STATE OF RHODE ISLAND
WORKERS' COMPENSATION COURT
MEDICAL ADVISORY BOARD

PROTOCOLS

Approved by the Medical Advisory Board
Rhode Island Workers' Compensation Court

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PREFACE

The Medical Advisory Board of the Workers' Compensation Court has developed treatment protocols for some of the most frequent work-related injuries seen in Rhode Island. It is important that the medical community understand the purpose of establishing these protocols, that is, to ensure the provision of quality medical care for all injured workers, while limiting costly, inappropriate intervention and unnecessary delay in returning workers to gainful employment.

The medical protocols were not designed as "cookbooks" of care, rather, they outline options of appropriate methods and types of intervention from which physicians and other providers are to choose. Limitation by practice or procedure is not, however, intended to reflect the opinion of the Medical Advisory Board that a particular area of practice or individual physician within an area of practice is not competent to perform a procedure, conduct a diagnostic test, or perform other services. Rather, any such limitations set forth in these protocols have been developed, and will be reviewed, to address issues within the Workers' Compensation system. Although primarily geared toward the entry-level physician, i.e, the first treating physician, these protocols offer important information for all physicians and health care providers.

These multidisciplinary protocols note anticipated time for the resolution of the injury and the time-frame for further medical interventions. The Medical Advisory Board is well aware that resolution of the injury may be affected by many factors, such as patient age, co-morbidity, etc. All treating medical providers are expected to follow the spirit of these guidelines. All cases which exceed the anticipated time frames will be reviewed by the Board.

In particular, rehabilitation intervention is geared toward the same time-frames for treatment. However, these time guidelines are based on the early referral of appropriate patients into therapy. The time guidelines may need to be extended when the onset of rehabilitation is delayed. Still important, though, is the health care provider's understanding that intervention should be as time-limited as is safe and feasible and that all treatments are geared toward improving objectively measured physical and work skill deficits.

A particular treatment option, not specifically mentioned in most of the protocols, is that of early referral for psychiatric or psychological evaluation. If the treating physician is concerned that psychosocial issues, such as marital problems, alcohol, or drug abuse, etc., are delaying the worker's return to work, a referral to treatment resources is an appropriate action. Referral may also be indicated for individuals with history of prior psychiatric treatment or those reporting anxiety or depression as a major symptom of the work injury.

Lastly, the effort to establish these protocols has been shared by many dedicated professionals. The Medical Advisory Board welcomes and appreciates feedback from all of the medical community of Rhode Island.

CARPAL TUNNEL SYNDROME

I. BACKGROUND

Carpal tunnel syndrome, also known as tardy median nerve palsy, is believed to be caused by local impairment of the median nerve at the carpal canal in the wrist secondary to narrowing or crowding of the nerve in the carpal tunnel. The condition may have multiple causes including 1) space-occupying lesions such as the residual of a wrist fracture, infections, local edema, tumors, flexor tenosynovitis (non-specific as well as that associated with rheumatoid arthritis), foreign bodies, or aberrant muscles; 2) systemic conditions such as pregnancy, obesity, diabetes mellitus, thyroid dysfunction, arthritis, or amyloidosis; 3) overuse of hand and wrist, work-related trauma and repetitive movements, constricting bandages around the wrist, or improper postural habits regarding the wrist joint; or 4) it may have a spontaneous or idiopathic onset. The condition can occur at any age but is most often encountered in patients over 30 years in age. It occurs three to five times more frequently in women than men.

II. DIAGNOSTIC CRITERIA

A. Pertinent Historical and Physical Findings

Patients complain of paresthesias and numbness in all or part of the sensory distribution pattern of the median nerve in the hand, which often worsen at night when lying in bed. These sensations are occasionally associated with pain that may radiate proximally to the shoulder area. The most characteristic history involves nocturnal parethesias, described frequently as sensations of burning or numbness that may be relieved by shaking or holding the affected arm in the dependent position. Weakness of grip, hypohydrosis, clumsiness and proximal pain migration may be accompanying complaints. Wrist palmar flexion may aggravate the symptoms, and the patient may note difficulty manipulating small objects. Occasionally, patients may complain of circulatory disturbances in the fingers.

Symptoms may be reproduced by hand and wrist motions, such as forced flexion and extension of the wrist, that constrict the carpal canal. This tendency forms the physiologic basis for the Phalen Test, which may be positive in the presence of median nerve compression at the wrist. The patient may exhibit dryness of the skin on the hand and fingers, thenar muscle atrophy or fasciculations, and decreased pinch or grip strength. There may be increased median nerve two-point discrimination. Tinel's sign may be positive. These tests are strongly corroborative, but their absence does not exclude this diagnosis.

B. Appropriate Diagnostic Tests and Examinations

1. Radiographs of wrist
2. Electromyogram and nerve conduction studies

3. Hematologic, serologic, and endocrinologic studies if symptoms suggest an underlying systemic disease

4. Response to steroid injection into carpal canal

5. Anteroposterior and lateral oblique radiographs of cervical spine if symptoms suggest origin in the cervical spine

6. Chest radiograph, if there is concern about brachial plexus or apex of lung

C. Supporting Evidence

The electromyograph and nerve conduction tests are helpful when positive but can be negative in some patients with this disorder. They are useful in atypical patients or in patients in whom secondary gain may be a motive. The most difficult differentiation involves patients with diabetes mellitus and suspected carpal tunnel syndrome. Some patients with neuropathies may be difficult to assess. Electrodiagnostic studies may facilitate the assessment of patients with both neuropathy and suspected carpal tunnel syndrome. In patients with suspected double-crush syndrome, electrodiagnostic tests may be helpful in determining the relative contributions of each site of compression.

III. TREATMENT

A. Outpatient Treatment

1. Nonoperative treatment – Treatment time limited to 3 to 6 weeks, provided all appropriate conservative measures have been assessed.

a. Indications
   1) Mild symptoms
   2) Pregnancy
   3) If constricting bindings or positional abnormalities are causative

b. Treatment Options
   1) Neutral position wrist splint, especially at night
   2) Steroid injections
   3) Nonsteroidal anti-inflammatory drugs
   4) Activity modification
   5) Treatment of underlying systemic disease
   6) Removal of constricting bindings or bandages

c. Rehabilitation
   1) Hand and wrist exercises
   2) Grip strengthening exercises
   3) Modification of activities of daily living and/or job tasks

d. Supporting evidence consists of favorable response to steroid injections and to the use of a wrist splint in the absence of objective evidence of denervation.

2. Ambulatory Surgery

a. Indications
   1) Failure to respond to nonoperative treatment
   2) Presence of thenar atrophy or weakness or significant hyperesthesia/dysesthesia (especially with objective impairment of sensibility as determined by two-point discrimination or by light touch)
   3) Progressive symptoms
   4) Presence of space-occupying lesion in carpal canal

b. Treatment Options
   1) Release of transverse carpal ligament, either under local or regional block

c. Rehabilitation
   1) Elevation of hand and exercise of fingers and shoulder
   2) Wrist splint in position of slight extension for two to three weeks postoperatively

B. Estimated Duration of Care

1. Nonoperative treatment – maximal medical improvement

2. Operative treatment – three to six weeks following surgery.

PROTOCOL HISTORY:
Passed: 9/01/1992
Amended: 6/06/2006

CERVICAL MUSCULOLIGAMENTOUS INJURY (Sprain/Strain)

I. BACKGROUND

These injuries may occur on the job, including operation of a motor vehicle as it relates to the patient's employment. Symptoms are believed to be related to a partial stretching or tearing of the soft tissues (muscles, fascia, ligaments, facet joint capsule, etc.). This may be associated, in addition to the neck pain, with vague upper extremity complaints. The recovery period is of variable duration, but generally is less than three or four weeks.

II. DIAGNOSTIC CRITERIA

A. Pertinent Historical and Physical Findings

The onset of neck pain and paraspinal muscle spasm begins either suddenly after the injury occurs or develops gradually over the next 24 hours. This pain is usually aggravated by motion of the neck and/or shoulder and frequently relieved by rest. The pain usually does not radiate below the shoulder. It can be accompanied by paresthesia or a sense of weakness in the upper extremities related to the muscle spasm in the neck. Physical findings include tenderness to palpation, spasm of the paravertebral muscles and aggravation of the pain with motion. Neurological examination and nerve root stretch tests are usually negative.

B. Appropriate Diagnostic Tests and Examinations

In general, anteroposterior, lateral, oblique, flexion and extension x-rays of the cervical spine and open mouth view to visualize the odontoid process are appropriate. Other x-rays may be added to the roentgenographic series as indicated. Straightening of the cervical spine is frequently observed on the lateral x-ray.

C. Inappropriate Diagnostic Tests and Examinations during the acute phase of the first 4 weeks

1. CT Scan
2. MRI
3. Bone Scan
4. Myelography
5. EMG in the absence of abnormal neurologic findings
6. Thermogram *
7. Evoked Potentials

* Never appropriate

III. TREATMENT

A. Outpatient Treatment

1. Non-operative Treatment

a. Indications: Almost all patients with cervical musculoligamentous (sprain/strain) can be treated satisfactorily. No indications exist for the use of surgery in the treatment of cervical musculoligamentous injury.

b. Treatment Options

1) Pain medication, non-narcotic
2) Muscle relaxants
3) Anti-inflammatory drugs, non-steroidal
4) Physical therapy and/or rehabilitive services*
5) Occasional trigger point injections may be helpful
6) Spinal manipulative therapy

c. Rehabilitation Procedures

1) Therapy may be initiated as early as the day of injury; indications for and focus of (early) intervention include:
   a) acute management of pain/spasms;
   b) limited use of passive modalities, except unlimited ice;
   c) instruction in ROM/stretching exercises for neck/shoulder muscles;
   d) assessment of return to work readiness and identifying necessary work modifications;
   e) patient education in healing process and body mechanics.

   Time Frame: May range from one visit only to ½ to 2 hours per day.

2) Inappropriate Treatments: Exclusive use of passive (palliative) modalities; TENS is not indicated.
3) For the (smaller) portion of workers, some may have unique job requirements necessitating a change in work duties or work skills retraining.

* Never appropriate

B. Inappropriate Treatment

1. Operative treatment is inappropriate for a cervical strain
2. Narcotic medication for a prolonged period of time
3. Inpatient treatment

C. Estimated Duration of Care: 1 to 4 weeks

D. Anticipated Outcome

1. Resumption of normal activity without residual symptoms in most cases

E. Modifiers (age, sex, and co-morbidity)

Co-morbidity (e.g. degenerative disc disease, spondylolisthesis, segmental instability, osteoporosis, spine deformity) may be associated with a higher incidence of persistent symptoms.

IV. If the patient has not responded to the above-outlined treatments in four weeks time, the patient must be referred to a Neurologist, Neurosurgeon, Orthopedic Surgeon, or Physiatrist. The specialist referred to above may order further diagnostic procedures, since the failure to respond to conservative treatment brings with it the distinct possibility of a different diagnosis such as a cervical disc.

NOTE: Cervical Musculoligamentous Injury (Sprain/Strain) will also include BACK SPASM, BACK SPRAIN, SUBLUXATIONS, FACET ARTHROPATHY, SPONDYLOLISTHESIS WITH NO NEUROLOGICAL INVOLVEMENT, HERNIATED INTERVERTEBRAL DISC WITH NO NEUROLOGICAL INVOLVEMENT, ANNULAR TEARS, MYOFASCIAL PAIN, SPINAL STENOSIS.

PROTOCOL HISTORY:

Passed: 9/1/1992
Amended: 5/17/1993
Amended: 11/19/2002
Amended: 6/12/2007

HERNIATED CERVICAL DISC

I. BACKGROUND

A herniated cervical disc is a condition in which there is a protrusion of the intervertebral disc past the posterior longitudinal ligament. Herniations occur most commonly through a posterolateral defect, but may also occur in the midline. The resulting compression of a spinal nerve root may result in cervical radiculopathy, a condition with an annual incidence of approximately 8 per 1,000 persons and a prevalence of 3.5 per thousand persons, with a peak incidence between 50-54 years of age. Cervical disc herniations cause radiculopathy most frequently at the C6 and C7 levels; multiple etiologies including mechanical compression, nerve root hypoxia and/or release of inflammatory mediators in the vicinity of the nerve root have been implicated. Patients will often experience pain, paresthesias, numbness and/or upper extremity weakness. Infrequently, a disc herniation may cause compression of the cervical spinal cord with associated myelopathy manifested as motor dysfunction in the lower extremities and bowel and/or bladder symptoms.

II. DIAGNOSTIC CRITERIA

A. Historical and Physical Examination Findings

Neck pain is often the first symptom of cervical disc herniation with radiculopathy, and may be associated with interscapular or upper extremity pain. Paresthesias and/or numbness may also develop. Pain is often described as sharp, shooting, or burning with radiation along the anatomic course of the nerve from proximal to distal. The onset may be sudden or insidious. Cervical range of motion is often limited, and neck motion may cause an exacerbation of pain.

The neurological examination may be normal if the compressed nerve is functional, or there may be objective evidence of nerve dysfunction including atrophy, weakness, sensory dysfunction and/or altered reflex depending upon the anatomic nerve root affected.

B. Diagnostic Testing and Examination

If the symptoms and/or signs of a cervical disc herniation noted above manifest themselves and/or persist beyond four weeks, referral to a specialist physician (neurologist, neurological surgeon, orthopedic surgeon, physiatrist) is indicated.

Diagnostic Tests:

- Laboratory Studies
- Imaging Studies
- Electrodiagnostic Testing

Laboratory Studies

Laboratory studies include *white blood cell count, ESR, and C-reactive protein* can be increased with spinal infection or cancer, but do not have sufficient sensitivity or specificity to direct further testing.

Imaging Studies

Magnetic Resonance Imaging is a non-invasive means of evaluating the status of the cervical spine and its components. MRI is appropriate in the presence of objectives and/or progressive neurologic deficits. Indications include:

1. Symptoms or signs of myelopathy
2. Diagnostic suspicion of tumor or infection
3. Presence of progressive neurologic deficit

For most of patients, it is appropriate to limit the use of MRI to those individuals who remain symptomatic after 30 days of non-surgical management. Gadolinium contrast may be used in cases where previous surgery was performed in order to differentiate between epidural fibrosis and a recurrent disc herniation.

Conventional radiographs of the cervical spine are often obtained but are of limited value in detecting a cervical disc herniation, infection, or neoplasm.

Computer tomography (CT) can be useful in assessing the extent of bone spurs, canal encroachment, and/or ossification of the posterior longitudinal ligament.

Myelography has largely been supplanted by MRI, but in combination with CT (i.e., CT-myelography) may be useful in selected cases.

Electrodiagnostic studies

Needle electromyography and nerve conduction studies can help distinguish between cervical radiculopathy and other causes of neck pain. Involvement of muscles within the affected myotome can occur as soon as three weeks post-injury.

C. Inappropriate diagnostic tests and examinations

1. Myeloscopy
2. Thermography
3. Spinoscopy

III. MANAGEMENT

A. Non-surgical treatment

The main objectives of treatment are to relieve pain, improve neurologic function and prevent recurrence. None of the commonly recommended non-surgical therapies have been tested in a randomized, controlled trial, and recommendations derive largely from case series and/or anecdotal experience. Patient preference should be taken into account in the decision-making process.

Treatment options include:

1. Physical rehabilitation procedures including modalities, traction and exercise
2. Cervical collar or pillow
3. Home cervical traction preceded by the application of moist heat
4. Medications
   - Analgesics (narcotic and/or non-narcotic)
   - Muscle relaxants
   - NSAIDS
   - Steroids
5. Limited period of bed rest
6. Epidural steroid injections in selected cases

B. Surgical Management

Surgical intervention may be recommended when all of the following are present:

1. Definite cervical root compression on diagnostic imaging studies
2. Concordance symptoms and signs of cervical root-related dysfunction, pain, or both
3. Persistence of pain despite non-surgical treatment for a minimum of six weeks, or
4. The presence of a progressive, functionally important motor deficit, or
5. Cervical cord compression with clinical evidence of moderate to severe myelopathy

Discharge from the hospital should be obtained within 72 hours after most cervical spine procedures, unless complicated by wound infection, thrombophlebitis, spinal fluid leak or other significant morbidity. Post-operatively, rehabilitation procedures will be initiated in many cases and can be completed within 12 weeks of initiation of therapy.

The estimated duration of care for non-surgical patients is up to 6 weeks, and for surgical patients is at a point of maximum improvement, not to exceed 12 months after surgery.

PROTOCOL HISTORY:
Passed: 9/01/1992
Amended: 5/17/1993
Amended: 11/19/2002
Amended: 6/12/2007

PROTOCOLS FOR INJURIES TO THE EYE

CORNEAL ABRASION

I. BACKGROUND

A corneal abrasion is usually caused by a foreign body or other object striking the eye. This results in a disruption of the corneal epithelium.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

Patients complain of pain and blurred vision. Photophobia may also be present. Symptoms may not occur for several hours following an injury.

B. Appropriate Diagnostic Tests and Examinations

Comprehensive examination by an ophthalmologist to rule out a foreign body under the lids, embedded in the cornea or sclera, or penetrating into the eye. The comprehensive examination should include a determination of visual acuity, a slit lamp examination and a dilated fundus examination when indicated.

III. TREATMENT

A. Outpatient Treatment

Topical antibiotics, cycloplegics, and pressure patch at the discretion of the physician. Analgesics may be indicated for severe pain.

B. Duration of Treatment

May require daily visits until cornea sufficiently healed, usually within twenty-four to seventy-two hours but may be longer with more extensive injuries. In uncomplicated cases, return to work anticipated within one to two days. The duration of disability may be longer if significant iritis is present.

IV. ANTICIPATED OUTCOME

Full recovery.

CORNEAL FOREIGN BODY

I. BACKGROUND

A corneal foreign body most often occurs when striking metal on metal or striking stone. Auto body workers and machinists are the greatest risk for a corneal foreign body. Hot metal may perforate the cornea and enter the eye. Foreign bodies may be contaminated and pose a risk for corneal ulcers.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

The onset of pain occurs either immediately after the injury or within the first twenty-four hours. Typically there is a sensation of something in the eye, pain, and photophobia. The pain is aggravated by blinking or moving the eye. Vision may be affected if the foreign body is in the visual axis.

B. Appropriate Diagnostic Tests and Examinations

A comprehensive examination by an ophthalmologist is necessary, including determination of visual acuity, slit lamp and dilated fundus examination to rule out intraocular foreign bodies. An orbital x-ray or CT scan may be indicated if there is a suspicion of ocular or orbital penetration.

III. TREATMENT

A. Outpatient Treatment

Superficial or embedded corneal foreign bodies are usually removed at the slit lamp in the emergency room or ophthalmologist's office. Topical antibiotics, cycloplegics, and pressure patch are used at the discretion of the physician. Analgesics, including narcotics may be necessary for the first several days. Daily visits may be necessary until the cornea is healed.

B. Estimated Duration of Care

Return to work anticipated within one to two days in uncomplicated cases.

C. Anticipated Outcome

Full recovery unless the foreign body leaves a significant scar in the visual axis. This may result in diminished visual acuity or may require spectacles, a contact lens, or corneal surgery to improve the vision.

HYPHEMA

I. BACKGROUND

Hyphema is bleeding within the anterior chamber of the eye. It is typically caused by severe blunt trauma to the eye rupturing intraocular blood vessels. Hyphema may be associated with disruption of the trabecular meshwork and lead to angle recession glaucoma. Elevated intraocular pressure with hyphema may cause blood staining of the cornea. Hyphema in patients with sickle cell anemia also poses significant risk to vision. The most significant risk with hyphema is rebleeding which will occur in up to 30% of cases within the third to fifth day. Rebleeding may cause marked elevation of intraocular pressure, as well as corneal blood staining and visual loss. Late complications may include angle-recession glaucoma and cataract.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

Hyphema generally occurs after severe blunt trauma to the eye. It can range from red blood cells visible within the anterior chamber to a layered clot filling the entire anterior chamber. Intraocular pressure is often elevated.

B. Appropriate Diagnostic Tests and Examinations

This is an ocular emergency and requires immediate referral to an ophthalmologist. Appropriate diagnostic tests include a comprehensive exam by an ophthalmologist including a slit lamp exam, determination of the intraocular pressure, and dilated fundus examination if possible. Orbital x-rays may be indicated to rule out other orbital injuries depending on the mechanism of injury. A platelet count and coagulation studies may be indicated, and a sickle prep or hemoglobin electrophoresis should be performed if there is a question of sickle cell anemia.

III. TREATMENT

A. Outpatient Treatment

If the individual is reliable and the hyphema is not severe and there are no other complicating factors, this condition can be managed as an outpatient. All patients require strict bed rest for five days except for daily examinations. Topical cycloplegics, steroids, and ocular hypotensive agents are indicated at the discretion of the physician. Oral prednisone and/or aminocaproic acid may also be used at the discretion of the physician. A hard shield is typically worn throughout the day and night. After several weeks a gonioscopy is indicated to evaluate the trabecular meshwork.

B. Inpatient Treatment

If there is a significant hyphema, marked elevation of intraocular pressure, other complicating factors (e.g. sickle cell anemia, hyphema in a monocular patient, other ocular injuries) or if the individual does not seem reliable, hospital admission may be indicated to insure strict bed rest and regular follow-up. Oral prednisone and/or aminocaproic acid may also be used at the discretion of the physician. Hospitalization should last five days. Persistent elevated intraocular pressure, corneal blood staining, or persistence of the hyphema in the setting of sickle cell anemia may require surgical evacuation of the clot.

C. Estimated Duration of Care

Return to work anticipated in three weeks for uncomplicated cases. If there is evidence of disruption of intraocular structures, they will require lifetime monitoring for glaucoma and cataracts.

D. Anticipated Outcome

Resolution of the hyphema with return of visual acuity. These individuals should wear polycarbonate safety glasses if involved in an occupation where there is continued risk of ocular injury.

EYELID LACERATION

I. BACKGROUND

Eyelid lacerations may occur from blunt injuries or from laceration by a sharp object. The lacerations may only involve skin but may involve the eyelid muscles, eyelid margin, the lacrimal drainage system, and may be associated with an orbital foreign body.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

There is often profuse bleeding. Lacerations through the eyelid margin, in the medial canthus, or resulting in exposure of orbital fat indicate severe injuries and require immediate evaluation. Retained orbital foreign bodies must also be suspected, especially if the injury is caused by an explosion or fragmented object. With severe injuries to the lids, injury to the eye must be ruled out.

B. Appropriate Diagnostic Tests and Examinations

A comprehensive examination by an ophthalmologist including determination of visual acuity, slit lamp and dilated fundus examination is necessary to rule out ocular or orbital injury or foreign body.

III. TREATMENT

A. Outpatient Treatment

Superficial lacerations or lacerations not involving the lacrimal system or entering the orbit may be repaired in the emergency room or office. Sutures are removed over one to two weeks. Topical and oral antibiotics are usually prescribed. Analgesics may be necessary for pain.

B. Inpatient treatment

Injuries involving the lacrimal drainage system or penetrating the orbit should be repaired in the operating room. These repairs may require general anesthesia. Intravenous antibiotics are often indicated. Depending on the severity of the injury and overall condition of the patient, these individuals may be discharged from the recovery room or may require a one to two day hospital stay.

C. Estimated Duration of Care

Return to work anticipated within two weeks in uncomplicated cases. Medical follow-up four weeks if uncomplicated. Damage to the eyelid muscles resulting in traumatic ptosis may require six to twelve months to resolve, or may ultimately require surgical repair.

D. Anticipated Outcome

Resumption of normal eyelid function.

CANALICULAR LACERATION

I. BACKGROUND

Laceration in the medial eyelid may injure the upper or lower canaliculus or lacrimal sac. Disruption of the lacrimal drainage system may result in constant tearing or the development of an abscess within the lacrimal sac (dacryocystitis). Constant tearing may be no more than a nuisance, but it may also obstruct vision and the presence of an infection within the lacrimal system usually requires surgical repair.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

There is usually a laceration in the medial eyelid. The laceration may at first glance seem trivial, but any laceration medial to the punctum should raise the suspicion of a canalicular laceration. There may be tearing or bloody tears. The punctum may be displaced laterally.

B. Appropriate Diagnostic Tests and Examinations

A comprehensive examination by an ophthalmologist including determination of visual acuity, slit lamp and dilated fundus examination to rule out other orbital or ocular injuries is necessary. Probing of the canaliculus is indicated to determine if the canaliculus is lacerated and the extent of the injuries. Orbital x-rays or CT scan may be indicated if a fracture or foreign body is suspected.

III. TREATMENT

A. Outpatient Treatment

Repair of canalicular lacerations requires the operating room, frequently using the operating microscope. The lacerated canaliculi are intubated either with a silicone tube or other stent and the cut ends reapproximated. Depending on the severity of the injury, other complicating factors, and general condition of the patient, these individuals can be discharged from the recovery room. Topical drops and oral antibiotics may be indicated.

B. Inpatient Treatment

If the individual has eaten recently, it may be necessary to delay the surgery for twenty-four to forty-eight hours. Hospital admission may be required if the wound is contaminated and intravenous antibiotics are needed. Admission is also indicated in the presence of other complicating injuries. Complex reconstruction requiring prolonged general anesthesia would also require admission.

C. Estimated Duration of Care

Return to work anticipated in two weeks in uncomplicated cases. Medical follow-up three to six months. Occasionally the repair is unsuccessful, and lacrimal bypass surgery is indicated.

D. Anticipated Outcome

Return of normal eyelid function and elimination of tearing.

ORBITAL CONTUSION

I. BACKGROUND

An orbital contusion is usually a result of blunt trauma causing swelling and ecchymosis of the orbit. A pure orbital contusion is not associated with any fractures or significant lacerations. There may be significant swelling and initial double vision, but visual acuity is not usually affected, and ocular motility and diplopia return towards normal within several days.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

If there is a history of blunt trauma to the ocular area, there may be progressive swelling of the lids with ptosis, proptosis of the eye, and diplopia. The swelling and diplopia should improve over several days. Visual acuity is usually normal.

B. Appropriate Diagnostic Tests and Examinations

Orbital x-rays are indicated to rule out a fracture. A CT scan is indicated if the diplopia persists or if there is suspicion of an orbital fracture in spite of normal plain films. A comprehensive examination by an ophthalmologist, including assessment of visual acuity, slit lamp examination, and dilated fundus examination are necessary to rule out concomitant intraocular injury.

III. TREATMENT

A. Outpatient Treatment

If there are no complicating injuries, an orbital contusion is treated as an outpatient. Analgesics, ice packs, and systemic antibiotics may be indicated.

B. Inpatient Treatment

Diminished visual acuity or severe pain may indicate more extensive injury and may warrant hospital admission for further evaluation and treatment.

C. Estimated Duration of Care

Return to work in one to two days in uncomplicated cases. Disability may be longer if diplopia or ptosis persist.

D. Anticipated Outcome

Resolution of the swelling and diplopia with return of normal ocular motility.

ORBITAL FRACTURE

I. BACKGROUND

Fractures of the orbit may be indirect, resulting in "blowout" of the orbital floor or medial wall, or direct involving fractures of the orbital rims. Fractures of the orbit open communication between the orbit and the sinuses. Significant fractures may cause ocular motility disturbance from entrapment of orbital content, enophthalmos due to prolapse of the orbital contents into the sinus, and dystopia of the eye.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical findings

There is a history of blunt trauma to the eye, usually by an object larger than the bony orbital opening. The eye may appear proptotic or enophthalmic. Ocular motility is usually diminished. The intraocular pressure may elevate when the eye is turned away from an entrapped muscle. There is usually numbness over the cheek due to injury to the infraorbital nerve. There may be a palpable fracture of the orbital rim. There may also be a fracture of the zygomatic arch. This causes flattening of the cheek and may interfere with opening the mouth.

B. Appropriate Diagnostic Tests and Examinations

A comprehensive examination by an ophthalmologist is necessary, including a determination of visual acuity, slit lamp examination, and dilated fundus examination to rule out intraocular injury. X-ray of the orbits may miss up to 20% of orbital fractures. A coronal CT scan is indicated, especially if surgery is contemplated.

III. TREATMENT

A. Outpatient Treatment

Not all orbital fractures require repair. If there is no enophthalmos or diplopia, repair may not be necessary. It is appropriate to follow the patient on an outpatient basis for the first one to two weeks to determine if the diplopia is resolving. Oral antibiotics are usually given prophylactically. Analgesics may be required.

B. Inpatient Treatment

Severe facial fractures require hospital admission. Other complicating injuries may also make hospital admission necessary. Surgical repair of the fractures is usually undertaken within the first three weeks. This usually requires a one to three day hospital stay postoperatively.

C. Estimated Duration of Care

Disability from orbital fracture is usually due to diplopia. Double vision while looking straight ahead or down makes driving, operating machinery, reading, typing, and close work difficult. Double vision within the central 20 degrees of the visual field is considered a 100% loss of ocular motility according to the American Medical Association's Guide to Evaluation of Permanent Impairment.

Diplopia may resolve spontaneously within one to two weeks with small fractures not requiring repair. More severe fractures may have more persistent diplopia. Generally, double vision resolves within two to three weeks after surgical repair unless there is intrinsic damage to the extraocular muscles. It is rarely necessary that eye muscle surgery or further orbital surgery is necessary.

Light work may be done when diplopia is resolved. Heavy work can generally be resumed three weeks after injury if surgery is not required, or three weeks after surgical repair.

Individuals with diplopia in primary gaze, down gaze, or within the central 20 degrees should not drive, operate machinery, or work in a dangerous environment where good peripheral vision is necessary.

D. Anticipated Outcome

Resolution of diplopia and normal functioning of the eye. Numbness over the cheek may persist for one year or longer and is not affected by surgical repair.

CORNEOSCLERAL LACERATIONS

I. BACKGROUND

Corneoscleral lacerations are potentially severe injuries resulting from sharp objects making forceful contact with the globe. The severity of such injuries is quite variable and is dependent on the sharpness of the object and its velocity at the time of impact.

