3 to 6 treatments.
- ❖ Frequency: 1 to 3 times per week.
- ❖ Optimum Duration: 1 to 2 months.
- ❖ Maximum Duration: 14 treatments.

Any of the above acupuncture treatments may extend longer if objective functional gains can be documented and when symptomatic benefits facilitate progression in the patient's treatment program. Treatment beyond 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.

d. **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 Active Therapy (Therapeutic Exercise) and Passive Therapy sections (Massage and Superficial Heat and Cold Therapy) for a description of these adjunctive acupuncture modalities and time frames.

2. **BIOFEEDBACK:** Biofeedback is a form of behavioral medicine that helps patients learn self-awareness and self-regulation skills for the purpose of gaining greater control of their physiology, such as muscle activity, brain waves, and measures of autonomic nervous system activity. Stress-related psycho-physiological reactions may arise as a reaction to organic pain and in some cases may cause pain. Electronic instrumentation is used to monitor the targeted physiology and then displayed or fed back to the patient visually, auditorily, or tactilely, with coaching by a biofeedback specialist. There is good evidence that biofeedback or relaxation therapy is equal in effect to cognitive behavioral therapy for chronic low back pain. There is no evidence of the effect of EMG-biofeedback on knee OA. Therefore, it is ***not recommended***.

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

- 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 functional gains.

3. **BONE-GROWTH STIMULATORS**

a. **Electrical**: Pre-clinical and experimental literature has shown a stimulatory effect of externally applied electrical fields on the proliferation and calcification of osteoblasts and periosteal cells.

There is good evidence that, in the setting of acute tibial shaft fractures, pulsed electromagnetic field devices do not reduce the rate of secondary surgical

procedures in the first twelve months following the acute fracture. Therefore, the use of these devices is ***not recommended***.

b. **Low-intensity Pulsed Ultrasound (LIPUS)**: There is strong evidence that LIPUS does not have clinical efficacy in returning fracture patients to normal activities, and that the estimates of effectiveness in accelerating radiographic fracture healing are likely to be biased and inaccurate.

There is no evidence of the effect of low-intensity ultrasound (LIPUS), high-intensity focused ultrasound (HIFUS) and extracorporeal shockwave therapies (ESWT) as part of the treatment for acute fractures in adults. Therefore, the use of external bone growth stimulation in the setting of acute fractures in high risk patients requires prior authorization.

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

Informed decision making is the hallmark of a successful treatment plan. In most cases, the continuum of treatment from the least invasive to the most invasive (e.g. surgery) should be discussed. The intention is to find the treatment along this continuum which most completely addresses the condition. Patients should identify their personal functional goals of treatment at the first visit. It is recommended that specific individual goals are articulated at the beginning of treatment as this is likely to lead to increased patient satisfaction above that achieved from improvement in pain or other physical function. Progress toward the individual functional goals identified should be addressed at follow up visits and throughout treatment by other members of the health care team as well as the authorized physicians.

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

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

Before diagnostic tests or referrals for invasive treatment take place, the patient should be able to clearly articulate the goals of the intervention, the general side effects and risks associated with it and their decision regarding compliance with the suggested plan. There is some evidence that information provided only by video is not sufficient education.

Practitioners must develop and implement an effective strategy and skills to educate patients, employers, insurance systems, policy makers, and the community as a whole.

An education-based paradigm should always start with providing reassuring information to the patient and informed decision making. More in-depth education currently exists within a treatment regimen employing functional restoration, prevention, and cognitive behavioral techniques. Patient education and informed decision making should facilitate self-management of symptoms and prevention.

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

5. EXTRACORPOREAL SHOCK WAVE THERAPY (ESWT)

Extracorporeal shock wave therapy (ESWT) delivers an externally applied acoustic pulse to the plantar fascia. Focused ESWT concentrates the acoustic pulse on a single point in the heel, while radial ESWT distributes the pulse along the entire plantar fascia. It has been hypothesized that ESWT causes microtrauma to the fascia, inducing a repair process involving the formation of new blood vessels and delivery of nutrients to the affected area. High energy ESWT is delivered in one session and may be painful, requiring some form of anesthesia. Conscious sedation is ***not recommended***. The procedure may be performed with local blocks.

There is good evidence from one high quality trial that high intensity ESWT (0.25 mJ/mm2) is more effective than sham ESWT for improving pain and function in chronic plantar fasciitis which has not responded to conservative treatment after 6 months of symptoms. There is also some evidence from one adequate trial that high dose shock wave produces successful outcomes similar to those for endoscopic plantar fascia release in patients with persistent plantar fasciopathy which has not responded to more conservative treatment. However, two flawed meta-analyses failed to provide evidence that ESWT, regardless of energy level, produces a clinically meaningful reduction in pain or increase in function when compared to placebo for patients with plantar fasciitis lasting 6 months or more. While both meta-analyses did find a benefit for ESWT, the effect did not reach the level of clinical significance and provided conflicting evidence for which energy level is more effective. However, there is good evidence that plantar fascia specific stretching as initial treatment is more effective than radial ESWT in reducing pain and increasing function. Therefore, only ESWT at high intensity (0.25 mJ/mm2) may be considered in patients who have failed 6 months of conservative treatment, including stretching, physical therapy, orthoses, ice, and NSAIDs, and have significant functional deficits. This may be attempted for a maximum of 3 sessions spaced at least a week apart. ESWT may be a cost-effective alternative to plantar fascial release or a final non-invasive treatment option before surgery .

There is no evidence for extracorporeal shockwave therapies (ESWT) as part of the treatment for acute fractures in adults.

An adequate systematic review failed to provide evidence that extracorporeal shockwave therapy (ESWT) is superior to sham ESWT for Achilles tendinopathy. This review examined the only two studies in the past 10 years that had adequate blinding of participants. However, a clinically important effect has not been ruled out, and future research may change the unbiased estimate of the effect of ESWT. Additionally, a single randomized controlled trial does provide some evidence that in patients with insertional Achilles tendinopathy who have no calcification of the tendon at the calcaneus, three sessions of a moderate dose (flux density of 0.12 mJ/mm2) is likely to be more successful than a 12 week program of eccentric loading exercise. As such, providers should be free to add ESWT to their treatment options for Achilles tendinopathy.

- Indications: Patients who have failed 6 months of standard therapy for plantar fasciitis and have significant functional deficits should be considered for ESWT. These patients should meet the indications for surgery found in Section E, heel spurs, plantar fascia pain. Tarsal tunnel syndrome should be ruled out. Peripheral vascular disease, lower extremity neuropathy, and diabetes are all relative contraindications. Diagnostic testing may be needed to rule out these conditions.

  ESWT may also be considered for those patients who have failed conservative treatment for Achilles tendinopathy.

- Time to Effect: 2 sessions.

- Optimum/Maximum Duration: 3 sessions one week or more apart.

6. INJECTIONS-THERAPEUTIC

Description — Therapeutic injection procedures are generally accepted, well-established procedures that may play a significant role in the treatment of patients with upper 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.

Caution should be used when ordering four or more steroid injections total for all anatomic sites in one year. Please refer to Section F.4.d. Shoulder Joint Steroid Injections.

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.

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. **Steroid Injections**: are generally accepted, well-established procedures that can be performed as analgesic or anti-inflammatory procedures. There is good evidence that steroid injection in the setting of knee osteoarthritis produces rapid but short-lasting pain relief compared to placebo, likely to last at least one week but not likely to last 4 weeks or longer.

There is good evidence for a small to moderate reduction in pain from corticosteroid injection, whether performed under ultrasound guidance or by palpation alone . Tibial nerve blocks (heel blocks) do not add benefit to the procedure. It is unclear whether factors such as the specific corticosteroid, the injection approach (e.g. medial vs. posterior), the injection target (e.g. parallel to the plantar fascia vs. into the plantar fascia), or mixing of local anesthetic with the steroid influence outcomes.

Steroid injections to the Achilles tendon should generally be avoided in these patients since this is a risk for later rupture. Therefore, steroid injections are ***not recommended*** for any pathology of the Achilles tendon.

Combination steroid and local anesthetics increase chrondrocyte death in cell cultures. This calls into questions its long-term effects on osteoarthritis.

Complications: Safety concerns regarding steroid injection of the heel exist, including plantar fascia rupture and heel pad atrophy. Steroid injection under significant pressure should be avoided as the needle may be penetrating the tendon, and injection into the tendon could cause tendon breakdown, degeneration, or rupture. Injections should be minimized for patients under 30 years of age.

General complications of injections may include transient neurapraxia, nerve injury, infection, hematoma, glucose elevation, and endocrine changes.

The majority of diabetic patients will experience an increase in glucose following steroid injections. Average increases in one study were 125mg/dL and returned to normal in 48 hours. In other studies, the increased glucose levels remained elevated up to 7 days, especially after multiple injections. All diabetic patients should be told to follow their glucose levels carefully over the 7 days after a steroid injection. For patients who have not been diagnosed with diabetes, one can expect some increase in glucose due to insulin resistance for a few days after a steroid injection. Clinicians should consider diabetic screening tests for those who appear to be at risk for type 2 diabetes and checking hemoglobin A1c and/or glucose for diabetics. Caution should be used when considering steroid injections for patients with an A1c level of 8% or greater.

Intra-articular or epidural injections cause rapid drops in plasma cortisol levels which usually resolve in one to 4 weeks. There is some evidence that an intra-articular injection of 80 mg of methylprednisolone acetate into the knee has about a 25% probability of suppressing the adrenal gland response to exogenous adrenocortocotrophic hormone ACTH for four or more weeks after injection, but complete recovery of the adrenal response is seen by week 8 after injection. This adrenal suppression could require treatment if surgery or other physiologically stressful events occur.

Case reports of Cushing’s syndrome, hypopituitarism and growth hormone deficiency have been reported uncommonly and have been tied to systemic absorption of intra-articular and epidural steroid injections. Cushing’s syndrome has also been reported from serial occipital nerve injections and paraspinal injections.

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

The effect of steroid injections on bone mineral density (BMD) and any contribution to osteoporotic fractures is less clear. Patients on long-term steroids are clearly more likely to suffer from fractures than those who do not take steroids. However, the contribution from steroid injections to this phenomena does not appear to be large. A well-controlled, large retrospective cohort study found that individuals with the same risk factors for osteoporotic fractures were 20% more likely to suffer a lumbar fracture if they had an epidural steroid

injection. The risk increased with multiple injections. Other studies have shown inconsistent findings regarding BMD changes.

Given this information regarding increase in blood glucose levels, effects on the endocrine system, and possible osteoporotic influence, it is suggested that intra-articular and epidural injections be limited to a total of 3 to 4 per year [***all joints combined***].

- ❖ Time to Produce Effect: Immediate with local anesthesia, or within 3 days if no anesthesia.
- ❖ Optimum Duration: Usually one to two injections is adequate.
- ❖ Maximum Duration: No more than 4 steroid injections to all body parts should be performed in one year.

b. **Soft Tissue Injections**: include bursa and tendon insertions. Injections under significant pressure should be avoided as the needle may be penetrating the tendon. Injection into the tendon can cause tendon degeneration, tendon breakdown, or rupture. Injections should be minimized for patients under 30 years of age.

When performing tendon insertion injections, the risk of tendon rupture should be discussed with the patient and the need for restricted duty emphasized.

- ❖ Time to Produce Effect: Immediate with local anesthesia, or within 3 days if no anesthesia.
- ❖ Optimum Duration: Usually one to two injections is adequate.
- ❖ Maximum Duration: Not more than three to four times annually.

For more information, please refer to Section F.6.a. Steroid Injections.

c. **Stem Cell Injections**: The purpose of stem cell therapy is to supply mesenchymal stem cells to a site of injury. The cells may then differentiate into cells that may aid recovery. In the U.S., stem cells are usually obtained from fat cells obtained from the patient through liposuction or bone marrow cells obtained through bone marrow aspiration. They are then injected into the injury site. There are also other stem cell products, including cells obtained through amniotic fluid. To date the FDA has only approved one stem cell product, a cord blood-derived product for use in specific disorders involving the blood forming system only. A number of scams have been reported in the area of stem cells. Patients and providers must perform diligence regarding the use of amniotic fluids and other sources of stem cells.

Numerous trials are currently in process or have not been published regarding the use of stem cells from bone marrow aspirate or demineralized bone matrix. The only clear effects are on small bone deficits. They are considered to be experimental and thus are ***not recommended*** for delayed union or nonunion of long bone fractures.

There is some evidence from one study that, in the setting of core decompression, the use of bone marrow derived mesenchymal stem cells, taken

from subtrochanteric marrow, cultured in vitro for two weeks, and implanted back into the necrotic lesion, greatly reduces the rate of progression of the disease process over the following five years. There is also some evidence that the procedure similarly reduces the need for total hip replacement. It is not known how this study related to non-cultured stem cells. Core decompression has been tried with mesenchymal stem cells and bone marrow derived cells. However, currently stem cells cannot be cultured in the United States. Due to differing techniques and study methodologies, these procedures continue to be considered experimental and are ***not generally recommended***.

d. **Platelet Rich Plasma (PRP):** Platelet Rich Plasma injections are intended to augment soft tissue healing. Blood is obtained from the patient, centrifuged to increase the platelet content and re-injected into the injury site.