II. DIAGNOSTIC CRITERIA

A detailed examination by an ophthalmologist, including visual acuity, slit lamp exam, intraocular pressure, and dilated fundus exam is necessary to determine the extent of injury. If retained foreign body is anticipated, localizing radiologic studies (e.g., CAT scan of orbits) may be required.

III. TREATMENT

Small partial thickness lacerations may require only follow-up and/or patching. More severe ones may respond to bandage contact lens application and follow-up.

Virtually all full-thickness corneal lacerations require very careful follow-up. Very small ones may respond to bandage lens application with or without cyanoacrylate tissue adhesive and protective shield. Larger ones require surgical repair under general anesthesia and hospitalization.

The goal of management is to restore the eye to its normal anatomic configuration and create a water-tight closure. If the lens is involved in the injury, it often must be removed at the time of surgery. Prolapsing uveal tissue must be replaced. Vitreous must be meticulously removed from the anterior chamber if it is present. Involvement of retinal tissue in the injury can make the prognosis much more guarded, and a vetreoretinal surgeon would then be required at the time of initial repair.

Postoperative management usually consists of forms of cycloplegic, steroid, and antibiotic drops.

IV. ESTIMATED DURATION OF CARE AND ANTICIPATED OUTCOME

Partial thickness laceration patients may be managed as outpatients. The patient should wear a protective shield for three to six weeks. Light work may be done after several days. Usually recovery is quite good with normal visual function after six weeks.

Full thickness simple corneal lacerations require two to four months to heal and remove sutures. Protective shield should be worn for six weeks. Light work could be done after two weeks. Return to full work after suture removal in three to four months if vision is adequate for tasks. Sometimes, corneal scar is extensive, and corneal transplant for visual recovery would be necessary at a later date.

Lacerations involving lens, uveal tissue, and retina may require a week's hospitalization and perhaps six months to achieve stability. At that time, contact lens correction of the aphakic condition may allow good visual recovery. Many patients with these severe injuries may never recover full vision, either with later cornea transplant and intraocular lens placement.

CHEMICAL OCULAR INJURIES

I. BACKGROUND

Chemical injuries may result from an almost infinite variety of agents contacting the ocular surface. The extent of the injury is largely a function of the nature of the substance involved, how much of the ocular surface is involved, and the duration of exposure. In general, alkali injuries (e.g., ammonia, lye, potassium hydroxide, calcium hydroxide (lime) are the most serious because these agents readily penetrate into the ocular tissue. Acid burns (e.g., sulfuric acid, hydrofluoric acid, nitric acid, acetic acid) may be serious but have less penetration than alkalis.

II. DIAGNOSTIC CRITERIA

A detailed examination by an ophthalmologist is performed after copious irrigation (see Treatment). It is vitally important to know the chemical causing the injury, its concentration, and amount of exposure.

In alkali burns, the Hughes classification (grading of corneal haziness and loss of blood vessels at limbus) is helpful in assessing long-term prognosis.

III. TREATMENT

Acute phase (0 to 7 days). Immediate copious irrigation using any nontoxic irrigating solution is the most important treatment of any chemical injury. It should be continued for at least 30 minutes. Checking the pH until it returns to normal is a good way to determine if enough irrigation is done.

After the irrigation, management by the ophthalmologist may include topical steroids and the use of prophylactic antibiotic drops. Other agents, such as topical ascorbate, cycloplegic agents, etc., may be warranted.

Severe chemical injuries should be hospitalized for treatment for several days. For milder cases, outpatient care with frequent follow-up (every several days for first three weeks) is appropriate.

IV. ESTIMATED DURATION OF CARE AND ANTICIPATED OUTCOME

Quite dependent on extent of initial injury. Milder injuries may return to work after several days. Moderate chemical injuries (if bilateral) may need several weeks to recover. Severe burns (if bilateral) may be blinding. In many cases, corneal transplants, performed months after the initial injury, may be able to restore vision.

PROTOCOL HISTORY:
Passed: 12/15/1992

PROTOCOL FOR THE EVALUATION AND MANAGEMENT OF ACUTE SHOULDER INJURIES

INTRODUCTION:

This protocol is designed to aid the practitioner in the appropriate evaluation and management of acute shoulder girdle injuries. The goal of early evaluation is to establish a precise diagnosis in order to initiate effective management.

The vast majority of shoulder injuries result from soft tissue rather than bony injury. Injuries can result from direct or indirect trauma, or overuse. The affected soft tissues include muscles, ligaments, and tendons. These problems fall into major categories; instability and dislocations (acromioclavicular and glenohumeral), rotator cuff tendon and subacromial disorders, and periscapular muscle injuries.

Shoulder pain as a result of cervical spine pathology should always be considered and excluded before definitively determining a diagnosis for shoulder pain.

Overuse injuries can present with acute or chronic symptoms and may be the result of acute tendonitis and bursitis or chronic degenerative conditions. Overuse injuries of the shoulder include scapular muscle strain, rotator cuff tendonitis (impingement) and tearing, and arthritic conditions of the glenohumeral joint and acromioclavicular joint.

In general, patients with shoulder injuries should be referred for orthopaedic, physiatric, neurologic, or rheumatologic consultation or treatment under the following circumstances:

1. History of radiographic evidence of joint instability such as acromioclavicular, sternoclavicular, or genohumeral joint subluxation or dislocation.
2. Significant lack of active motion and/or weakness.
3. Evidence of neurologic injury.
4. Shoulder fracture.
5. Significant obvious soft tissue swelling or ecchymosis.
6. Failure of shoulder sprain or strain to demonstrate progressive resolution of symptoms and respond to appropriate conservative management within 4 weeks.

EVALUATION:

Evaluation of shoulder injuries includes detailed history, physical examination, and plain radiographs. Details of prior related conditions, co-morbid medical conditions, work history, mechanism of injury, and current symptoms should be obtained. A careful physical examination includes observation, palpation, and assessment of active and passive motion, strength, and stability. Significant acute shoulder injuries should be evaluated with x-rays to assess acute injury and signs of chronic pathology. Specific

attempts should be made to diagnose injuries such as extensive acute rotator cuff tearing that may be best treated with early surgery.

INITIAL TREATMENT:

Initial management of most shoulder injuries includes a combination of the following:

1. Non-narcotic analgesics and non-steroidal anti-inflammatory drugs, and ice for symptomatic relief.
2. Short-term sling immobilization.
3. Physical therapy for range of motion, progressive resistive exercises, and symptom control. Appropriate modalities include, but are not limited to, ice, ultrasound, phonophoresis, heat.

Customary and usual therapy documentation requirements prevail. Therapy treatments may be indicated beyond the initial 9 visits, as the expected healing time is 4 to 6 weeks. Reauthorization for continued treatments should follow the normal requested procedures and be based on improvement in objective measures. Prolonged therapy is not indicated if a patient's status is not improving.

4. Corticosteroid injection for overuse injuries.
5. Activity modification.

Initial management should continue for 4 to 6 weeks. Resolution of symptoms and resumption of normal activities is anticipated.

FURTHER EVALUATION:

If symptoms persist despite a trial of initial treatment, further evaluation can be pursued in order to determine a diagnosis. Additional testing includes:

1. CT scan or radionuclide bone scan to evaluate bone and joint pathology.
2. Arthrogram to evaluate for rotator cuff tearing.
3. MRI to evaluate periarticular soft tissues, including the rotator cuff, capsule, and labrum.
4. Electrodiagnostic studies (EMG/NCV) to evaluate for neurologic pathology.

FURTHER TREATMENT:

Further treatment should be based upon the results of additional evaluation. Surgically treatable pathology can be addressed with arthroscopy and/or open surgery.

Arthroscopy permits minimally invasive surgery both to confirm a diagnosis and perform debridement, excision, or repair. The outcome of arthroscopic and open surgical treatment of specific diagnostic entities should be the same.

Postoperative rehabilitation duration will vary with arthroscopic and open surgeries. In general, arthroscopic debridement/acromioplasty should resolve within 6 weeks of therapy. Open repairs require more prolonged therapy, but should be completed within 12 weeks of rehabilitation.

Therapy following arthroscopic repairs should focus on regaining full range of motion, with progression to strength and endurance exercises as soon as tolerated. Use of strength and isokinetic equipment is appropriate; use of modalities other than ice is not generally indicated.

Therapy following open repairs requires a number of weeks with passive range of motion only (per individual orthopedist protocol). A slower progression to regain active range of motion and strength is then followed. Use of equipment and job simulated tasks are appropriate in the later phase of treatment. Short-term modalities may be indicated when initially regaining range of motion.

Customary and usual therapy documentation requirements would still prevail.

PROTOCOL HISTORY:
Passed: 9/1/1992
Amended: 6/9/1998

PROTOCOL FOR THE MANAGEMENT OF ACUTE INJURIES TO THE KNEE

INTRODUCTION

The vast majority of knee injuries result from direct trauma to the joint or are caused by torsional or angulatory forces. These injuries vary in severity from simple ligamentous strains to complex injuries involving ligamentous disruption with meniscal damage and associated fractures.

The Protocol is designed to guide the practitioner in the appropriate management of these injuries and to establish a logical sequence for the diagnostic evaluation and treatment of the more complex injuries.

In general, knee injuries should be referred for orthopedic consultation and/or treatment under the following circumstances:

1. Failure of a presumed knee sprain to show progressive resolution and respond to appropriate conservative treatment in a period of three (3) weeks.
2. Radiographic evidence of an associated fracture.
3. The initial presence of a tense hemarthrosis or the development of a recurrent hemarthrosis.
4. An acutely locked, or an acutely dislocated knee.
5. Clinical evidence of gross ligamentous instability.
6. A presumed diagnosis of a meniscal injury.

ACUTE KNEE SPRAINS – MILD VS. MAJOR

I. MILD KNEE SPRAINS

These are common injuries usually resulting from the application of a torsional or angulatory force to the knee and are characterized by pain, swelling, localized tenderness, increased discomfort on weight bearing, negative x-rays, and no clinical evidence of instability.

A. APPROPRIATE DIAGNOSTIC TESTS

1) Plain x-rays
2) MRI of knee by Orthopedic Specialist, Rheumatologist, or Physiatrist
3) Bone Scan
4) CT Scan of knee
5) Arthrogram of knee (if MRI contraindicated)

B. OUTPATIENT/OPERATIVE TREATMENT

1) Medications to include analgesics and non-steroidal anti-inflammatory drugs
2) Application of ice, compression dressings, and temporary partial restriction of weight bearing
3) Physical modalities and/or rehabilitative procedures (up to 6 weeks)
4) Surgical treatment and inpatient treatment are generally not indicated for this level of injury.

C. DURATION OF TREATMENT

Should not exceed three (3) weeks

D. ANTICIPATED RESULTS

Resolution of symptoms and resumption of normal activities

II. MAJOR KNEE SPRAINS

Cases with positive clinical evidence of instability

A. APPROPRIATE DIAGNOSTIC TESTS

1) Plain x-rays
2) MRI of knee by Orthopaedic Specialist, Rheumatologist, or Physiatrist
3) Bone Scan
4) CT Scan of knee
5) Arthrogram of knee (if MRI is contraindicated)

B. OUTPATIENT/NON-OPERATIVE TREATMENT

Includes bracing and physical therapy up to 6 weeks

C. ANTICIPATED RESULTS

1) Variable permanent limitation of activities
2) Surgical treatment is frequently indicated and may require inpatient hospital stay.

III. MENISCAL INJURIES

The mechanism of injury is similar to that for knee sprains, but symptoms of pain and swelling fail to resolve in the anticipated period of time, and the symptoms frequently include a sensation of "catching or giving away" of the joint, and a history of locking of the joint may be elicited.

Clinical findings may include joint space tenderness, a mild effusion restricted range of motion, or a positive McMurry's sign.

A. DIAGNOSTIC STUDIES

1) Plain x-rays
2) Arthrocentesis
3) MRI
4) Arthrogram, especially when an MRI is contraindicated
5) Bone Scan
6) Diagnostic Arthroscopy

B. TREATMENT

1) OUTPATIENT/NON-OPERATIVE TREATMENT

a) Short-term use of non-steroidal anti-inflammatory drugs in conjunction with an Arthrocentesis and short-term immobilization with a period of limited weight bearing

b) Physical modalities and/or rehabilitative procedures

2) OUTPATIENT/OPERATIVE TREATMENT

a) Options include arthroscopic menisectomy and/or arthroscopic meniscal repair.

b) Physical Therapy/Rehabilitation

3) INPATIENT/NON-OPERATIVE TREATMENT

Admission for non-operative treatment is not indicated.

4) INPATIENT/OPERATIVE TREATMENT

The reason for admission for surgical treatment may include the presence of associated medical conditions, a concomitant knee injury such as a fracture of the tibial plateau or a major ligamentous disruption, or the presence of other injuries which require inpatient treatment.

a) Treatment options include:
   1) Arthroscopic menisectomy or meniscal repair
   2) Open arthrotomy for menisectomy or meniscal repair
b) Physical modalities and/or rehabilitative procedures

C) DURATION OF TREATMENT

Duration of treatment generally may vary up to three (3) months or to a point of maximum medical improvement. The patient's age and pre-existence of arthritic changes within the joint influence the duration of treatment.

D) ANTICIPATED RESULTS

1) Improved knee function with minimal residual symptoms
2) Possible predisposition to the development of traumatic arthritis of the knee

PROTOCOL HISTORY:
Passed: 9/1/1992
Amended: 11/19/2002
Amended: 6/12/2007

LOW BACK MUSCULOLIGAMENTOUS INJURY (Sprain/Strain)

I. INTRODUCTION

Low back injuries including muscular strains and/or ligament sprains are exceedingly common in the general population. These injuries may be the result of mechanical stresses and/or functional demands placed on the low back by everyday activities, or may be related to an acute injury. Symptoms are believed to be caused by a partial stretching or tearing of the soft tissues (muscles, fascia, ligaments, facet joint capsule, etc.). For the vast majority of patients, these conditions are of short duration with a complete recovery as a general rule. Most individuals with a musculoligamentous injury of the lower back recover rapidly, with 50 to 60% of patients recovering within one week and 90% of patients recovering within six weeks.

II. DIAGNOSTIC CRITERIA

A. Historical and Physical Examination Findings

Low back pain, with or without paraspinal muscle spasm, may begin suddenly or develop gradually over the first 24 hours following an injury. Pain is usually relieved by rest and exacerbated by motion. Pain due to a musculoligamentous injury does not radiate below the knee, and a lumbar strain is not accompanied by paresthesias or weakness in the legs or feet. Physical findings may include tenderness to palpation in the lower back, loss of normal lumber lordosis, and/or spasm of the paraspinal muscles. Straight leg raising and other tests that cause spinal motion may increase low back pain. The subject may stand in a flexed position or tilted to one side. Neurologic examination and nerve root stress tests are commonly negative.

III. DIAGNOSTIC TESTING AND EXAMINATION

A. Laboratory Studies

Laboratory studies including *white blood cell count, ESR and C-reactive protein* can be increased with spinal infection or cancer, but do not have sufficient sensitivity or specificity to direct further testing in most cases. Serologic testing including rheumatoid factor, antinuclear antibody and/or Lyme titer are rarely necessary or appropriate in the case of a work-related injury.

B. Imaging Studies

Conventional radiographs of the lumbar spine are often obtained, but are of limited value in detecting a lumbar disc herniation, infection or neoplasm. The diagnosis of a musculoligamentous injury is not based on radiographic criteria, but x-rays may be indicated in certain cases. Criteria developed by the Agency for Healthcare Research and Quality (AHRQ) suggests that lumbar spine x-rays may be appropriate in a patient with any of the following risk factors:

* age over 50 years
* high velocity trauma
* history of cancer
* history of osteoporosis or fracture

Magnetic resonance imaging is a non-invasive means of evaluating the status of the lumbar spine and its components. MRI is appropriate in the presence of objective and/or progressive neurologic deficits. Indications for early MRI examination include:

1. Symptoms or signs of acute neurologic bowel or bladder dysfunction or saddle anesthesia.
2. Diagnostic suspicion of tumor, hemorrhage, or infection.
3. Presence of progressive weakness (neurologic motor deficit).

For most patients, it is appropriate to limit the use of MRI to those individuals who remain symptomatic after 30 days of non-surgical management. Gadolinium contrast may be used in cases where previous surgery was performed in order to differentiate between epidural fibrosis and a recurrent disc herniation.

Computed tomography (CT) can be useful in assessing the extent of bone spurs, canal encroachment and/or ossification of the posterior longitudinal ligament.

Myelography has largely been supplanted by MRI, but in combination with CT (i.e., CT-myelography) may be useful in selected cases.

C. Electrodiagnostic Studies

Needle electromyography and nerve conduction studies can help distinguish between lumbar radiculopathy and other causes of back pain. Involvement of muscles within the affected myotome may occur as soon as three weeks post-injury, but EMG testing is of limited value in the absence of neurologic findings and is generally reserved until after 30 days post-injury.

D. Inappropriate Diagnostic Tests and Examinations

1. Myeloscopy
2. Thermography
3. Spinoscopy

IV. MANAGEMENT

A. Appropriate Treatment Strategies

Almost all patients with low back musculoligamentous injuries can be treated satisfactorily. No indications exist for the use of surgery in the treatment of low back

musculoligamentous injuries. The main objectives of treatment are to relieve pain, improve function and prevent recurrence. Few of the commonly recommended non-surgical therapies have been tested via a randomized, controlled trial, and treatment recommendations derive largely from case series and/or anecdotal experience. The AHRQ has established guidelines for treatment based upon the recommendations of a consensus panel formed from specialists in many disciplines including orthopedics, neurology, neurosurgery, physiatry, rheumatology, chiropractic, physical therapy, etc.

Appropriate treatment recommendations include:

1. Limited period of bed rest, generally not to exceed 48 hours after injury.
2. Physical modalities and procedures including therapeutic cold or heat, instruction in proper body mechanics, and exercise. A physical therapy program may be initiated as early as the day of injury, but can often be reserved until > 4 days post-injury.
3. Spinal manipulation therapy.
4. Medications
   - muscle relaxants
   - NSAIDS
   - analgesics (narcotic and/or non-narcotic)
   - steroids
5. Epidural steroid injections in selected cases.
6. Psychological evaluation and treatment, functional capacity evaluation and/or work conditioning or work hardening programs may be indicated for individuals with prolonged symptoms and/or disability status.

Consultation with an appropriate specialist (neurologist, orthopedic surgeon, physiatrist, or neurosurgeon) should be obtained if conservative treatment has not led to significant clinical improvement within four weeks of the reported injury.

B. Inappropriate Treatment Strategies

1. Operative treatment is inappropriate for a lumbar musculoligamentous injury
2. Prolonged bed rest > 5 days
3. Narcotic medications for a prolonged period
4. Prolonged home traction

PROTOCOL HISTORY:
Passed: 9/1/1992
Amended: 5/17/1993
Amended: 6/9/1998
Amended: 11/19/2002
Amended: 5/5/2009

HERNIATED LUMBAR DISC

Patients with sciatic nerve pain under treatment by their own physician who fail to improve after four weeks – refer to a Neurologist, Orthopedic Surgeon, Physiatrist, or Neurosurgeon for consultation and/or treatment.

I. BACKGROUND

A herniated lumbar disc is a condition in which there is protrusion of the intervertebral disc. Herniations occur most commonly through a posterolateral defect, but midline herniations may occur. Resulting compression of the spinal nerve root causes inflammation and pain, often along the anatomic course of the nerve. In the lumbar spine, this most often occurs at the L4-L5 and L5-S1 disc levels, causing involvement of the corresponding L5 and S1 nerve roots. As a result of both mechanical and biochemical changes around the nerve root, the patient will experience pain, paresthesia, and possibly weakness in one or both lower extremities, usually below the knee. The rare herniations at the L1, L2, and L3 levels are usually associated with vague pain, paresthesia, and weakness above the knee. Back pain may or may not be a presenting complaint with any herniated lumbar disc.

Most acute lumbar disc herniations occur in patients between 35 and 55 years of age, whereas spinal stenosis usually occurs in patients over 50 years of age. Spinal stenosis may mimic a herniated disc. Patients with spinal stenosis in addition to low back pain will give a history suggestive of neurogenic claudication (pain on walking) and will present radicular signs and symptoms caused by degenerative changes involving the intervertebral discs and the facet joints.

II. DIAGNOSTIC CRITERIA

A. Pertinent Historical and Physical Findings

Back pain is usually the first symptom and may or may not abate as the pain and paresthesia begins to radiate down the lower extremity. Motion of the spine is limited due to pain and muscle spasm. The neurological examination may be normal if the compressed nerve is still functional, or it may yield objective evidence of impaired nerve conduction (e.g. atrophy, weakness, sensory alteration or diminished reflex) depending upon the anatomic nerve root affected. Signs of nerve root tension (e.g. positive straight leg raising, bow-string test, Lasgue's test) may also be present.

When the L4 disc herniates, it usually causes pressure on the L5 nerve root resulting in weakness of the great toe extensor or other dorsiflexor muscles of the foot and sensory loss along the medial aspect of the foot to the great toe, but it may be associated with a knee reflex abnormality. When the L5 disc herniates, it usually causes pressure on the S1 nerve root, resulting in weakness of the plantar flexors of the foot and

a sensory deficit in the posterior calf area and lateral aspect of the foot in addition to a diminished Achilles' reflex.

B. Appropriate Diagnostic Tests and Examinations

1. Clinical examination by Neurologist, Neurosurgeon, Physiatrist, Orthopedic Surgeon.
2. Plain radiographs of the lumbosacral spine may be indicated.
3. MRI Imaging is the prime diagnostic test in evaluating a herniated disc suspect, which in addition to the disc would evaluate tumor, infection, fracture and congenital abnormalities.
4. CT Scan may be ordered if there is a specific bone problem that may be better delineated by that test, or when MRI imaging is contraindicated (e.g., metal imbedment or severe claustrophobia).
5. Electrodiagnostic studies may be done three or four weeks following the onset of symptoms to diagnose and assess the extent of nerve dysfunction and may be necessary to correlate the affected level by the findings on the above testing. This should include both needle EMG and nerve conduction studies.
6. Myelography is rarely indicated and is done as an outpatient procedure. It may be performed with a CT Scan in an instance where the above studies leave some question.

C. Inappropriate Diagnostic Tests and Examinations

1. Myeloscopy
2. Thermography
3. Spinoscopy
4. Dermatomal Somatosensory Evoked Potential

III. TREATMENT

A. Outpatient Treatment

1. Non-operative Treatment

a. Short period of bed rest, up to 2 days, with analgesics, mild relaxants, and nonsteroidal anti-inflammatory drugs. Complete bed rest for long periods may be deleterious to the body and should be closely monitored.
b. Physical therapy and/or rehabilitation
c. Injection of trigger points, spinal nerve blocks

Outpatient Procedure

d. Finite course of chiropractic spinal manipulation
e. Epidural steroid injections

Outpatient Procedure

f. Pain clinic – chronic phase
g. Orthotics

B. Inpatient Treatment

1. Non-operative Treatment

Rarely is there indication for admission but in some cases inability to control pain may require a short period of hospitalization.

2. Operative Treatment

a. Indications

1. Failure of non-operative treatment to improve function
2. Quality of patient's life significantly impaired
3. Presence of significant or progressive neurological deficit

b. Procedure Options

1. Laminectomy with discectomy
2. Laminotomy with discectomy
3. Microdiscectomy
4. Percutaneous discectomy (in developmental phase)
5. Interbody fusion
6. Posterior or lateral bony fusion
7. Transpedicular fixation

c. Indications for Discharge

1. Uncomplicated
   a. One day following microdiscectomy or percutaneous discectomy
   b. One to two days after open discectomy

2. Complicated
   c. After wound infection, thrombophlebitis, spinal fluid leak, or other significant complications have been controlled
   d. Home health care may be required for a short period.

e. Physical modalities and/or rehabilitative procedures

1. Some monitoring of the patient's activities may be necessary.
2. Patient should be instructed in walking program with a gradual increase in their physical activities.
3. Strengthening exercises or work simulation activities may be indicated for some patients.

C. Estimated Duration of Care

In both non-operative and operative treatment, it would depend on the degree of improvement and the length of time his physical impairment will enable him to return to his pre-operative occupation or the availability of a transfer to a less demanding physical position.

D. Modifiers (age, sex, and co-morbidity)

Patients with symptoms suggestive of cauda equina syndrome will require a different approach to treatment. Cauda equina syndrome is usually caused by a central herniated disc. Symptoms include low back pain, unilateral or bilateral leg pain and weakness, saddle anesthesia, and paralysis with loss of bladder and bowel control. Once this diagnosis is suspected, the patient should undergo prompt neurodiagnostic evaluation. Early surgery is recommended; however, there is no evidence that neurologic recovery will be effected.

PROTOCOL HISTORY:
Passed: 9/1/1992
Amended: 5/17/1993
Amended: 11/19/2002
Amended: 5/5/2009

LUMBAR FUSION

A. Indications for Lumbar Fusion

1. Unstable vertebral fracture

2. Fusion may be indicated after second or third surgery with documented MRI, CT Scan, or myelogram showing re-extrusion of previously unsuccessfully operated disc at the same level, with or without intractable back pain and clear clinical evidence of new lumbar radiculopathy with EMG evidence, if felt needed.

3. Traumatic (acquired or congenital) spinal deformity, history of compression wedge fractures with demonstrated acquired kyphosis-scoliosis.

4. Intractable low back pain for longer than three months and six-week trial with a rigid back brace or body cast producing significant pain relief associated with one of the following conditions involving the lower lumbar segments below L3.

a. For first surgery only, degenerative disc disease with pre-operative documentation of instability (motion on flexion/extension or fixed spondylolisthesis)
b. Pseudoarthrosis
c. For second or third time disc surgery

B. Contraindications for Lumbar Fusion

1. Primary surgery for a new, acute disc herniation with unilateral radiation leg pain

C. Surgical Procedures

1. Posterior or lateral bony fusion
2. Transpedicular fixation
3. Interbody fusion

PROTOCOL HISTORY:
Passed: 9/1/1992
Amended: 6/12/2007

POST-TRAUMATIC HEADACHE

I. BACKGROUND

Headache is a frequent consequence of head and neck injury and may be experienced soon after injury by 30-80 % of persons. Post-traumatic headaches may be mild or severe, but frequently resolve within 6 – 12 months after injury.

The most frequent cause of post-traumatic headache is related to muscular contraction within the neck and scalp and may account for up to 85% of cases, with migraine-like vascular headaches accounting for nearly 15% of cases.

II. CLASSIFICATION

A. Acute post-traumatic headaches:
Headaches develop within 14 days of injury and resolve within 8 weeks after injury.

B. Chronic post-traumatic headaches:
Headaches develop within 14 days of injury and last longer than 8 weeks after injury.

III. DIAGNOSTIC CRITERIA

A. History of a direct or indirect head or neck injury
B. Persistent pain and/or impaired sensation or cognition

IV. DIAGNOSTIC STUDIES

A. History and physical examination including persistent neurological examination
B. X-rays of the cervical spine in the presence of neck pain
C. Skull films are not usually indicated but may be obtained in the presence of penetrating injury to the skull or scalp, otorrhea or peri-orbital ecchymosis.
D. MRI and CT scans may be essential in the presence of objective neurologic abnormalities; in the absence of localizing neurologic findings, MRI and/or CT scan are rarely indicated within 30 days of injury.
E. EEG is not indicated within 30 days of injury unless the patient has signs or symptoms of a post-traumatic seizure disorder.
F. Neuropsychological testing may be helpful for objective evaluation of cognitive and/or behavioral function.

V. TREATMENT

The vast majority of individuals with post-traumatic headache may be treated as outpatients, and hospital admission for observation is rarely necessary. Symptomatic treatment may include non-steroidal anti-inflammatory medications, mild analgesics and/or muscle relaxants. Superficial heat, postural support, and exercise may be useful for cervicogenic headache. Individuals with migraine-type post-traumatic headaches may require tricyclic antidepressants or abortive medications (butalbital compounds such as fiorinal, Fioricet, Esgic, and phrenilin, ergots, sumatriptin, valproate, or intravenous dihydroergotamine).

Individuals with chronic post-traumatic headaches may develop symptoms and signs including dizziness, vertigo, candidates, hearing loss, irritability, anxiety, depression, personality change, fatigue, sleep disturbance, decreased libido, and/or decreased appetite. These conditions and symptoms may require treatment by an appropriate specialist such as a psychiatrist or otolaryngologist.

PROTOCOL HISTORY:

Passed: 9/1/1992 (as Post-Concussion Syndrome)
Amended: 11/19/2002
Amended: 5/5/2009 (as Post-Traumatic Headache)

CHRONIC REGIONAL PAIN SYNDROME (CRPS)
(also referred to as Sympathetic Dystrophy or Causalgia)

I. BACKGROUND

Complex regional pain syndrome is a descriptive term encompassing a variety of painful conditions following injury, which appear regionally and have a distal predominance of abnormal physical examination findings. This painful condition typically follows a traumatic injury or noxious event to an extremity, with a disproportionate response respective to the original insult. Medical conditions including stroke and myocardial infarction may also be precipitating factors. The pain pattern is not limited to the distribution of a single peripheral nerve, and physical findings include edema, alterations in skin blood flow, abnormal sudomotor activity in the region of pain, allodynia, or hyperalgesia.

CRPS Type I (Reflex Sympathetic Dystrophy)

1. Type 1 CRPS is a syndrome that develops after an initiating noxious event.
2. Spontaneous pain or allodynia/hyperalgesia occurs, is not limited to the territory of a single peripheral nerve and is disproportionate to the inciting event.
3. There is or has been evidence of edema, skin blood flow abnormality, or abnormal sudomotor activity in the region of the pain since the inciting event.
4. The diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction.

CRPS Type II (Causalgia)

1. Type II CRPS is a syndrome that develops after a nerve injury. Spontaneous pain or allodynia/hyperalgesia occurs and is not necessarily limited to the territory of the injured nerve.
2. There is or has been evidence of edema, skin blood flow abnormality or abnormal sudomotor activity in the region of the pain since the inciting event.
3. The diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction.