There is insufficient evidence for or against the use of PRP in the setting of Achilles tendinopathy or application to the ACL patellar tendon donor site. There is also no evidence supporting the use of PRP for augmentation of ACL reconstruction. There is also insufficient evidence from another recent systematic review to recommend for or against PRP injections for non-insertional Achilles tendinopathy. Additionally, there is insufficient evidence from randomized controlled trials to draw conclusions on the use, or to support the routine use, of injection therapies, including PRP, for the treatment of Achilles tendinopathy. There is insufficient evidence to support use of PRP with an open reduction of a calcaneus fracture.

There is inadequate evidence of the effectiveness of PRP in the setting of microfracture in patients with knee OA over the age of 40. Therefore, it is ***not recommended***.

There is some evidence that, in the setting of total knee arthroplasty, intraoperative use of PRP can reduce blood loss, improve levels of postoperative hemoglobin, and reduce the need for blood transfusions by the third postoperative day. There is also some evidence that PRP theoretically may improve pain control and promote earlier return to function. Therefore it may be used in total knee arthroplasty.

There is inadequate evidence to recommend for the use of PRP in the setting of plantar fasciitis to improve pain, function, or alignment. Therefore, PRP is ***not generally recommended*** to treat plantar fasciitis, but may be considered in unusual circumstances for cases which have not responded to appropriate conservative measures for 4 to 6 months.

There is some evidence that, in the setting of knee OA, intra-articular injection with PRP is more effective than HA or placebo in improving knee function and pain. There is some evidence that in patients with knee OA, a single PRP injection is more beneficial than a saline injection, and that more than one PRP injection is likely to be more beneficial than a single PRP injection when the Kellgren-Lawrence grade is less than Grade IV, and that a single PRP injection is as beneficial as three hyaluronic acid injections for knee OA. Therefore, it may be used for patients with significant functional deficits who are not yet eligible for or to forestall an arthroplasty.

Therefore, PRP is ***not generally recommended***. It may be considered in unusual circumstances for cases which meet the following three criteria:

- tendon damage or osteoarthritis; ***and***
- non-responsiveness to appropriate conservative measures; ***and***
- the next level of guideline -consistent therapy would involve an invasive procedure with risk of significant complications ***and***~~.~~
- Approval from the designated authorized treating physician***.***

If PRP is found to be indicated in these select patients, the first injection may be repeated twice when significant functional benefit is reported but the patient has not returned to full function***.***

Steroid injections prior to use of PRP are believed to lower the chance of healing. Generally, PRP injections should not be used for at least 2 months following a steroid injection.

e. **Viscosupplementation/Intracapsular Acid Salts**:

There is strong evidence that, in the setting of knee osteoarthritis, the effectiveness of viscosupplementation is clinically unimportant, and may impose a risk of adverse events on the patient.

A recent meta-analysis has garnered a large amount of support for use of hyaluronic acid injections in the ankle. This seemingly confirmed findings from some previous randomized controlled trials while contradicting others. However, a major statistical error in the findings of this meta-analysis has been overlooked by many reviewers. The study, when examined appropriately, does not reveal a statistically significant difference between hyaluronic acid and saline. Thus, there is inadequate evidence that HA is more effective than saline for treatment of ankle osteoarthritis. Hyaluronic acid injections are, therefore, ***not recommended*** for ankle osteoarthritis due to the small effect size documented in knee conditions and the lack of evidence supporting its use in the ankle. Therefore, the patient and treating physician should identify functional goals and the likelihood of achieving improved ability to perform activities of daily living or work activities with injections versus other treatments. The patient should agree to comply with the treatment plan including home exercise. These injections may be considered an alternative in patients who have failed non-operative treatment and for whom surgery is not an option, particularly if non-steroidal anti-inflammatory drug treatment is contraindicated or has been unsuccessful. Viscosupplementation's efficacy beyond 6 months is not well-established. There is no evidence that one product significantly outperforms another. Prior authorization is required to approve product choice and for repeat series of injections.

Due to lack of efficacy, viscosupplementation for knee or ankle is ***not recommended*** and requires prior authorization. It may be used for patients with significant functional deficits who are not eligible for or wish to delay arthroplasty.

Viscosupplementation is ***not recommended*** for hip arthritis given the probable superiority of corticosteroid injections. In rare cases a patient with significant hip osteoarthritis who does not qualify for surgical intervention may try viscosupplementation. It should be done with ultrasound or fluoroscopic guidance and will not necessarily require a series of three injections. The patient may choose to have repeat injections when the first injection was successful.

- Time to Produce Effect:1-3 injections; one injection may provide sufficient relief, a series of three is not required.

- Frequency: One injection or 1 series (3 to 5 injections generally spaced 1 week apart).

- Optimum/Maximum Duration: 2 series. Efficacy beyond 6 months is not well-established.

f. **Prolotherapy**: (also known as sclerotherapy) consists of peri-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. There is no evidence to support the use of injection therapies, including steroids, for treating Achilles tendinopathy. The evidence in support of prolotherapy is insufficient and therefore, its use is ***not recommended*** in lower extremity injuries.

g. **Trigger Point Injections & Dry Needling**: 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.

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

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

Indications - Trigger point injections and dry needling may be used to relieve myofascial pain and facilitate active therapy and stretching of the affected areas. They are to be used as an adjunctive treatment in combination with other

treatment modalities such as active therapy programs. Trigger point injections should be utilized primarily for the purpose of facilitating functional progress. Patients should continue in an aggressive aerobic and stretching therapeutic exercise program, as tolerated, while undergoing intensive myofascial interventions. Myofascial pain is often associated with other underlying structural problems. Any abnormalities need to be ruled out prior to injection.

Trigger point injections and dry needling are indicated in patients with consistently observed, well-circumscribed trigger points. This demonstrates a characteristic radiation of pain pattern, and local autonomic reaction such as persistent hyperemia following palpation. Generally, neither trigger point injections nor dry needling are necessary unless consistently observed trigger points are not responding to specific, noninvasive, myofascial interventions within approximately a 6-week time frame. However, both trigger point injections and dry needling may be occasionally effective when utilized in the patient with immediate, acute onset of pain or in a post-operative patient with persistent muscle spasm or myofascial pain.

Complications - Potential but rare complications of trigger point injections and dry needling include infection, pneumothorax, anaphylaxis, penetration of viscera, neurapraxia, and neuropathy. If corticosteroids are injected in addition to local anesthetic, there is a risk of local myopathy. Severe pain on injection suggests the possibility of an intraneural injection, and the needle should be immediately repositioned. The following treatment parameters apply to both interventions combined.

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

h. **Botulinum Toxin Injections**: Description – Used to temporarily weaken or paralyze muscles. May reduce muscle pain in conditions associated with spasticity, dystonia, or other types of painful muscle spasm. EMG needle guidance may permit more precise delivery of botulinum toxin to the target area.

There is some evidence that, in patients with plantar fasciitis lasting 3 months or more, botulinum toxin type A injected into the gastrocnemius-soleus complex combined with stretching produces greater pain reduction and greater functional improvement than corticosteroid injection into the heel combined with stretching. The effect sizes were clinically significant and lasted through 6 months. A therapeutic response to a botulinum toxin type A injection into the gastrocnemius-soleus complex may also be helpful in determining which patients would respond favorably to a gastrocnemius recession surgery. This is not a FDA approved indication. Thus, the evidence supports injections into the gastrocnemius-soleus complex.

There is insufficient evidence and no plausible physiologic theory to support a

botulinum toxin injection into the plantar fascia. Therefore, it is ***not recommended***.

Complications – Rare systemic effects include flu-like syndrome, and weakening of distant muscles.

- Time to Produce Effect: 24 to 72 hours post injection with peak effect by 4 to 6 weeks.

- Frequency: No less than 3 months between re-administration. Patients should be reassessed after each injection session for an 80% improvement in pain (as measured by accepted pain scales) and evidence of functional improvement for 3 months. A positive result would include a return to base line function, return to increased work duties, and measurable improvement in physical activity goals, including return to baseline after an exacerbation.

- Optimum Duration: 3 to 4 months.

- Maximum Duration: 1 time. Prior authorization is required for additional injections. Repeat injections should be based upon functional improvement. In most cases, not more than four injections are appropriate due to accompanying muscle atrophy.

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

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

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

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

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

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

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

- Communication: To ensure positive functional outcomes, communication between the patient, insurer, and all professionals involved must be coordinated and consistent. Any exchange of information must be provided to all parties, including the patient. Care decisions should be communicated to all parties and should include the family and/or support system.

- Documentation: Through documentation by all professionals involved and/or discussions with the patient, it should be clear that functional goals are being actively pursued and measured on a regular basis to determine their achievement or need for modification. It is advisable to have the patient undergo objective functional measures.

- Treatment Modalities: Use of modalities may be necessary early in the process to facilitate compliance with and tolerance to therapeutic exercise, physical conditioning, and increasing functional activities. Active treatments should be emphasized over passive treatments. Active and self-monitored passive treatments should encourage self-coping skills and management of pain, which can be continued independently at home or at work. Treatments that can foster a sense of dependency by the patient on the caregiver should be avoided. Treatment length should be decided based upon observed functional improvement. For a complete list of active and passive therapies, refer to F.12. Therapy – Active and F.13. Therapy – Passive. All treatment timeframes may be extended based on the patient's positive functional improvement.

- Therapeutic Exercise Programs: A therapeutic exercise program should be initiated at the start of any treatment rehabilitation. Such programs should emphasize education, independence, and the importance of an on-going exercise regimen. There is good evidence that exercise alone or part of a multi-disciplinary program results in decreased disability for workers with non-acute low back pain. There is not sufficient evidence to support the recommendation of

any particular exercise regimen over any other exercise regimen.

- Return to Work: The authorized treating physician should continually evaluate the patients for their potential to return to work. For patients who are currently employed, efforts should be aimed at keeping them employed. Formal rehabilitation programs should provide assistance in creating work profiles. For more specific information regarding return to work, refer to F.11. Return to Work.

- Patient Education: Patients with pain need to re-establish a healthy balance in lifestyle. All providers should educate patients on how to overcome barriers to resuming daily activity, including pain management, decreased energy levels, financial constraints, decreased physical ability, and change in family dynamics.

- Psychosocial Evaluation and Treatment: Psychosocial evaluation should be initiated, if not previously done. Providers should have a thorough understanding of the patient's personality profile, especially if dependency issues are involved. Psychosocial treatment may enhance the patient's ability to participate in pain treatment rehabilitation, manage stress, and increase their problem-solving and self-management skills.

- Vocational Assistance: Vocational assistance can define future employment opportunities or assist patients in obtaining future employment. Refer to F.13. Return to Work for detailed information.

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

a. Formal Interdisciplinary Rehabilitation Programs:

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

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

The Medical Director of the pain program should ideally be board certified in pain management. Alternatively, he/she should be board certified in his/her specialty area and have completed a one-year fellowship in interdisciplinary pain medicine or palliative care recognized

by a national board. As a final alternative, he or she should have two years of experience in an interdisciplinary pain rehabilitation program. Teams that assist in the accomplishment of functional, physical, psychological, social, and vocational goals must include: a medical director, pain team physician(s), who should preferably be board certified in an appropriate specialty, and a pain team psychologist. Professionals from other disciplines on the team may include, but are not limited to: a biofeedback therapist, an occupational therapist, a physical therapist, a registered nurse (RN), a case manager, an exercise physiologist, a psychologist, a psychiatrist, and/or a nutritionist.

- Time to Produce Effect: 3 to 4 weeks.
- Frequency: Full time programs – No less than 5 hours per day, 5 days per week; part-time programs – 4 hours per day, 2–3 days per week.
- Optimum Duration: 3 to 12 weeks at least 2–3 times a week. Follow-up visits weekly or every other week during the first 1 to 2 months after the initial program is completed.
- Maximum Duration: 4 months for full-time programs and up to 6 months for part-time programs. Periodic review and monitoring thereafter for 1 year, AND additional follow-up based on the documented maintenance of functional gains.

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

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

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

As appropriate, the team may also include any of the following: chiropractor, an RN, a case manager, a psychologist, a vocational specialist, or a certified biofeedback therapist.

- Time to Produce Effect: 2 weeks.
- Frequency: 2 to 5 visits per week, up to 8 hours per day.

- ❖ Optimum Duration: 2 to 4 weeks.
- ❖ Maximum Duration: 6 weeks. Participation in a program beyond 6 weeks must be documented with respect to need and the ability to facilitate positive symptomatic and functional gains.

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

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

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

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

- ❖ Time to Produce Effect: 3 to 4 weeks.
- ❖ Frequency: Full-time programs – No less than 5 hours per day, 5 days per week; Part-time programs – 4 hours per day for 2–3 days per week.
- ❖ Optimum Duration: 3 to 12 weeks at least 2–3 times a week. Follow-up visits weekly or every other week during the first 1 to 2 months after the initial program is completed.

Maximum Duration: 4 months for full-time programs and up to 6 months for part-time programs. Periodic review and monitoring thereafter for 1 year, and additional follow-up based upon the documented maintenance of functional gains.

8. **JOBSITE ALTERATION** Early evaluation and training of body mechanics are essential for every injured worker. Risk factors to be addressed include: repetitive work, lifting, and forces that have an impact on the lower extremity. In some cases, this requires a jobsite evaluation. There is no single factor or combination of factors that is proven to prevent or ameliorate lower extremity pain, but a combination of ergonomic and psychosocial factors are generally considered to be important. Physical factors that may be considered include

use of force, repetitive work, squatting, climbing, kneeling, crouching, crawling, prolonged standing, walking a distance or on uneven surfaces, jumping, running, awkward positions requiring use of force, and lower extremity vibration. Psychosocial factors to be considered include pacing, degree of control over job duties, perception of job stress, and supervisory support.

The job analysis and modification should include input from the employee, employer, and a medical professional familiar with work place evaluation. An ergonomist may also provide useful information. The injured worker must be present and an employee must be observed performing all applicable job functions in order for the jobsite analysis to be valid. Periodic follow-up is recommended to evaluate effectiveness of the intervention and need for additional ergonomic changes.

a. **Ergonomic Changes**: may be made to modify the hazards identified. In addition, workers should be counseled to vary tasks throughout the day. When possible, employees performing repetitive tasks should take 15 to 30 second breaks every 10 to 20 minutes, or 5-minute breaks every hour. Mini-breaks should include stretching exercises.

b. **Interventions**: should consider engineering controls (e.g., mechanizing the task, changing the tool used, or adjusting the jobsite), or administrative controls (e.g., adjusting the time an individual performs the task).

9. **MEDICATIONS AND MEDICAL MANAGEMENT** Use of medications will vary widely due to the spectrum of injuries from simple strains to complicated fractures. A thorough medication history, including use of alternative and over-the-counter medications, should be performed at the time of the initial visit and updated periodically. Treatment for pain control is initially accomplished with acetaminophen and/or NSAIDs. The patient should be educated regarding the interaction with prescription and over-the-counter medications as well as the contents of over-the-counter herbal products.

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.

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

Glucosamine and chondroitin are sold in the United States as dietary supplements. Their dosage, manufacture, and purity are not regulated by the Food and Drug Administration.

There is good evidence that glucosamine sulfate and glucosamine hydrochloride are ineffective for relieving pain in patients with knee or hip OA. There is some evidence that glucosamine sulfate treatment for more than 6 months shows a small improvement in joint function compared to placebo controls in people with osteoarthritis of the knee or hip. There is some evidence that chondroitin plus glucosamine has no clinically important effect on knee pain and function when taken for two years. An effect of slowing of the progression of joint space narrowing cannot be ruled out. However, due to investigations finding that 79% of herbal supplements did not actually contain the substance on the label, these supplements are ***not recommended***.

S-adenosyl methionine (SAM-e), like glucosamine and chondroitin, is sold as a dietary supplement in the United States, with a similar lack of standard preparations of dose and

manufacture. There is some evidence that a pharmaceutical-grade SAM-e is as effective as celecoxib in improving pain and function in knee osteoarthritis, but its onset of action is slower. Studies using liquid chromatography have shown that it may lose its potency after several weeks of storage. In addition, SAM-e has multiple additional systemic effects. It is not currently recommended due to lack of availability of pharmaceutical quality, systemic effects, and loss of potency with storage.

There is insufficient evidence to evaluate if topical herbal therapies (arnica, capsicum, and comfrey extract gels) are effective for treating patients with knee or hip OA. There is insufficient evidence to evaluate if avocado-soybean unsaponifiables (ASU) or the proprietary ASU product Piasclidine® are effective for treating patients with knee or hip OA. There is good evidence that *Boswellia serrata* is marginally effective for decreasing pain and improving function in treating patients with knee or hip OA. However, due to investigations finding that 79% of herbal supplements did not actually contain the substance on the label, these supplements are ***not recommended***.

The following are listed in alphabetical order.

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

There is good evidence that acetaminophen is not more effective than placebo for the treatment of knee osteoarthritis. It is likely the acetaminophen is also not effective for hip arthritis either. It may be used on patients with contraindications to other medications.

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

b. **Bisphosphonates**: may be used for patients who qualify under osteoporosis guidelines. Long-term use for the purpose of increasing prosthetic fixation is ***not recommended*** as long-term improvement in fixation is not expected.

There is some evidence that a post-surgery single infusion of zoledronic acid is not effective in reducing the time to clinical osteotomy healing compared to a control infusion. Other medications such as alendronate have been tried for femoral osteonecrosis; however, results are inconsistent. Therefore, they are ***not recommended*** for those without osteopenia or osteoporosis. See Section 7.h. Osteoporosis Management Section below.

c. **Deep Venous Thrombosis (DVT) Prophylaxis**: is a complex issue involving many variables such as individual patient characteristics, the type of surgery, anesthesia used, and agent(s) used for prophylaxis. Final decisions regarding prophylaxis will depend on the surgeon's clinical judgment. The following are provided as generally accepted concepts regarding prophylaxis at the time of

writing of these guidelines.

All patients undergoing lower extremity surgery or prolonged lower extremity immobilization should be evaluated for elevated risk for DVT and should receive education on prevention. Possible symptoms should be discussed. Patients at higher risk than the normal population include, but are not limited to, those with known hypercoagulable states and those with previous pulmonary embolism or DVT. Those with a higher risk for bleeding, may alter thromboprophylaxis protocols. This includes patients with a history of a bleeding disorder, severe renal failure, use of an antiplatelet agent, active liver disease, revision surgery, extensive dissection or difficult to control bleeding.

There is no evidence to support mandatory prophylaxis for all patients who have isolated lower extremity injuries with immobilization. No prophylaxis is recommended for knee arthroscopy in patients without a history of prior venous thrombosis.

Hip and knee arthroplasties and hip fracture repair are standard risk factors requiring thromboprophylaxis.

There is good evidence that, in the setting of total hip or knee replacement, a venous foot pump or a strategy using chemoprophylaxis with low-molecular weight heparin, heparin, or heparin combined with aspirin, confer approximately equal benefits for preventing thrombotic events and pulmonary emboli. However, pulmonary emboli are a rare complication.

Chemoprophylaxis begins 12 hours pre or postoperatively. Low molecular weight heparin may be preferred. Dual prophylaxis, chemical and intermittent pneumatic compression devices may be more appropriate for at risk patients and during the hospital stay. However, single prophylaxis is also acceptable. Prophylaxis may be extended to 35 days. Chemical prophylaxis may use low-molecular-weight heparin, fondaparinux, apixaban, dabigatran, rivaroxaban, low-dose unfractionated heparin, adjusted-dose vitamin K antagonist and aspirin. One Cochrane review found similar prophylaxis for direct thrombin inhibitors as for warfarin, low molecular weight heparin or coumarin. However, new agents caused more bleeding. Aspirin is generally used with compressive devices and is one recommended option.

Combined compression and chemoprophylaxis may be important for patients with previous venous thrombosis and compression should be used for all patients during hospitalization. Patients with a history of bleeding disorders should receive mechanical compression only.

All patients should be mobilized as soon as possible after surgery. Mechanical prophylaxis such as pneumatic devices that are thigh/calf, calf only, or foot pumps should be considered immediately postoperatively and/or until the patient is discharged. Thigh length or knee high graduated compression stockings are used for most patients. With prolonged prophylaxis, lab tests must be drawn regularly. These may be accomplished with home health care or outpatient laboratories when appropriate.

Asymptomatic patients should **not** have Doppler or duplex ultrasound screening before discharge.

d. **Doxycycline:** There is good evidence that oral doxycycline has no therapeutic effect on knee OA.

e. **Minor Tranquilizer/Muscle Relaxants**: Appropriate for objective findings of muscle spasm with pain. When prescribing these agents, physicians must seriously consider all central nervous system (CNS) side effects including drowsiness or dizziness and the fact that benzodiazepines may be habit-forming**.** Carisoprodol, which metabolizes into meprobamate, is a known addictive drug. Chronic use of benzodiazepines or any muscle relaxant is ***not recommended*** due to their habit-forming potential, seizure risk following abrupt withdrawal, and documented contribution to deaths of patients on opioids due to respiratory depression. A number of muscle relaxants interact with other medications.

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

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

Topical NSAIDs may be more appropriate for some patients as there is some evidence that topical NSAIDs are associated with fewer systemic adverse events than oral NSAIDs.

Oral and topical NSAIDs are likely to be beneficial in the short-term treatment of acute ankle sprains, but there is no evidence on long-term effects, and oral NSAIDs may be associated with possible adverse events.

There is some evidence that a six week postoperative course of 75 mg of daily indomethacin does not reduce the risk of heterotopic ossification compared to placebo, and that the risk of nonunion may be increased with 6 weeks of indomethacin.

There is some evidence that, in the setting of long bone fractures of the femur, tibia, and humerus, NSAID administration in the first 48 hours after injury is

associated with poor healing of the fracture.

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

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

Includes NSAIDs and acetylsalicylic acid. Serious GI toxicity, such as bleeding, perforation, and ulceration can occur at any time, with or without warning symptoms, in patients treated with traditional NSAIDs. Physicians should inform patients about the signs and/or symptoms of serious GI toxicity and what steps to take if they occur. Anaphylactoid reactions may occur in patients taking NSAIDs. NSAIDs may interfere with platelet function. Fluid retention and edema have been observed in some patients taking NSAIDs.

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

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

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

COX-2 inhibitors should not be first-line for low risk patients who will be using an NSAID short-term. COX-2 inhibitors are indicated in select patients who do not tolerate traditional NSAIDs. 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.

g. **Opioids**: should be primarily reserved for the treatment of severe lower extremity pain. There are circumstances where prolonged use of opioids is justified based upon specific diagnosis and in pre- and post–operative patients. In these and other cases, it should be documented and justified. In mild-to-moderate cases of lower extremity pain, opioid medication should be used cautiously on a case-by-

case basis. Adverse effects include respiratory depression, the development of physical and psychological dependence, and impaired alertness.

Opioids 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 pain scale and assessment of function to rate effectiveness of the opioid prescribed. Any use beyond the maximum should be documented and justified based on the diagnosis and/or invasive procedures.

- Optimum Duration: Up to 10 days.

- Maximum Duration: 2 weeks. Use beyond 2 weeks is acceptable in appropriate cases when functional improvement is documented. Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines, which give a detailed discussion regarding medication use in chronic pain management. Use beyond 30 days after non-traumatic injuries, or 6 weeks post-surgery after the original injury or postoperatively is ***not recommended***. If necessary the physician should access the Colorado Prescription Drug Monitoring Program (PDMP) and follow recommendations in Chronic Pain Guideline. This system allows the prescribing physician to see most of the controlled substances prescribed by other physicians for an individual patient.

h. **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.

i. **Osteoporosis Management**:

One in 5 men and one in 2 Caucasian women will experience an osteoporosis related fracture in their lifetime.

Medications/Vitamins : All patients with conditions which require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day which is similar to recommendations for older patients or those with osteoporosis and age greater than 50. Natural sources for vitamins, diet and sunlight, may be preferred but supplements are frequently necessary. A Cochrane review noted that supplements of vitamin D and calcium may prevent hip or any type of fracture. A systematic review was unable to find evidence for the role of vitamin D alone. Monitoring of vitamin D levels can be considered and may be appropriate for delayed healing of fracture, lack of radiographic signs of healing, or suspected vitamin D deficiency. For all fractures, an initial vitamin D level should be obtained if there is any clinical suspicion of deficiency. Monitoring and treatment for any deficiency should continue as clinically indicated.

There is some evidence that, for women in the older age group (58 to 88) with low hip bone density, greater callus forms for those who adhere to these recommendations than those who do not. Although the clinical implications of this are not known, there is greater nonunion in this age group and thus, coverage for these medications during the fracture healing time period is recommended. At this time there is no evidence that bisphosphonates increase acute fracture healing.