II. DIAGNOSTIC CRITERIA

1. History of noxious event or cause of immobilization.
2. Continued pain, allodynia or hyperalgesia out of proportion to the injury.
3. Physical evidence of edema, trophic skin changes, hair loss, alterations in skin blood flow or abnormal sudomotor activity in the region of pain.
4. The diagnosis is excluded by the existence of conditions that otherwise account for the degree of pain and dysfunction.

III. DIAGNOSTIC STUDIES

1. Surface temperature measurements indicating at least 1 degree Celsius asymmetry between the normal and injured sides. The existence of a skin temperature differential may vary, and repeated measurements are helpful. The injured side may be warmer or cooler.
2. A three-phase radionuclide bone scan may assist in diagnosis. A normal study does not exclude this diagnosis, however.
3. Radiographic studies of the injured extremity may show patchy demineralization in chronic or severe cases.

IV. TREATMENT

Treatment for complex regional pain syndrome type 1 (reflex sympathetic dystrophy) should be directed at providing pain control, in conjunction with an effort to promote participation in a directed physical and/or occupational therapy program to restore use and function of the injured extremity. Treatment options include:

1. Pharmacologic Agents

    a. Nonsteroidal anti-inflammatory drugs
    b. Tricyclic antidepressants
    c. Membrane stabilizers (anticonvulsants)
    d. Oral opioids
    e. Oral corticosteroids
    f. Capsaicin

2. Physical Modalities

    a. Desensitization (contrast baths or fluidotherapy)
    b. Range of motion exercises (passive, active assisted, active)
    c. Edema control garments (stocking or glove)
    d. Stress-loading via weight-bearing exercises
    e. Functional training/work conditioning/work hardening

3. Injection Techniques

Somatic and sympathetic nerve blocks may be effective for patients displaying allodynia who are unable to tolerate manipulation of the injured extremity. Occasionally, continuous nerve blocks employing brachial plexus or epidural catheter is/may be necessary for patients with severe pain and stiffness from prolonged immobility.

General guidelines for the use of neural blockade are as follows:

a. Evidence of a successful block, either an increase in skin temperature by 4 degrees Fahrenheit with sympathetic blocks, or evidence of motor block in the appropriate nerve distribution should be documented.

b. Unless a continuous catheter is used, nerve blocks should be utilized at most two or three times per week in conjunction with therapy.

c. Repeated neural blockade should only be considered if a clear benefit is evident following each block, as indicated by substantial improvement in pain persisting for prolonged time periods following the block, or marked improvement in range of motion and swelling can be documented.

d. Nerve blocks performed in a series should be conducted based on a positive benefit from the initial blocks and should not exceed three blocks in a series. The response to the block series should then be reassessed following a period of continued physical therapy, not to exceed 6 weeks of treatment between physician reassessments. Failure to continue to improve, or diminished function, should be considered an indication for additional nerve blocks, assuming a positive response was documented with the first series.

e. If a substantial improvement cannot be demonstrated, excluding the transient pain relief that accompanies any somatic nerve block, further use of neural blockage is unwarranted.

4. Surgical Sympathectomy and Neuromodulation

Surgical sympathectomy is rarely considered effective in resolution of complex regional pain syndromes. These syndromes, including causalgia and reflex sympathetic dystrophy, are related to receptor supersensitivity and are not caused by over-activity of the sympathetic nervous system. Most patients undergoing a surgical sympathectomy obtain only transient improvement in pain levels and may suffer serious or disabling complications from the surgery. Neuromodulation techniques such as spinal column stimulator implantation use are governed by the Spinal Column Stimulators Protocol.

5. The assistance of a pain management psychologist or psychiatrist may be helpful in cases where symptoms persist for 2 months or more. Psychology and/or psychiatry intervention can provide motivational support, assess and treat co-existing conditions such as depression, and may aid in the establishment of realistic treatment goals and objectives. This condition may be appropriate for treatment in a multidisciplinary program if pain persists for 2 months or more.

PROTOCOL HISTORY:

Passed: 9/1/1992 (As "Sympathetic Dystrophy")
Amended: 11/19/2002 (As "Chronic Regional Pain Syndrome")
Amended: 6/3/2008
Amended: 5/5/2009
Amended: 4/27/2010

THORACIC OUTLET SYNDROME

I. BACKGROUND

The thoracic outlet syndrome (TOS) is a potential cause of neck, arm, and/or hand pain. TOS is more common among women than men, and occurs most frequently in the 2nd and 4th decades. The thoracic outlet is located at the superior aspect of the thorax; neural and/or vascular compression attributed to the thoracic outlet syndrome has been described as occurring at up to 9 anatomic locations, with the three most common being (a) the interscalene triangle, (b) between the first rib and the clavicle, and (c) between the pectoralis minor and thoracic cage. Risk factors include anatomic anomalies (cervical rib, long transverse process at the cervical spine, clavicle fracture or anomaly, bifid first rib or fusion of the 1st and 2nd ribs, tumor, subclavian artery aneurysm, etc.), trauma, or occupations requiring prolonged, static shoulder protraction postures and/or frequent shoulder abduction activity such as reaching or lifting over shoulder height.

This diagnosis often requires consultation by a specialist (neurologist, neurosurgeon, orthopedist, physiatrist, or vascular surgeon). Treatment is non-surgical in the majority of cases, but surgical decompression of the brachial plexus and/or vascular structures may be required in some instances.

II. DIAGNOSTIC CRITERIA

A. History and Physical Examination

Patients most commonly complain of supraclavicular shoulder pain with radiation to the medial arm and forearm, often with numbness and/or coolness in the 4th and 5th digits of the hand. Hand weakness or difficulty with fine manipulation may be reported, as well as cold intolerance. Cervical motion may increase symptoms, and headaches may develop. A cool, pale hand or swollen upper extremity may be reported. Symptom duration ranges from weeks to years, with an average of 18 months. Ten percent of patients have bilateral hand symptoms. Differential diagnosis includes carpal tunnel syndrome, ulnar neuropathy, cervical radiculopathy, medial epicondylitis, fibromyalgia, CRPS-1, axillary vein thrombosis, subclavian steal syndrome and/or apical lung tumor.

Physical examination should include a complete orthopedic and neurovascular examination, with attention to: sensation, reflexes, strength, range of motion, muscle atrophy and pulses. Specific diagnostic tests include:

1. Adson's maneuver, in which the shoulder is abducted and externally rotated with the neck extended, and the radial pulse is palpated. A positive test includes a decrease in the radial pulse pressure.

2. Wright's maneuver, in which the shoulders are abducted and externally rotated as the patient inhales deeply and holds his/her breath. A positive test includes a reproduction of paresthesias in the symptomatic distribution.

3. Roos test, in which the shoulders are fully flexed, and repetitive, rapid finger flexion and extension are performed. A positive test includes a reproduction of paresthesias in the symptomatic distribution.

B. Diagnostic Test Procedures Include:

1. X-rays of the cervical spine, to rule out cervical rib and/or apical tumor.

2. Electrodiagnostic studies including nerve conduction testing and electromyography. A prolongation of the ulnar F wave and/or a decrease in the ulnar sensory nerve action potential (SNAP) may be seen.

3. MRI of the cervical spine and/or brachial plexus may rule out cervical disc herniation or a space-occupying lesion (tumor, cyst, abscess, etc.).

4. MRA or arteriography with the arm in abduction may demonstrate compression of the supraclavicular vasculature.

III. TREATMENT

A. Non-operative

1. Application of a specific exercise protocol, as may be provided under the direction of a physical therapist or occupational therapist. Scapular retraction (passive and active) and cervical active range of motion exercises are generally included.

2. Avoidance of carrying heavy objects; avoidance of persistent and/or repetitive activities with the shoulders flexed and/or abducted; avoidance of carrying a heavy backpack.

3. Medication: Analgesics, NSAIDS, tricyclics, SSRIs, muscle relaxants, and/or anticonvulsants.

B. Operative

1. Surgical resection of a segment of the first rib.

2. Scalenectomy or removal of cervical rib or rudimentary rib via a supraclavicular approach.

IV. ESTIMATED DURATION OF CARE

Non-operative care options are indicated prior to consideration of operative treatment. Non-operative care may be provided for at least 8 weeks prior to considering surgery, and may be continued until the point of maximum medical improvement.

Operative treatment, followed by a post-operative treatment phase of up to six months' duration, should lead to a point of maximum medical improvement in most cases.

PROTOCOL HISTORY:

Passed:	9/1/1992
Amended:	9/16/2003
Amended:	5/5/2009

PROTOCOLS FOR INJURIES TO THE FOOT AND ANKLE

I. DIGITAL FRACTURES

A. Background

Digital fractures commonly occur in the workplace and are usually the result of a crush injury from a falling object, or from striking one's foot against an immobile object (stubbing one's toe).

There is a wide range of digital fractures, from simple non-displaced fractures requiring stiff soled shoe wear, to comminuted compound intra-articular fractures requiring emergent surgical debridement and stabilization.

Minimizing digital fracture occurrence should be the primary goal in the workplace, and the steel toe "safety shoes" have significantly reduced the incidence of these injuries.

B. Diagnostic Criteria

1. History and Physical Examination:
   i. Typically the patient presents with a painful, swollen toe. The patient often complains of difficulty with shoe wear and ambulation.
   ii. Physical exam reveals swelling, erythema and ecchymosis at the injured digit, which can often extend into the forefoot. Palpating the injured digit reproduces pain.

2. Diagnostic Imaging:
   i. Plain Radiography: Standard anteroposterior (AP), oblique, and lateral radiographs of the entire foot should be obtained to not only include the toe, but the entire foot as injuries more proximal are common.
   ii. Bone Scan: Not indicated.
   iii. CT Scan: Not indicated.
   iv. MRI: Not indicated.

C. Treatment Based on Fracture Type:

1. Lesser Digit Fractures – 2nd and 5th toe fractures
   i. Extra-articular fractures
      1. Non-displaced: Buddy splint with post op shoe or short CAM walker depending on patient comfort level for 2-4 weeks.
      2. Displaced: Closed reduction under digital anesthetic block followed by buddy splint, post-op shoe, or short CAM walker boot for 4-6 weeks.
   ii. Intra-articular fractures
      1. Non-displaced: Buddy splint with post op shoe or short CAM walker depending on patient comfort level for 2-4 weeks.

2. Displaced: Closed reduction under digital anesthetic block followed by buddy splint, post-op shoe, or short CAM walker boot for 4-6 weeks.

iii. Open Fractures

1. Tetanus prophylaxis should be administered as soon as possible, with appropriate antibiotics.

2. Simple wounds can be irrigated and closed in the Emergency Department.

3. More complex wounds and crush injuries should be evaluated by an available Orthopaedic Surgeon or Podiatrist, and often require operative intervention.

iv. Return to Work

1. With all types, patient may return to modified duty when comfortable, with appropriate foot orthosis (buddy splint, post-op shoe, or CAM walker).

2. Physical therapy can be used to expedite return to function when appropriate.

2. Great Toe Fractures

i. Extra-articular fractures

1. Non-displaced proximal or distal phalanx fracture

a. Subungal hematoma should be decompressed if present via nail puncture or nail avulsion.

b. Post-op shoe or Short CAM walker for 2-4 weeks

2. Comminuted distal tuft fracture

a. Subungal hematoma should be decompressed if present via nail puncture or nail avulsion.

b. Post-op shoe or Short CAM walker for 2-4 weeks

ii. Intra-articular fractures

1. Distal phalanx dorsal avulsion fracture (Great toe mallet)

a. Displaced: Open reduction and internal fixation followed by immobilization with post-op shoe, short leg cast, or Short CAM walker for 4-6 weeks

b. Non-Displaced: Fracture shoe, or Short CAM walker for 4-6 weeks

2. Intra-articular distal or proximal phalanx fractures

a. Non-Displaced: Fracture shoe or Short CAM walker for 4-6 weeks

b. Displaced: Attempt closed reduction, but often unsuccessful, under digital anesthetic block. If necessary open reduction and internal fixation (ORIF) followed by short leg cast immobilization or short CAM walker for 4-6 weeks.

iii. Open Fractures

1. Tetanus prophylaxis should be administered as soon as possible, with appropriate antibiotics.

2. Simple wounds can be irrigated and closed in the Emergency Department.

3. More complex wounds and crush injuries should be evaluated by an available Orthopaedic Surgeon or Podiatrist and often require operative intervention.

iv. Return to Work

1. With non-operative fractures, patient may return to modified duty when comfortable, with appropriate foot orthosis (buddy splint, post-op shoe, or CAM walker).

2. Operative injuries typically require two weeks of strict elevation at home followed by return to modified duty when comfortable, with appropriate foot orthosis (buddy splint, post-op shoe, or CAM walker) for 4-6 weeks.

3. Physical therapy can be used to expedite return to function when appropriate.

D. Summary

Digital fractures are common in the workplace and often result from blunt trauma caused by a falling object, or stubbing of the toe. Injuries range from simple non-displaced fractures to open intra-articular injuries which require surgical treatment.

The nature of the workers' occupation will often dictate when return to function will occur. It is to be determined by the treating physician when return to work will either delay healing or put the worker at risk for re-injury.

Digital fractures usually do not preclude a worker returning to modified duty or sedentary desk work when soft tissue swelling and patient's comfort level allows.

II. METATARSAL FRACTURES AND DISLOCATIONS

A. Background

Metatarsal fractures are typically the result of blunt trauma or a crush injury to the foot from a falling object, a fall from height or misstep, or from a worker striking their foot against an immobile structure. Metatarsal stress fractures can occur from repetitive overuse of the foot (such as frequent pedal use, excessive walking, or jack-hammer use) and are of insidious onset.

Metatarsal fractures are typically separated into three areas, 1st metatarsal fractures, central metatarsal fractures (2-4 metatarsal), and 5th metatarsal fractures. They can be open or closed, intra-articular or extra-articular, and follow fracture classification patterns of long bones where fractures can occur at the base, midshaft, neck, or head of the metatarsal. Metatarsal dislocations can often occur in work-related injuries and represent another subcategory of metatarsal injuries.

Occurrence is common and not related to gender or age. Protective industrial work boots and varied terrain floor surfaces offer protection from these injuries.

B. Diagnostic Criteria

1. History and Physical Examination:

i. The patient typically presents acutely after an accident or fall with immediate pain and swelling at the fracture site, with often the inability to ambulate. The exception to this is with stress fractures where the onset is insidious but the patient often points directly to the level of stress fracture. Obtaining an accurate history is important, in particular the mechanism of injury.

ii. Physical examination reveals progressive **edema in the forefoot with tenderness to palpation in** the fracture site and surrounding radial tissue. Patients often will be highly guarded, particularly in comminuted, displaced, and intra-articular fractures. Careful neurovascular exam is critical, particularly in crush injuries where foot compartment syndromes can occur and are surgical emergencies. In cases where compartment syndrome is suspicious, frequent neurovascular exams and elevation at or just above the level of the heart is important. The orthopaedic surgeon should have a low threshold to perform foot fasciotomies if excessive swelling and pain out of proportion to the injury suggests a compartment syndrome. Open injuries are not common, but the foot should be carefully examined in its entirety for open wounds, and these should be addressed in the operating room.

2. Diagnostic Imaging:

i. Plain Radiography: Three view x-rays (AP, Oblique, and Lateral) should be obtained of the entire foot to evaluate for injury. Contralateral films are not necessary, but stress views and weight bearing views can often be helpful to evaluate for ligamentous injuries (Lisfranc injuries). Repeat x-rays at 2-3 weeks after onset of pain can be helpful in identifying stress fractures.

ii. Bone Scan: Not routine. Can be helpful in cases of suspected stress fractures, but often require 7-10 days after stress fracture occurrence to be positive.

iii. CT Scan: Not routine. Can be helpful and necessary when intra-articular extension exists and is used to aid operative decision making and planning. Also important tool in diagnosing metatarsal base dislocations (Lisfranc injuries).

iv. MRI: Not routine. Can be helpful when history suggests a stress fracture and can detect a stress fracture within days of their occurrence. Can also be helpful tools when patient fails to improve post 4-6 weeks of conservative management.

C. Treatment Based on Fracture Type

1. 1st Metatarsal Fractures.

i. Non-Displaced: These can be treated in a non-weight bearing cast or CAM walker for 4-6 weeks, followed by progressive weight bearing for

another 4-6 weeks. Close radiographic follow-up is required at 1-2 week intervals in those fractures at risk for displacing.

ii. Displaced: Since the 1st metatarsal bears the majority of the weight during the gait cycle, reduction of the displaced 1st metatarsal is important to minimize the long-term complication of lesser metatarsal overload secondary to a shortened or elevated 1st metatarsal head. ORIF is usually required to stabilize the fracture. The foot is typically immobilized in a short leg cast or CAM walker for 4-6 weeks, followed by another 4-6 weeks of progressive weight bearing and physical therapy. Return to sedentary desk work can occur as early as 2-3 weeks after surgery in some patients.

iii. Intra-articular. Anatomic reduction of intra-articular fractures is essential to prevent long-term post-traumatic arthritis of the 1st metatarsal phalangeal joint, or 1st tarsal metatarsal joint. ORIF is usually required to stabilize the fracture. The foot is typically immobilized in a short leg cast or CAM walker for 4-6 weeks, followed by another 4-6 weeks of progressive weight bearing and physical therapy.

2. Central Metatarsal Fractures

i. Non-Displaced: These can be treated in a non-weight bearing cast or CAM walker for 4-6 weeks, followed by progressive weight bearing for another 4-6 weeks. Close radiographic follow-up is required at 1-2 week intervals in those fractures at risk for displacing.

ii. Displaced: When evaluating displaced central metatarsal fractures, it is important to evaluate the relationship of the metatarsal heads with respect to the 1st metatarsal. Displaced fractures with a normal metatarsal head relationship with respect to the surrounding metatarsal heads can be treated nonoperatively in a short leg cast or CAM walker for 4-6 weeks. These are relatively stable injuries, as the distal intermetatarsal ligaments are usually intact. In displaced fractures where there is significant shortening of the metatarsal head, or where neurovascular or skin compromise is present, reduction is necessary. Those fractures that cannot be maintained by closed means are treated with ORIF. The foot is typically immobilized in a short leg cast or CAM walker for 4-6 weeks, followed by another 4-6 weeks of progressive weight bearing and physical therapy. Return to sedentary desk work can occur as early as 2-3 weeks after surgery in some patients.

iii. Intra-articular: Fortunately, these injuries are rare. When they occur they usually occur along with associated dislocations of the metatarsal bases, and represent Lisfranc joint fracture dislocations. These are usually treated with ORIF. Postoperatively, the patient is immobilized for 4-6 weeks in a short leg splint or short leg cast, and then requires another 4-6 weeks of progressive weight bearing and physical therapy until full weight bearing with a regular shoe is possible. Return to sedentary desk work can occur as early as 2-4 weeks after initial surgery.

3. 5th Metatarsal Fractures

i. Non-displaced: These can be treated in a post-operative shoe or CAM walker, for 4-6 weeks, and the patient is allowed to weight bear as

tolerated. Typically symptoms subside by 2-4 weeks and return to modified duty if possible.

ii. Displaced: Follow the guidelines for displaced central metatarsal fractures above. (C-2-ii)

iii. Jones Fractures: These represent fractures at the metaphyseal-diaphyseal junction, and have the propensity to become non-unions. The blood supply in this area of the 5th metatarsal is tenuous and represents a watershed area. As such, nonunions of Jones fractures can occur. There are some proponents that suggest immediate ORIF, which is often advocated in high performance athletes. Jones fractures, however, can be managed by closed mean with a short leg non-weight bearing cast for 6 weeks followed by another 4-6 weeks of progressive weight bearing. If during serial radiographic follow-up there are no visible signs of bony healing by about 6 weeks, AND the patient has persistent pain in the fractured site, then ORIF is recommended. Postoperatively, the patient is immobilized for 4-6 weeks in a short leg splint or short leg cast, and then requires another 4-6 weeks of progressive weight bearing and physical therapy until full weight bearing with a regular shoe is possible. Return to sedentary desk work can occur as early as 2-4 weeks after initial surgery.

iv. Base of the 5th Avulsion Fractures:

These represent an avulsion fracture from the lateral tarsal metatarsal ligament pulling on the base of the 5th metatarsal. Most often these are stable injuries and can be treated in a weight bearing short leg cast, CAM walker, or postoperative shoe for 4-6 weeks with return to modified duty once the patients comfort allowed. Significantly displaced and rotated fractures represent significant intra-articular injuries and should be reduced. If the reduction is not stable via closed means, then ORIF should be performed. Postoperatively, the patient is immobilized for 4-6 weeks in a short leg splint or short leg cast, and then requires another 4-6 weeks of progressive weight bearing and physical therapy until full weight bearing with a regular shoe is possible. Return to sedentary desk work can occur as early as 2-4 weeks after initial surgery.

4. Stress Fractures

i. Stress fractures are typically non displaced and treated with a CAM walker, short leg cast, or post op shoe for a period of 4-6 weeks, with return to modified duty once the patient is comfortable. Return to full activity is possible after fracture healing.

5. Metatarsal Dislocations (Lisfranc Joint Injuries)

i. Metatarsal dislocations often require surgical treatment, as closed management typically does not allow for anatomic reduction.

ii. Lisfranc dislocations represent dislocations at the bases of the metatarsals with respect to the tarsal bones. Missed Lisfranc injuries go on to develop often debilitating midfoot arthritis. The standard of care is to treat them with ORIF. Postoperatively, the patient is immobilized for 4-6 weeks in a short leg splint or short leg cast, and then requires another 4-6 weeks of progressive weight bearing and physical therapy until full weight bearing with a regular shoe is possible. Return to sedentary desk work can occur as early as 2-4 weeks after initial surgery.

6. Open Fractures and Crush Injuries

i. Crush injuries should be monitored in the hospital with frequent neurovascular checks to rule out compartment syndrome of the foot.

ii. When open fractures are identified, tetanus prophylaxis should be administered as soon as possible, with appropriate antibiotics.

iii. Patient is taken emergently to the operating room by an orthopaedic surgeon for surgical debridement, open reduction, and internal fixation.

iv. Severe crush injuries with concomitant compartment syndrome are treated with foot fasciotomies, and delayed closure, either primarily or with skin grafts.

v. Post-operatively, the foot is immobilized for approximately 4-6 weeks, and the patient is then started in a physical therapy program with progressive weight bearing for another 4-6 weeks until able to return to modified duty work.

D Summary

Metatarsal fractures represent a higher level of injury to the foot and ankle, and as such, proper identification, treatment, and rehabilitation is paramount to the successful outcome and expedient return to function of the injured worker. These injuries can occur as the result of direct blunt trauma, such as an object falling on a foot or a worker striking his foot against another object, via indirect means, such as twisting mechanism or misstep, or from repetitive microtrauma leading to a stress fracture.

Most often these injuries can be treated non-operatively, however, when the mechanics of the foot are significantly affected because of displaced fractures, reduction is necessary and this is usually via ORIF.

The nature of the worker's occupation will often dictate when return to function will occur. The treating physician determines when return to work will no longer interfere with healing or put the worker at risk for re-injury. Often though the patient is allowed to return to sedentary desk work when soft tissue swelling and patient's comfort level allows. This occurs typically 2-3 weeks after surgery, or 1-2 weeks with closed management of minimally displaced fractures.

III. MIDFOOT AND HINDFOOT INJURIES

A. Background

The midfoot is comprised of five tarsal bones (navicular, cuboid, medial cuneiform, middle cuneiform, and lateral cuneiform), and the hindfoot is comprised of two bones (calcaneus and talus). The intricate relationship of the tarsal bones with the hindfoot make up the apex of both the longitudinal and traverse arches of the foot, and their stability is important to the normal function of the foot.

Variations in normal anatomy of the foot can lead to a wide variety of foot shapes which range from the high arched cavo-varus foot shape, to the adult acquired or flexible flat foot. Having an underlying high arched or flat foot does not preclude a worker from performing the normal duties of most jobs as evidenced by the Royal Canadian Army study of the 1940s which showed no demonstrable functional difference between asymptomatic flat feet and normal feet of army recruits.

Injuries to the mid and hind foot typically represent a higher level of injury often a result from a fall from height or a crush injury. Emergent evaluation of the foot in an emergency room by experienced orthopaedic surgeons is often necessary to evaluate for serious soft tissue injuries, compartment syndromes, and fractures which often need surgical stabilization.

B. Diagnostic Criteria

1. History and Physical Examination:

i. The patient typically presents acutely after an accident or fall with immediate pain and swelling at the injury site, with often the inability to ambulate. Obtaining an accurate history is important, in particular the mechanism of injury. Sprains of the midfoot present much more innocuously, and the worker is usually able to ambulate but complains of a pain and a limp.

ii. Physical examination reveals progressive edema in the mid and hindfoot with tenderness to palpation at the fracture site and surrounding radial tissue. Patients often will be highly guarded, particularly in comminuted, displaced, and intra-articular fractures. Careful neurovascular exam is critical, particularly in crush injuries where foot compartment syndromes can occur and are surgical emergencies. In cases where compartment syndrome is suspicious, frequent neurovascular exams and elevation at or just above the level of the heart is important. The orthopaedic surgeon should have a low threshold to perform foot fasciotomies if excessive swelling and pain out of proportion to the injury suggests a compartment syndrome. Open injuries are not common, but the foot should be carefully examined in its entirety for open wounds, and these should be addressed in the operating room.

2. Diagnostic Imaging:

i. Plain Radiography: Three view x-rays (AP, Obligue, and Lateral) should be obtained of the entire foot to evaluate for injury. Contralateral films are not necessary, but stress views and weight bearing views can often be helpful to evaluate for ligamentous injuries (Lisfranc injuries). Repeat x-rays 2-3 weeks after injury can be helpful in identifying stress fractures or unstable midfoot ligamentous injuries.

ii. Bone Scan: Not routine. Can be helpful in cases of suspected stress fractures, but often require 7-10 days after stress fracture occurrence to be positive.

iii. CT Scan: Not routine. Can be helpful and necessary when intra-articular extension exists and is used to aid operative decision making and planning. Also important tool in diagnosing tarsal-metatarsal injuries (Lisfranc injuries) as well as talus and Calcaneus fractures. Useful tool also to delineate osteochondral injuries to the talus.

iv. MRI: Not routine. Can be helpful when history suggests a stress fracture, and can detect a stress fracture within days of their occurrence. Can also be helpful tools when patient fails to improve post 4-6 weeks of conservative management and can pick up avulsion fractures that are easily missed with plain radiography. Useful tool also to delineate osteochondral injuries of the talus.

C. Treatment Based on Injury Type

1. Midfoot Sprains

i. Midfoot sprains represent a continuum of injury to the midfoot and can often be debilitating injuries. If the plain x-rays are initially normal, treatment begins with activity modification in a stiff sneaker, post-op shoe or CAM walker for 1-2 weeks while the swelling and pain resolves, and gradual return to activity. Referral to orthopaedic surgeons is indicated when patient fails to improve after 2-3 weeks. This often suggests a more significant injury, and repeat x-rays should be obtained to evaluate for unstable midfoot injuries and/or fractures not recognized at initial workup; MRI and CT scan may be indicated at this point of the history, physical exam, and plain films warrant. Physical therapy is often initialized to maximize functional recovery.

2. Tarsal Fractures

i. Non-displaced: Treatment often consists of short leg cast or CAM walker for 4-6 weeks with a progressive weight bearing program with physical therapy. Return to sedentary work can occur as early as 1-2 weeks, and return to normal function by 6-8 weeks is typical.

ii. Displaced: Treatment often consists of ORIF, short leg cast or CAM walker for 4-6 weeks, followed by a progressive weight bearing with physical therapy for another 4-6 weeks. Return to sedentary desk work is dictated by the soft tissues but can occur as early as 2-4 weeks after surgery. Return to normal function can occur as early as 3-4 months, but in significant injuries can be upwards of 12 months for full recovery.

3. Talus and Calcaneus Fractures

i. Non-displaced: Treatment often consists of short leg cast or CAM walker for 4-6 weeks with a progressive weight bearing program with physical therapy. Return to sedentary work can occur as early as 1-2 weeks, and return to normal function by 6-8 weeks is typical.

ii. Displaced: Treatment often consists of ORIF, short leg cast or CAM walker for 4-6 weeks, followed by a non weight bearing physical therapy program for another 4-6 weeks. Return to sedentary desk work is dictated by the soft tissues but can occur as early as 2-4 weeks after surgery. Return to normal function can occur as early as 3-4 months, but in significant injuries can be upwards of 12-24 months for full recovery.

4. Open Fractures and Crush Injuries

i. Crush injuries should be monitored in the hospital with frequent neurovascular checks to rule out compartment syndrome of the foot.

ii. When open fractures are identified, tetanus prophylaxis should be administered as soon as possible, with appropriate antibiotics.

iii. Patient is taken emergently to the operating room by an orthopaedic surgeon for surgical debridement, open or closed reduction, and internal or external fixation.

iv. Severe crush injuries with concomitant compartment syndrome are treated with foot fasciotomies, and delayed closure, either directly or with skin grafts.

v. Post-operatively, the foot is immobilized for approximately 4-6 weeks, and the patient is then started in a physical therapy program with progressive weight bearing for another 4-6 weeks until able to return to modified duty work.

D. Summary

Mid and hind foot injuries are typically the result of higher energy mechanisms and fortunately do not occur frequently. Prompt involvement by orthopaedic surgeons is essential to both maximize functional outcome of patients, as well as expedite return to work.

Sprains of the midfoot often resolve within 2-3 weeks, and symptoms persisting beyond this should prompt referral to orthopaedic surgeons for further work up. Physical therapy early on can maximize return to function and expedite return to work. Return to sedentary work within 1-2 weeks is typical with return to full function by 2-4 weeks.

Severe injuries to the mid and hindfoot can be significantly debilitating and often are the result of falls from heights or crush injuries. Open reduction and internal fixation of indicated fractures can maximize overall long term function. Despite prompt evaluation, treatment, and fixation, however, the long-term functional outcome of these injuries is typically poor and is usually related to the development of significant post-traumatic arthritis.