Patients with a low energy fracture, female patients 65 and older, and men 70 and older should have a bone mineral density test. A bone mineral density test may also be considered for men and women aged 50-69. Patients who have been on prednisone at a dose of 5 mg for more than 3 months should be evaluated for glucocorticoid induced osteoporosis. Risk factors for osteoporosis include alcohol use of 3 or more drinks per day, tobacco use, low BMI, parental history of hip fracture, 2º osteoporosis, age, and rheumatoid arthritis. Those with risk factors for secondary osteoporosis may require further workup. In one adequate study, all patients aged 50 to 75 referred to an orthopaedic department for treatment of wrist, vertebral, proximal humerus, or hip fractures received bone mass density testing. 97% of patients had either osteoporosis (45%) or osteopenia (42%). Referral is important to prevent future factures in these groups. Long-term care for osteoporosis is not covered under workers compensation even though it may be discovered due to an injury-related acute fracture. It is unclear if bisphosphonate use beyond 5 years is necessary. Patients should be counseled regarding prevention, including decreased alcohol consumption, smoking cessation, regular exercise, and vitamin D and calcium consumption, preferably from dietary sources.

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

There is good evidence that duloxetine more effectively decreases knee OA pain in older adults than placebo. However, the side effect profile of constipation and other symptoms should be considered if the drug is given to older adults.

Anti-anxiety medications are best used for short-term treatment (i.e. less than 6 months). Accompanying sleep disorders are best treated with sedating anti-depressants prior to bedtime. Frequently, combinations of the above agents are useful. The physician should be aware of potential drug interactions with these combinations. As a general rule, physicians should assess the patient's prior history of substance abuse or depression prior to prescribing any of these agents.

Due to the habit-forming potential of the benzodiazepines and other drugs found in this class, they are ***not generally recommended***. Refer to the Division's Chronic Pain Disorder Medical Treatment Guidelines, which give a detailed discussion regarding medication use in chronic pain management.

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

k. **Topical Drug Delivery**: Creams and patches 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.

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. 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 by allowing the topical use of these medications when systemic administration is relatively contraindicated. This may be the case in patients with hypertension, cardiac failure, or renal insufficiency.

There is strong evidence from a meta-analysis that topical NSAIDs are more effective than placebo vehicles such as gels or creams in the setting of acute musculoskeletal injuries, and some evidence that topical NSAIDs are associated with fewer systemic adverse events than oral NSAIDs.

There is no evidence that topical agents are more effective than oral medications. Therefore, they should not generally be used unless the patient has an intolerance to oral anti-inflammatories.

- Optimum Duration: One week.
- Maximum Duration: 2 weeks per episode.

ii. Capsaicin: is another medication option for topical drug use in lower extremity injury. Capsaicin offers a safe 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.

- Optimum Duration: One week.
- Maximum 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 when there are demonstrated functional gains or decreased use of oral medication with side-effects. .

- ❖ Optimum Duration: Varies with drug or compound.
- ❖ Maximum Duration: Varies with drug or compound.

iv. Iontophoretic Agents: Refer to Section F.15.e. Iontophoresis.

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

There is good evidence that, in the setting of hip OA, the analgesic and functional effects of tramadol compared to placebo are likely to be small enough to be clinically unimportant. Careful dose titration is recommended as some patients experience intolerance. There may be fewer life-threatening adverse events with tramadol than with commonly used NSAIDs. However, it is commonly used for chronic pain and may be useful for some patients.

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

m. **Tranexamic Acid**: Tranexamic acid is an effective anti fibrinolytic agent which decreases the need for blood transfusions. Blood transfusions increase the likelihood of infection for hip and knee arthroplasties. It is usually given in two doses intravenously or topically on the surgical site. There is strong evidence that tranexamic acid in the setting of total knee arthroplasty reduces blood loss, reduces the risk of transfusion, and reduces the number of units transfused, without increasing the risk of pulmonary embolus or deep vein thrombosis. It is also used for hip arthroplasty. Contraindications include patients with hypercoagulable states, cardiac stints, previous strokes. Dosage adjustment for those with renal compromises.

10. OCCUPATIONAL REHABILITATION PROGRAMS

a. **Non-Interdisciplinary**: These generally accepted programs are work-related, outcome-focused, individualized treatment programs. Objectives of the program include, but are not limited to, improvement of cardiopulmonary and neuromusculoskeletal functions (strength, endurance, movement, flexibility, stability, and motor control functions), patient education, and symptom relief. The goal is for patients to gain full or optimal function and return to work. The service

may include the time-limited use of passive modalities with progression to 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 Jobsite Analysis.

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

11. ORTHOTICS AND PROSTHETICS

a. Fabrication/Modification of Orthotics: would be used when there is a 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. Footwear modifications may be necessary for work shoes and everyday shoes. Replacement is needed every six months to one year. For specific types of orthotics/prosthetics see Section E, "Specific Lower Extremity Injury Diagnosis, Testing and Treatment."

There is good evidence that valgus knee bracing provides moderate improvement in pain and function compared to patients who do not use another type of orthosis. There is also good evidence that the use of valgus knee bracing also provides a small improvement in pain among patients with medial knee osteoarthritis, compared to patients who use another type of orthosis. Thus,

valgus knee bracing is a reasonable treatment for medial knee osteoarthritis.

There is some evidence that conservative management using either the valgus knee brace or the lateral wedged insole reduces pain and improves function in adults with medial tibiofemoral osteoarthritis of the knee. There were no significant differences between the two orthoses in any of the clinical outcomes. Participants wore the insoles more consistently than the braces, and this may reflect convenience and greater acceptance of use. There is some evidence that laterally elevated wedged insoles are more effective in reducing pain, improving function, and reducing NSAID usage than neutrally wedged insoles in adults with medial compartment knee osteoarthritis. Participants wore the neutral insoles more consistently than the elevated insoles, and this may reflect on their comfort and greater acceptance of use. Thus, there is good evidence for the use of laterally elevated wedged soles for those with medial osteoarthritis.

There is good evidence that orthoses have a small, short-term (3 months) functional benefit compared to sham orthosis in the treatment of plantar fasciitis. There is also some evidence for overall subjective improvement from various types of orthoses plus stretching compared to stretching alone. Evidence does not support pain reduction from orthoses. There is strong evidence that the effectiveness of prefabricated orthoses is equivalent to, and possibly better than, custom-made orthoses. There is insufficient information to support the superiority of custom-made orthoses over those that are prefabricated. Generally custom made orthoses are not necessary except in specific cases such as those with anatomic or alignment abnormalities of the foot.

There is some evidence that off the shelf foot orthoses were found to be better than flat foot inserts in the short-term for patellofemoral pain syndrome. In this study both physiotherapy and foot orthoses had similar outcomes at 52 weeks. Physiotherapy once each week for 6 weeks included joint mobilization, taping and quadriceps muscle strengthening. Although foot orthoses added to PT did not appear to change long-term outcome, it is possible they may hasten return to work. In another study, patients with patellofemoral pain syndrome who benefited most from orthoses met 3 of the following criteria: older than 25; height less than 165cm; worst pain less than 5.3/10; and mid foot width difference from non-weight bearing to weight bearing greater than 10.96mm.

- Time to Produce Effect: 1 to 3 sessions (includes wearing schedule and evaluation).
- Frequency: 1 to 2 times per week.
- Optimum/Maximum Duration: Over a period of approximately 4 to 6 weeks for casting, fitting, and re-evaluation.

b. **Orthotic/Prosthetic Training**: is the skilled instruction (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**: indications for splints and adaptive equipment include the need to 1) control stress during functional activities following neurological and orthopedic injuries and 2) modify tasks through instruction in the use of a device or physical modification of a device. This includes design, fabrication, and/or modification. Equipment and any associated training should improve safety and reduce risk of re-injury. This includes high and low technology assistive options such as workplace modifications, crutch or walker training, and self-care aids.

There is inadequate evidence to recommend for or against night splinting for plantar fasciitis. A single randomized controlled trial of night splinting was identified but did not meet criteria for evidence due to large risk of bias. Night splinting is commonly used for plantar fasciitis and may be incorporated as a part of the stretching protocol.

- Time to Produce Effect: Immediate.
- Frequency: 1 to 3 sessions or as indicated to establish independent use.
- Optimum/Maximum Duration: 1 to 3 sessions.

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

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

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

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

A psychologist with a PhD, PsyD, EdD credentials, or a psychiatric MD/DO may perform psychosocial treatments. Other licensed mental health providers or licensed health care providers with training in CBT, or certified as CBT therapists who have experience in

treating chronic pain disorders in injured workers, may also perform treatment in consultation with a PhD, PsyD, EdD, or psychiatric MD/DO.

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

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

There is good evidence that cognitive intervention reduces low back disability in the short-term and in the long-term. In one of the studies, the therapy consisted of 6, 2-hour sessions given weekly to workers who had been sick-listed for 8-12 weeks. Comparison groups included those who received routine care. There is good evidence that psychological interventions, especially CBT, are superior to no psychological intervention for chronic low back pain. There is also good evidence that self-regulatory interventions, such as biofeedback and relaxation training, may be equally effective. There is good evidence that six group therapy sessions lasting one and a half hours each focused on CBT skills improved function and alleviated pain in uncomplicated sub-acute and chronic low back pain patients. There is some evidence that CBT provided in seven two-hour small group sessions can reduce the severity of insomnia in chronic pain patients. A Cochrane meta-analysis grouped very heterogenous behavioral interventions and concluded that there was good evidence that CBT may reduce pain and disability, but the effect size was uncertain. In total, the evidence clearly supports CBT, and it should be offered to all chronic pain patents who do not have other serious issues, as discussed above.

CBT is often combined with active therapy in an interdisciplinary program, whether formal or informal. It must be coordinated with a psychologist or psychiatrist. CBT can be done in a small group or individually, and the usual number of treatments varies between 8 and16 sessions.

Before CBT is done, the patient must have a full psychological evaluation. The CBT

program must be done under the supervision of a PhD, PsyD, EdD, or psychiatric MD/DO.

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

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

a. **Cognitive Behavioral Therapy (CBT) or Similar Treatment**:

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

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

b. **Other Psychological/Psychiatric Interventions**:

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

13. **RESTRICTION OF ACTIVITIES** Continuation of normal daily activities is the recommendation for most patients since immobility will negatively affect rehabilitation.

Prolonged immobility results in a wide range of deleterious effects, such as a reduction in aerobic capacity and conditioning, loss of muscle strength and flexibility, increased segmental stiffness, promotion of bone demineralization, impaired disc nutrition, and the facilitation of the illness role.

Some level of immobility may occasionally be appropriate which could include bracing. While these interventions may occasionally have been ordered in the acute phase, the provider should be aware of their impact on the patient's ability to adequately comply with and successfully complete rehabilitation. Activity should be increased based on the improvement of core strengthening.

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

14. **RETURN-TO-WORK** Return to work and/or work-related activities whenever possible is one of the major components in treatment and rehabilitation. Return to work is a subject that should be addressed by each workers' compensation provider at the first meeting with the injured employee and updated at each additional visit. A return-to-work format should be part of a company's health plan, knowing that return to work can decrease anxiety, reduce the possibility of depression, and reconnect the worker with society.

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

Two counseling sessions with an occupational physician, and work site visit if necessary, may be helpful for workers who are concerned about returning to work.

At least one study suggests that health status is worse for those patients who do not return to work than those who do. Self-employment and injury severity predict return to work. Difficulty with pain control, ADLs, and anxiety and depression were common.

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

a. **Job History Interview:** The authorized treating physician should perform a job history interview at the time of the initial evaluation and before any plan of treatment is established. Documentation should include the worker's job demands, stressors, duties of current job, and duties of job at the time of the initial injury. In addition, cognitive and social issues should be identified, and treatment of these issues should be incorporated into the plan of care.

b. **Coordination of Care:** Management of the case is a significant part of return to work and may be the responsibility of the authorized treating physician, occupational health nurse, risk manager, or others. Case management is a method of communication between the primary provider, referral providers, insurer, employer, and employee. Because case management may be

coordinated by a variety of professionals, the case manager should be identified in the medical record.

c. **Communication:** This is essential between the patient, authorized treating physician, employer, and insurer. Employers should be contacted to verify employment status, job duties and demands, and policies regarding injured workers. In addition, the availability and duration of temporary and permanent restrictions, as well as other placement options, should be discussed and documented. All communications in the absence of the patient are required to be documented and made available to the patient.

d. **Establishment of Return-to-Work Status:** Return to work for persons with chronic pain should be considered therapeutic, assuming that work is not likely to aggravate the basic problem or increase the discomfort. In **some** cases of chronic pain, the worker may not be currently working or even employed. The goal of return to work would be to return the worker to any level of employment with the current employer or to return him/her to any type of new employment. Temporary restrictions may be needed while recommended ergonomic or adaptive equipment is obtained; employers should obtain recommended equipment in a timely manner.

e. **Establishment of Activity Level Restrictions:** A formal job description for the injured worker is necessary to identify physical demands at work and assist in the creation of modified duty. A jobsite evaluation may be utilized to identify applicable tasks such as pushing, pulling, lifting, reaching, grasping, pinching, sitting, standing, posture, and ambulatory distance and terrain. If applicable, a job site evaluation may also be utilized to assess temperature, air flow, noise, and the number of hours worked per day in a specific environment. Also refer to Section F.6. Jobsite Alterations. Due to the lack of predictability regarding exacerbation of symptoms affecting function, an extended, occupationally focused functional capacity evaluation may be necessary to determine the patient's tolerance for job type tasks over a continued period of time. Job requirements should be reviewed for the entire 8 hours or more of the working day. Between one and three days after the evaluation, there should be a follow-up evaluation by the treating therapist and/or the authorized treating physician to assess the patient's status. When prescribing the FCE, the physician must assess the probability of return to work against the potential for exacerbation of the work related condition. Work restrictions assigned by the authorized treating physician may be temporary or permanent. The case manager should continue to seek out modified work until restrictions become less cumbersome or as the worker's condition improves or deteriorates.

f. **Rehabilitation and Return to Work:** As part of rehabilitation, every attempt should be made to simulate work activities so that the authorized treating physician may promote adequate job performance. The use of ergonomic or adaptive equipment, therapeutic breaks, and interventional modalities at work may be necessary to maintain employment.

g. **Vocational Assistance:** Formal vocational rehabilitation is a generally accepted intervention and can assist disabled persons to return to viable employment. Assisting patients in identifying vocational goals will facilitate medical recovery and aid in the achievement of MMI by (1) increasing motivation towards treatment and (2) alleviating the patient's emotional distress. Physically limited patients will benefit most if vocational assistance is provided during the

interdisciplinary rehabilitation phase of treatment. To assess the patient's vocational capacity, a vocational assessment utilizing the information from occupational and physical therapy assessments may be performed. This vocational assessment may identify rehabilitation program goals and optimize both patient motivation and utilization of rehabilitation resources. This may be extremely helpful in decreasing the patient's fear regarding an inability to earn a living, which can add to his/her anxiety and depression.

Recommendations to Employers and Employees of Small Businesses: employees of small businesses who are diagnosed with chronic pain may not be able to perform any jobs for which openings exist. Temporary employees may fill those slots while the employee functionally improves. Some small businesses hire other workers, and if the injured employee returns to the job, the supervisor/owner may have an extra employee. Case managers may assist with resolution of these problems and with finding modified job tasks or jobs with reduced hours, etc., depending on company philosophy and employee needs.

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

15. **THERAPY-ACTIVE** The following active therapies are widely used and accepted methods of care for a variety of work-related injuries. They are based on the philosophy that therapeutic exercise and/or activity are beneficial for restoring flexibility, strength, endurance, function, range-of-motion, and can alleviate discomfort. Active therapy requires individual effort 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 predominately comes from 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. Follow-up visits to reinforce and monitor progress and proper technique are recommended. Home exercise can include exercise with or without mechanical assistance or resistance and functional activities with assistive devices.

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

The following active therapies are listed in alphabetical order:

a. **Activities of Daily Living (ADL)**: are well-established interventions which involve instruction, active-assisted training, and/or adaptation of activities or equipment

to improve a person's capacity in normal daily activities such as self-care, work re-integration training, homemaking, and driving.

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

b. **Aquatic Therapy**: is a well-accepted treatment which consists of the therapeutic use of aquatic immersion for therapeutic exercise to promote ROM, flexibility, core stabilization, endurance, strengthening, body mechanics, and pain management. Aquatic therapy includes the implementation of active therapeutic procedures in a swimming or therapeutic pool. The water provides a buoyancy force that lessens the amount of force gravity applies to the body. The decreased gravity effect allows the patient to have a mechanical advantage and more likely to have a successful trial of therapeutic exercise. Studies have shown that the muscle recruitment for aquatic therapy versus similar non–aquatic motions is significantly less. Because there is always a risk of recurrent or additional damage to the muscle tendon unit after a surgical repair, aquatic therapy may be preferred by surgeons to gain early return of ROM. In some cases, the patient will be able to do the exercises unsupervised after the initial supervised session. Parks and recreation contacts may be used to locate less expensive facilities for patients. There is some evidence that, for osteoarthritis of the hip or knee, aquatic exercise may slightly reduce pain and slightly improve function over 3 months. There is also some information that aquatic exercise may reduce pain and improve function in the setting of chronic ankle instability. Indications include:

- Postoperative therapy as ordered by the surgeon; or
- Intolerance for active land-based or full-weight-bearing therapeutic procedures; or
- Symptoms that are exacerbated in a dry environment; and
- Willingness to follow through with the therapy on a regular basis.

The pool should be large enough to allow full extremity ROM and fully erect posture. Aquatic vests, belts, snorkels, and other devices may be used to provide stability, balance, buoyancy, and resistance.

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

A self-directed program is recommended after the supervised aquatics program has been established, or alternatively a transition to a self-directed dry environment exercise program.

c. **Functional Activities**: are the use of therapeutic activity to enhance mobility, body mechanics, employability, coordination, balance, and sensory motor integration.

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

d. **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, sluggish muscle contraction, neuromuscular dysfunction, or peripheral nerve lesion. Indications also may include an individual who is precluded from active therapy.

- 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. Home use is ***not recommended*** for neuromuscularly intact patients.

e. **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. The physician should assess whether the patient has sufficient upper body strength and request strength and core stabilization for those patients that require moe than simple gait training in order to use crutches following non-weight bearing orders.

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

f. **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.

There is good evidence that, for chronic ankle instability, 4 weeks of neuromuscular training aimed at improving balance and proprioception are more effective than no training at producing functional recovery.

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

g. **Therapeutic Exercise**: is a generally accepted treatment with or without mechanical assistance or resistance, may include isoinertial, isotonic, isometric and isokinetic types of exercises.

There is some evidence that a treatment approach consisting of a combination of hip- and knee-strengthening exercises was more effective in improving function and reducing pain over a 1-year period than knee-strengthening exercises alone in sedentary women with patellofemoral pain syndrome (PFPS).

There is good evidence that 4 weeks of resistance training is effective for improving maximal strength, functional ability, and reducing pain when used as a therapeutic rehabilitation program for various musculoskeletal conditions, including chronic tendinopathy, knee osteoarthritis, and after hip replacement surgery.

There is some evidence that, in the setting of hip OA with Kellgren-Lawrence grades 0 through 3, a short 5 week course of 9 sessions of manual therapy yields better overall improvement and hip function in daily activities than a supervised exercise program of similar duration and number of supervised sessions.

There is some evidence that 3-weeks of a home preoperative quadriceps exercise program prior to knee arthroplasty is more effective in reducing pain, and improving function and quadriceps strength in the short-term up to 3 months postoperatively compared with usual care in patients with knee osteoarthritis. However, these effects are not sustained at 6 months after total knee arthroplasty. Thus, there is good evidence supporting pre-operative exercise.

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. May 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.

h. **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.

16. **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, as well as improving the rate of healing soft tissue injuries. They should be used adjunctively with active therapies to help control swelling, pain, and inflammation during the rehabilitation process. They may be used intermittently as a therapist deems appropriate or regularly if there are specific goals with objectively measured functional improvements during treatment.

On occasion, specific diagnoses and post-surgical conditions may warrant durations of treatment beyond those listed as "maximum." Factors such as exacerbation of symptoms, re-injury, interrupted continuity of care, and comorbidities may also extend durations of care. Specific goals with objectively measured functional improvement during treatment must be cited to justify extended durations of care. It is recommended that, if no functional gain is observed after the number of treatments under "time to produce effect" has been completed, 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 Motion (CPM)**: is a form of passive motion using specialized machinery that acts to move a joint. Home use of CPM is expected after some chondral defect surgery or manipulation of a joint under anesthesia. Use of this equipment may require home visits.

There is good evidence that, in people with osteoarthritis of the knee, continuous passive motion following total knee arthroplasty does not have clinically important short-term effects on active knee flexion ROM or medium-term effects on function or quality of life.

There is some evidence that there are no beneficial effects of early aggressive continuous passive motion (CPM) and fixed flexion CPM preceding progressive CPM on the short-term outcomes of range of motion (ROM), pain, and hospital length of stay compared to standardized physical therapy alone in patients following total knee arthroplasty. Therefore, it is ***not recommended.***.

There is good evidence that, in the setting of postoperative ACL rehabilitation, knee bracing is not always necessary. Continuous passive motion has no benefits. Home exercises may be as effective as outpatient rehabilitation in motivated patients. Therefore, it is ***not recommended*** for ACL repair.

Indications: Postoperative for knee microfracture, autologous cartilage implantation, or joint manipulation under anesthesia. Postoperative for hip microfracture.

- Time to Produce Effect: Immediate.
- Frequency: 6-8 hours per day.
- Optimum Duration: Up to 4 weeks post-surgical.
- Maximum Duration: 6 weeks if progress in range of motion is demonstrated.

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. **Dynamic Splinting:** splinting which gradually increases range of motion through increasing the angle of the splint approximately every 2 weeks.

Indications: for patients whose postoperative knee or ankle has limited range of motion and impedes function. Increasing range of motion is used to judge the effect of splinting. Physical therapy should continue with the use of dynamic splints.

- Time to Produce Effect: 2 weeks.
- Frequency: Usually 6-8 hours per day.
- Optimum Duration: 8 weeks.
- Maximum Duration: 16 weeks- may be continued if function ROM has not been reached but continual ROM increase is demonstrated with use.

d. **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. Refer to 3a for Bone Growth Stimulators.

- 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 treatment is effective and frequent use is recommended.
- Optimum Duration: 1 to 3 months.
- Maximum Duration: 3 months.

e. **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.

f. **Hyperbaric Oxygen Therapy**: There is no evidence to support long-term benefit of hyperbaric oxygen therapy for nonunion lower extremity fractures. It is ***not recommended***.

g. **Infrared Therapy**: is a radiant form of heat application. There is no evidence of the effect of monochromatic infrared energy (MIRE) on knee OA. 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.

h. **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 (mecholyl, hyaluronidase, and salicylate), ischemia (magnesium, mecholyl, and 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.

i. **Manipulation**: is a generally accepted, well-established and widely used therapeutic intervention for lower extremity injuries. Manipulative treatment (not therapy) is defined as the therapeutic application of manually guided forces by an operator to improve physiologic function and/or support homeostasis that has been altered by the injury or occupational disease, and has associated clinical significance.

High velocity, low amplitude (HVLA) technique, chiropractic manipulation, osteopathic manipulation, muscle energy techniques, counter strain, and non-force techniques are all types of manipulative treatment. This may be applied by osteopathic physicians (D.O.), chiropractors (D.C.), properly trained physical therapists (P.T.), properly trained occupational therapists (O.T.), or properly trained medical physicians. Under these different types of manipulation exist many subsets of different techniques that can be described as a) direct – a forceful engagement of a restrictive/pathologic barrier, b) indirect – a gentle/non-forceful disengagement of a restrictive/pathologic barrier, c) the patient actively assists in the treatment and d) the patient relaxing, in allowing the practitioner to move the body tissues. When the proper diagnosis is made and coupled with the appropriate technique, manipulation has no contraindications and can be applied to all tissues of the body. Pre-treatment assessment should be performed as part of each manipulative treatment visit to ensure that the correct diagnosis and correct treatment is employed.

There is some evidence that, in patients with plantar fasciitis, six sessions of individually tailored manual therapy with exercise is more effective in improving foot function six months later than six sessions of a standardized program of exercise with ultrasound, dexamethasone iontophoresis, and ice.

There is some evidence that, for ankle sprains, a 4 week program of twice weekly manual physical therapy plus home exercise provides benefits in addition to home exercise alone at the end of treatment. However, these differences decrease over a 6 month period as the natural history of ankle sprains begins to resolve.

- Time to Produce Effect (for all types of manipulative treatment): 1 to 6 treatments.
- Frequency: Up to 3 times per week for the first 3 weeks as indicated by the severity of involvement and the desired effect.
- Optimum Duration: 10 treatments.
- Maximum Duration: 12 treatments. Additional visits may be necessary in cases of re-injury, interrupted continuity of care, exacerbation of symptoms, and co-morbidities. Functional gains including increased ROM must be demonstrated to justify continuing treatment.

j. **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, atrophy, decreased circulation, osteogenic stimulation, inflammation, peripheral neuropathies and the need to facilitate muscle hypertrophy, muscle strengthening, and muscle responsiveness.

- Time to Produce Effect: Variable, depending upon use.

- Frequency: 3 to 7 times per week.
- Optimum Duration: 8 weeks.
- Maximum Duration: 2 months.

k. **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.

l. **Mobilization (Joint)**: Joint mobilization is the skilled application of manual therapy techniques such as gliding, rolling, oscillation and traction to a joint to improve joint play, improve intracapsular arthrokinematics, or reduce symptoms associated with impingement.

There is good evidence that supervised exercise therapy with added manual mobilization shows moderate, clinically important reductions in pain compared to non-exercise controls in people with osteoarthritis of the knee. 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.

- Time to Produce Effect: 6 to 9 treatments.
- Frequency: 3 times per week.
- Optimum Duration: 6 weeks.
- Maximum Duration: 2 months.