IV ANKLE INJURIES

A. Background

Ankle injuries are amongst one of the most common injuries sustained at work. They represent approximately 30% of all complaints of patients reporting to the emergency department. More common reasons to sustain an ankle injury include poor shoe wear choice, uneven or irregular surfaces, missteps, and falls from heights.

There is a wide spectrum of injuries comprising ankle injuries. They range from the common grade 1 ankle sprain which typically resolves within 1-3 days, to the severe open ankle fracture dislocation which can take upwards of 1-2 years to obtain maximal medical improvement.

Preventing ankle injuries is the primary goal in protecting workers. Appropriate shoe wear, textured surfaces to prevent slippage, and awareness of surroundings when operating machinery and when working at heights are important measures which workers and employees should be aware of in order to minimize the risk of ankle injuries.

B. Diagnostic Criteria

1. History and Physical Examination

i. The patient typically presents acutely after an accident or fall with immediate pain and swelling at the injury site, with often the inability to ambulate. Obtaining an accurate history is important, in particular the mechanism of injury. Ankle sprains typically occur after an inversion of the foot (“rolling in”, “rolled over”). The patient complains of pain and inability to ambulate.

ii. Physical examination reveals progressive edema at the level of the ankle with tenderness to palpation usually over the lateral side of the ankle (area of anterior talo-fibular ligament rupture and fibular fractures). Patients often will be highly guarded, particularly in comminuted, displaced, and intra-articular fractures. Careful neurovascular exam is critical, particularly in crush injuries where leg and foot compartment syndromes can occur and are surgical emergencies. In cases where compartment syndrome is suspicious, frequent neurovascular exams and elevation at or just above the level of the heart is important. The orthopaedic surgeon should have a low threshold to perform foot and leg fasciotomies if excessive swelling and pain out of proportion to the injury suggests a compartment syndrome. Open injuries are not common, but the foot and ankle should be carefully examined in its entirety for open wounds, and these should be addressed emergently in the operating room.

2. Diagnostic Imaging:

i. Plain Radiography: Three view x-rays (AP, Mortise, and Lateral) should be obtained of the ankle to evaluate for injury. Contralateral films are not necessary, but stress views and weight bearing views can often be helpful to evaluate for gross ligamentous instability. Repeat x-rays 2-3 weeks after injury can be helpful in identifying stress fractures or unstable ligamentous injuries in those patients who fail to improve after a period of activity modification.

ii. Bone Scan: Not routine. Can be helpful in cases of suspected stress fractures, but often require 7-10 days after stress fracture occurrence to be positive.

iii. CT Scan: Not routine. Can be helpful and necessary when intra-articular fracture extension exists or if an osteochondral defect or intra-articular loose body is suspected.

iv. MRI: Not routine. Can be helpful when history suggests a stress fracture, and can detect a stress fracture within days of their occurrence. Can also be a helpful tool when patient fails to improve post 4-6 weeks of physical therapy and can pick up a multitude of foot and ankle injuries masquerading as an ankle sprain (See "Persistent Pain After an Ankle Sprain" below).

C. Treatment Based on Injury Type

1. Anatomy

i. Stability of the ankle is made possible by both bony congruence (the fit of the talus within the distal tibia and fibula) as well as by the integrity of the ligaments, muscles, and tendons which surround the ankle. The ligaments and bones represent the static stabilizers (as they are fixed) and the muscles and tendons represent the dynamic stabilizers (as they move). The lateral side of the ankle is stabilized by the lateral collateral ligament (LCL) complex, the fibula and syndesmosis, and the peroneal tendons. The LCL complex consists of the anterior talo-fibular ligament, the calcaneo-fibular ligament, and the posterior talo-fibular ligament. The medial side of the ankle is stabilized by the deltoid ligament, the medial malleolus, the posterior tibial tendon, flexor digitorum longus tendon, and the flexor hallucis longus tendon. The deltoid ligament consists of superficial and deep layers which work in concert to stabilize the medial side of the ankle.

2. Ankle Sprains

i. The most common ligament injured in the typical inversion ankle sprain is the anterior talo-fibular ligament, followed by the calcaneo-fibular ligament, the posterior talo-fibular ligament, and finally the deltoid ligament. Ankle sprains are graded 1-3. Acute surgical repair is NOT indicated, even with MRI confirmed complete ligament rupture. Patients with clinical ankle instability after months of rehabilitation MAY warrant surgical reconstruction.

1. Grade 1 Sprain: Microtearing of the collateral ligaments about the ankle, without any appreciable ankle joint laxity on exam. Treated with RICE protocol (Rest, Ice, Compressive Dressing (splint), Elevation). Typically resolves within 1-2 weeks.

2. Grade 2 Sprain: Complete tearing of some of the collateral ligaments of the ankle, with some laxity noted on physical exam. Treated with RICE protocol, immobilization with an ankle brace or CAM walker boot, and early mobilization with Physical Therapy. Typically resolved in 2-4 weeks.

3. Grade 3 Sprain: Complete rupture of the collateral ligaments of the ankle (usually medial or lateral side), with gross instability on examination. Acute surgical repair is NOT indicated. Treatment requires immobilization in a short leg cast or CAM walker boot for 2-3 weeks, followed by 3-6 weeks of Physical Therapy. Grade 3 sprains can potentially go on to gross instability that requires long-term bracing, rehabilitation, or surgical reconstruction.

4. Chronic Ankle Instability: Ankles which are chronically unstable after 2-3 months of rehabilitation and bracing warrant further workup with stress x-rays and/or MRI to evaluate for intra-articular Osteochondral defects. Based on functional complaints, physical exam, and diagnostic tests, reconstructive surgery may be required for functional recovery. Post-operatively, patients are typically immobilized with a cast or CAM walker for 4-6 weeks, followed by a functional rehabilitation and Proprioceptive training program for another 4-6 weeks.

5. Return to work: For all of the above, return to sedentary work is possible as early as 1-2 weeks after injury or reconstructive surgery. Return to full function is based on completion of a functional rehabilitation and Proprioceptive training program.

3. Ankle Dislocations

i. Ankle dislocations are the result of a higher mechanism of injury and represent complete rupture of the lateral and medial collateral ligaments. They are usually associated with a fracture, but not always. Treatment is emergent closed reduction under conscious sedation or anesthetic ankle block. The patient is typically immobilized in a short leg cast or splint for 2-3 weeks followed by progressive weight bearing in a CAM walker or weight bearing short leg cast over 4-6 weeks. Patient is then initiated in a functional rehabilitation and Proprioceptive training program for approximately 4-6 weeks, and then allowed to return to full function. Surgery is rarely indicated, unless chronic instability develops after several months of rehabilitation.

4. Ankle Fractures

i. Stable fractures: Fractures involving the tips of the medial or lateral malleolus, and do not involve the ankle mortise represent stable ankle fractures. These injuries typically represent an indirect avulsion fracture from the collateral ligament origins on the medial and/or lateral malleolus. Oblique fractures involving the lateral malleolus (typical supination-external rotation pattern of injury), without any widening of the medial ankle clear space (space must be less than 4mm), are also considered stable. Rarely minimally displaced fractures of the posterior malleolus can occur, and typically represent extra-articular injuries and have no evidence of displacement of the tibio-talar joint on AP, lateral or mortise x-rays. Stable ankle fractures are treated with an air splint, ankle brace, CAM walker, or short leg cast for a period of 2-4 weeks, followed by rehabilitation program for another 4-6 weeks. Return to sedentary work can occur as early as 1-2 weeks (depending on the injury), and return to full duty is typical after completion of a functional rehabilitation program. Surgical treatment is rarely indicated, unless the fracture goes on to a painful non-union, in which case surgery is indicated.

ii. Unstable Fractures: These fractures indicate the loss of bony stability to the ankle joint and represent intra-articular fractures. Displacement of the medial clear space (space between the medial malleolus and the medial side of the talus) greater than 4mm indicates an unstable ankle fracture. Initial treatment begins in the emergency department with a closed reduction under conscious sedation or ankle block followed by splinting or short leg casting. Depending on the conditions of the soft tissues, surgery can be delayed as long as 2-3 weeks to minimize the risk of wound healing problems. Fractures involving the weight bearing portion of the distal tibia (pilon fractures) represent high energy injuries of the ankle, and usually require 1-3 weeks for soft tissue swelling to resolve prior to surgery. Pilon fractures are typically treated in an external fixator initially, as splint and casts are inadequate, and surgical ORIF is delayed. Post-operative course for most ankle fractures requires immobilization for 2-4 weeks in a splint or short leg cast, followed by 4-8 weeks of progressive weight bearing in a CAM walker, short leg cast, or ankle brace with physical therapy. Pilon fractures are typically immobilized longer and kept non-weight bearing for 3 months prior to the initialization of weight bearing. Maximal medical improvement after surgical repair of an unstable ankle fracture typically occurs 3-6 months after surgery, but can be upwards of 1-2 years in more severe injuries.

5. Open Fractures and Crush Injuries

i. Crush injuries should be monitored in the hospital with frequent neurovascular checks to rule out compartment syndrome of the foot and leg.

ii. When open fractures are identified, tetanus prophylaxis should be administered as soon as possible, with appropriate antibiotics.

iii. Patient is taken emergently to the operating room by an orthopaedic surgeon for surgical debridement, open or closed reduction, and internal or external fixation.

iv. Severe crush injuries with concomitant compartment syndrome are treated with leg fasciotomies, and delayed closure. Often the application of vacuum assisted closure devices (VAC dressings) and implanted antibiotic cement beads

are utilized to minimize wound infections. In severe injuries, involvement with a plastic surgeon and/or vascular surgeon is necessary to re-establish neurovascular supply to the foot, as well as closure of the soft tissue envelope.

v. Post-operatively, the foot is immobilized for approximately 6-8 weeks. Physical Therapy is delayed until the soft tissue envelope of the ankle is restored and the patient's neurovascular status has stabilized. This often can take several months and typically takes 1-2 years for patient to be at maximal medical improvement.

6. Persistent Pain After an Ankle Sprain

i. Persistent pain 2-3 months after an ankle sprain is NOT typical, and when it exists usually indicates a concomitant ankle disability. Careful history and physical examination usually directs the physician to the reason for persistent pain. If this is not easily apparent further workup with an MRI and/or stress ankle radiographs is indicated to evaluate the ankle further. The differential diagnosis is long and includes:

1. Anterolateral impingement syndrome
2. Anteromedial impingement syndrome
3. Anterior joint line impingement
4. Osteochondral defects of the tibial plafond
5. Osteochondral defects of the talus
6. Loose bodies within the ankle
7. Peroneal tendonitis
8. Peroneal tendon tear
9. Perondeal tendon dislocation
10. Symptomatic os sub-fibulare
11. Nonunion medial maleolar avulsion fracture
12. Nonunion lateral maleolar avulsion fracture
13. Anterior process fracture of the calcaneus
14. Lateral process fracture of the talus
15. Chronic ankle instability
16. Sinus tarsi syndrome
17. Posterior tibial tendonitis
18. Posterial tibial tendon tear
19. Posterior process of talus fracture
20. Symptomatic os trigonum of the talus
21. Posterior ankle impingement syndrome
22. Flexor hallucis longus tendonitis
23. Avascular necrosis of the talus
24. Tarsal tunnel syndrome
25. Peripheral neuropathy

ii. Treatment: Treatment is dictated by the pathology, but usually begins with a period of rest, immobilization, physical therapy guided specifically towards the pathology, and possibly diagnostic and therapeutic injections of cortisone with a local anesthetic. Failure to improve after non-surgical treatment for about 4-6 weeks warrants surgical treatment. Recovery is dictated by the surgical intervention, but

the patient is typically at maximal medical improvement by 6-12 months after surgical reconstruction.

D. Summary

Ankle injuries are amongst the most commonly sustained injuries in the workplace. Approximately 25,000 ankle injuries occur every day in the United States. There is a wide range of ankle injuries, but fortunately, most only require a short period of disability before return to full functional.

Acute surgical repair of ankle sprains or dislocations is not indicated, and only rarely after completing a functional rehabilitation and proprioceptive training program is surgery warranted.

Physical therapy is a useful adjunct in treating patients with ankle injuries as often their proprioception and static ankle stabilizers are disrupted. Physical therapy focusing on functional rehabilitation and proprioceptive training can expedite return to function and minimize the development of chronic ankle instability.

As with all foot and ankle injuries, prevention is the key to worker safety. Efforts should be made by employers to provide employees with education regarding proper shoe wear and fall prevention, as well as providing a work environment free of hazards which could cause serious injury.

PROTOCOL HISTORY:
Passed: 12/15/1992
Amended 5/5/2009

WORKERS' COMPENSATION PROTOCOLS
WHEN PRIMARY INJURY IS PSYCHIATRIC/PSYCHOLOGICAL

General Guidelines

Patient must have a diagnosed mental illness on Axis I as defined by DSM-IV that, by accepted medical standards, can be expected to improve significantly through medically necessary and appropriate therapy. The emotional impairment must be of such a degree to severely interfere with social, familial, or occupational functioning.

For the purpose of determining medical necessity of care, medical necessity is defined as "Services and supplies by a provider to identify or treat an illness that has been diagnosed." They are:

A. Consistent with the efficient diagnosis and treatment of a condition, and standards of good medical practice.

B. Required for other than convenience.

C. The most appropriate supply or level of service.

D. Unable to be provided in a more cost effective and efficient manner; and

E. Unable to be provided elsewhere by a less intensive level of care.

The evaluation and assignment of mental illness diagnosis must take place in a face-to-face evaluation of the patient performed by a psychiatrist or doctoral level clinical psychologist.

Presence of the illness(es) must be documented through the assignment of appropriate DSM-IV codes on all axes (I-V), using published criteria.

Whenever feasible and appropriate, psychiatric care and treatment should take place in an outpatient setting or the less intensive treatment setting able to meet the patient's needs. Structured outpatient programs are considered the treatment of first choice. Inpatient treatment is considered medically necessary when all less intensive levels of treatment have been determined to be unsafe or have been unsuccessful.

The initial evaluation should include not only documentation of the diagnosis (DSM-IV, axes I-V) but also an initial treatment plan, individualized goals for treatment, treatment modalities to be used, and discharge planning.

A progress note documenting the provider's treatment, the patient's response to treatment, and the persistence of the problems that necessitate continued care despite treatment efforts, with the emergence of additional problems consistent with the initial diagnosis, must be written for each session of treatment. Documentation of disposition planning should be an integral part of each session note. Response, non-response or severe reactions to medications given must be recorded.

ADULT PSYCHIATRIC HOSPITALIZATION CRITERIA

Medical necessity of psychiatric inpatient admission must be documented based on conditions defined under either Section I or Section II.

I. Criteria for Admission Based on Severity of Illness.

A. Patient makes direct threats or a reasonable inference of serious harm to self or to the body or property of others.

B. Violent, unpredictable or uncontrolled behavior, including patients with organic brain impairment and/or functional illness.

C. Lack of insight, unwillingness or inability to adequately care for one's physical needs. Acute cases may include starvation or failure to take essential medications accurately and safely.

D. Lack of response to previously attempted partial hospitalization management of medication and/or psychotherapy.

II. Criteria for Admission Based on Intensity of Service.

A. Need for daily skilled observation by both MD and RN staff (such as, but not limited to):

(1) To confirm diagnosis;
(2) To initiate medication regime;
(3) To regulate dosage of potent medication; or
(4) To withdraw potent medication.

B. Need for electroconvulsive shock therapy.

III. Criteria for Continued Stay.

The treatment plan should include documentation of diagnosis, individualized goals of treatment and therapeutic modalities. The medical record must include daily progress notes by the psychiatrist or psychologist.

While documentation may justify the need for continued hospitalization, the Medical Advisory Board expects that each service rendered by a physician or other provider of care and reported for payment be documented in the medical record. Documentation should include:

A. The persistence of the problems that necessitated the admission, despite therapeutic efforts, or the emergence of additional problems consistent with the admission criteria.

B. Severe reaction to the medication or need for further monitoring and adjustment of dosage.

C. Attempts at therapeutic re-entry into the community have resulted in exacerbation of the psychiatric illness.

D. Psychiatric evidence or rationale indicating the need for stabilization of patient's condition to a point where stress of community re-entry does not substantially risk an exacerbation of the psychiatric illness.

HOSPITALIZATION CRITERIA FOR SUBSTANCE DEPENDENCY

(Applies to Psychiatric Hospitals and General Hospital Psychiatric Units)

Admission to a psychiatric hospital is appropriate for alcohol and/or drug dependency of a severity which requires intensive intervention by a multi-disciplinary health care team including physicians, nurses, counselors, social workers, and other therapists. Evidence should be present that outpatient care or treatment in an intermediate care facility has been attempted recently, but has been unsuccessful.

The patient also must have, in additional to substance dependency of a severity described above, a psychiatric disorder which inhibits his/her ability to be treated in a less intensive setting. There must be documented evidence of a present and acute psychiatric disorder of a severity which would require hospitalization in and of itself in accordance with the Adult Psychiatric criteria.

I. SUBSTANCE DEPENDENCY CRITERIA FOR REHABILITATION SERVICES FOR ADMISSION

Patient needs to meet the Adult Psychiatric Admission Criteria and both of the admission criteria given below.

A. Patient has alcohol and/or drug dependency of a severity which requires intensive intervention, and at hospital level of care, by a multi-disciplinary health care team including physicians, nurses, counselors, social workers, and other therapists. Evidence that the patient cannot be treated in a residential center for substance abuse must be documented.

B. Patient has, in addition to substance dependency of a severity described above, a psychiatric disorder which inhibits his/her ability to be treated in a less intensive setting. Evidence of a present and acute psychiatric disorder of a severity which would require hospitalization in accordance with the adult psychiatric criteria must be documented.

II. CRITERIA FOR CONTINUED STAY

The patient needs to meet the Adult Psychiatric Continued Stay Criteria, as well as (all of) A through D below.

A. The treatment plan should include documentation for both the substance dependency and psychiatric disorders of individualized goals of treatment and therapeutic modalities.

B. The medical record should include daily patient's progress notes by the psychiatrist, psychologist, or primary therapist. Evidence should be presented as to whether or not the problems necessitating admission have changed in response to specific treatment modalities being utilized.

C. Documentation of all therapeutic modalities being provided to the patient on a daily basis should be present and should specify the plan of treatment and patient's progress.

D. Post-hospital treatment planning and referral efforts that have been conducted as soon as the initial evaluation is complete must be documented in the treatment plan and progress notes.

RESIDENTIAL TREATMENT CRITERIA FOR SUBSTANCE ABUSE

I. CRITERIA FOR ADMISSION.

Medical necessity for admission to a residential substance abuse treatment facility must be documented by the presence of all of the criteria below in Section A and Section B.

In addition, it is noted that structured professional outpatient treatment is the treatment of first choice. Residential treatment, when indicated, should (a) be individualized and not consist of a standard, pre-established number of days, and (b) should follow recent outpatient treatment in a structured professional program of significant duration and intensity during the course of which the patient has not been able to maintain abstinence for a significant period of time.

A. Severity of Need.

1. The provider must be able to document that the individual has a history of alcohol/substance dependence but is mentally competent and cognitively stable enough to benefit from admission to the inpatient program at this point in time. Individual days during any part of the stay where the patient does not meet this criterion cannot be certified as medically necessary.

2. Individual exhibits a pattern of severe alcohol and/or drug abuse as evidenced by continued inability to maintain abstinence despite recent professional outpatient intervention.

If the patient has not been in a recent outpatient program (i.e., the past 3 months), then the following conditions must be met: 1) patient must be residing in a severely dysfunctional living environment; or 2) there must be actual evidence for, or clear and reasonable inference of serious imminent physical harm to self or others directly attributable to the continued abuse of substances which would prohibit treatment in an outpatient setting.

3. For individuals with a history of repeated relapses and a treatment history involving multiple treatment attempts, there must be documentation of the restorative potential for the proposed admission.

B. Intensity of Service.

Due to significant impairment in social, familial, scholastic or occupational functioning, the individual requires intensive individual, group, and family education and therapy in an inpatient rehabilitative setting.

II. CRITERIA FOR CONTINUED STAY

In additional to meeting all of the admission criteria on a daily, continued basis, there must be daily documentation supporting the need for continued inpatient treatment. All of A through C below need to be met.

A. Progress Notes – Daily documenting of the providers' treatment, the patient's response to treatment, and the persistence of the problems that necessitated the admission, despite treatment efforts, or the emergence of additional problems consistent with the admission criteria.

B. The persistence of the problems that caused the admission to the degree that would necessitate continued inpatient care, despite therapeutic efforts, or the emergence of additional problems consistent with the admission criteria and to the degree that would necessitate continued inpatient care.

C. Clear and reasonable evidence that re-entry into the community would result in exacerbation of the illness to the degree that would require an inpatient level of care.

CRITERIA FOR ADMISSION AND LENGTH OF STAY FOR ALCOHOL/DRUG DETOXIFICATION AND AN INPATIENT SETTING

Patient must meet both of the criteria under the appropriate section.

I. CRITERIA FOR ADMISSION

A. Patient has a history of heavy and continuous alcohol/drug use requiring detoxification services where (a) there is the potential for serious physical harm from the side effects of withdrawal and (b) these services cannot be provided on an outpatient basis. Services that cannot be provided on an outpatient basis must require intensive nursing and medical treatment intervention on a 24-hour basis in order to be medically necessary on an inpatient basis.

B. Patient presents signs and symptoms of impending withdrawal and/or history of seizures of delirium tremens and requires intensive nursing and medical treatment intervention on a 24-hour basis.

II. CRITERIA FOR CONTINUED STAY

A. Documentation of the need for skilled observation and medical treatment consistent with AEP criteria.

B. Documentation of physical signs and symptoms of acute withdrawal which requires intensive nursing and medical treatment intervention on a 24-hour basis. This documentation must be noted three times daily, of which one such notation must be made by a physician.

III. CONDITIONS LIKELY AND UNLIKELY TO BE RELATED TO TRAUMA OR WORK

A. The following classes of disorders are frequently diagnosed post-trauma:

1. Cognitive Mental Disorders.
   Cognitive mental disorders associated with Axis III physical disorders – (mainly deliriums, but occasional dementias).

2. Mood Disorders.
   a. Depressive Disorders NOS
   b. Major Depression (all types)

3. Anxiety Disorders.
   a. Panic Disorder (with or without Agoraphobia)
   b. Agoraphobia without Panic
   c. Specific Phobia
   d. Post-Traumatic Stress Disorder
   e. Generalized Anxiety Disorder
   f. Anxiety Disorder NOS
   g. Acute Stress Disorder
   h. Anxiety due to a (compensable) general medical condition

4. Somatoform Disorders.
   a. Conversion Disorders
   b. Pain Disorders (all types, if pain secondary to a compensable injury)

5. Adjustment Disorders (all types) (note: reaction lasts no more than six (6) months)

6. Psychotic Disorders NOS
   a. Brief Psychotic Disorder
   b. Psychotic disorder due to a compensable general medical condition

B. The following classes of disorders are rarely post-trauma and in the committee's opinion are not caused or worsened by industrial injuries, diseases, or stresses.

1. Organic Mental Disorders.
   a. Dementias arising in the senium and presenium, like Alzheimer's
   b. Multi-infarct dementia
2. Psychoactive substance-induced organic mental disorders
   a. Alcohol (intoxication, idiosyncratic intoxication, uncomplicated alcohol withdrawal, withdrawal delirium, hallucinosis, amnestic disorder, dementia associated with alcoholism)
   b. Amphetamine (intoxication, withdrawal, delirium, delusional disorder)
   c. Caffeine (intoxication)
   d. Cannabis (intoxication, delusional disorder)
   e. Cocaine (intoxication, withdrawal, delirium, delusional disorder)

+ f. Hallucinogen (hallucinosis; delusional, mood, or post hallucinogen perception disorders)

+ g. Inhalant (intoxication)
   h. Nicotine (withdrawal)

* i. Opioid (intoxication, withdrawal)

j. Phencyclidine (PCP) (intoxication, delirium; delusional mood or organic mental disorders)

* k. Sedative, hypnotic or anxiolytic (intoxication, withdrawal, withdrawal delirium, amnestic disorder)

* l. Other or unspecified psychoactive substance (intoxication, withdrawal, delirium, dementia, hallucinosis; delusional, mood, anxiety, personality, or organic mental disorders)

3. Psychoactive Substance Use Disorders

a. Alcohol (dependence, abuse)

b. Amphetamine (dependence, abuse)

c. Cannabis (dependence, abuse)

d. Cocaine (dependence, abuse)

e. Hallucinogen (dependence, abuse)

f. Inhalant (dependence, abuse)

g. Nicotine (dependence)

* h. Opioid (dependence, abuse)

i. Phencyclidine (PCP) (dependence, abuse)

* j. Sedative, Hypnotic, or Anxiolytic (dependence, abuse)

k. Polysubstance dependence

l. Psychoactive substance dependence or abuse NOS

4. Schizophrenia (catatonic, disorganized, paranoid, undifferentiated, residual)

5. Delusional (Paranoid) Disorder (erotomanic, grandiose, jealous, persecutory, somatic, unspecified)

6. Psychotic Disorders Not Elsewhere Classified

a. Schizophreniform disorders

b. Schizoaffective disorders

c. Induced (shared) psychotic disorders

\+ = compensable if an industrial agent exposure occurs at worksite

* = compensable if iatrogenic via treatment for compensable injury

7. Mood Disorders
    a. Bipolar disorders (Mixed, Manic, Depressed)
    b. Dysthymic Disorder (all types)

8. Anxiety Disorders
    a. Social Phobia
    b. Obsessive Compulsive Disorder

9. Somatoform Disorders
    a. Body Dysmorphic Disorder
    b. Somatization Disorder
    c. Hypochondriasis

10. All Dissociative Disorders

11. Sexual Disorders

All sexual dysfunctions (unless caused by a physical disorder caused by a work injury, or psychogenic only secondary to work stress, disease, or injury). Not compensable if lifelong or acquired through other than compensable means.

Sexual disorder NOS

12. Sleep Disorders, all types, - unless there is an organic factor related to the compensable injury.

13. Factitious Disorders, (all types)

14. Impulse Control Disorders Not Elsewhere Classified
    a. Intermittent Explosive Disorder
    b. Kelptomania
    c. Pathological Gambling
    d. Pyromania
    e. Trichotillomania
    f. Impulse Control Disorder NOS

15. V Codes For Conditions Not Attributable to a Mental Disorder That Are a Focus of Attention or Treatment
    a. Academic Problem
    b. Adult Antisocial Behavior
    c. Borderline Intellectual Functioning
    d. Childhood or Adolescent Antisocial Behavior
    e. Malingering
    f. Marital Problem
    g. Parent-Child Problem

h. Other Interpersonal Problem
i. Other Specified Family Circumstances
j. Phase of Life or Other Life Circumstances Problem
k. Uncomplicated Bereavement

16. Disorders Usually First Evidence in Infancy, Childhood, or Adolescence as Defined in DSM-IV Classification

17. All Personality Disorders

UTILIZATION REVIEW CRITERIA

OUTPATIENT MENTAL HEALTH AND SUBSTANCE ABUSE TREATMENT PROTOCOL

Mental health and substance abuse outpatient services are defined as partial hospital, intensive outpatient programs, outpatient therapy, and all other noninpatient treatment. The criteria contained in this protocol have been developed for outpatient mental health and substance abuse services that are less intensive than partial hospitalization or intensive specialty outpatient treatment programs.

Outpatient treatment protocols are based on both necessity of care and treatment approach. Outpatient treatment is based on Severity of Illness (SI) and Intensity of Service (IS) indicators. Patients must have psychiatric and/or substance abuse disorders with appropriate Severity of Illness and Intensity of Service indicators for outpatient treatment to be determined to be medically necessary.

Medical necessity is defined as follows:

"Services and supplies by a provider to identify or treat an illness that has been diagnosed. They are:

a. consistent with:
   (1) the diagnosis and treatment of the condition; and
   (2) standards of good medical practice;
b. required for other than convenience; and
c. the most appropriate supply or level of service."

The following criteria are a more detailed elaboration of the above definition for the purpose of establishing the medical necessity of outpatient mental health services.

1. The method of treatment specified in terms of treatment framework or orientation, treatment modality, treatment frequency, and estimate of treatment duration;

2. provision of measurable, target criteria for interim goals and end of treatment goals to be used to determine both that 1) treatment is progressing and 2) when treatment is no longer indicated; and

3. an alternative plan to be implemented if patient does not make substantial progress toward the given goals in a specified period of time. Examples of an alternative plan are a second opinion or introduction or adjunctive or alternative therapies.

CONTINUED OUTPATIENT TREATMENT CRITERIA

After initial treatment has been completed (GAF=70), continued psychotherapy treatment is indicated only if criteria below are met.

I. Severity of Illness Indicators

Continued outpatient psychotherapy treatment requires the presence of each of the following Severity of Illness Indicators:

A. A DSM IV diagnosis on Axis I.

B. A description of DSM-IV psychiatric symptoms, behavioral (occupational) and/or cognitive dysfunction, consistent with the diagnoses given; and

C. Impairment in occupational functioning due to those psychiatric symptoms. To address medical necessity in the context of varying patient needs, this impairment in functioning is divided into two subcategories.

1. Patients in the middle phases of treatment (six one-hour sessions over six weeks) who typically have fluctuating degress of impairments in functioning as evidenced by a specific clinical description. GAF scores, fluctuate but may exceed 71 for the six-week period prior to review. Such scores are frequently considered typical and appropriate within the context of the progressive response to treatment and the treatment plan.

Among the factors considered in making a determination on the continued medical necessity of treatment in this phase are the frequency and severity of previous relapses, level of stressors, and other relevant clinical indicators.

2. Patients in the final and consolidation phases of treatment (six one-hour sessions over twelve weeks) who typically have GAF scores above 71. Such scores are frequently considered typical and appropriate within the context of the progressive response to treatment and the treatment plan.