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

There is some evidence that, for ankle sprains, a 4 week program of twice weekly manual physical therapy plus home exercise provides benefits in addition to home exercise alone at the end of treatment. However, these differences decrease over a 6 month period as the natural history of ankle sprains begins to resolve.

- 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.

n. **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. If beneficial, provide with home unit or purchase if effective.

o. **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. It 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.

p. **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.

q. **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.

r. **Transcutaneous Electrical Nerve Stimulation (TENS)**: is a generally accepted treatment. 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. Consistent, measurable functional improvement must be documented prior to the purchase of a home unit.

- Time to Produce Effect: Immediate.
- Frequency: Variable.
- Optimum Duration: 3 sessions.
- Maximum Duration: 3 sessions. If beneficial, provide with home unit or purchase if effective. Due to variations in costs and in models, prior authorization for home units is required.

s. **Ultrasound**: is an accepted treatment which 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.

There is no evidence of the effect of ultrasound on knee osteoarthritis. However, there is some evidence that in primary hip osteoarthritis, the addition of ultrasound (US) treatment with conventional physical therapy is more effective in reducing pain and improving function one and 3 months after treatment compared with conventional physical therapy alone. Therefore, ultrasound may be used for treatment of osteoarthritis when combined with active therapy.

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.

t. **Vasopneumatic Devices**: are mechanical compressive devices used in both inpatient 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.

17. **VOCATIONAL REHABILITATION** is a generally accepted intervention, but Colorado law limits its use. Initiation of vocational rehabilitation requires adequate evaluation of patients for quantification of highest functional level, motivation, and achievement of maximum medical improvement (MMI). Vocational rehabilitation may be as simple as returning to the original job or as complicated as being retrained for a new occupation. The effectiveness of vocational rehabilitation may be enhanced when performed in combination with work hardening or work conditioning.

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

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 operative conditions (e.g. peripheral neuropathy, myofascial pain, scleratogenous or sympathetically mediated pain syndromes, psychological), 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 neuro-musculoskeletal examination to identify mechanical pain generators that may respond to non-surgical techniques or may be refractory to surgical intervention.

Structured rehabilitation interventions should strongly be considered postoperatively in any patient not making expected functional progress within three weeks after surgery.

Postoperative therapy will frequently require a repeat of the therapy provided pre-operatively. Refer to Section F. Therapeutic Procedures - Non-operative, and consider the first postoperative visit as visit number one, for the time frame parameters provided.

Return-to-work restrictions should be specific according to the recommendation in Section F.13. Return-To-Work.

The patient and treating physician should have identified functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work. The patient should agree to comply with the pre- and postoperative treatment plan, including home exercise. The provider should be especially careful to make sure the patient understands the amount of postoperative treatment required and the length of partial- and full-disability expected postoperatively. The patient should have committed to the recommended postoperative treatment plan and fully completed the recommended active, manual and pre-operative treatment plans.

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

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 Exam Findings: Painful, limited range of motion of the joint(s). Possible fixed deformity.

d. Diagnostic Testing Procedures: Radiographs. Diagnostic injections, MRI, CT scan, and/or bone scan.

e. Surgical Indications/Considerations: All reasonable conservative measures have been exhausted and other reasonable surgical options have been seriously considered or implemented. Patient has disabling pain or deformity. Fusion is the

procedure of choice for individuals with osteoarthritis who plan to return to physically demanding activities.

There is some concern that ankle arthrodesis may affect the development of adjacent-joint arthritis. However, a recent systematic review found no consensus in the literature as to the effects of ankle arthrodesis on biomechanics or on whether ankle arthrodesis leads to adjacent-joint arthritis.

Medications/Vitamins: All patients with conditions that require bone healing, especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Open reduction internal fixation (ORIF) with possible bone grafting. External fixation may be used in some cases.

Some information from a retrospective case series indicates that both open and arthroscopic arthrodesis significantly reduces pain and improves function. However, the arthroscopic approach may result in a shorter hospital stay and better outcomes at one and two years.

Autologous bone graft is currently considered the gold standard for all indications for bone grafting procedures. However, due to the limited availability and donor site complications, new products are being developed to eliminate the need for autograft. Thus, allograft in combination with advanced orthobiologics may be

considered in lieu of autograft, but advanced orthobiologics require prior authorization.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing, and exercise progressions.

ii. When bony union is achieved, treatment usually includes active therapy with or without passive therapy, including gait training and ADLs. Osseous union may need to be verified by CT scan in order to ensure appropriate healing prior to advancing rehabilitation.

iii. Rocker bottom soles or shoe lifts may be required. A cast is usually in place for 6 to 8 weeks followed by graduated weight-bearing. Modified duty may last up to 4 to 6 months.

iv. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

2. KNEE FUSION

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

b. Occupational Relationship: Usually from post-traumatic arthritis or deformity.

c. Specific Physical Exam Findings: Stiff, painful, sometime deformed limb at the knee joint.

d. Diagnostic Testing Procedures: Radiographs. MRI, CT, diagnostic injections or bone scan.

e. Surgical Indications/Considerations: All reasonable conservative measures have been exhausted and other reasonable surgical options have been seriously considered or implemented, e.g. failure of arthroplasty. Fusion is a consideration particularly in the young patient who desires a lifestyle that would subject the knee to high mechanical stresses. The patient should understand that the leg will be shortened and there may be difficulty with sitting in confined spaces and climbing stairs. Although there is generally a painless knee, up to 50% of cases may have complications.

Medications/Vitamins: All patients with conditions that require bone healing,

especially those over 50, should be encouraged to ingest at least 1000 mg of calcium and 1000 IU of vitamin D per day. Refer to Section F.9.i. Osteoporosis Management.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Open reduction internal fixation (ORIF) with possible bone grafting. External fixation or intramedullary rodding may also be used.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing, and exercise progressions.

ii. When bony union is achieved, treatment usually includes active therapy with or without passive therapy, including gait training and ADLs. Non weight-bearing or limited weight-bearing and modified duty may last up to 4 and 6 months.

iii. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

3. ANKLE ARTHROPLASTY

a. Description/Definition: Prosthetic replacement of the articulating surfaces of the ankle joint.

b. Occupational Relationship: Usually from post-traumatic arthritis.

c. Specific Physical Exam Findings: Stiff, painful ankle. Limited range-of-motion of the ankle joint.

d. Diagnostic Testing Procedures: Radiographs, MRI, diagnostic injections, CT scan, bone scan.

e. Surgical Indications/Considerations: When pain interferes with ADLs, and all reasonable conservative measures have been exhausted and other reasonable surgical options have been considered or implemented. A very limited population of patients are appropriate for ankle arthroplasty.

Requirements include:

- Good bone quality;
- BMI less than 35;
- Nonsmoker currently;
- Patient is 55 or older;
- No lower extremity neuropathy;
- Patient does not pursue physically demanding work or recreational activities.
- Diabetics under confirmed control with Hgb A1c no greater than 8%.

The following issues should be addressed when determining appropriateness for surgery: ankle laxity, bone alignment, surrounding soft tissue quality, vascular status, presence of avascular necrosis, history of open fracture or infection, motor dysfunction, and treatment of significant knee or hip pathology.

Ankle implants are less successful than similar procedures in the knee or hip. While the volume of total ankle arthroplasty procedures is increasing, there are no quality studies comparing arthrodesis to ankle replacement. Patients with ankle fusions generally have good return to function and fewer complications than those with joint replacements. Re-operation rates may be higher in ankle arthroplasty than in ankle arthrodesis. Long-term performance beyond ten years

for current devices is still unclear. Salvage procedures for ankle replacement include revision with stemmed implant or allograft fusion. Given these factors, an ankle arthroplasty requires prior authorization and a second opinion by a surgeon specializing in lower extremity surgery.

For ankle distraction arthroplasty please refer to section E.1.b Aggravated Osteoarthritis.

Complications: Infection, need for revision, prolonged hospital stay. Revision rates may be somewhat higher for arthroplasty than for arthrodesis.

Contraindications - severe osteoporosis, significant general disability due to other medical conditions, psychiatric issues.

In cases where surgery is contraindicated due to obesity, it may be appropriate to recommend a weight loss program if the patient is unsuccessful losing weight on their own. Coverage for weight loss would continue only for motivated patients who have demonstrated continual progress with weight loss.

Prior to surgery, patients may be assessed for any associated mental health or low back pain issues that may affect rehabilitation.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Prosthetic replacement of the articular surfaces of the ankle; DVT prophylaxis is not always required but should be considered for patients who have any risk factors for thrombosis.

Complications – include pulmonary embolism, infection, bony lysis, polyethylene wear, tibial loosening, instability, malalignment, stiffness, nerve-vessel injury, and peri-prosthetic fracture.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist while using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing, and exercise progressions.

ii. NSAIDs may be used for pain management after joint replacement. They have also been used to reduce heterotopic ossification after ankle arthroplasty. NSAIDs do reduce the radiographically documented heterotopic ossification in this setting, but there is some evidence (in literature on hip arthroplasty) that they do not improve functional outcomes and they may increase the risk of bleeding events in the postoperative period. Their routine use for prevention of heterotopic bone formation is ***not recommended***.

iii. Treatment may include the following: bracing, active therapy with or without passive therapy, gait training, and ADLs. Rehabilitation postoperatively may need to be specifically focused on the following problems: contracture, gastrocnemius muscle weakness, and foot and ankle malalignment. Thus, therapies may include braces, shoe lifts, orthoses, and electrical stimulation accompanied by focused therapy.

iv. In some cases, aquatic therapy may be used. Refer to Section F. Therapeutic Procedures, Non-operative 14, b, Aquatic Therapy. Pool exercises may be done initially under therapist's or surgeon's direction then progressed to an independent pool program.

v. Prior to revision surgery, there should be an evaluation to rule out infection.

vi. Return to work and restrictions after surgery may be made by a treating physician experienced in occupational medicine in consultation with the surgeon or by the surgeon. Patient should be able to return to sedentary work within 4 to 6 weeks. Some patients may have permanent restrictions based on their job duties.

vii. Patients are usually seen annually after initial recovery to check plain x-rays for signs of loosening.

4. KNEE ARTHROPLASTY

a. Description/Definition: Prosthetic replacement of the articulating surfaces of the knee joint.

b. Occupational Relationship: Usually from post-traumatic osteoarthritis.

c. Specific Physical Exam Findings: Stiff, painful knee, and possible effusion.

d. Diagnostic Testing Procedures: Radiographs.

e. Surgical Indications/Considerations: Severe osteoarthritis and all reasonable conservative measures have been exhausted and other reasonable surgical options have been considered or implemented. Significant changes such as advanced joint line narrowing are expected. Refer to subsection E.2. a, Aggravated Osteoarthritis.

Patients younger than 50 may be considered for unicompartmental replacement if there is little or no arthritis in the lateral compartment, there is no inflammatory disease and/or deformity, and BMI is less than 35. They may be considered for lateral unicompartmental disease when the patient is not a candidate for osteotomy. Outcome is better for patients with social support.

In cases where surgery is contraindicated due to obesity, it may be appropriate to recommend a weight loss program if the patient is unsuccessful losing weight on his or her own. Coverage for weight loss would continue only for motivated patients who have demonstrated continual progress with weight loss. A nutritional consultation is recommended for anyone with a BMI over 40. A number of studies suggest that obesity correlates with an increased risk of complications following TKA. Furthermore several studies suggest that morbid obesity (BMI > or = to 40) is associated with lower implant survivorship, lower functional outcome, and a higher rate of complications in TKA patients. Patients with BMI greater than 40 require a second expert surgical opinion.

Contraindications - severe osteoporosis, significant general disability due to other medical conditions, psychiatric issues.

Prior to surgery, patients may be assessed for any associated mental health or low back pain issues that may affect rehabilitation.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively. One decision quality tool, the Hip/Knee Osteoarthritis Decision Quality Instrument, may be valuable in assessing patients' understanding of the procedure.

Informed decision making should be documented for all invasive procedures. This must include a thorough discussion of the pros and cons of the procedure and the possible complications as well as the natural history of the identified diagnosis. There is good evidence that in patients with knee OA and with moderate level pain, total knee replacement followed by nonsurgical rehabilitation leads to improvements in knee symptoms, function, and quality of life which are superior to nonsurgical rehabilitation alone. However, adverse events such as deep vein thrombosis and knee stiffness requiring manipulation under anesthesia occur in approximately 16% of knee replacements, and as many as 75% of patients can improve symptomatically over the course of 12

months with nonsurgical rehabilitation alone, and a shared decision-making process is appropriate for knee OA patients who are eligible for knee replacement.