However, if the level of functioning has progressed to the point that the patient has sustained a GAF score above 71, serious consideration should be given to the medical necessity of continued treatment. Options to consider are: a) termination of treatment or b) reduction in the level and/or type of treatment previously given.

Note: Medication management with a visit every eight weeks for 15-20 minutes may be necessary indefinitely and should be reviewed on a case-to-case basis.

As above, the factors considered in making a determination about the continued medical necessity of treatment in this phase are the frequency and severity of previous relapse, level of stressors, and other relevant clinical indicators. The therapist should be able to explain whether the therapeutic modality being utilized will shift (and if

not, why) when there has been sustained improvement as measured in part by a GAF score over 71.

II. Intensity of Services Indicators

Continued outpatient psychotherapy treatment requires the presence of each of the following indicators:

A. An update of the medically necessary and appropriate treatment plan specific to the patient's impairment in functioning and DSM-IV psychiatric symptoms, behavior or cognitive dysfunctions.

B. The treatment plan update must identify:

1. all changes in target specific DSM-IV psychiatric symptoms, behavior, and cognitive dysfunction being treated;
2. all modifications, if any, in biologic, behavioral, psychodynamic or psychosocial framework(s) of treatment for each psychiatric symptom/cluster and/or behavior;
3. all changes in the specific and measurable goals for treatment specified in terms of symptom alleviation, behavioral change, cognitive alteration, psychodynamic change, or improvement in occupational functioning;
4. all modifications in treatment methods in terms of:
   - treatment framework or orientation,
   - treatment modality,
   - treatment frequency, and
   - estimate of treatment duration;
5. progress in measurable, target criteria used to identify both interim treatment goals and end of treatment goals to determine 1) treatment is progressing and 2) goals have been met and treatment is no longer needed;
6. alternative plan to be implemented if patient does not make substantial progress toward the given goals in a specified period of time. Examples of an alternative plan are a second opinion or introduction of adjunctive or alternative therapies.

ADULT PSYCHIATRIC PARTIAL HOSPITALIZATION CRITERIA

Preamble – Medical necessity is defined as "services and supplies by a provider to identify or treat an illness that has been diagnosed or suspected. They are:

a. consistent with:
   (1) the diagnosis and treatment of a condition; and
   (2) standards of good medical practice;
b. required for other than convenience; and
c. the most appropriate supply or level of service.

When applied to inpatient care, the term means: "the needed care cannot be safely given on other than an inpatient basis."

The purpose of this protocol is to define and clarify criteria for when partial hospitalization for psychiatric treatment meets the above definition for medical necessity.

PRINCIPLES FOR CERTIFICATION

When a patient has a psychiatric disorder that requires professional evaluation and treatment, he/she should be treated at the least intensive outpatient level appropriate for the condition prior to partial hospital/day treatment; unless there is compelling evidence to the contrary.

I. Criteria for Admission

Medical necessity for psychiatric partial hospitalization treatment must be based on meeting the conditions defined under Section A, 1 and 2 (both must be met) and either 3 and 4, as well as meeting all of the criteria defined under Section B.

A. Severity of Need

1. Patient must have a mental illness. Mental illness is defined as Axis I psychiatric disorder that, by accepted medical standards, can be expected to improve significantly through medically necessary treatment and therapy.
2. There is clinical evidence that documents that a less intensive outpatient setting is not appropriate at this time and/or a day treatment program can safely substitute for or shorten a hospital stay.
3. There is clinical evidence that the patient would be at risk to self or others if he were not in a partial hospitalization program. Additionally:
   a. Patient can contract for safety in a structured environment under clinical supervision for part of the day and has a suitable environment for the rest of the time; or

b. The patient is believed to be capable of controlling this behavior and/or seeking professional assistance or other support when not in the partial hospital setting.

4. As a result of the patient's mental disorder there is an inability to adequately care for one's physical needs, representing potential serious harm to self.

B. Intensity of Service

1. In order for a partial hospital program to be safe and therapeutic for an individual patient, professional and/or social supports must be identified and available to the patient outside of program hours, and the patient must be capable of seeking them as needed.

2. The patient's condition must require intensive nursing and medical intervention for more than three (3) hours per day and for more than two (2) days per week.

3. The individualized plan of treatment for partial hospitalization requires treatment by a multidisciplinary team. A specific treatment goal of this team is improving symptoms and level of functioning enough to return the patient to a lesser level of care.

II. Criteria for Continued Stay

In addition to continuing to meet the criteria given above for admission, patients must meet A and B.

A. Progress notes for each day that patient is in a partial hospital/day treatment program documenting the provider's treatment, the patient's response to treatment, and the persistence of the problems that necessitated the admission to the partial hospitalization program, despite treatment efforts, or the emergence of additional problems consistent with the admission criteria.

B. Documentation that attempts at therapeutic re-entry into a less intensive level of care have or would result in exacerbation of the psychiatric illness to the degree that would warrant the continued need for partial hospitalization services.

<u>VNS Therapy for Depression</u>

The Medical Advisory Board concludes that there is sufficient scientific evidence to conclude that vagus nerve stimulation is not reasonable and necessary for the treatment of resistant depression.

PROTOCOL HISTORY:
Passed: 9/01/1992
Amended: 11/19/2002
Amended 6/12/2007

OUTPATIENT PHYSICAL AND OCCUPATIONAL THERAPY PROTOCOL GUIDELINES

General Therapy Guidelines

1. Therapy evaluations must be provided by licensed physical and/or occupational therapists. Therapy evaluations may not be performed by therapy assistants or other medical providers.

2. For workers' compensation patients, physicians may not provide or bill for physical therapy services without employing a licensed therapist to evaluate and supervise treatments.

3. Therapy treatments may be provided by licensed therapy assistants ** as directed by the licensed therapist or by therapy aides under supervision of the licensed therapist.

A facility may not employ more than two licensed assistants per therapist. Physical therapists shall maintain the following documentation regarding the supervision of physical therapy assistants:

1. ON-SITE SUPERVISION OF THE ASSISTANTS PERFORMANCE
2. A REVIEW OF THE ASSISTANTS DOCUMENTATION
3. A REASSESSMENT AND UPDATE OF THE PATIENTS PROGRAM AND GOALS.

** Certified Occupational Therapy Assistants are nationally certified to provide care under the direction of licensed occupational therapists.

4. A course of physical and/or occupational therapy treatment will consist of nine (9) treatments or less. In those few instances where further treatments need to be given, the following format will be followed:

a. The therapist will provide the rationale for continuation of treatment to the employer/insurer.

b. The employer/insurer, usually in correlation with a medical specialist, will make a judgment concerning the medical necessity for further treatment. The employer/insurer will inform the therapist within ten (10) days of receipt of the written or verbal request for continued treatment whether therapy treatment will be reauthorized.

5. Therapy evaluations must identify patient problems and objective measurements of physical or work-skills deficits. These objective measures should be as specific as is possible for the diagnosis or patient problem. Example: Patient diagnosis of rotator cuff strain.

Appropriate

ROM flexion 160, abduction 90, int rotation 45, ext rotation 60.

Unable to reach or lift above shoulder height; able to lift up to 25 lbs from floor to waist.

Inappropriate

ROM limited in all planes.

Unable to lift secondary to pain.

6. Therapy treatment plans must be problem oriented.

7. Therapy evaluations should identify subjective complaints of pain or paresthesias, however, therapy treatments cannot be based solely on pain reduction. Evaluations must identify specific treatment plans and relate treatments to improving objective deficits and patient problems.

8. Frequent reassessment of progress towards improving objective deficits must be done and documented. Timing of reassessment is based on frequency of treatment, but should occur no less than every nine (9) sessions. Revision of problem lists, goals, and treatment plans must be documented at this time.

9. Continuation of treatments cannot be based solely on presence of continued pain symptoms. If objective measures have failed to improve, or have plateaued, the rehabilitation professional will confer with the referring physician to determine if the treatment should be modified or changed.

10. All treatment sessions and tests must be documented in writing. Daily treatment notes must:

a) identify type of treatment PROVIDED.

b) note patient response to treatment in subjective and objective terms.

c) identify any change in treatment plan and reasoning for change; e.g., stopping ultrasound treatment because of diminished tendonitis symptoms and increased ROM.

d) all assisting personnel notations must be co-signed by the supervising therapist.

11. Most of the treatment protocols anticipate healing and return to work will occur during the first four weeks after injury. There are some patients whose rehabilitation will take longer than the anticipated time frame because of the severity of their injury or the occupational demands of their job. Continuance of the therapy program will be according to the guidelines noted above.

THERAPY PROTOCOLS

LOW BACK MUSCULAR INJURY

… as delineated in the Low Back Musculoligamentous Injury (Sprain/Strain) Medical Advisory Board Protocols.

CERVICAL MUSCULAR NECK INJURY

… as delineated in the Cervical Musculoligamentous Injury (Sprain/Strain) Medical Advisory Board Protocols.

CARPAL TUNNEL SYNDROME

… as delineated in the Carpal Tunnel Syndrome Medical Advisory Board Protocols.

Non-operative Intervention

1. Appropriate Interventions:
    a) ROM and strengthening exercises
    b) splint fabrication
    c) assessment of job skill levels for RTW
    d) instruction in work activities modifications or simulation of work activities
    e) patient education
2. Inappropriate Intervention:
    a) exclusive use of passive modalities
3. Extenuating Services:
    a) prolonged onset of symptoms prior to referral

Post-Operative Intervention

1. Extenuating Circumstances
    a) post-operative complications
    b) delayed referral into therapy

2. Appropriate Interventions:
    a) ROM, simple strengthening exercises
    b) splint fabrication
    c) scar tissue/swelling management
    d) assessment of job skill levels needed for RTW
    e) instruction in work activities modifications or simulation
    f) patient education

CERVICAL HERNIATED DISC

. . . as delineated in the Herniated Cervical Disc Medical Advisory Board Protocols.

Non-operative Intervention

1. Appropriate Interventions:
   a) ROM exercises for neck and upper extremity
   b) strengthening/endurance exercises for upper extremity
   c) trial of cervical traction; if beneficial, a prescription for a home unit is sought
   d) short-term use of modalities for pain relief
   e) patient education
   f) assessment of work skill levels for return-to-work
   g) modification/simulation of work activities

2. Extenuating Circumstances:
   a) profound muscle weakness
   b) delayed referral into therapy

Post-Operative Intervention

1. Extenuating Circumstances:
   a) profound muscle weakness
   b) delayed referral into therapy

2. Appropriate Interventions:
   a) ROM exercises for neck and upper extremity
   b) strengthening/endurance exercises for upper extremity
   c) patient education
   d) modification/simulation of work activities

3) Inappropriate Interventions:
   a) cervical traction
   b) exclusive and/or prolonged use of passive modalities

LUMBAR HERNIATED DISC

. . . as delineated in the Herniated Lumbar Disc Medical Advisory Board Protocols.

Non-operative

1. Appropriate Interventions:
   a) ROM exercises for trunk and extremities
   b) strengthening/endurance exercises for trunk and extremities
   c) short-term use of modalities for pain relief, in conjunction with active exercises
   d) patient education
   e) assessment of work skill levels for return-to-work
   f) work simulation activities (when acute symptoms have subsided) or work-site modifications
   g) short-term trial TENS for chronic pain; if found to relieve symptoms, a referral for a home unit should be sought

2) Inappropriate Interventions:
   a) prolonged and/or exclusive use of modalities

3) Extenuating Circumstances:
   a) delayed referral into therapy
   b) profound muscle weakness (non-operative and post-operative)

Post-operative

1) Appropriate Interventions:
   As above, exceptions noted below.

2) Inappropriate Interventions:
   a) use of passive modalities, including traction

NON-OPERATIVE SOFT TISSUE INJURIES:

SHOULDER SPRAINS, OVERUSE INJURIES, KNEE STRAINS, ANKLE SPRAINS
(Refer to appropriate Medical Advisory Board Protocols.)

1. Appropriate Interventions:
   a) acute management of muscle spasms, pain, and/or swelling
   b) ROM exercises
   c) gait training w/assistive devices, as needed
   d) (as tissue healing progresses) strengthening and endurance exercises
   e) proprioception and balance activities
   f) assessment of job skill levels; job simulation activities if significant deficits noted
   g) isokinetic tests and rehab if deficits noted

2) Inappropriate Interventions:
   a) exclusive and/or prolonged use of passive modalities
   b) multiple computerized tests in any one week

3) Extenuating Circumstances:
   a) further medical evaluation that changes diagnosis
   b) surgery
   c) delayed referral into therapy

MENISCAL INJURIES

Refer to appropriate Medical Advisory Board Protocols.

Non-operative

1. Appropriate Interventions:
   a) ROM and strengthening exercises
   b) acute management of swelling and pain
   c) gait training with assistive devices, as needed
   d) isokinetic testing and rehab.
   e) assessment of work skill levels for return-to-work
   f) work skills simulation

2. Inappropriate Interventions:
   a) prolonged and/or exclusive use of passive modalities

3. Extenuating Circumstances:
   a) delayed referral into therapy
   b) surgery

Post-Operative

As noted above.

SYMPATHETIC DYSTROPHY

. . . as delineated in the Chronic Regional Pain Syndrome (formerly Sympathetic Dystrophy) Medical Advisory Board Protocols.

1. Appropriate Interventions:

   a) ROM exercises (aggressive if done after nerve block)
   b) strengthening and endurance exercises
   c) short-term use of modalities
   d) patient education

e) short-term trial of TENS; if beneficial, a home unit should be sought

f) assessment of work skills levels; simulation of work activities if deficits are found

2. Inappropriate Interventions:
   a) prolonged or exclusive use of modalities

3. Extenuating Circumstances
   a) development of adhesive capsulitis
   b) delayed referral into therapy
   c) repeated nerve blocks with therapy after each procedure

THORACIC OUTLET SYNDROME

1. Appropriate Interventions:
   a) postural exercises and correction
   b) ROM exercises
   c) strengthening and endurance exercises
   d) patient education
   e) assessment of work skills; simulation if deficits are noted

2. Inappropriate Interventions:
   a) prolonged or excessive use of modalities
   b) traction

PROTOCOL HISTORY:
Passed: 3/30/1993
Amended: 5/5/2009

ACOUSTIC TRAUMA

TRAUMA TO THE EXTERNAL EAR

I. BACKGROUND

The common types of trauma to the external ear usually result from thermal, blunt or penetrating trauma causing damage to the auricle, external auditory canal, or tympanic membrane.

II. DIAGNOSTIC CRITERIA

A. Pertinent History and Physical Findings

Direct examination of the external ear and tympanic membrane and evaluation of hearing with an audiogram.

III. TREATMENT

1. Hematoma of the external ear, usually due to a direct blow, is treated by drainage of the hematoma which may be done with an 18 gauge needle and syringe or a small incision under local anesthesia followed by application of Vaseline gauze and fluffs between the external ear and mastoid, and a soft gauze bandage is wrapped around the head. The patient should be re-examined in 24 hours for reaccumulation. Time loss from work, 0 to 2 days.
2. Simple lacerations present no difficulty in management and may be sutured, and a bulky pressure dressing is applied. They are anticipated to heal. Time loss from work, none.
3. Exposed cartilage presents a special problem. Debridement and complete coverage of all cartilage are key principles, and torn cartilage should be repaired. These usually heal readily. Maximum time lost from work, only with the most serious injuries, five days.
4. Large auricular avulsions may need to be reanastomosed by an otolaryngologist or plastic surgeon. This will require follow-up visits. Loss of work may be minimal depending on the type of work, but maximum time lost from work, two weeks.
5. Large circumferential lacerations to the external auditory canal may lead to stenosis of the canal and these mandate referral to an otolaryngologist. Loss of time from work, 1 to 2 days.
6. Burns to the auricle require removal of devitalized tissue and antibiotic ointments to protect the underlying cartilage. Time lost from work, none.
7. Chemical burns may follow exposure to acids or alkali. Primary treatment consists of immediate irrigation with several liters of water, identification of

the toxic chemical and should be treated primarily as a burn. No loss of work anticipated. No time lost from work.

8. Simple perforation of the tympanic membrane generally heals in four to six weeks, some use of antibiotics if there are definite signs of contamination. Failure to heal will require an ENT referral. Patient to be instructed to keep water out of ear until perforation has healed. No loss of time from work anticipated.

IV. ANTICIPATED OUTCOME

Full recovery.

INJURY TO THE MIDDLE EAR

I. BACKGROUND

The middle ear cavity is connected with the nasal pharynx by the eustachian tube and is intimately related to injury or diseases of both structures.

The primary trauma to the middle ear is barotrauma due to changes in barometric pressure and blunt trauma. Severe injury can disrupt the ossicular chain with conductive hearing loss or cause a perilymphatic fistula resulting in vertigo and sensorineural hearing loss.

Tympanic membrane perforations secondary to thermal burns as well as slag-bur injury and perforations from direct trauma to the ear drum from foreign body.

II. DIAGNOSTIC CRITERIA

Examination of the ear looking for retraction, or perforation of the tympanic membrane as well as evidence of effusion or hemotympanum. A neurological examination should be performed looking for evidence of vestibular disfunction (nystagmus). Patient should have an audiogram and if clinically indicated (vertigo) a fistula test can be performed by an audiologist, but only after examination by otorhinolaryngologist.

III. TREATMENT

1. Antibiotic if URI is present, oral steroids may reduce eustachian tube edema. No loss of time from work.

2. Patient with vestibular findings requires an emergency ENT referral. There may be no time lost from work, but this would depend on the ENT referral, including the severity of the vertigo and the type of work the patient is involved with.

IV. ANTICIPATED OUTCOME

This depends on how much damage has occurred.

TRAUMA TO THE INNER EAR

I. BACKGROUND

Trauma may result from blunt injury causing temporal bone fracture, blast injury, noise exposure or toxic injury. Vestibular, cochlear or facial nerve function may be affected.

II. DIAGNOSTIC CRITERIA

Radiologic evaluation with blunt trauma is of limited value. An MRI or CT Scan may show the fracture. The physical examination may reveal the discolored tympanic membrane and may show the fracture through the external canal. The neurological examination may reveal facial paralysis, perforation of the tympanic membrane with CSF leak. The patient should be examined for evidence of hearing loss (Hearing Test) or vestibular dysfunction (ENG) by an otolaryngologist.

III. TREATMENT

1. CSF Leak. One should watch for a cerebral spinal fluid leak and if this persists may require a neurosurgical consultation and repair, usually a combined procedure performed by an otolaryngologist and neurosurgeon. The use of antibiotics is controversial, more recently it is felt that they are not useful in this situation.

2. Hearing Loss.

a. Nerve hearing loss, there is no surgical treatment although amplification devices may be required.

b. Conductive hearing loss.

1. Repair of tympanic membrane perforation. Time lost from work with surgery, maximum one week.

2. Repair of disrupted ossicles. Time lost from work with surgery, maximum two weeks.

3. Facial paralysis may require nerve repair or a form of re-animation procedures of the facial muscles. Time lost from work would be variable in this case, but not more than three days.

4. Vestibular Injury.

a. Vestibular suppression medications such as Antivert, Valium or Klonopin.

b. If the vertigo becomes disabling and persists after six months of treatment with the above medications, then vestibular destructive surgery

either with labyrinthine destruction or vestibular nerve section may be required. Loss of time from work would be two weeks following surgery.

IV. ANTICIPATED OUTCOME

This depends on how much damage has occurred.

WORK-RELATED HEARING IMPAIRMENT DUE TO NOISE

I. BACKGROUND

Hearing impairment due to noise may occur in the workplace. An effort has been made by the American Academy of Otolaryngology Committee on Hearing and Equilibrium and the American Council of Otolaryngology Committee on the medical aspects of noise.

II. DIAGNOSTIC CRITERIA

A. Pertinent Historical and Physical Findings.

The history consists of impairment of hearing. The Hearing Conservation Program requires employers to monitor noise exposure levels in a manner that will accurately identify employees who are exposed to noise at or above 85 decibels (dB) averaged over eight working hours. The exposure measurement must include all noise within an 80 dB to 130 dB range and must be taken during a typical work situation. Audiometric testing must be made available to all employees who have average exposure levels over an eight-hour period of 85 decibels.

III. TREATMENT

Hearing protectors must adequately reduce the severity of noise in each employees' work environment.

The percentage loss is to be evaluated by an Otolaryngologist and Audiologist.

PROTOCOL HISTORY:
Passed: 3/30/1993
Amended: 11/19/2002
Amended: 6/3/2008

EPIDURAL STEROID INJECTIONS IN THE MANAGEMENT OF SPINAL PAIN

A. BACKGROUND

Epidural glucocorticoid and local anesthetic injections can be considered as part of a treatment program for radicular pain syndromes secondary to a herniated disc, degenerative disc disease, or spinal stenosis. The goal of such injections is to deliver the active medication with minimal systemic effects (vs. oral steroids) as close as possible to the target tissue. There are three most frequently used approaches: caudal, interlaminar, and transforaminal. Of these three, the most common is the use of interlaminar epidural injection, performed by injection immediately adjacent to the dural sac in the posterior spinal column, with subsequent diffusion to the herniated disc or other inflamed, irritated, or impinged neural structures. Fluoroscopic guidance of needle placement has been shown to improve the accuracy of the placement of the injection; however, whether the clinical outcome is improved with this remains somewhat unclear.

Epidural injections may be performed in the cervical, thoracic, lumbar, as well as sacral (caudal) regions. Caudal epidural steroid injections may be used for patients with leg pain of sacral origin or in whom direct access to the lumbar region is difficult. Epidural injections are invasive, how a low risk of adverse effects, and are relatively costly. They are most commonly offered as an option in acute radiculopathy as a second-line treatment after prior treatment with NSAIDS, possibly a short course of an oral steroid, and a waiting period of at least 3 weeks with/without other adjunctive treatment measures (exercise, spinal manipulation, etc.).

Complications of injections can occur, but are not common and are usually self-limited. However, serious complications can occur, including (but not limited to) infection, hemorrhage (penetration of an anatomical variant artery), and hematoma formation with/without compression of an adjacent nerve or spinal cord. Finally, suppression of the pituitary-adrenal axis can occur, as does transient elevation of blood sugar in diabetics.

If the injury being treated is attributable to a single nerve root irritation/compression, transforaminal injections usually involve the least volume of agent, provided in the most closely targeted site of symptomatic pathology. Also known as “selective nerve root injections”, transforaminal epidural injections achieve the same goal, however, the needle is placed along the nerve root, in closer proximity to either the impinged nerve or herniated disc. As these are technically more challenging injections, they are frequently performed with either fluoroscopic or CT guidance. Electrical stimulation is sometimes also used to facilitate nerve root identification. The injections involve the injection of a glucocorticoid as well as anesthetic agent. As such, they can often provide both diagnostic assistance, as well as therapeutic relief of targeted symptoms. The efficacy of these injections is significantly tied to the technical precision of the procedure.

Finally, local anesthetic (as well as glucocorticoid) epidural injections can be useful in conjunction with aggressive physical therapy.

B. DIAGNOSTIC CRITERIA

1. Pertinent History and Physical Findings

A pattern of pain in the upper extremity, thoracic region, or lower extremity with the characteristics as well as specific distribution of a known nerve root, known as a radiculitis or radiculopathy. Radiculopathy refers to a sensory and/or motor dysfunction in the discrete distribution of an affected nerve root. Most cases result from either compression of, or inflammation to the nerve root as it exits the spinal canal, most commonly secondary to a disc protrusion/herniation. Such pain may be seen in the absence of previous surgery, but can also be seen following failed post-operative disc surgery. Physical findings strongly suggestive of a radiculitis/radiculopathy (positive straight leg raise testing, reflex diminishment in the affected limb, motor weakness and/or sensory dysesthesias/hypoesthesias, particularly in a pattern consistent with specific nerve root(s)) may accompany subjective complaints.

For cervical epidural steroid injections, pain may be distributed in a specific nerve root pattern (dermatome):

- Neck, shoulder and upper arm: C5 nerve root
- Neck, shoulder and radial forearm: C6 nerve root
- Neck, shoulder and dorsal forearm: C7 nerve root
- Neck, shoulder and ulnar forearm: C8 nerve root

For thoracic epidural injections, pain may be distributed in a "barrel stave" fashion, from the mid back, then extending anteriorly to the side and chest, in accordance with the underlying thoracic nerve root inflammation.

For lumbar epidural steroid injections, pain may be distributed in a specific nerve root pattern:

- Hip, thigh, and knee: L3 nerve root
- Hip, thigh, knee, and medial leg: L4 nerve root
- Hip, lateral thigh and leg: L5 nerve root
- Buttock, posterior thigh and calf: S1 nerve root

Anatomic variation can exist in these nerve root distributions. Additionally, particularly in the early stages, entire nerve root distribution may not be affected.

The duration of symptoms may play a role in decision making regarding timing of injections. Subacute radicular pain (pain lasting 3 weeks or longer) that has not

responded to more conservative measures (particularly when the presumed etiology of this pain is well identified and potentially reversible with a steroid injection) may form a historical foundation for proceding with injection. Patients with chronic back pain with an exacerbation also fall into this group. The goal of injection(s) in this group is to afford a few weeks of partial pain relief while spontaneous recovery occurs, or allowing for the patient to tolerate other treatments, and therefore facilitate more active and aggressive pursuit of rehabilitative goals and restoration of function.

C. APPROPRIATE DIAGNOSTIC TESTS AND EXAMINATIONS

The current practice in the U.S. is to obtain either a CT or MRI scan prior to the performance of an epidural injection. There are, however, studies of good quality showing effectiveness of injections based on clinical examination to address the target level for injection. Benefits of pre-procedural imaging include a greater safety margin in the determination of the entry level, the ability to rule out/in other pathology, as well as determining the presence of a surgical condition (thereby contraindicating the use of the epidural injection). Studies are ongoing, however, regarding whether imaging is required or not, as well as the benefit magnitude obtained from imaging.

Occasionally, the use of an EMG/NCVS can be considered, particularly in cases where the symptoms/physical findings and, possibly, imaging studies are ambiguous, or do not provide a clear guide as to the underlying pathology attributable to the presenting complaints. In some instances (e.g., presence of a medical condition contraindicating a specific imaging study, etc.) other studies (CT myelogram, discography) may be considered to confirm the diagnosis prior to proceding to epidural injection.

D. TREATMENT

1. Outpatient Treatment

Since the pain relief from epidural steroid injections is usually brief and by definition chronic non-specific back pain and chronic radicular pain (with or without prior back surgery) are chronic problems, injections are not recommended as a transient treatment for these long-term problems, unless there is specific exacerbation that indicates their use. Additionally, there is currently no information that supports an advantage to the performance of injections early on in the course of the syndrome. There is insufficient evidence, at present, to recommend one technique (caudal, interlaminar, or transforaminal) over another for an initial approach. Finally, the concurrent use of injections during participation in a rehabilitation program may be beneficial.

Injections are commonly performed on an outpatient basis. As noted in Section A, fluoroscopic guidance provides the most accurate method for ensuring injection of the steroid into the desired location. If local anesthetics are also used, proper vital sign monitoring is required, including electrocardiography, blood pressure monitoring, as well as pulse oximetry. Conscious sedation may be required for some anxious patients, but is not usually necessary. Emergency equipment, including but not

limited to oxygen, ventilatory tools, laryngoscope, endotracheal tubes, intravenous access supplies and vasopressors must be available, as well as appropriately trained individuals, as per State of R.I. Board of Health requirements, as well as any other applicable regulatory medical agencies or groups. Commonly, long acting steroids (betamethasone or methylprednisone) are used, with the most common anesthetics being lidocaine and/or bupivicaine. Corticosteroid dosing is most often based on one third (1/3) the dose associated with adrenal suppression, per injection.

2. Treatment Duration

Epidural steroid injections are primarily intended for reducing inflammation around the nerve root for primarily radicular pain. Due to the long acting nature of the steroid preparations used, they should not be performed at less than two (2) week intervals. Optimally, injections should occur at four (4) week intervals. Injections should not exceed three (3) in number over a six (6) month interval, and not more than six (6) in a twelve (12) month interval. If a lack of response is seen after two epidural steroid injections, no further injections should be performed at the same level.

Epidural injections should be scheduled separately and effects of each evaluated, rather than scheduling a series of 3. A second epidural injection is not recommended if, following the first injection, there has been significant reduction or resolution of targeted symptoms, or if a documented increase in physical activities/function occurs. If no response to a first injection occurs, there is less indicating for a second injection. However, if the interventionalist opines that the medication was not well placed, and/or if the underlying condition is believed to be so severe that one injection of a standard steroid dose would not be anticipated to adequately reverse the pathology, a second injection may be indicated. In patients who respond to an injection with 3-6 weeks of temporary, partial radicular pain relief, but then develop worsening pain and functional loss, but do not wish to proceed to surgery, a repeat epidural injection may be an option. Patients requesting a 4^{th} injection should be counseled regarding surgery, as further injections are not likely to be of benefit.

PROTOCOL HISTORY:

Passed: 4/27/1993 as “Caudal Epidural Blocks…”
Amended: 6/9/1998 as “Epidural Nerve Blocks and Epidural Steroid Injections…”
Amended: 11/19/2002
Amended: 4/27/2010

WORK HARDENING PROTOCOLS

I. INTRODUCTION

Guidelines have been established that define the nature, character, time duration, and cost of physical/occupational therapy treatments. In order to return an injured worker back to work, the therapy provider can provide one or both of the following therapy programs: "work hardening and/or work conditioning." The provider should indicate that their treatment services will be in the form of work conditioning with job simulated activities for a true work hardening program.

II. DEFINITION

Work conditioning is an intensive work-related, goal-oriented conditioning program designed specifically to restore systemic neuromuscular functions, including joint integrity, mobility, and muscular performance (including strength, power, and endurance), motor function (motor control and motor learning), ROM and cardiovascular/pulmonary functions. The objective of a work conditioning program is to restore physical capacity and function to enable the patient/client to return to work.

A work hardening program is an interdisciplinary, individualized and goal oriented, job specific program designed to return the patient/client to work. Work hardening programs use real or simulated work activities and progressively graded conditioning exercises that are based on the individual's measured tolerances, to restore physical, behavioral, and vocational functions. Work hardening programs address the issues of productivity, safety, physical tolerance, and work behaviors.

III. THE PROTOCOL COMPONENTS

1. Determination of the strength and endurance goals of the client in relation to the return to work goal should be established using equipment that quantifies and measures strength and conditioning levels; i.e., ergometers, dynamometers, treadmills, free weights, and circuit training. Goals for each worker are dependent on the demands of their respective jobs.

2. Simulation of the client's work demands job simulations that provide for progressions in frequency, load, and duration of work are essential. These should directly relate to the work goal and offer the client opportunity to practice work-related positions and motions.

3. The program should include education in body mechanics, work safety and injury prevention. This should include direct therapist interaction and may be combined with video presentations that cover anatomy, back care, posture and the role of exercise and the worker's responsibility in self-treatment.

4. Assessment of the worker's need for job modifications. Documentation of job modifications is needed; i.e., adaptations in equipment, work station ergonomics. Adaptations should be made and practiced to insure success.

5. A written plan that includes measurable goals, the strategies used to meet these goals and the projected time necessary to accomplish the goals and expected outcomes. This plan may be supported by a functional capacity evaluation to establish a base-line that can be compared to the demands of the job. A re-evaluation may be performed to determine success of the program and the worker's readiness to return to work. These evaluations are considered part of the work hardening program.

6. The work hardening facility should be a safe work environment that is appropriate for the vocational goals and the worker. The amount of space should be determined by the number of workers, or approximately 100 square feet per client.

7. A total of nine (9) to twenty (20) physical/occupational therapy treatments will be paid for by the insurer for services given to the injured worker. The total number of treatments should be dependent upon the severity of the condition and intervention necessary.

IV. DOCUMENTATION

The following represents the general outline for the evaluation of candidates for work hardening and for implementation of treatment.

1. A request for work hardening may be made by the treating physician, insurer/case manager, acute care therapy provider, physician's assistant, nurse practitioner, osteopathic physician, and/or chiropractor.

2. All requests for work hardening will be forwarded from the generating source of the referral to the physician and then to the industrial health provider. They must include prior approval from the physician as well as the claims manager before the program begins.

3. Work hardening facility will submit a copy of the evaluation to the referring physician and the insurer within three (3) business days of the evaluation. The evaluation should include the initial plan as well as the following:

a. the medical status
b. the musculoskeletal exam
c. the current functional work capacity testing
d. the projected work capacity to return to work
e. the cognitive/perceptual status
f. the behavioral/attitudinal status
g. the vocational status.

The evaluation should document a benchmark from which to establish the initial treatment plan and/or the physical/functional/vocational disposition.

Information will include:

a. the name of the case manager
b. the estimated time frame for treatment
c. the worker must demonstrate physical recovery sufficient to allow for progressive participation for a minimum of 4 hours a day for three to five days per week. Some exceptions may be made for hand injuries as well as other specialized diagnoses that may begin at 2-3 hours per day.

4. It is anticipated that work hardening programs will include:

a. the practice, modification, and instruction of component work tasks through real or simulated work
b. the development of strength and endurance of the person related to the performance of work tasks
c. the education to teach safe job performance to prevent re-injury
d. the assessment of specific job requirements in relation to program goals through work site evaluation and/or job analysis
e. the provision of ergonomic recommendations to the employer which would facilitate and optimize the successful and safe return to employability
f. communication with the employer as to the person's present functional level
g. the development of behaviors and attitudes that will improve the person's ability to return to work or to benefit from other rehabilitation efforts.

5. A brief, weekly report should identify progress or lack of progress to date towards goals of treatment. Any changes in objective measures should be noted; e.g., amount of weight that cannot be lifted. This report should be sent to the employer/insurer.

6. Work hardening programs may be conducted three to five days per week for a period of up to four weeks or less. Prior authorization will be required to continue treatment beyond four weeks with a maximum of two additional weeks allowed. These exceptions must be justified by diagnosis, and must be accompanied by documentation of good participation and the necessity to reach the vocational goal.

7. A full reassessment of all objective measures must be completed at the end of the program or at the end of four weeks. If approval for continued treatment beyond the initial four weeks is requested, this reassessment must be forwarded to the insurer/employer. The rationale for continued treatment, proposed treatment extensions, and cost of services must also be identified.

8. An exit/discharge summary shall be submitted to the referring physician and insurer/employer within seven working days of the exit/discharge date. This summary shall include:

a. The reason for program termination
   1. The client has reached initially stated goals.
   2. The client has not participated according to program plan and absences exceed that allowed by program.
   3. The worker is not adhering to schedule.
   4. The worker has not reached interim goals (2, 3, and 4 must be reported to the claims staff to determine future planning).

b. clinical and functional status

c. recommendations for return to work

d. recommendations for follow-up services.

The final assessment may be used in lieu of a separate summary if all of the information above is contained therein.

PROTOCOL HISTORY:
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PROTOCOL FOR THE MANAGEMENT OF GROIN HERNIAS

I. BACKGROUND

Hernia is defined as a weakness in the supporting structures through which a contained organ may protrude. A hernia may be described in terms of a weakness or actual opening or defect in an enclosing layer. However, the organ need not be present within the weakness for the hernia to exist.

Groin hernias can be sub-classified into:

1. Inguinal
2. Femoral

Hernias may further be classified into:

1. Reducible
2. Non-reducible – incarcerated
3. Strangulated – where there is compromise to the blood supply to the protruding organ

Other abdominal wall or ventral hernias include:

1. Incisional/Ventral – through a prior surgical incision in the abdominal wall
2. Umbilical – through a defect at the umbilicus or belly button
3. Epigastric – defect through the linea alba above the umbilicus
4. Spigelian – through a defect at the lateral border of the rectus muscle
5. Lumbar – defect through the lateral abdominal wall

Hernias may be congenital or secondary, that is, they develop later in life. The etiology of a hernia that develops secondarily in later life is usually trauma. However, the traumatic explanation may not be entirely clear. In some instance, the patient may be able to pinpoint the precise event, such as lifting a heavy object, and suddenly feeling a tear or severe pain in the groin. In other cases, the patient may only recognize a gradual bulge over years of hard work.

II. SYMPTOMS OF HERNIAS

1. Asymptomatic
   a. Many hernias are discovered only on routine physical examination, and patients have no symptoms referable to them.
2. Symptomatic
   a. Noticeable, painless bulge in the groin which may or may not be intermittent.
   b. Noticeable, painful bulge in the groin which may or may not be intermittent.
      1. Pain may be quite severe initially, but usually subsides to a dull ache unless incarceration or strangulation occurs.

c. Severe, generalized abdominal pain often associated with nausea and vomiting, abdominal distention, and a non-reducible bulge in the groin – which suggests incarceration and/or strangulation, causing bowel obstruction.

d. In the obese patient, actual bulge can be missed on examination, but the patient may present with symptoms and signs of bowel obstruction with no other etiology.

III. PHYSICAL SIGNS

1. Hernia may not be detectable on physical examination. This is frequently the case with baby hernias, or in obese patients.
2. The defect and/or bulge can be felt in the inguinal canal. For a reducible hernia, often the patient must be in the upright position and strain, to increase the intra-abdominal pressure for the hernia to be detected. A dilated external ring does not, in and of itself, constitute the diagnosis of a hernia.
3. Signs of bowel obstruction, such as abdominal distention and tenderness, suggests incarcerated and/or strangulated hernia, in the absence of another cause.

IV. DIFFERENTIAL DIAGNOSIS OF GROIN MASSES

1. Testicular torsion
2. Acute femoral lymphadenitis
3. Soft tissue mass, such as lipoma

V. TREATMENT

1. Non-operative

a. External device or truss to maintain reduction of the hernia to prevent incarceration and/or strangulation. This is most helpful for large ventral hernias or incisional hernias and of little help in groin hernias. It does not treat the hernia, it only helps to prevent complications resulting from the hernia.

2. Operative Repair

a. This should be scheduled in a timely fashion after diagnosis.

b. If there are signs or symptoms of incarceration and/or strangulation, surgery should be scheduled more urgently or emergently (usually within 24 hours).

c. Outpatient

1. Conventional surgical treatment is performed under local, neuroleptic (IV) sedation and local anesthesia), general anesthesia, spinal or epidural anesthesia.
2. Laparoscopic repair usually requires general anesthesia
3. If strangulation has occurred, the patient may require conversion to a general anesthetic with full laparotomy with resection of the involved organ. The patient may need admission to the hospital following this procedure.

Most surgeons performing hernia repairs today use a tension free technique which reduces pain, reduces the risk of recurrence, and enables the patient to return to work much quicker. A tension free repair can be performed either using an open technique or a laparoscopic technique. The type of repair is usually based on the patient's anatomy, as well as the surgeons preference and expertise.

Most groin hernias can be repaired on an outpatient basis. If incarceration and/or strangulation occurs, and conversion to a laparotomy is required or a bowel resection is required, admission to the hospital is usually required, and recovery is usually longer.

IV. COMPLICATIONS RESULTING FROM REPAIR OF THE HERNIA

1. Infection – rare
2. Wound Hematoma/Seroma
3. Nerve entrapment with hypesthesias or numbness
4. Recurrence – early or late
5. Testicular ischemia/infarction – rare

VII. FOLLOW-UP

1. Patients are usually treated as outpatients with initial postoperative visit one to two weeks following the surgery. Patients may return to work at 2 weeks. For individuals who routinely lift greater than 100 lbs., 3 weeks recovery is generally required. Follow-up visits beyond 2-3 weeks are generally needed if complications have occurred. Patients who undergo bilateral hernia repair, in general, should not require longer recuperative time.

VIII. PRECAUTIONS TO PREVENT RECURRENCE FROM WORK-RELATED HERNIAS

1. Cessation of smoking
2. Weight reduction
3. Muscle strengthening exercises, which usually do not require physical therapy
4. Learning proper techniques in lifting and bending

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ACUPUNCTURE

INTRODUCTION

The indications and uses of acupuncture in injury/illness treatment continue to be defined and refined over time. Acupuncture is used as an option when pain medication is reduced or not tolerated, or it may be used as an adjunct to physical rehabilitation and/or surgical intervention to hasten functional recovery. As noted in the American College of Occupational and Environmental Medicine's "Occupational Medicine Practice Guidelines" (2nd Edition, with revisions; 2008), acupuncture is based largely on the theory that many diseases are manifestations of a yin/yang imbalance, reflected in disruption of "Qi" (normal vital energy flow) in specific locations referred to as "meridians". Restoring balance occurs via placement of needles in one or several classical acupuncture points on these meridians. Typically thin, solid, metallic needles are used, either manually manipulated, or stimulated electrically (electroacupuncture). Needles may be inserted, manipulated, and retained for a period of time. Physiological effects (depending on location and settings) may include endorphin release for pain relief, reduction of inflammation, increased blood circulation, analgesia through interruption of pain stimulus, and muscle relaxation. Additionally, other techniques such as moxibustion and cupping are occasionally used as part of the treatment.

In addition to Chinese acupuncture, many other types of acupuncture have developed, with use on non-traditional acupuncture points. Different techniques are also used, including more standard acupuncture, superficial dry needling, and deep dry needling. Acupuncture is minimally invasive, carries minimal risk for adverse effects, and is moderately costly.

Acupuncture has been utilized to treat many musculoskeletal disorders, as well as non-musculoskeletal conditions (chronic pain, headaches, etc.). Acupuncture has been claimed 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. A major challenge in assessing the effectiveness and efficacy of this methodology in the treatment of various disorders has been the quality of study design and exclusion of study bias. There remain significant reservations regarding acupuncture's true mechanism(s) of action. Several states, however, have incorporated limited and defined clinical situations in which acupuncture has been possibly shown to be of benefit. The ACOEM's Guidelines provide the most comprehensive, evidence-based assessment and recommendations regarding the use of acupuncture to date and, therefore, form the foundation of this protocol.

RECOMMENDATIONS

A. Current studies do not differentiate between the different acupuncture methodologies and effectiveness of treatment.

B. Referral to an acupuncturist will only be made to an individual who has successfully met all qualifications and licensure requirements as set forth by the State of Rhode Island Department of Health.

C. Acupuncture should be considered only after failure of prior treatment (NSAIDs, exercise, physical therapy, chiropractic, and weight loss (in the case of knee/hip arthrosis) to effectively limit or resolve symptoms.

D. Acupuncture may be recommended for select use for treatment of chronic moderate to severe low back pain, neck pain, chronic trigger points/myofascial pain, and osteoarthrosis of the knee and hip, as an adjunct to more efficacious treatments.

1. Chronic pain, for purposes of acupuncture, is defined as pain that persists for at least 30 days beyond the usual course of an acute disease, or a reasonable time for an injury to heal, or that is associated with a chronic pathological process that causes continuous pain.

2. The role of acupuncture in these conditions is to assist in increasing functional activity levels and, therefore, should be incorporated only in those cases where a conditioning program is in progress.

3. In cases where an injured worker is not involved in a conditioning program, or where evidence exists of noncompliance with a conditioning program (consisting of graded increases in activity levels is documented), such intervention is not appropriate.

4. Based on current studies, the use of acupuncture in the treatment of other entities, such as acute tender/trigger points, chronic lateral epicondylitis, adhesive capsulitis of the shoulder, chronic regional pain syndrome (CRPS), and migraine headaches can be considered in select cases as a secondary or tertiary treatment where other, more standard therapies (see appropriate protocol) have failed, or to assist in increasing functional activity levels more rapidly.

5. Referral to an acupuncturist will be made by the treating/referring health care professional, in writing, after well documented lack of acceptable response/return of acceptable function, disability or incapacity, despite use of more standard medical care (as outlined in the appropriate protocol for that condition) over a period of time usually and reasonably associated with functional recovery from that condition.

6. Initial treatment will be limited to six (6) acupuncture sessions, as an adjunct to a conditioning program (with both graded aerobic exercise and strengthening exercises).

a. During this time, clear objective and functional goals are to be documented, with achievement of the goals documented as well.

b. The conditioning program is not required to be provided by the acupuncturist, but can be provided by an appropriate rehabilitation facility equipped and capable of the performance of a well-defined, systematic conditioning program.

7. Resolution of symptoms and functional limitations, treatment intolerance, non-compliance (with either acupuncture and/or conditioning program), or failure to improve are indications for discontinuance of treatment.

8. Ongoing acupuncture treatment extending beyond the initial 6 visits should be based on objectifiable measures of improvement, with an initial extension of 6 additional visits, if justified, for a total of 12 visits/sessions.

a. Ongoing authorization for continuing acupuncture treatment may require independent, objective evidence of the efficacy of treatment(s) and may, at the direction of the Workers' Compensation Court, require a supportive opinion rendered by an impartial medical examiner.

b. At the completion of the initial 6 sessions, the treating acupuncturist should submit a written report with clinical assessment, response to treatment, as well as recommendations to either terminate or extend treatment. Objective parameters, in addition to the patient's subjective reports of pain/limitations will be provided as part of this report. These objective parameters will also be provided by the provider of the conditioning program, in accordance with an acceptable reporting methodology, in accordance with the appropriate treatment protocol providing guidance in that regard.

c. If ongoing treatment is recommended and supported by objectifiable parameters, similar reports will be submitted at the completion of each subsequent 6 session interval, until the patient has recovered, realized maximal functional benefit, or displayed noncompliance with treatment recommendations, at which point treatment will be terminated.

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DIAGNOSTIC TESTING PROTOCOLS

Guidelines for the Ordering of CT Scans, MRI Scans, EMG, Bone Scans, Myelograms & Angiograms

I. CT Scans

A. A CT scan is appropriate for an acute head injury when there is need to rule out an associated acute cerebral condition.

B. A CT scan is appropriate for low back injuries with appropriate neurologic deficits which have not responded to conservative treatment after a period of 4 to 6 weeks.

C. In the event of an eye injury, orbital CT scans may be ordered by an ophthalmologist in the presence of foreign body or orbital injury.

D. Shoulder injuries may require a CT scan, but this should be ordered by an Orthopedic Surgeon.

E. A CT scan may be ordered by an Orthopedic or Neurosurgeon in a case where a patient has undergone a 2nd or 3rd surgical procedure and in which a lumbar fusion is being considered.

F. A repeat CT scan may be ordered if there has been a marked progression of signs and symptoms but should not be ordered just for routine follow-up purposes.

G. CT scans may not be ordered for routine follow-up purposes. In addition, any follow-up CT scan may only be done with the permission of the employer/insurer.

II. MRI Scans With or Without Contrast

Indications

A. Cervical injuries in which a cervical disc is suspected, generally performed without contrast (to be ordered generally by Orthopedic Surgeon, Neurologist, Neurosurgeon, Physiatrist, or Rheumatologist).

B. Acute knee injuries with suspected (1) meniscal injuries or (2) collateral ligament injuries (to be ordered only by an Orthopedic Surgeon, Physiatrist, or Rheumatologist).

C. In lumbar disc injuries, a CT scan may be a reasonable alternative. Generally both studies should not be performed (to be ordered generally by Orthopedic Surgeon, Neurologist, Neurosurgeon, Physiatrist, or Rheumatologist).

D. In metatarsal fractures, an MRI is rarely indicated (can be ordered only by an Orthopedic Surgeon/Hand Surgeon, Physiatrist, or Rheumatologist).

E. Thoracic spine injuries with any indication of damage within the canal (to be ordered generally by Orthopedic Surgeon, Neurologist, Neurosurgeon, Physiatrist, or Rheumatologist).

A repeat MRI study is indicated only if:

1) There are clear clinical or radiographic signs of significant progression.

2) A repeat study may be useful after surgery if a patient's condition fails to improve. In this situation, contrast material should be used to differentiate between further disc material and scar tissue.

F. Waters view is frequently done to determine if there is a suspicion of a metallic foreign body of the orbit. In the infrequent occasion in which there is a high level of suspicion of metallic foreign body in the orbit, a CT scan of the orbit can be done.

G. MRI can be utilized for shoulder injuries (to be ordered only by an Orthopedic Surgeon, Physiatrist, or Rheumatologist).

H. An MRI of a peripheral nerve disorder may only be ordered by a specialist (Orthopedic Surgeon, Neurologist, Neurosurgeon, Physiatrist, or Rheumatologist) and only with the express consent of the insurer.

MRI scans may not be ordered for routine follow-up purposes. In addition, any follow-up MRI study may only be done with the permission of the employer/insurer.

III. Bone Scans

A Bone Scan may be ordered for the following reasons:

A. Suspected tumor involvement of the bony part injured.

B. Suspected infection of the bony part injured.

C. Occasionally, where x-rays have failed to show a fracture.

D. In some cases of acute knee injuries (should be ordered by an Orthopedic Surgeon).

IV. Myelograms

A Myelogram may be ordered for the following reasons:

A. When there are true signs of cervical disc and one has been demonstrated by MRI Scan and the patient is a surgical candidate.

B. In a low back injury where a disc has previously been demonstrated by CT Scan or MRI Scan and who has not responded to conservative treatment and the patient is a surgical candidate.

C. Thoracic injury would follow the same as above.

D. Any spinal fracture or subluxation in which there is suspected cord compression.

V. Angiograms

A. In traumatic cervical injuries in which there is a suspicion of damage to the vertebral or carotid arteries.

B. In thoracic outlet syndrome, if vascular compression is suspected.

VI. Electromyogram and Nerve Conduction Studies

Neurophysiological studies (EMG and CV studies) are frequently utilized diagnostic techniques for the identification and assessment of disorders affecting the nerve roots (radiculopathy), peripheral nerves, neuromuscular junction and for the diagnoses of diseases of the muscles. These techniques are generally not useful for the diagnosis of disorders of the central nervous system.

The aforementioned electrophysiological techniques can be utilized for the diagnosis or evaluation of several conditions that are associated with an injury at work. These include (I) radiculopathy in association with disc disease, with spondylitic disease, or with other nerve root conditions, (II) peripheral nerve injury.

A. Radiculopathy – EMG studies are employed to detect the presence of nerve root injury. This study is most useful after a period of four weeks and is generally not indicated prior to that time.

1. If the initial study is negative for nerve root irritation and/or damage, a repeat study may be indicated after a six-month time interval. However, a repeat study can be performed prior to six months if surgery is under consideration or if requested by an attending physician.

Follow-up EMG studies may be required (on not less than a yearly basis), for the purpose of re-evaluation of an active problem requiring ongoing treatment (prior to MMI).

2. If the study is abnormal, a repeat study may be indicated (after six months) if:

a. There is a significant change in the patient's clinical status.

b. If surgical treatment has been performed and the desired clinical result has not been achieved.

c. If repeat surgical treatment is being contemplated or if the study is requested by the attending physician (radiculopathy).

3. Conduction velocity studies can be useful in evaluating for the presence of radiculopathy as well.

a. In testing for radiculopathy, study of a motor nerve, a sensory nerve and study of a "late response" (usually F wave in the upper extremity and the H response in the lower extremity) may be of significant value in the diagnosis of a radiculopathic disorder. H response may be performed in the opposite extremity as well.

b. In addition, studies may need to be performed to rule out an associated peripheral nerve lesion, and the appropriate format for study is described below (see "II. Peripheral Nerve Injury").

B. Peripheral Nerve Injury

1. Studies can include EMG and CV studies to evaluate for the presence of a peripheral nerve injury.

a. Acute injury – EMG and nerve conduction studies are the most useful after four weeks (approximately) and are generally not indicated prior to that time. However, EMG and nerve conduction studies can be performed prior to that time if

(1) surgical treatment is under consideration

or

(2) if requested by an attending physician.

b. Chronic dysfunction – In general, a single study (EMG and CV) is sufficient to evaluate for a chronic nerve disorder (carpal tunnel, ulnar nerve disorder or other nerve entrapment condition). A repeat study may be performed after three or four months if specific treatment (for example, surgical release procedure) is contemplated or if requested by the attending physician. Follow-up studies may be performed after this time but not more frequently than yearly for purpose of re-evaluation of an active problem requiring ongoing treatment (prior to MMI).

2. Concerning the issue of nerve conduction studies and the appropriate nerve(s).

a. Conduction velocity studies are useful for the study of one or more nerves that are clinically suspect in the affected extremity.

b. Testing of an uninvolved nerve in the same limb such as the ulnar nerve in a patient with, for example, a median nerve disorder (carpal tunnel) is useful. Studies of the contralateral and presumably normal nerve may also be of diagnostic importance.

c. On occasion, the testing of a motor nerve, a sensory nerve, and a "late response" study may be performed in a non-affected extremity to evaluate for the presence of a coexistent systemic peripheral nerve disorder (e.g. Diabetic Peripheral Neuropathy).

VII. Evoked potential studies are not useful for diagnosis and management of peripheral nerve disorders.

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TEMPOROMANDIBULAR JOINT DISORDERS

I. BACKGROUND

Temporomandibular Joint Disorders (TMD) has been defined as a collective term embracing a number of clinical problems that involve the musculature and/or the temporomandibular joint itself. Temporomandibular Joint Disorder (TMD) has been used to refer to a group of conditions that are often called TMJ by the public. Unfortunately, this imprecise term, TMJ, has been used by physicians and dentists as well to describe all of the myriad of pain problems that patients experience in association with the head, neck, jaws, and muscles in this anatomical region of the body. This imprecision in the use of terms has led to a great deal of confusion. In an attempt to clarify this situation, the following definitions are presented:

There are two distinct categories of TMD:

1. Masticatory and cervical muscle fatigue/spasm/pain and dysfunction.

This is a specific term used to describe painful and debilitating extra-articular maladies of the head, neck, and jaws. These problems result from the abuse of the masticatory and cervical musculature secondary to abnormal parafunctional habits such as bruxism and clenching of the teeth in response to stress and/or myofascial pain. However, if not controlled or eliminated, these problems could, in some cases, cause intra-articular pathology.

2. Intra-articular biomechanical dysfunction.

This is a specific term used to describe the consequences of the pathologic entities that occur to the intra-articular structures of the TMJ.

The important distinction is that masticatory and cervical muscle pain and dysfunction is not primarily centered in the joint itself, whereas biomechanical dysfunction of the TMJ is directly related to the anatomy and associated pathology of the joint.

The health consequences of TMD can be devastating. Dependence on pain medications, decreased productivity, and disability are common. Most patients who have extra-articular TMD, fortunately, can be successfully treated and rehabilitated with a combination of rest, medication, change in habits, and an orthotic appliance. However, those patients whose cause of TMD is intra-articular pathology often cannot be treated successfully without surgical intervention.

II. DIAGNOSTIC CRITERIA

Masticatory and Cervical Muscle Pain and Dysfunction

A. Pertinent Historical and Physical Findings

Intermittent, generalized unilateral or bilateral dull, aching preauricular or auricular pain is usually the first symptom. Often this leads the patient to their physician or an otolaryngologist. This pain will frequently migrate to the temporal, cervical, and occipital regions.

Masticatory and cervical muscle origin pain (extra-articular) differs from the pain associated with intra-articular biomechanical dysfunction in that with intra-articular pain the pain is directly localized to the affected joint, rather than generalized to

an area as is the pain associated with the extra-articular conditions. Also, with the intra-articular conditions, the pain is constant each time the patient functions the mandible.

The extra-articular patient will complain of decreased range of motion of the mandible. Often, this is worse in the morning upon awaking, particularly if the patient clenches and/or grinds (bruxism) their teeth while sleeping. Many times the patient will describe a sensation of their jaw feeling locked. This sensation usually goes away as they go about their daily activities.

These patients will also complain that their jaw feels tired and/or tight after functional motions associated with eating, chewing, or prolonged talking.

Often, joint noises such as clicking with function are described. Patients describe a feeling in their ipsilateral ear of a stuffiness as when going up in an airplane.

All of these symptoms in the extra-articular patient are intermittent daily, weekly, or monthly.

Physical examination is remarkable for tenderness to palpation over the muscles of mastication, particularly the deep masseter, anterior temporalis and its tendon and the cervical and occipital muscles to which the pain migrates.

There is usually no intrameatal tenderness to palpation, and there may or may not be evidence of joint noise on palpation or auscultation of the affected joint(s).

The patients will have a decreased range of mandibular function as demonstrated by measuring the opening pattern between the maxillary and mandibular incisor teeth on maximum opening. The patients will describe a tight sensation as they attempt this maneuver. Lateral excursion are decreased to the contralateral side, and protrusive excursion deviates the mandible to the affected side in unilateral cases.

B. Appropriate Diagnostic Tests and Examinations Suggested Sequence

1. Clinical Diagnosis is supported by these studies:

a. Imaging – plain or panoramic radiograph to determine that there is no gross articular bony pathology

b. Differential diagnostic local analgesia blocks to determine extra- vs. intra-articular etiology of pain

c. Trial dosage of medication such as NSAID or muscle relaxant

C. Inappropriate Diagnostic Tests and Examinations

1. Masticatory or cervical muscle evoked potentials
2. Trial doses of narcotic analgesics

D. Supporting Evidence

Imaging is essential to the initial work-up of these patients to rule out the presence of incipient intra-articular biomechanical dysfunction pathology. Differential diagnostic blocks are helpful in complex cases in determining the primary site of the etiology of the problem as extra-articular or intra-articular so the treatment can be appropriately directed. Trial dosages of NSAIDS and/or muscle relaxants can be useful in determining etiology and thus dictate treatment.

III. TREATMENT

All treatment directly associated with masticatory and cervical muscle pain and dysfunction is done on an outpatient basis. There are occasions when the patient has such

a tremendous psychological overlay that inpatient behavioral modification therapy is needed.

A. Appropriate Forms of Therapy
   1. Medications
      a. NSAIDS
      b. Muscle relaxants
      c. Sedatives
      d. Antidepressants
      e. Local analgesic trigger point injections
   2. Orthotics
   3. Physical therapy
      a. Exercises
      b. Ultrasound
      c. Galvanic stimulation
      d. Heat and cold packs
      e. TENS
      f. Iontophoresis
   4. Diet modifications
   5. Psychological counseling
   6. Relaxation therapy
   7. Family therapy

B. Supporting Evidence

With the proper early diagnosis of masticatory and cervical muscle pain and dysfunction with identification of the etiology and its removal or treatment, the vast majority of these patients can be taught to manage this problem. Progression of this problem untreated can lead to biomechanical dysfunction in a small percentage of cases (5%).

C. Estimated Duration of Care

Extra-articular TMD is a management problem because there is no anatomical or pathological entity that can be repaired or removed. The basis of the problem is stress relieving patterns that lead to abnormal parafunctional oral habits that result in fatigue, spasm, and muscle pain.

D. Modifiers

Modifying factors are defined as factors that precipitate, aggravate, or alleviate the individual episodes of pain and dysfunction. Frequent precipitating factors include stressful situations, weather changes, and trauma. Frequent aggravating factors include tooth clenching and grinding and tension. Frequent alleviating factors include heat or ice, rest, medications, massage, stretching exercises and relaxation.

IV. <u>DIAGNOSTIC CRITERIA – Intra-articular Biomechanical Dysfunction</u>

Biomechanical dysfunction of the TMJ can occur as the result of the following pathologic conditions:

1. Trauma
   A. Persistent Historical and Physical Findings

1. History of trauma
2. Physical evidence of fracture
3. Malocclusion
4. Mandibular dysfunction
5. Abnormal relationship of the jaw
6. Presence of a foreign body
7. Hemorrhage in external auditory canal
8. Laceration of external auditory canal
9. CSF in external auditory canal

B. Appropriate Diagnostic Tests and Examinations

Suggested Sequence

1. Clinical Diagnosis is supported by these studies:
    a. Imaging – Plain or panoramic radiograph to determine the nature and extent of the fracture and any displacement
        - CT Scan
        - Tomogram

C. Inappropriate Diagnostic Tests and Examinations

a. Arthrogram
b. MRI
c. Arthroscopy

D. Treatment

Outpatient or Inpatient

1. Closed reduction in cases of:
    a. Nondisplaced fracture of the mandibular condyle
    b. Displaced fracture of the mandibular condyle
    c. Medical contraindication for open reduction
2. Open reduction in cases of:
    a. Fracture dislocation of the mandibular condyle
    b. Mechanical interference with function by a condyle
    c. Condyle fracture with loss of anterior – posterior and vertical dimension which cannot be managed by closed reduction
    d. Compound fracture
    e. Displacement of a mandibular condyle into the middle cranial fossa

E. Supportive Evidence

It has been well documented that with proper treatment, fractures of the mandibular condyle heal well.