There is some evidence that a supervised, 8-week preoperative program of neuromuscular exercise prior to hip or knee arthroplasty is more effective in improving function and reducing pain 6 weeks after surgery than no pre-operative exercise. However, the effect is no longer present at 3 month post-surgery. There is some evidence that 3-weeks of a home preoperative quadriceps exercise program prior to knee arthroplasty is more effective in reducing pain and improving function and quadriceps strength in the short-term up to 3 months postoperatively compared with usual care in patients with knee osteoarthritis. However, these effects are not sustained at 6 months after TKA. This adequate study provides some evidence that 6-weeks of a home preoperative exercise program prior to knee arthroplasty is more effective in improving range of motion, and knee function before TKA, and in reducing the time to reach functional postoperative recovery (90^0 of knee flexion) after TKA compared with usual care in patients with knee osteoarthritis, but these effects are not sustained one year after TKA. Thus, there is good evidence supporting pre-operative exercise. Pre-operative neuromuscular exercise is recommended prior to arthroplasty. This is frequently accomplished prior to the decision to perform arthroplasty as treatment for aggravated osteoarthritis is recommended. There is good evidence that preoperative exercise with education programs improve function 3 months after total hip replacement among people with symptomatic osteoarthritis of the hip.

Allergy to implant components can play a role in arthroplasty failure. Pre-operative screening of patients with the following questions is suggested:

1. Do you have an allergy to metal, such as nickel?

2. Have you ever had a rash or itching under jewelry, jean snaps, or watchbands?

3. If you have ever worn artificial nails, did you ever have a skin reaction?

4. Have you ever developed a rash from topical antibiotics, such as Neosporin?

If there are positive or equivocal responses to any of the questions, patch and or lymphocyte proliferation testing is recommended in advance of surgery.

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Prosthetic replacement of the articular surfaces of the knee; total or uni-compartmental with DVT prophylaxis. May include patellar

resurfacing and computer assistance.

There is currently conflicting evidence on the effectiveness of patellar resurfacing. Isolated patellofemoral resurfacing is performed on patients under 60 only after diagnostic arthroscopy does not reveal any arthritic changes in other compartments. The diagnostic arthroscopy is generally performed at the same time as the resurfacing. Resurfacing may accompany a total knee replacement at the discretion of the surgeon. There is good evidence that patellar resurfacing reduces the risk of later reoperation for a small number of arthroplasties. If 25 arthroplasties are done with resurfacing, one later reoperation may be avoided.

Alignment is only one of many factors that may affect the implant longevity. One study provides some evidence that, in patients having bilateral total knee replacements, there are no radiographic alignment differences postoperatively and no functional differences at five years between the knee which was operated on with computer navigation and the knee which was operated on without computer navigation. Another study provides some evidence that navigated total knee arthroplasty (TKA) improves coronal alignment compared to conventional TKA, increasing the likelihood that the implant will have alignment within 3° of neutral. However, there is no evidence that this alignment leads to improved knee function or implant durability compared to conventional TKA in patients who do not have considerations of extra-articular deformity, retained implants, or other factors precluding conventional alignment guides. Thus, there is good evidence that computer navigation does not improve the functional outcome in total knee arthroplasty and therefore it is ***not recommended***. There is strong evidence that in the setting of total knee replacement, the use of patient-specific cutting instrumentation does not offer benefits over conventional instrumentation in terms of postoperative radiographic joint alignment.

There is good evidence that, in patients undergoing primary TKA who do not have patellar resurfacing, circumferential denervation of the patella during the operation can reduce pain postoperatively and improve patient satisfaction two years later.

Tranexamic acid is an effective anti-fibrinolytic agent which decreases the need for blood transfusions. Blood transfusions increase the likelihood of infection for hip and knee arthroplasties. It is usually given in two doses intravenously or topically on the surgical site. There is strong evidence that tranexamic acid in the setting of total knee arthroplasty reduces blood loss, reduces the risk of transfusion, and reduces the number of units transfused, without increasing the risk of pulmonary embolus or deep vein thrombosis. It is also used for hip arthroplasty. Contraindications include patients with hypercoagulable states, cardiac stints, previous strokes. Dosage adjustment for those with renal compromises.

There is some evidence that, in the setting of TKA, intraoperative use of PRP can reduce blood loss, improve levels of postoperative hemoglobin, and reduce the need for blood transfusions by the third postoperative day. Intraoperative use of PRP theoretically may improve pain control and promote earlier return to function. It is rarely used as tranexamic acid is usually prescribed.

There is strong evidence that femoral nerve block (FNB) reduces postoperative

pain from total knee replacement more effectively than patient-controlled opioid intravenous analgesia. There is also strong evidence that total opioid use in the immediate postoperative period is lower with FNB than with PCA opioids.

There is some evidence that periarticular injections provide comparable pain relief to femoral sciatic nerve blocks as part of postoperative pain management in patients after total knee arthroplasty, but peripheral nerve blocks have a higher rate of peripheral nerve dysesthesia 6 weeks after surgery and require greater expertise, thus periarticular injections may be preferable.

Complications – Complications may include pulmonary embolism, infection, bony lysis, polyethylene wear, tibial loosening, instability, malalignment, stiffness, patellar tracking abnormality, nerve-vessel injury, and peri-prosthetic fracture. There is good evidence that adverse events such as deep vein thrombosis and knee stiffness requiring manipulation under anesthesia occur in approximately 16% of knee replacements. More complications including infections occur with BMI greater than 30. Patients with pre-existing psychiatric conditions may have more complications.

g. Postoperative Treatment:

i. Anti-coagulant therapy to prevent deep vein thrombosis. Refer to Section F. 9. c. Deep Venous Thrombosis Prophylaxis.

ii. NSAIDs may be used for pain management after joint replacement. They have also been used to reduce heterotopic ossification after knee arthroplasty. NSAIDs do reduce the radiographically documented heterotopic ossification in this setting, but there is some evidence (in literature on total hip arthroplasty) that they do not improve functional outcomes and they may increase the risk of bleeding events in the postoperative period. Their routine use for prevention of heterotopic bone formation is ***not recommended***.

iii. There is some evidence that local infiltration analgesia with ropivacaine and ketorolac during and for the first two days after TKA has relevant advantages over intrathecal morphine on the day of the procedure. These advantages include lower postoperative consumption of morphine, less postoperative pain, and earlier return to activity. Local Infiltration Analgesia (LIA) with intraoperative administration of local anesthetic in various combinations with Epinephrine, Non-Steroidal Anti-inflammatories, Opioids and Steroids has been gaining clinical interest as a simple surgeon-administered technique for the treatment of postoperative pain after hip and knee arthroplasty. This technique has gained widespread use, although optimal design, including interoperative injection technique and drug mixture, has not been completely evaluated. A FNB may hinder early postoperative mobilization because of motor blockade of the Quadriceps muscle, and patients may have a risk of falling in first days after surgery. For these reasons, LIA may be preferable to FNB, although FNB remains identified in the literature as the gold standard after TKA.

iv. There is good evidence that a conventional cold pack is as effective as an advanced computer-controlled cryotherapy device in relieving pain after knee arthroplasty for osteoarthritis. Therefore, computer controlled cryotherapy is ***not recommended***.

v. There is some evidence that there are no beneficial effects of early aggressive continuous passive motion (CPM) and fixed flexion CPM preceding progressive CPM on the short-term outcomes of range of motion (ROM), pain, and hospital length of stay compared to standardized physical therapy alone in patients following total knee arthroplasty. In addition, there is good evidence that, in people with osteoarthritis of the knee, continuous passive motion (CPM) following total knee arthroplasty does not have clinically important short-term effects on active knee flexion ROM, medium-term effects on function or quality of life, or on preventing thromboembolism. CPM also appears to provide no cost advantage. For these reasons, CPM is ***not recommended*** for knee arthroplasty.

vi. An individualized rehabilitation program must be based upon communication between the surgeon and the therapist and use therapies outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing, and exercise progressions.

There is some evidence that initiating rehabilitation treatment within 24 hours versus 48–72 hours after total knee arthroplasty for osteoarthritis is more effective in reducing the hospital stay and reducing pain leading to an earlier onset of postoperative recovery.

vii. Treatment may include the following: bracing and active therapy with or without passive therapy. Rehabilitation postoperatively may need to be specifically focused on the following problems: knee flexion contracture, quadriceps muscle weakness, knee flexion deficit, and foot and ankle malalignment. It is not clear that early progressive strength training changes outcomes when added to regular rehabilitation. It is also not clear that early monitored home exercise has worse outcomes than usual rehabilitation. A balanced rehabilitation program may increase function for some patients. Active stretching, passive stretching, and proprioceptive neuromuscular facilitation all have similar positive effects on increasing knee flexibility. In summary, therapists will need to develop individual rehabilitation programs based on the patient needs and their professional expertise.

There is some evidence that a long-term, 12-month home exercise program intervention is not more effective in reducing pain or improving function in patients after primary total knee arthroplasty than a control group receiving normal care. However, there is some evidence that this program is more effective in improving walking speed and knee flexion strength. Home exercise should be encouraged for all post knee arthroplasty patients in order to maintain function. This may require occasional physiotherapy visits – approximately 3-4 after traditional rehabilitation.

Specialized taping postoperatively may be useful. Other therapy may include knee braces, shoe lifts, orthoses, and electrical stimulation, accompanied by focused active therapy.

viii. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon. Patient should be able to return to

sedentary work within 4 to 6 weeks. Some patients may have permanent restrictions based on their job duties.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

ix. In some cases, aquatic therapy may be used. Refer to Section F.15.b. Aquatic Therapy. Pool exercises may be done initially under therapist's or surgeon's direction then progressed to an independent pool program.

x. Consider need for manipulation under anesthesia or arthroscopic lysis of adhesions if range of motion remains compromised after knee arthroplasty.

xi. Prior to revision surgery there should be an evaluation to rule out infection.

xii. Patients are usually seen annually after initial recovery to check plain x-rays for signs of loosening.

5. HIP ARTHROPLASTY

a. Description/Definition: Prosthetic replacement of the articulating surfaces of the hip joint. In some cases, hip resurfacing may be performed.

b. Occupational Relationship: Usually from post-traumatic arthritis, hip dislocations and femur or acetabular fractures. 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 Exam Findings: Stiff, painful hip.

d. Diagnostic Testing Procedures: Standing pelvic radiographs demonstrating joint space narrowing to 2 mm or less, osteophytes, or sclerosis at the joint. MRI may be ordered to rule out other more serious disease.

e. Surgical Indications/Considerations: Severe osteoarthritis, all reasonable conservative measures have been exhausted, and other reasonable surgical options have been considered or implemented. Refer to subsection E. 3. b. Aggravated Osteoarthritis.

Possible contraindications - inadequate bone density, prior hip surgery, and obesity.

There is good evidence that preoperative exercise with education programs improve function 3 months after total hip replacement among people with symptomatic osteoarthritis of the hip.

Another study provided some evidence that a supervised, 8-week preoperative

program of neuromuscular exercise prior to hip or knee arthroplasty is more effective in improving function and reducing pain 6 weeks after surgery. However, the effect is no longer present at 3 month post-surgery. Pre-operative neuromuscular exercise is recommended prior to arthroplasty. This is frequently accomplished prior to the decision to perform arthroplasty as treatment for aggravated osteoarthritis.

In cases where surgery is contraindicated due to obesity, it may be appropriate to recommend a weight loss program if the patient is unsuccessful losing weight on his or her own. Coverage for weight loss would continue only for motivated patients who have demonstrated continual progress with weight loss.

Prior to surgery, patients may be assessed for any associated mental health or low back pain issues affecting rehabilitation.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively. One decision quality tool, the Hip/Knee Osteoarthritis Decision Quality Instrument, may be valuable in assessing patients' understanding of the procedure.

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

The success rate of hip arthroplasty is high regarding improved function and patient satisfaction.

Allergy to implant components can play a role in arthroplasty failure. Pre-operative screening of patients with the following questions is suggested:

1. Do you have an allergy to metal, such as nickel?

2. Have you ever had a rash or itching under jewelry, jean snaps, or watchbands?

3. If you have ever worn artificial nails, did you ever have a skin reaction?

4. Have you ever developed a rash from topical antibiotics, such as Neosporin?

If there are positive or equivocal responses to any of the questions, patch and or lymphocyte proliferation testing is recommended in advance of surgery.

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Prosthetic replacement of the articular surfaces of the hip, ceramic or metal prosthesis, with DVT prophylaxis. Ceramic prosthesis is more expensive; however, it is expected to have greater longevity and may be appropriate in some younger patients. Hip resurfacing, metal on metal, is an option for younger or active patients likely to out-live traditional total hip replacements. Metal-on-metal prosthesis are ***not generally recommended***.

There is good evidence that the risk of recurrent fracture is lower with a hemiarthroplasty than with a total hip replacement. There is also good evidence that cemented hemiarthroplasty has a lower risk of intraoperative and postoperative fractures than an uncemented hemiarthroplasty. There is good evidence that unipolar and bipolar hemiarthroplasty yield similar results for mortality, acetabular erosion, reoperations, or mobility. The evidence regarding functional and pain outcomes of hemiarthroplasty versus total hip replacement remains unclear at this time. The surgeon will determine the arthroplasty type for fractures.