F. Estimated Duration of Care

Early mobilization (2 - 3 weeks) is important to prevent ankylosis.

H. Estimated Return to Work

6 – 8 weeks

2. Internal Derangement

A. Pertinent Historical and Physical Findings

1. Earaches, headaches, masticatory or cervical myalgias
2. Clicking or popping of the joint

3. Locking of the joint
4. Restricted masticatory function
5. Restricted range of jaw motion
6. Imaging evidence of disc displacement and/or perforation
7. Arthroscopic evidence of internal derangement

B. Appropriate Diagnostic Tests and Examinations

Suggested Sequence

1. Clinical Diagnosis is supported by these studies:
   a. Imaging – MRI
   b. Arthrogram
   c. Arthroscopy

C. Inappropriate Diagnostic Tests and Examinations

1. Imaging – any imaging that professes to show disc displacement by condylar position
   - CT Scan

D. Treatment: Outpatient or Inpatient

1. Arthrocentesis and/or manipulation of mandible
2. Arthroscopic surgery
3. Arthroplasty
   a. Discoplasty with or without arthroplasty or discorrhaphy
   b. Discectomy
   c. Discectomy with insertion of autogenous graft
   d. Discectomy with recontouring of the articular surface and placement of autogenous graft
   e. Repair of perforated posterior attachment
4. Mandibular condylotomy
5. Orthognathic surgery
6. Orthotics
7. Physical therapy

E. Supporting Evidence

It has been well documented that with proper treatment, internal derangements of the TMJ do well.

F. Estimated Duration of Care:

With surgery and post-operative physical therapy, 4 – 6 months

G. Estimated Return to Work:

6 – 8 weeks

PROTOCOL HISTORY:
Passed: 5/24/1994

ACUTE HAND INJURY PROTOCOLS

I. FRACTURES OF THE HAND AND DIGITS

A. Background

Digital and hand fractures are seen in workers who use their hands, due to the exposed nature of the hand (in most functions) at work. Most fractures are due to local trauma caused by an applied force. The energy of applied force determined the severity of the fracture. Digital fractures are much more common than hand fractures, and may present as open fractures with soft tissue loss.

B. Medical History

1. Pain, swelling, and discomfort to the injured digit, thumb, or hand
2. Age, occupation, activities, hand dominance, history of previous hand injury/impairment important to document
3. Date of injury, as well as time interval between injury and treatment
4. Conditions surrounding injury (physical environment)
    - Assists in determination of dirty vs. clean wound
5. Mechanism of injury

C. Physical Examination

1. Swelling and tenderness of the affected part
2. Digital range of motion
3. Vascular changes (ischemic, congestion, or cyanosis)
4. Neurologic changes (including two-point discrimination)
5. In digital fractures, notation of the soft tissue "envelope" and the presence of any skin interruption, consistent with an open fracture, should be sought.

D. Appropriate Diagnostic Tests and Examinations

1. X-rays, including true lateral views of the involved digit/metacarpal bone
2. Occasionally, noninvasive/invasive vascular studies may be useful and appropriate, when there is suspicion of circulatory compromise. Such studies include:
    a. Doppler
    b. Ultrasound
    c. Angiogram
    d. MRA

E. Outpatient Treatment: Uncomplicated Fractures

1. Uncomplicated digital fractures are expected to heal within four to six weeks.
2. Indications for Treatment
    a. Pain

b. Limited Motion
c. Swelling

3. Treatment Options: Closed Reduction With/Without Anesthesia
a. Digital finger splints
b. Intrinsic plus splints
c. Buddy taping
d. Intrinsic plus casting
e. Casting

4. Rehabilitation
a. After initial healing (confirmed by exam/x-ray), active and passive range of motion exercises of the digits, hand and wrist
b. Grip strengthening exercises, when indicated
c. Activities of daily living modification, with job task limitations may be necessary, based on the nature of the injury.

5. Duration of Care
a. Generally extends over 6-12 weeks
b. Duration depends on severity of wound, complications, and complexity of care required for healing and optimization of functional restoration.

6. Return to Work Status
a. Based on extent and severity of wound
b. Two to four weeks of no use of injured hand
c. Usual return to full hand use within 8 weeks

F. Closed Reduction, Internal Fixation/Open Reduction, Internal Fixation/Surgically Treated Injuries
1. Indications
a. Failure to respond to conservative measures
b. Failure to correct digital deformity/displacement (seen in AP, lateral, or rotatory x-ray views)
c. Intra-articular joint fracture that cannot be adequately treated by closed measures
d. Open fractures requiring irrigation and debridement
e. Amputations
2. Treatment Options
a. Closed reduction with/without internal fixation
b. Open reduction with/without internal fixation
c. Irrigation and debridement
d. Closed reduction or external fixation
3. Rehabilitation
a. Following initial healing, active and passive range of motion exercises of the digits, hand and wrist
b. When indicated, grip strengthening exercises

c. Activities of daily living modification
d. Job task limitations
e. Range of motion exercises (after fracture healing)
f. Splinting/casting

4. Duration of Care
   a. Operative treatment: 3-6 months
   b. Follows surgery
5. Return to Work Status
   a. Generally, no use of injured hand for 3-6 weeks
   b. Full use of injured hand generally within 6-12 weeks

II. DIGIT AND HAND DISLOCATIONS

A. Background

Dislocations require tearing of some of the structures surrounding the joints of the digits, hand, and/or wrist. All injuries of this sort must be reduced to allow for adequate post-injury function. Unduly lengthy immobilization following these injuries can lead to stiffness in the affected part. Often accompanying these injuries is cartilaginous disruption, resulting in eventual joint (traumatic) arthritis.

B. Diagnostic Criteria

1. Precipitating Injury History/Mechanism of Injury
   a. Usually involves a hyperextension type injury (digits)
   b. Metacarpal dislocations often involve a direct blow to the "knuckles"
   c. Usually presents with severe pain, swelling, and deformity of the hand or digit
2. Physical findings
   a. Swelling
   b. Pain
   c. Limited motion

C. Appropriate Diagnostic Tests and Examinations

1. Digital X-rays: true lateral views of the digits, including AP, lateral, and oblique pre and post-reduction views.
2. Hand X-rays: true lateral radiographs, including metacarpals, with AP, lateral, and oblique pre and post-reduction views

D. Outpatient Treatment

1. Nonoperative Treatment
   a. Varies according to injury severity
   b. Ranges from 6-24 weeks
   c. Can include closed reduction of digital joints under local anesthesia
   d. Immobilization after reduction, including digital splints, intrinsic-plus splints of the hand or wrist, and casting

2. Rehabilitation
    a. Can include active/passive range of motion exercises, beginning 2-6 weeks after injury
    b. Grip strength exercises, when indicated
    c. Activities of daily living modification
    d. Job task modification
3. Return to Work Status
    a. Simple digital dislocation: no hand use for 1-2 weeks
    b. Full use of injured hand: 2-6 weeks
4. Surgery
    a. Indications
        - Inability to reduce a dislocation under closed conservative treatment
        - Open digital dislocation
        - Irreducible joint dislocations with extensor and/or flexor tendon involvement
        - Fractures associated with dislocations
    b. Surgical Options
        - Closed reduction under anesthesia
        - Closed reduction, internal fixation
        - Open reduction
        - Open reduction, internal fixation, with ligament or tendon repair
    c. Post-operative rehabilitation
        - Although this group may require extended periods of rehabilitation, generally required rehabilitation components approximates that of the nonoperative group
5. Estimated Duration of Care
    a. Usually requires 10-24 weeks after surgery
    b. Varies depending on severity of tissue damage, complication occurrence, etc.
6. Return to Work Status
    a. No use of injured hand for 3-6 weeks
    b. Full use of injured hand within 6-12 weeks

III. WRIST FRACTURES AND DISLOCATIONS

A. Background

Fractures and dislocations of the wrist are frequently missed emergent musculoskeletal injuries. The intricate anatomy of the carpal bones, along with multiple overlapping shadows on x-rays, make this type of injury difficult to diagnose. Many injuries, therefore, are missed on initial examination. Careful evaluation, therefore, is paramount in recognition of these injuries.

B. Diagnostic Criteria

1. Medical History

a. Mechanism of injury

- Direct blow to wrist or hand
- Fall onto wrist or hand
- Hypertension or hyperflexion injury

2. Physical Examination

a. Swelling, as well as tenderness, are localized to the location of the injury

b. Tenderness to the anatomic snuff box, consistent with scaphoid fracture

c. Swelling, with restricted range of motion, suggestive of serious ligamentous disruption

d. Potential scaphoid or carpal fracture, as well as ligament injury, should be ruled out prior to assigning diagnosis of wrist pain.

e. Difficulty with performance of wrist flexion and extension

f. Occasional numbness and/or dysesthesias, consistent with median and/or ulnar nerve involvement

When present, further nerve testing (see below) is critical.

3. Diagnostic Tests and Examination

a. X-rays: true, AP, lateral, and oblique views, in addition to scaphoid views (when clinically indicated)

b. CT or MRI scan indicated for detection of suspected nonunion

c. Arthrogram, fluoroscopic (CT and MRI arthrogram) may be indicated when physical examination indicates wrist instability

d. EMG/NCVS may be indicated to verify presence and of nerve involvement, if clinically suspected

C. Nonsurgical Treatment

1. Outpatient/nonoperative treatment

a. Treatment is specified and fracture-based

b. Variable, diagnosis-specific healing times

- Triquetral fractures: 4-6 weeks
- Scaphoid fractures: 3-6 *months*

2. Treatment Options

a. Neutral position wrist splint

b. Thumb spica splint/short arm cast

c. Thumb spica long arm cast

d. Wrist neutral cast

3. Estimated Duration of Care/Return to Work Status

a. Care duration usually from 6 weeks to 6 months

b. Use of injured hand: 6-12 weeks

D. Neurosurgical Rehabilitation
1. Begins after fracture/injury healed
2. Digital, hand and wrist exercises
3. Active and passive range of motion exercises
4. Grip strengthening exercises, as indicated
5. Activities of daily living and job task modifications

E. Surgical Treatment
1. Indicated for failure to heal with nonoperative measures
2. Treatment options
a. Open reduction, internal fixation of fracture
b. Open reduction and operative repair of ligamentous injury
c. Intercarpal fusion
d. Radiocarpal fusion
e. Wrist arthroscopy
f. Wrist arthroplasty

F. Surgical Rehabilitation
1. Digital, hand and/or wrist active and passive range of motion exercises
2. Grip strengthening exercises
3. Wrist splinting in extension

G. Estimated Care Duration/Return to Work
1. Usually from 3-6 months following surgery
2. No use of injured hand: 12-24 weeks

IV. TENDON INJURIES

A. Background

The flexor and extensor tendons of the digits lie superficially under the skin and, therefore, are commonly injured. Appropriate care at the point of initial treatment is imperative for a positive outcome. However, due largely to the complexity of the extensor and flexor tendon systems in the upper extremity, accurate diagnosis of injury is often problematic. For example, every hand laceration (regardless of the size) carries with it the potential for tendon tear(s). Anticipating a tendon tear, based on the location of the laceration, therefore, is paramount in the provision of appropriate care of these injuries.

B. Medical History
1. Open Tendon Injuries
a. Most are secondary to sharp objects that cause wounds to skin and soft tissue(s)
b. Hand position at time of injury determines location of tendon injury

c. Usually, patients cannot fully bend or extend the affected finger or hand, as well as noted alteration in function
d. Pain in affected digit
e. Numbness/dysesthesias suggestive of accompanying nerve injury

2. Closed Tendon Injuries
a. Complete extensor/flexor tendon rupture can occur without a visible wound
b. Spontaneous ruptures can occur secondary to other medical conditions

C. Physical Examination
1. Includes subtle evaluation of normal stance of the digits in both flexion and extension
2. Active motion tests indicate lack of motion in affected digit
3. Partial lacerations can be present with pain with resisted motion
4. Sensibility should be assessed via light touch, two-point discrimination, etc.

D. Diagnostic Tests and Examinations
1. Radiograph of digit
2. Sensibility tests

E. Outpatient, Nonsurgical Treatment (Closed Extensor Tendon Injuries)
1. Neutral position using intrinsic plus splint
2. Digital splint
3. Buddy taping

F. Nonsurgical Rehabilitation
1. Begins after tendon heals
2. Active and passive range of motion of digits, hand, and wrist
3. Grip strengthening exercises as appropriate

G. Surgical Treatment
1. Indications
a. All open flexor or extensor tendon injuries with open wounds and limited motion
b. Open injuries with pain with motion
c. All expectant tendon injuries (flexor/extensor)
d. Closed flexor tendon injuries
e. Failure to respond to nonoperative treatment and rehabilitation after appropriate time to heal (including active/passive range of motion digital exercises)

H. Estimated Duration of Care
1. Nonoperative treatment: 8-12 weeks after injury
2. Operative treatment: 3-6 *months* after injury

I. Return to Work Status
1. Nonoperative treatment: 6 weeks
2. Operative treatment: no use of hand for 3-6 weeks
3. Operative treatment: full use of injured hand in 6-12 weeks

V. DIGITAL NERVE INJURIES

A. Background

Most significant digital nerve injuries result in sensation loss distal to the injury level. Most are the result of lacerations that frequently also involve the flexor tendons. Contusions or crush injuries may disrupt nerve function without an actual physical disruption of the nerve.

B. Diagnostic Criteria

1. Medical History and Physical Examination
   a. History of trauma
   b. Laceration over the volar digital surface (palm for the common digital nerves)
   c. Absent sensibility in the distribution of the affected nerve

C. Diagnostic Tests

1. Light touch: diagnostic if deficit is in anatomic distribution consistent with the location of laceration
2. Two-point discrimination (Semmes-Weinstein)
3. Monofilament testing
4. Digital vibration
5. Sensory nerve conduction studies

D. Surgical Treatment

1. Laceration with probable nerve division: operative exploration and repair with magnification
   - Healthy nerve: end-to-end repair
   - Other: interposition nerve graft
   a. Immediate repair if suitable operative candidate
   b. Urgent repair if skin wound closed and repair delayed up to 7 days, then repaired primarily
   c. Delayed repair after 7 days if patient is unstable or graft needed
   d. After 7 days, neuroma at divided nerve ends just be resected, with additional nerve length required for closure without tension

2. Laceration With Equivocal Nerve Division

a. Exploratory surgery

- If patient at surgery for other injuries
- If wound does not need enlargement

b. Observation

- With closure of wound and reassessment in 1-3 days

3. No Laceration

a. Observe for functional return (Tinel's sign) or increase of sensibility

b. Explore if progression of Tinel's sign is not seen

E. Rehabilitation

1. Splint three weeks to maintain tension on the nerve repair, with elevation to minimize swelling

2. Range of motion exercise after 3 weeks, avoiding stretching or trauma to the nerve repair for additional 3 weeks

F. Duration of Care/Return to Work

1. Work/activities not requiring stretch or trauma to nerve repair, or sensibility to affected nerve distribution: 6-12 weeks

2. Work not requiring use of the injured digit: 6 weeks

3. Work requiring sensibility in the affected nerve distribution:

- Gross sensibility (1mm. / day, or 1 inch/month)
- Nerve regeneration beyond injury level as indicated by advancing Tinel's sign and return of sensibility
- Maximum sensibility return occurs at an approximate rate of time equal to twice that required for gross sensibility to return
  - Never returns to 100%
  - Range is zero to near 100% return
  - Maximal medical improvement at 6 months
  - If function is unsatisfactory, neuroma resection and nerve grafting may be appropriate

VI. DISTAL PHALANX/FINGER TIP INJURIES

A. Background

Injuries to the tips of digits are very common in industry, especially in the manufacturing and construction sectors. Injuries of this type include full thickness soft tissue injuries with soft tissue loss, compound fractures of the distal phalanx of an upper extremity, as well as nail bed injuries requiring repair. Injuries extending proximally to the distal interphalangeal (DIP) joint are considered elsewhere.

B. Medical History
   1. Usually result from crush type injury

C. Physical Examination and Diagnostic Testing
   1. X-rays of affected digit are usually sufficient

D. Outpatient Treatment: Nonoperative
   1. Most often provided in an emergency room setting
   2. Debridement and laceration(s) repair
   3. Fracture reduction
   4. Skin grafting (full/partial thickness)
   5. Local Flap
   6. Amputation

E. Outpatient Operative Treatment
   1. May require overnight stay
   2. Fixation of complex or intra-articular fractures
   3. Pedicle flaps

F. Inpatient Operative Treatment
   1. Sensory neurovascular island flap (rare)
   2. Replantation

G. Rehabilitation and Return to Work
   1. Elevation and protection of fracture(s)
   2. Gradual mobilization and desensitization
   3. Estimated duration of care:
      - Return to light, non-forceful, non-dexterous, nondiscriminating use of injured digit: 3-6 weeks
      - Return to forceful use of injured digit(s): 6-12 weeks
      - Grafts/flaps with decreased sensibility
   4. No use of injured hand at work: 2-6 weeks
   5. MMI at 3-6 months (longer in older patients)

VII. ULNAR COLLATERAL LIGAMENT INJURY (THUMB): SPRAIN/TEAR

A. Background

Injuries to the ulnar collateral ligament (UCL) of the thumb occur in a variety of ways, including a fall from a height, resulting in a radial deviation force to the metacarpophalangeal (MCP) joint, placing the ligament under tension. Partial or complete tear may occur, as well as avulsion of the ligament from its bony attachment (with or without fracture). Skiing and contact sports are frequently associated with this type of injury.

B. Medical History and Physical Examination
   1. Pain, swelling, and weakness are frequent complaints

2. History of a blow or fall involving the thumb (MCP joint)
3. Palpable lump at site of avulsed ligament
4. Ulnar stress instability should be documented

C. Diagnostic Tests and Examination
1. X-rays of the injured thumb are sufficient
2. MRI may be appropriate if exam equivocal

D. Outpatient Treatment
1. Nonoperative
   a. Indications
      - Incomplete ligamentous injury; not disrupted either within its substance, nor at its attachments
      - Nondisplaced fracture at the attachment of the ulnar collateral ligament
   b. Treatment options
      - Immobilization for 4-6 weeks
      - Elevation and range of motion of all uninvolved joints
      - Home health care unnecessary
   c. Rehabilitation
      - Active range of motion after cast/splint removal
      - Begin rehabilitation after exam documents healing
2. Ambulatory (outpatient) Surgery
   a. Indications
      - Significantly displaced or avulsed fracture with ligament attachment
      - Complete ligamentous disruption
      - Stenner's lesion (displacement of the UCL superficial to the adductor tendon)
      - Joint instability or subluxation
   b. Treatment options
      - Exploration with ligament reapproximation, or fracture reduction and/or fixation, with attached ligament, followed by immobilization for 4-8 weeks
      - Primary or secondary reconstruction, including joint subluxation
      - Postoperative elevation and range of motion of all uninvolved joints
   c. Rehabilitation/Return to Work
      - Operative treatment: no use of injured hand for 4-6 weeks
      - Operative treatment: full use of injured hand within 8-12 weeks
      - Nonoperative treatment: no use for 4-6 weeks

- Nonoperative treatment: full use within 8-12 weeks

VIII. DIGITAL STENOSING TENOSYNOVITIS (TRIGGER THUMB AND TRIGGER FINGER)

A. Background

Arising from irritation and inflammation of the flexor tenosynovium at the A-1 pulley of the digital flexor tendon sheath, this injury can be due to trauma during a single event, or secondary to repetitive "microtrauma" (repetitive motion), or an inflammatory process. It is frequently seen in conjunction with other upper extremity tendonopathies or inflammatory conditions, such as carpal tunnel syndrome or DeQuervain's tenosynovitis.

B. Medical History and Physical Examination

1. Most often caused by repetitive and/or forceful gripping, or use of vibrational tools
2. Gradual onset of pain and limitation of full digital flexion, with "triggering" or clicking of the digit
3. Can follow a single episode of pain accompanying forceful gripping or digit hyperextension
4. Exam shows point-specific pain/tenderness at the A-1 pulley (distal palmar crease) with/without crepitance with active motion
5. Passive arc of motion exceeds active arc
6. Palpable, sometimes audible click with flexion/extension
7. Finger swelling; morning stiffness/triggering, often diminishing during the day
8. Retinacular (ganglion) cysts may be present

C. Diagnostic Tests and Examinations

1. Hand x-rays, primarily to rule out associated arthritis or bony lesions
2. Laboratory studies to rule out/in connective tissue disease, if clinically suspected
3. MRI only if cyst or mass is clinically suspected

D. Nonoperative Treatment

1. Indications
    - Pain
    - Triggering
    - Functional limitations/disability
2. Treatment options
    - Nonsteroidal anti-inflammatory medications (NSAIDS)
    - Intermittent splinting
    - Tendon sheath steroid injections
    - Activity modification

E. Operative Treatment

1. Outpatient surgery indications
    - Lack of response to nonoperative measures after 4-10 weeks, dependent on symptom complex
2. Options
    - Release of the A-1 pulley, partial excision and partial release of A-2 pulley (proximal margin) under local, regional, or general anesthesia
    - Limited tenosynovectomy and tenolysis of flexor tendon(s)
3. Rehabilitation
    a. Progressive active range of motion, strengthening
    b. Splinting
    c. Hand therapy may be useful for scar tenderness and/or post surgical stiffness
    d. In the case of long term symptoms, postoperative splinting may be indicated to regain full extension
4. Duration of Care
    a. Nonoperative treatment: 2-4 weeks, depending on symptom complex
    b. Operative treatment: 4-8 weeks, may need postoperative splinting
5. Return to Work
    a. Nonoperative: 2-4 weeks
    b. Operative
        - No use of injured finger: 2-4 weeks
        - Use of injured finger: 4-8 weeks

PROTOCOL HISTORY:
Passed: 5/24/1994
Amended: 4/27/2010

PHARMACEUTICAL PROTOCOLS

The Medical Advisory Board establishes this protocol with the intent to:

1. Reduce the numbers of GI bleeds and other complications caused by prescriptions;
2. Reduce the numbers of injured workers being addicted to pain medications;
3. Reduce the disposal of drugs that are ineffective or not tolerated by the worker.

The protocol is established as follows:

1. Generics should be used as the first choice;
2. If a generic equivalent exists, but the attending physician feels that the brand name is needed, the physician must seek preauthorization from the insurer before using that drug;
3. No over-the-counter medications will be paid for unless prescribed by the attending physician;
4. Workers not declared permanently injured may not receive more than a thirty (30) day prescription at any one time. No more than one (1) refill will be allowed without a new prescription form;
5. At the end of three months time, if additional medication is needed, the attending physician must make a clear statement to the insurer substantiating the need for additional medication being prescribed;
6. Any new prescription (a drug not previously shown effective and/or tolerated by an injured worker) must include a 10 day trial period on the initial prescription;
7. Permanently injured workers requiring ongoing medication should use mail away pharmacy designated by their workers' compensation insurance company for a ninety (90) day prescription, if this service is more cost effective.

PROTOCOL HISTORY
Passed: 3/21/1995
Amended: 1/9/2001

CONTACT DERMATITIS PROTOCOL

. Contact dermatitis is a broad term used to describe various abnormal reactions of the skin to the external environment. Contact dermatitis is of two types – allergic and irritant. Allergic contact dermatitis represents an immunologic response of the skin to an external allergen. Irritant refers to a reaction to a chemical substance seen in certain susceptible individuals at lower concentration than would be expected in "normal" people. Either condition can be induced by or aggravated by photic exposure.

I. DIAGNOSIS: Appropriate evaluation and diagnostic measures include the following:

a. Extensive and comprehensive history and complete examination of the skin is necessary to diagnose the nature and cause of the patient's condition.

b. Skin biopsy may be necessary if the diagnosis is unclear or if there is a question of an underlying (coincident) skin disease.

c. Bacterial and fungal cultures and limited blood evaluation may also be required.

d. Patch testing is frequently necessary to identify the offending agent.

e. On rare occasion, intradermal scratch tests to the suspected allergens may be necessary, particularly in dealing with an urticarial form of dermatitis.

II. THERAPY:

a. Removal of the patient from contact with the suspected allergen is necessary. The acute process generally persists for a period of two to four weeks.

b. Local therapy to include wet dressings, steroids, and/or emollient creams, tars, etc., are usually required.

c. Systemic therapy may be required as well (antibiotics, antifungals, steroids, etc.). A chronic disorder may require use of tar, tar baths, or local PUVA.

d. If the process persists, referral for dermatologic specialist care should be made after one month of therapeutic treatment.

III. PROGNOSIS:

a. Assuming that the patient is removed from the offending agent, the acute contact reaction usually resolves with appropriate treatment over a two to four week period, depending upon the severity and location of the condition. A chronic dermatitis may require treatment over a three to six month interval, particularly if an underlying skin disease is contributing to the problem. On rare occasion, the condition is persistent and non-responsive to the usual treatments.

IV. DISPENSATION:

a. <u>With contact allergen</u> – If the patient is found to be allergic to a specific material (at work) he-she cannot return to work requiring further contact with a specific

agent. However, the previous difficulty does not preclude work in a similar field where the specific allergen is not present.

b. With contact irritant – The patient may be able to return to his-her present job with exposure to a more dilute concentration of the offending substance or with a more protected situation (gloves, creams, hardening, etc.)

PROTOCOL HISTORY:
Passed: 3/21/1995

PROTOCOL CONCERNS REGARDING PERFORMANCE OF RADIOGRAPHIC EVALUATION IN WORKERS' COMPENSATION CASES

1. Repetition of X-rays:

A repeat examination for fracture would be considered reasonable in 7-10 days of initial radiographic examination, assuming that initial films fail to demonstrate fracture and that symptoms persisted, which suggested the possibility of occult fracture.

Alternatively, bone scan evaluation, magnetic resonance imaging, or CT imaging of the symptomatic bone could be done, which would preclude the necessity of repeating x-ray examination.

Repeat examination of a known fracture might be considered in order to assess fracture healing, angulation, or displacement which might have occurred since the initial fracture.

Repetition of radiographic examinations would not be considered within reason if done for convenience (either patient or physician convenience) or because of failure to obtain adequate history revealing that radiographs had been obtained.

2. Comparison X-Rays:

Comparison x-rays would be considered reasonable if there is, on initial radiographic examination of the affected area, a finding which may or may not represent a variation of normal.

The observed finding for which comparison views are deemed necessary must be well described in the initial report and given as a reason for obtaining comparison x-rays.

3. Contiguous Parts:

Radiographic examination for workers' compensation injury should be preceded by examination of physician, chiropractor or nurse practitioner and the examination specified by that examiner, and that examination should be limited to only those areas which are symptomatic or felt to be significant in the evaluation of patient injury.

For example: If injury has occurred to the metacarpal region of the hand, only a right hand radiographic evaluation would be considered as necessary, and right hand radiographs would be requested by the medical personnel. Interpretation and billing of right hand and right wrist radiographs, in this instance, would be considered unnecessary, as the site of suspected injury is the hand and not the wrist, and considering that the wrist is usually included in hand radiographs.

An additional example would consist of injury to the right thigh. X-rays requested for evaluation of the right femur should include both the knee and hip, but billing for right hip, right femur, and right knee would be considered improper, as only the right femur x-ray examination was requested. Continuing this example, if there was concern of right femur fracture and abnormality of the right hip, then both the right femur and right hip radiographs should be obtained, and these examinations would be considered medically necessary.

4. Regarding Health Care Professionals or Extenders
Examination of Patient Prior to X-ray:

It is felt that a physical examination and a history would be necessary before a proper radiographic evaluation could be requested and performed.

With regard to protocols for specific injuries:

a. Low back musculoligamentous injury –
Appropriate diagnostic tests –
If the acute injury involves trauma, radiographic examination following the traumatic event would be considered appropriate.
If the injury is not precipitated by a single traumatic event but of chronic origin, x-ray examination should be considered if pain persists for more than four weeks. If pain persists for a period of greater than four weeks, with negative plain radiograph examination, magnetic resonance imaging should be considered for further evaluation, as this imaging modality will evaluate both disc and bone.
Alternatively, CT examination will provide evaluation of disc and, to some degree, bone with nuclear medicine bone scan imaging being limited to the evaluation of metabolically active bone lesions.

b. Neck, muscular injury –
If the injury is not precipitated by a single traumatic event but of chronic origin, x-ray examination should be considered if pain persists for more than four weeks. If pain persists for a period of greater than four weeks, with negative plain radiograph examination, magnetic resonance imaging should be considered for further evaluation, as this imaging modality will evaluate both disc and bone.
Alternatively, CT examination will provide evaluation of disc and, to some degree, bone with nuclear medicine bone scan imaging being limited to the evaluation of metabolically active bone lesions.

c. Acute hand injuries –
Radiographic evaluation immediately following hand injury. Follow-up radiographic evaluation in 7-10 days, if pain persists, suggesting fracture with initial plain radiographs failing to demonstrate fracture.
With penetrating injuries that might result in tendon or ligament damage, magnetic resonance imaging might be helpful in the assessment of fracture extent.

d. Injuries to the foot –

Radiographic evaluation immediately following foot injury. Follow-up radiographic evaluation in 7-10 days, if pain persists, suggesting fracture with initial plain radiographs failing to demonstrate fracture.

With penetrating injuries that might result in tendon or ligament damage, magnetic resonance imaging might be helpful in the assessment of fracture extent.

e. Herniated lumbar disc –

See State of Rhode Island Workers' Compensation Court Medical Advisory Board Protocols for Herniated Lumbar Disc.

f. Herniated cervical disc –

See State of Rhode Island Workers' Compensation Court Medical Advisory Board Protocols for Herniated Cervical Disc.

g. Acute injuries to the shoulder –

See State of Rhode Island Workers' Compensation Court Medical Advisory Board Protocols for Acute Injuries to the Shoulder.

h. Acute injuries to the knee –

See State of Rhode Island Workers' Compensation Court Medical Advisory Board Protocols for Acute Injuries to the Knee.