Complications include leg length inequality, deep venous thrombosis with possible pulmonary embolus, hip dislocation, possible renal effects, need for transfusions, future infection, need for revisions, fracture at implant site. Patients who have received a metal on metal total hip are likely to have elevated cobalt levels compared to ceramic on ceramic models. These patients should have their chromium and cobalt levels monitored regularly. With metal on metal implants, there is concern regarding adverse local tissue reactions as a result of metal particles around the implant.

Tranexamic acid is an effective anti- fibrinolytic agent which decreases the need for blood transfusions. Blood transfusions increase the likelihood of infection for hip and knee arthroplasties. It is usually given in two doses intravenously or topically on the surgical site. There is strong evidence that tranexamic acid in the setting of total knee arthroplasty reduces blood loss, reduces the risk of transfusion, and reduces the number of units transfused, without increasing the risk of pulmonary embolus or deep vein thrombosis. It is also used for hip arthroplasty. Contraindications include patients with hypercoagulable states, cardiac stints, previous strokes. Dosage adjustment for those with renal compromises.

The long-term benefit for computer assisted hip replacements is unknown. It improves acetabular cup placement. However, the long-term functional advantages are not clear. Prior authorization is required.

Robotic assisted surgery is considered experimental and ***not recommended*** due to technical difficulties.

Patients with pre-existing psychiatric conditions may have more complications than those without.

g. Postoperative Treatment:

i. Anti-coagulant therapy to prevent deep vein thrombosis. Refer to Section F. 9. c. Deep Venous Thrombosis Prophylaxis.

ii. NSAIDs may be used for pain management after joint replacement. They have also been used to reduce heterotopic ossification after hip arthroplasty. NSAIDs do reduce the radiographically documented heterotopic ossification in this setting, but there is some evidence that they do not improve functional outcomes and they may increase the risk of bleeding events in the postoperative period. Their routine use for prevention of heterotopic bone formation is ***not recommended***.

iii. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using the therapies as outlined in Section F. Therapeutic Procedures Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing and exercise progressions.

iv. Treatment usually includes active therapy with or without passive therapy with emphasis on gait training with appropriate assistive devices. Patients with accelerated return to therapy appear to do better. Training should include knee flexors and extensors for strength, balance training, correction of faulty gait, and increased range of motion. Limitations exist for 6-12 weeks. Therapy should include training on the use of adaptive equipment and home and work site evaluation when appropriate.

There is some evidence that adding a 4-week maximal strength training intervention to a conventional hip rehabilitation program in the early postoperative phase after undergoing total hip arthroplasty (THA) is effective in improving lower extremity muscle and hip abductor strength in the short-term (5 weeks postoperative), and in improving work efficiency 6 and 12 months after THA.

There is good evidence that 4 weeks of resistance training is effective for improving maximal strength, functional ability, and reducing pain when used as a therapeutic rehabilitation program for various musculoskeletal conditions and after hip replacement surgery. The musculoskeletal conditions include chronic tendinopathy and knee osteoarthritis.

There is some evidence that, for patients older than 60, early multidisciplinary therapy may shorten hospital stay and improve activity level for those receiving hip replacement. Therefore, this may be used for selected patients.

There is good evidence for the use of aquatic therapy. Refer to Section F., 14. b. Therapeutic Procedures, Non-operative. Pool exercises may be done initially under a therapist's or surgeon's direction then progressed to an independent pool program.

v. Return to activities at 4 to 6 weeks with appropriate restrictions by the surgeon. Initially, range of motion is usually restricted. Return to activity

after full recovery depends on the surgical approach. Patients can usually lift, but jogging and other high impact activities are avoided.

Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

vi. Helical CT or MRI with artifact minimization may be used to investigate prosthetic complications. The need for implant revision is determined by age, size of osteolytic lesion, type of lesion and functional status. Revision surgery may be performed by an orthopedic surgeon in cases with chronic pain and stiffness or difficulty with activities of daily living. Prior authorization is required and a second opinion by a surgeon with special expertise in hip/knee replacement surgery should usually be performed.

vii. Patients are usually seen annually after the initial recovery to check plain x-rays for signs of loosening.

viii. Aseptic loosening of the joint requiring revision surgery occurs in some patients. Prior to revision, the joint should be checked to rule out possible infection. This may require a bone scan as well as laboratory procedures, including a radiologically directed joint aspiration.

ix. Cobalt and chromium should be check serially on patients who received metal on metal implants. Increasing levels may indicate malfunctioning of the implant.

6. 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 Exam Findings: Non-useful or non-viable portion of the lower extremity.

d. Diagnostic Testing Procedures: Radiographs, vascular studies, MRI, bone scan.

e. Surgical Indications/Considerations: Non-useful or non-viable portion of the extremity.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in

proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Amputation.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

ii. Rigid removable dressings are used initially.

iii. Therapies usually include active therapy with or without passive therapy for prosthetic fitting, construction and training, protected weight-bearing, training on the use of adaptive equipment, and home and jobsite evaluation. Temporary prosthetics are used initially with a final prosthesis fitted by the second year. Multiple fittings and trials may be necessary to assure the best functional result.

iv. For prosthesis with special adaptive devices, e.g. computerized prosthesis; prior authorization and a second opinion from a physician knowledgeable in prosthetic rehabilitation and who has a clear description of the patients expected job duties and daily living activities are required.

v. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

7. 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 Exam Findings: Joint stiffness in both active and passive modes.

d. Diagnostic Testing Procedures: Radiographs. CT, MRI, diagnostic injections.

e. Surgical Indications/Considerations: Consider if routine therapeutic modalities, including 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 six weeks.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Treatment: Not applicable.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. Therapy includes a temporary increase in frequency of both active and passive therapy to maintain the range of motion gains from surgery.

ii. Continuous passive motion is frequently used postoperatively.

iii. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

8. OSTEOTOMY

a. Description/Definition: A reconstructive procedure involving the surgical cutting of bone for realignment. It is useful for patients that would benefit from realignment in lieu of total joint replacement.

b. Occupational Relationship: Post-traumatic arthritis or deformity.

c. Specific Physical Exam Findings: Painful decreased range of motion and/or deformity.

d. Diagnostic Testing Procedures: Radiographs, MRI scan, CT scan.

e. Surgical Indications/Considerations: Failure of non-surgical treatment when avoidance of total joint arthroplasty is desirable. For the knee, joint femoral osteotomy may be desirable for young or middle age patients with varus alignment and medial arthritis or valgus alignment and lateral compartment arthritis. High tibial osteotomy is also used for medial compartment arthritis. Multi-compartmental degeneration is a contraindication. Patients should have a range of motion of at least 90 degrees of knee flexion. Those with BMI less than 30, lower disability scores on the WOMAC (Western Ontario McMaster University Osteoarthritis) index, and aged less than 55 are likely to have better outcome for high tibial osteotomy. For the ankle, supra malleolar osteotomy may be appropriate. High body mass is a relative contraindication.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively. Patients should know that total knee arthroplasty may be necessary later and is somewhat more complex after an osteotomy.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Peri-articular opening or closing wedge of bone, usually with grafting and internal or external fixation.

Complications - new fractures, lateral peroneal nerve palsy, infection, delayed unions, compartment syndrome, or pulmonary embolism.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative. In all cases, communication between the physician and therapist is important to the timing of weight-bearing, and exercise progressions.

ii. Weight-bearing and range-of-motion exercises depend on the type of procedure performed. Partial or full weight-bearing restrictions can range from 6 weeks partial weight-bearing, to 3 months full weight-bearing. It is usually 6 months before return to sports or other rigorous physical activity.

iii. If femoral intertrochanteric osteotomy has been performed, there is some evidence that electrical bone growth stimulation may improve bone density. Refer to Section F., 3. Therapeutic Procedures, Non-operative, Bone Growth Stimulators for description.

iv. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation

with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

9. **HARDWARE REMOVAL** Hardware removal frequently occurs after initial MMI. Physicians should document the possible need for hardware removal and include this as treatment in their final report on the WC 164 form.

a. Description/Definition: Surgical removal of internal or external fixation device, commonly related to fracture repairs.

b. Occupational Relationship: Usually following healing of a post-traumatic injury that required fixation or reconstruction using instrumentation.

c. Specific Physical Exam Findings: Local pain to palpation, swelling, erythema.

d. Diagnostic Testing Procedures: Radiographs, tomography, CT scan, MRI.

e. Surgical Indications/Considerations: Persistent local pain, irritation around hardware.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with

demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Removal of hardware may be accompanied by scar release/resection, and/or manipulation. Some instrumentation may be removed in the course of standard treatment without symptoms of local irritation.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

ii. Treatment may include therapy with or without passive therapy for progressive weight-bearing, range of motion.

iii. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

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 complication.

c. Specific Physical Exam Findings: Shortened tendon or stiff joint.

d. Diagnostic Testing Procedures: Radiographs, CT scan, MRI scan.

e. Surgical Indications/Considerations: Persistent shortening or stiffness associated with pain and/or altered function.

Diabetes clearly effects outcomes and the incidence of postoperative infections. Physicians should screen those who have risk factors for prediabetes and check hemoglobin A1c and/or glucose for diabetics. Caution should be used in proceeding with surgery on patients with a A1c 8% or greater.

Prior to surgical intervention, the patient and treating physician should identify functional operative goals and the likelihood of achieving improved ability to perform activities of daily living or work, as well as possible complications. The patient should also agree to comply with the pre- and postoperative treatment plan and home exercise requirements. The patient should understand the length of partial and full disability expected postoperatively.

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

Smoking may affect soft tissue healing through tissue hypoxia. Patients should be strongly encouraged to stop smoking and be provided with appropriate counseling by the physician. If a treating physician recommends a specific smoking cessation program peri-operatively, this should be covered by the insurer. Typically the patient should show some progress toward cessation at about six weeks. Physicians may monitor smoking cessation with laboratory tests such as cotinine levels. The surgeon will make the final determination as to whether smoking cessation is required prior to surgery. Patients with demonstrated success may continue the program up to 3 months or longer if needed based on the operative procedure.

f. Operative Procedures: Surgical incision or lengthening of involved soft tissue.

g. Postoperative Treatment:

i. An individualized rehabilitation program based upon communication between the surgeon and the therapist and using therapies as outlined in Section F. Therapeutic Procedures, Non-operative.

ii. Treatments may include active therapy with or without passive therapy for stretching, range of motion exercises.

iii. Return to work and restrictions after surgery may be made by an attending physician experienced in occupational medicine in consultation with the surgeon or by the surgeon.

An FCE and/or job site analysis may be appropriate if the patient is returning to a job that requires heavy lifting, prolonged walking or low level work such as squatting or crouching to establish safe work restrictions. When work requires prolonged stress on the lower extremity, a gradual return to work schedule may be beneficial. Reasonable accommodations should be addressed for temporary or permanent physical restrictions.

11. HUMAN BONE MORPHOGENETIC PROTEIN (RHBMP)

Bone morphogenetic proteins (BMPs) are proteins secreted by cells which serve as signaling agents that influence cell division, matrix synthesis, and tissue differentiation. Most BMP studies examine utility in tibial fractures. For acute tibial fractures, BMP has been used at the site of fracture in conjunction with reamed or undreamed intramedullary nail fixation in an effort to promote bone formation and fracture healing. It has also been used in tibial nonunion.

A recent systematic review and meta-analysis examined the use of BMP for fracture healing in skeletally mature adults with acute or nonunion fractures with the primary outcomes of time to union and union rate. The eleven studies were of overall poor quality due to bias, measurement error, and potential for selective outcome reporting. These

biases generally tend to favor the intervention. Yet, the included studies failed to identify differences in fracture healing rates between the BMP and control groups or evidence for benefit of BMP in achieving union for nonunion fractures. This further supports the conclusion that the addition of BMP does not result in significant gains in attaining union without a second procedure over the standard of care.

One study included in that meta-analysis found a higher rate of secondary procedures in the group not treated with BMP. However, this study was susceptible to assessment bias as the decision to proceed with more invasive secondary procedures may have been influenced by knowledge of allocation. Additionally, the study protocol did not specify a minimum waiting period prior to assessing the need for a secondary procedure. This omission may have influenced outcomes, as the authors did not allow sufficient time for fracture healing.

There is currently a lack of evidence to recommend the use of BMP in the treatment of tibial fractures. There is good evidence that there are no measureable benefits of BMP over standard of care without BMP for tibial fractures. There is good evidence that, for open tibial shaft fractures, BMP does not enhance fracture healing at 20 weeks compared to fracture fixation with intramedullary nailing.

Addition of BMP does not accelerate healing in the treatment of acute open tibial fractures, result in significant gains in attaining union without a secondary procedure over the standard of care, or affects the risk of hardware failure. If unusual circumstances arise, a provider may feel that a patient will benefit from addition of BMP. BMP should only be used for long bone fractures with a nonunion or high risk arthrodesis procedures and requires prior authorization.