PROTOCOL HISTORY:
Passed: 6/18/1996

CUBITAL TUNNEL SYNDROME

I. Background

The ulnar nerve originates from the C8 and T1 spinal nerve roots and is the terminal branch of the medial cord of the brachial plexus. The ulnar nerve travels posterior to the medial epicondyle of the humerus at the elbow and enters the cubital tunnel. After exiting the cubital tunnel, the ulnar nerve passes between the humeral and ulnar heads of the flexor carpi ulnaris muscle and continues distally to innervate the intrinsic hand musculature.

Ulnar nerve compression occurs most commonly at the elbow. At the elbow, ulnar nerve compression has been reported at five sites: the arcade of Struthers, medial intermuscular septum, medial epicondyle/post-condylar groove, cubital tunnel and deep flexor pronator aponeurosis. The most common site of entrapment is at the cubital tunnel.

Ulnar nerve compression at the elbow may have multiple causes, including:

A. chronic compression
B. local edema or inflammation
C. space-occupying lesion such as a tumor or bone spur
D. repetitive elbow flexion and extension
E. prolonged flexion of the elbow, as an habitual sleeping in the fetal position
F. in association with a metabolic disorder including diabetes mellitus.

Ulnar neuropathy at the elbow can occur at any demographic but is generally seen between 25 and 45 years of age and occurs slightly more often in women than in men.

II. Diagnostic Criteria

A. Pertinent History and Physical Findings

Patients often present with intermittent paresthesias, numbness and/or tingling in the small finger and ulnar half of the ring finger (i.e. ulnar nerve distribution). These symptoms may be more prominent after prolonged periods of elbow flexion, such as sleeping in the “fetal position”, sleeping with the arm tucked under the pillow or head, or with repetitive elbow flexion-extension activities. Subjects may progress to develop atrophy or weakness of the intrinsic hand musculature manifested as hand weakness or impaired dexterity.

Several provocative exam techniques have been validated to aid in the diagnosis of these patients. The elbow flexion test, in which the elbow is held in maximal flexion for one minute, may reproduce symptoms. Tinel’s test, in which the post-condylar groove is tapped by the examiner, may also reproduce symptoms. Patients may develop weak finger abduction secondary to interosseus muscle atrophy; weak small finger adduction may be noted (Wartenberg sign) and some patients may note that the

small finger gets caught when placing the hand inside of a pocket. Patients may also be unable to grasp with a lateral pinch grip and instead compensate with a fingertip grip (Froment sign). Severe clawing of the ring and small fingers (i.e. flexion of the interphalangeal joints with extension of the metacarpophalangeal joints) may be noted secondary to interosseus and lumbrical muscle atrophy.

Other potential causes of medial hand numbness or weakness include nerve root compression at the cervical spine, brachial plexopathy, thoracic outlet syndrome and/or ulnar nerve compression at the wrist (Shea neuropathy, including entrapment of the ulnar nerve at Guyon's canal).

B. Appropriate Diagnostic Tests and Examinations

1. Electromyographic and nerve conduction studies
2. Radiographs of the elbow
3. Magnetic resonance imaging of the elbow
4. Clinical laboratory tests to assess for potential causes of peripheral neuropathy

C. Supporting Evidence

1. Electromyographic and nerve conduction studies are particularly helpful in localizing the site of nerve compression, quantifying the degree of demyelination, evaluating patients with atypical symptoms, and/or assessing for alternative diagnoses. These studies may also aid in determining the prognosis for nerve and muscle recovery. Performing these studies with the elbow in flexion may increase sensitivity. Elbow radiographs may be helpful to identify osteophytes or bone fragments in patients with arthritis or prior trauma. MRI may be helpful if a space-occupying lesion is suspected, but otherwise is not routinely used. Clinical laboratory tests may help assess for potential causes of peripheral neuropathy including such as diabetes, pernicious anemia, chronic alcoholism or hypothyroidism.

III. Treatment

A. Outpatient Treatment

1. Conservative Management

i. **Indications**

1. In the absence of intrinsic muscle atrophy, four to eight weeks of conservative treatment should be attempted.

ii. **Treatment options**

1. Activity modification to avoid elbow flexion and/or reduce cubital tunnel compression, such as use of an elbow extension splint, adjusting posture at work to reduce elbow flexion, using a hands-free headset for the phone and/or padding the elbow.
2. Non-steroidal anti-inflammatory drugs may be used for analgesia.

iii. **Rehabilitation**

Exercise therapy may be utilized to improve strength, dexterity and hand function.

iv. **Supporting Evidence**

Most cases of mild or moderate cubital tunnel syndrome will improve and/or resolve with conservative management.

2. Ambulatory Surgery

i. **Indications**

1. Failure to respond to conservative treatment
2. Intrinsic muscle atrophy or weakness
3. Severe, persistent symptoms

ii. **Treatment Options –** requiring referral to an orthopedic surgeon, neurosurgeon or hand surgeon

1. Ulnar nerve release at the cubital tunnel (i.e. in situ decompression)
2. Ulnar nerve release at the cubital tunnel with subcutaneous, intramuscular or submuscular transposition of the ulnar nerve
3. Ulnar nerve release at the cubital tunnel with medial epicondylectomy
4. Endoscopic ulnar nerve release at the cubital tunnel

iii. **Rehabilitation**

Post-operative rehabilitation is often directed by the surgeon.

iv. **Supporting Evidence**

Given the similarity in outcomes reported between the surgical treatments for cubital tunnel syndrome, the choice of procedure is based largely on surgeon experience, as well as underlying etiology. Two recent meta-analyses have demonstrated similar outcomes between in situ decompression and anterior transposition (subcutaneous, intramuscular or submuscular) of the ulnar nerve with a 65% to 96% patient satisfaction rate. Patients with recurrent disease following in situ decompression may benefit from subsequent anterior transposition of the ulnar nerve. However, revision surgery outcomes are often disappointing.

B. Estimated Duration of Care

1. Non-operative treatment – maximum medical improvement should be achieved by eight weeks after diagnosis.
2. Operative treatment – eight to twelve weeks post-operatively.

PROTOCOL HISTORY:
Passed: 6/18/1996
Amended: 3/22/2011

RADIAL TUNNEL SYNDROME

I. BACKGROUND

Radial Tunnel Syndrome involves compression of the radial nerve in the proximal forearm. It is also sometimes known colloquially as "persistent tennis elbow". In the region of the proximal forearm, the radial nerve splits into the posterior interosseous nerve branch (the main trunk) and the sensory branch of the radial nerve (the minor trunk) in the proximal forearm. Compression can occur either before or after this split off of the sensory branch of the radial nerve has occurred. Multiple sites of potential entrapment of the radial nerve include: the origin of the extensor carpi radialis brevis origin; the fibrous bands overlying the radial head; the radial recurrent arterial fan; and the arcades of Frohse, at the entrance to the supinator muscle. The condition has multiple causes, including: space-occupying lesions, such as tumors; local edema or inflammation; overuse of the hand and wrist through repetitive movements; blunt trauma to the proximal forearm with secondary bleeding; and idiopathic onset. The condition can occur at any age, but is generally seen in younger individuals.

This is a rare condition, estimated to be 30-100 fold less common than carpal tunnel syndrome. As a result, it is infrequently encountered by most practitioners. With failure to respond to non-operative treatment, the patient should be referred to a surgeon who has had experience in the treatment of radial tunnel syndrome.

II. DIAGNOSTIC CRITERIA

A. Pertinent Historical and Physical Findings

Patients generally complain of a deep-seated aching or tightness in the proximal forearm, over the mobile wad of Henry muscle mass. Patients can occasionally experience paresthesias and numbness and tingling in the distribution of the sensory branch of the radial nerve (the dorsal first web space of the hand including the back of the thumb and back of index finger).

Patients frequently have symptoms after significant repetitive or power grip use of the involved upper extremity. Burning or pain can also be associated with the condition, and should be related to the proximal forearm, specifically over the mobile wad of Henry muscle mass. Strength in the hand is generally not reduced. Patients can have pain with resisted wrist extension or resisted extension of the middle finger, with pain being noted in the proximal forearm during these maneuvers. A Tinel's sign is rarely seen over the nerve itself.

Patients most commonly have a positive radial tunnel compression test (involving the examiner rolling the fingers over the radial nerve region in the proximal forearm, eliciting pain and tenderness in the area palpated). Occasionally, distal radiation of symptoms along the sensory branch of the radial nerve distribution will occur during this test.

B. Appropriate Diagnostic Tests and Examinations

1. Radiographs of the forearm
2. Electromyogram and nerve conduction studies.
3. Trial injection of Xylocaine around the radial nerve to see if symptoms resolve.
4. MRI scan of the forearm

C. Supporting Evidence

EMG/nerve conduction tests can be helpful if positive, but are most frequently negative in this particular condition, and can be difficult to obtain. The nerve conduction velocity component is rarely positive, and diagnosis is generally made on the electromyographic component, showing changes in the muscle innervated by the posterior interosseous nerve.

MRI may show denervation, edema, or atrophy in muscles innervated by the posterior interosseous nerve, but sensitivity is approximately 50% for these findings.

III. TREATMENT

A. Outpatient Treatment

1. Nonoperative treatment – treatment time is generally limited to three to six weeks, provided all appropriate conservative measures have been assessed.
    a. Indications
        1) Mild to moderate symptoms
        2) Persistent symptoms after significant repetitive activities (supination of the forearm with/without wrist extension) of the affected upper extremity
    b. Treatment Options
        1) Neutral position wrist splint for periodic daytime use
        2) Steroid injection
        3) Nonsteroidal anti-inflammatory medications
        4) Activity modification
    c. Rehabilitation
        1) Modification of activities of daily living and/or job tasks
        2) Ultrasound over the mobile wad of Henry
2. Ambulatory Surgery
    a. Indications
        1) Failure to respond to nonoperative treatment
        2) Loss of wrist or finger extensors, or significant weakness in this distribution
        3) Progressive or unchanged symptoms
    b. Treatment Options
        1) Neurolysis of the radial and posterior interosseous nerves under regional or general anesthesia

c. Rehabilitation

1) Range of motion and strengthening exercises of the fingers, wrist, and elbow

B. Estimated Duration of Care

1. Nonoperative treatment – maximum medical improvement
2. Operative treatment – six to eight weeks following surgery

PROTOCOL HISTORY:
Passed: 6/18/1996
Amended: 1/31/2012

SPINAL COLUMN STIMULATORS

I. BACKGROUND

The Spinal Column Stimulator (SCS) is a device that allows for electrical stimulation of the dorsal aspect of the spinal cord in an effort to relieve pain. Stimulation in this area interferes with the conduction of pain impulses through adjacent sensory pathways. The technique does not alter the underlying pathological process. However, in carefully selective patients with persistent, intractable pain of nerve origin, roughly half realize pain relief, thereby decreasing the need for analgesic medication and, at times, obviating the need for further procedures.

II. PROCEDURE

The SCS system consists of stimulation lead(s) (which deliver(s) electrical stimulation to the spinal cord); an extension wire (which conducts electrical pulses from the power source to the lead); and a power source (which generates electrical pulses). One or more epidural electrodes are inserted into the spinal canal over the dorsal aspect of the spinal cord. The locus of the electrode placement – cervical, thoracic or lumbar – is dependent on the location of the patient's pain. The electrode is usually placed by a percutaneous technique but, on occasion (usually in a post-surgical patient), surgical placement (laminotomy) is required.

SCS is a reversible therapy that can be tested for pain relief effectiveness before the patient receives a permanent implant. The procedure is performed in two stages. First, during the trial stage, the electrode is implanted, with a wire located outside of the body. The trial usually lasts from three to five days and, if successful in relieving pain, permanent placement of the SCS is performed. The procedures are generally safe but, on occasion, local or epidural infection occurs.

III. APPROPRIATE CONDITIONS FOR SCS PLACEMENT

A. In approximately 75% of cases, the "failed back syndrome", with persistent, intractable disabling pain of neural origin (perineural fibrosis, arachnoiditis, etc.) despite medical, surgical, or other appropriate therapies.

B. In five to ten percent of cases, chronic and intractable pain following spinal cord surgery.

C. The remainder of cases consists of nerve disorders/injuries, such as chronic regional pain syndrome (CRPS, formerly known as reflex sympathetic dystrophy), post-amputation (phantom limb) pain, and post-herpetic neuralgia; wherein there has been a failure to respond to generally acceptable alternative therapeutic modalities.

IV. SCS PATIENT SELECTION CRITERIA

A. SCS stimulation shall be provided after an assessment by a multidisciplinary team experienced in chronic pain assessment and management of people with spinal cord stimulation devices, including experience in the provision of ongoing monitoring and support of the assessed patient. At a minimum, implantation treatment is limited to physicians with training and experience in the field of pain management, as well as in SCS use.

B. SCS implantation is restricted to those patients with an organic basis for neurogenic pain, for whom conventional medical, surgical or other therapeutic as well as behavioral modalities and therapies have been unsuccessful in providing adequate pain relief. The patient's condition must have been previously evaluated by two prior consultants (neurosurgeon, neurologist, physiatrist, or orthopedic surgeon).

C. Patients must have been evaluated by a psychiatrist/psychologist with specific experience in the evaluation of chronic pain problems.

D. A satisfactory response to a trial of SCS, with the temporary insertion of an electrode, is required prior to permanent SCS placement.

V. SCS IMPLANTATION CONTRAINDICATIONS

A. Patients with significant drug-seeking behavior, including substantial drug and alcohol abuse.

B. Patients with substantial psychological instability, psychosis, etc., need to be carefully evaluated and, if appropriate, excluded.

C. Patients in whom the possibility of secondary gain (compensation, litigation, etc.) plays a significant role, need to be carefully evaluated and, if appropriate, excluded.

D. Patients requiring chronic anticoagulant treatment.

PROTOCOL HISTORY:
Passed: 6/9/1998
Amended: 4/27/2010

ANTERIOR CRUCIATE RUPTURES

I. Acute Ruptures of the Anterior Cruciate Ligament

There is a history of direct trauma to the knee of the patient or of an injury involving torsional or angular forces.

The Protocol for the management of acute injuries to the knee notes two separate sets of circumstances which require orthopaedic referral and, namely, these are "clinical evidence of gross ligamentous instability" and "the initial presence of a tense hemarthrosis or the development of a recurrent hemarthrosis." These are diagnostic features of acute ruptures of the anterior cruciate ligament.

A. Diagnostic Tests

1. Plain x-rays to rule out associated fractures.
2. MRI – to confirm the diagnosis and/or to determine associated meniscal or ligamentous pathology.
3. Diagnostic/Therapeutic arthroscopy – to confirm the diagnosis and/or to provide initial or definitive treatment.

B. Outpatient Nonoperative Treatment

1. Aspirate knee
2. Analgesics
3. Compression dressing, ice application, immobilizer splint
4. Partial to full weight-bearing as tolerated
5. Physical therapy – initially a period of range of motion exercises followed by a progressive resistive exercise program
6. Question long-term bracing

Duration of this treatment program is 4 to 6 months

Probable outcome – clinical recovery with residual permanent partial impairment of function which may be mild (3%, 7%), moderate (7%, 17%), or severe (10%, 25%)

C. Outpatient Operative Treatment

1. One to four as above with an operative arthroscopy and debridement followed by five and six

Duration of treatment – 6-month minimum

Probably outcome – probably clinical recovery with residual impairment which may be mild (3%, 7%), moderate (7%, 17%) or severe (10%, 25%)

D. Inpatient Operative Treatment

1. Treatment measures as above followed by an open arthrotomy or arthroscopy with reconstruction of the anterior cruciate ligament

2. Surgical procedure followed by a period of total and then partial immobilization followed by a rehabilitative physical therapy program

3 Duration of treatment – 6-month minimum from the date of the surgical procedure

Anticipated outcome – clinical recovery with residual permanent partial impairment which may be mild (3%, 7%), or moderate (7%, 17%), or severe (10%, 25%).

II. Chronic Rupture of the Anterior Cruciate Ligament

Clinical features include a history of remote injury from which full recovery never occurred for which surgical treatment was either not done or was not successful. History of recurrent effusions and/or demonstrable instability with likelihood of secondary traumatic arthritic changes.

Nonoperative and operative options similar to those outlined for acute ruptures.

PROTOCOL HISTORY:
Passed: 6/9/1998
Amended: 3/22/2011

HEARING LOSS PROTOCOL

I. INTRODUCTION

Hearing loss related to injury sustained in the workplace is of two general types:

1) Acuity hearing loss related to a single event – usually trauma (ex: in association with a basal skull fracture) or by other mechanism.

2) Occupational hearing disorder, generally related to chronic exposure to excessive noise in the workplace, resulting in nerve(s) injury. This condition is usually bilateral and is almost always less than total. Occupational hearing loss is generally a loss in the 4,000-6,000 Hz range; however, it can, at times, affect the lower frequencies.

II. DETERMINATION OF THE EXTENT OF AND THE CAUSE(S) OF HEARING LOSS FOR THE PURPOSE OF COMPENSATION FOR THE INJURY(IES) SUSTAINED

1) The patient will be examined by a Board Certified Otolaryngologist to determine the cause(s) of the hearing loss and the extent of that loss. The physician will determine if hearing loss has occurred as well as the extent of the loss in each ear. The physician will determine the relationship of the hearing loss to the workplace injury and will determine, if possible, the coexistence of other processes that may have antedated the injury(ies) in the workplace.

2) An Audiometric Study will be performed after maximum rehabilitation has been achieved and when the impairment is judged to be stable (neither improvement nor progression). Audiometric Testing for the purpose of determining the degree of hearing impairment will not be performed before 4 to 6 weeks following acoustic injury.

3) Testing will be performed without the use of prosthetic devices (Hearing Aids).

4) Audiometric Testing will be performed by a Certified Audiologist or Board Certified Otolaryngologist. Decibels of hearing loss will be determined (for each ear) as frequencies (measured in cycles/sec-Hz) of 500, 1,000, 2,000, 3,000, 4,000, and 6,000 Hz.

III. HEARING LOSS AT A LEVEL 3,000 Hz. OR LESS

a) Evaluation of Monaural Hearing Impairment: If the average of the hearing levels at 500, 1,000, 2,000 and 3,000 Hz. is 25 decibels or less, according to ANSI Standards, no impairment is considered to exist in the ability to hear everyday sounds under everyday listening conditions (See Table I).

At the other extreme, if the average of the hearing levels at 500, 1,000, 2,000 and 3,000 Hz is over 91.7 decibels, the impairment of hearing everyday speech is considered to be "total" – that is 100%. Variable degress of monaural hearing loss will be determined by computation (see Table I – in JAMA – "Guides to the Evaluation of Permanent Impairment"). **

b) Evaluation of Binaural Hearing Impairment: The evaluation of Binaural Hearing Impairment in adults is also derived from the pure tone audiogram and is always based on the function of both ears.

Binaural impairment is determined by the following formula (See "Guides"). Percent of hearing impairment equals five times the percent of hearing impairment in the better ear "+" percent of hearing impairment in the poorer ear divided by six (See Table 2 of the "Guides"). To convert binaural hearing impairment to impairment of the whole person, one would utilize Table 3 of the "Guides".

IV. HEARING LOSS AT A LEVEL GREATER THAN 3,000 Hz

Hearing loss at a level greater than 3,000 Hz generally does not affect the workers' ability to function in the workplace (speech, telephone, etc.). Therefore, hearing loss at this level is not addressed in the AMA Guides to the Evaluation of Permanent Impairment. These losses should be classified by a Board Certified Otolaryngologist or Certified Audiologist as mild, moderate, severe or profound.

** Information concerning the mechanism of determination of extent of hearing loss in relationship to workplace injury has been derived from information provided by the JAMA Guides to the Evaluation of Permanent Impairment of Hearing (Pages 922-925 in section labeled Ear, Nose, and Throat and related structures).

PROTOCOL HISTORY:
Passed: 6/29/2000

INITIAL MEDICAL CASE MANAGEMENT ASSESSMENT PROTOCOL GUIDELINES

The purpose of medical case management is to provide a systematic approach for identifying and coordinating quality medical care. While advocating for the injured worker, the medical case manager will conduct an assessment and will work as a liaison in planning, implementing, and evaluating on-going medical care as recommended by the treatment team. The ultimate goal of medical case management is to facilitate maximum medical recovery.

1. An Initial Medical Case Management Assessment must be provided by a Qualified Rehabilitation Counselor (QRC) or Qualified Rehabilitation Counselor Intern (QRCI) as certified by the RI Department of Labor and Training.
2. Prior to the assessment, the medical case manager should review all available medical records and clarify the purpose of the referral with the referral source.
3. The initial interview will be conducted at a mutually agreeable location.
4. The medical case management assessment should include, but not be limited to, the following areas:
   - A. Statement of purpose for the assessment.
   - B. Diagnosis and reference to the average length of disability per the Presley Reed Disability Advisor or another nationally recognized disability guide.
   - C. Summary of medical providers and medical treatment to date.
   - D. Client's present medical status including history of current illness or injury, relevant past medical history, description of functional limitations and abilities and current treatment plan as outlined by the treating physician.
   - E. Client's social, educational and vocational history.
   - F. Review of client's job description and potential availability of transitional duty through contact with the employer.
   - G. Identify assets and/or limitations for return to work.
   - H. Recommendations for medical management goals to facilitate the treatment plan and timely return to work.
5. The Initial Medical Case Management Assessment will be submitted to the referral source within two (2) weeks of the initial interview.

PROTOCOL HISTORY:
Passed: 5/29/2000

INITIAL VOCATIONAL ASSESSMENT PROTOCOL GUIDELINES

The purpose of the Initial Vocational Assessment protocol is to establish standard practices for a vocational assessment through the application of consistent procedures including the hierarchy of vocational rehabilitation as defined in Appendix A. The goal of a vocational assessment is to objectively measure an injured worker's employability to identify realistic return to work opportunities and to develop appropriate vocational recommendations based on the individual's functional status, education, and vocational background and transferable skills. Progression in the hierarchy of vocational rehabilitation is a sequential process based on the injured worker's functional status, transferable skills, and established average weekly wage. It is presumed that each level of the hierarchy will be addressed when establishing vocational recommendations.

1. An Initial Vocational Assessment must be provided by a Qualified Rehabilitation Counselor (QRC) or Qualified Rehabilitation Counselor Intern (QRCI) as certified by the RI Department of Labor and Training per Section 28-33-41(h) of the Rhode Island Workers' Compensation Act.
2. The initial interview may be conducted at a mutually agreeable meeting place.
3. The referral source will provide claimant-identifying data, medical records, including functional capacities, if available, as they pertain to the work-related injury, purpose of referral and special instructions, if any.
4. During the initial interview, the rehabilitation counselor should gather all relevant information to include, but not be limited to; current medical status, educational history, specialized training, military experience, vocational history, including job duties and wages, interests, and hobbies. The hierarchy of vocational rehabilitation will be explained to the injured worker at the time of the initial interview. One meeting with the claimant will be allowed to complete the Initial Vocational Assessment.
5. A Transferable Skills Analysis should be completed provided that defined functional capacities are identified in the medical records and a return to work with the employer, to the original job (with or without modifications) has been ruled out. The Transferable Skills Analysis will be based on the following U.S. Department of Labor publications: D.O.T. (Dictionary of Occupational Titles), C.O.J. (Classification of Jobs), GOE (Guide for Occupational Exploration), SOC (Selected Characteristics of Occupations defined in the dictionary of Occupational Titles) and the O*NET. Software programs based on these publications/references will be considered acceptable resources for completing the analysis.
6. Testing is not considered part of the Initial Vocational Assessment, but may be included as a recommendation.
7. The initial Vocational Assessment Report will address the following:
    a. Purpose of the referral.
    b. Brief summary of claimant's medical history and current status, description of functional limitations and abilities, and any pending medical treatment.
    c. Claimant's education, specialized training and military experience.

d. Claimant's vocational history, including wages and length of employment. DOT (Dictionary of Occupational Titles) numbers should accompany job titles held.

e. Results of the Transferable Skills Analysis, if completed.

f. Identification of assets and barriers as they relate to continued vocational rehabilitation services.

g. The hierarchy of vocational rehabilitation will be considered in establishing recommendations.

h. Recommendations.

8. The Initial Vocational Assessment report will be submitted within two (2) weeks of the initial interview.

PROTOCOL HISTORY:
Passed: 5/29/2001

APPENDIX A

HIERARCHY OF VOCATIONAL REHABILITATION

1. **Return to work, same employer, same job –**
vocational services may include a job analysis and coordination to return to work with the employer, but usually no vocational services provided.

2. **Return to work, same employer, different job –**
work with the employer to identify a new position that would fit the restrictions or modifications needed by the injured worker.

3. **Return to work, different employer, same job –**
vocational services would assist in job development and placement.

4. **Return to work, different employer, different job –**
vocational services may consist of performing a transferable skills analysis, interest testing, job development and job placement.

5. **On-the-job training –** identify a new employer that can train the injured worker on the job. This program can last between 3 months and 6 months.

6. **Skills enhancement –** vocational services may identify a course to develop a skill prior to a job search. This does not consist of a full retraining program.

7. **Retraining –** vocational assessment identifies that the above options are not feasible and then identifies a retraining program usually less than two (2) years in length. The training program can range from a short-term certificate program to a two (2) year associates degree program. Vocational services would probably include interest testing, transferable skills analysis, aptitude testing, labor market research and vocational exploration to support a training program.

PROTOCOL HISTORY:
Passed: 5/29/2001

OCCUPATIONAL HEARING IMPAIRMENT TREATMENT PROTOCOL

This Protocol addresses the treatment of hearing impairment that has been established as "work-related" by a Board Certified Otorhinolaryngologist. Hearing impairment may be related to a single event, such as trauma or a basal skull fracture, or it may be related to exposure to excessive noise in the workplace.

DEGREES OF HEARING LOSS

0 to 25 dB	-	Normal
25 to 45 dB	-	Mild
45 to 60 dB	-	Moderate
60 to 75 dB	-	Moderately Severe
75 to 90 dB	-	Severe
Over 90 dB	-	Profound

Reference should be made to the OSHA table for age-related hearing loss, data from which is attached hereto and made a part of this Protocol.

I. TREATMENT OPTIONS

A. A trial of aural rehabilitation, if indicated, usually in cases of mild loss if recommended by the otorhinolaryngologist.

B. A hearing aid may be prescribed for occupational hearing impairment related to exposure to excessive noise in the workplace as determined by an otorhinolaryngologist. The need for such will be determined by an otorhinolaryngologist, who has provided the testing and indicated that the loss is work-related and sufficient to require the use of a hearing aid. This hearing aid may be provided by an otolaryngologist.

C. A hearing aid may be prescribed for a monaural hearing loss, if recommended by an otorhinolaryngologist.

II. TYPES OF HEARING AIDS TO BE CONSIDERED

A. BTE (Behind the ear)

B. CIC (Completely in ear canal) This is only helpful in mild to moderate hearing loss and not in smaller angular canals.

C. ITC (In the canal) This is stronger than the CIC.

D. ITE (Inside the ear) This device is easier to adjust the volume.

III. HEARING AID CIRCUITRY

A. Analog, is basic and the oldest type.

B. Programmable
C. Digital, which is state of the art
D. Disposable hearing aids are not acceptable treatment
E. Average life expectancy of a hearing aid is five (5) years.

IV. SURGERY

A. Cochlear implants; used in patients with hearing loss so extreme that the best hearing aid would have no effect
B. Reconstructive surgery, for either traumatic abnormalities to the external ear canal, tympanic membrane, or middle ear
C. A second opinion is required before surgical intervention may be performed.

Example of Age Correction; Text From:

9782 Federal Register / Vol. 48, No. 46 / Tuesday, March 8, 1983 / Rules and Regulations

	Frequency (Hz)				
	1000	2000	3000	4000	5000
Age 32	6	5	7	10	14
Age 27	5	4	6	7	11
Difference	1	1	1	3	3

The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audiogram hearing threshold at 4000 Hz (22). Thus the age-corrected threshold shift would be 17 dB (as opposed to a threshold shift of 20 dB without age correction.)

Table F-1 – Age Correction Values In Decibels for Males

Years	Audiometric Test Frequencies (Hz) 1000	2000	3000	4000	6000
20 or younger	5	3	4	5	8
21	5	3	4	5	8
22	5	3	4	5	8
23	5	3	4	6	9
24	5	3	5	6	9
25	5	3	5	7	10
26	5	4	5	7	10
27	5	4	6	7	11
28	6	4	6	8	11
29	6	4	6	8	12
30	6	4	6	9	12
31	6	4	7	9	13
32	6	5	7	10	14
33	6	5	7	10	14
34	6	5	8	11	15
35	7	5	8	11	15
36	7	5	9	12	16
37	7	6	9	12	17
38	7	6	9	13	17
39	7	6	10	14	18
40	7	6	10	14	19
41	7	6	10	14	20
42	8	7	11	16	20
43	8	7	12	16	21
44	8	7	12	17	22
45	8	7	13	18	23
46	8	8	13	19	24
47	8	8	14	19	24
48	9	8	14	20	25
49	9	9	15	21	26
50	9	9	16	22	27
51	9	9	16	23	28
52	9	10	17	24	29
53	9	10	18	25	30
54	10	10	18	26	31
55	10	11	19	27	32
56	10	11	20	28	34
57	10	11	21	29	35
58	10	12	22	31	36
59	11	12	22	32	37
60 or older	11	13	23	33	38

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Table F-2 – Age Correction Values in Decibels for Females

	Audiometric Test Frequencies (Hz)				
Years	1000	2000	3000	4000	6000
20 or younger	7	4	3	3	6
21	7	4	4	3	6
22	7	4	4	4	6
23	7	5	4	4	7
24	7	5	4	4	7
25	8	5	4	4	7
26	8	5	5	4	8
27	8	5	5	5	8
28	8	5	5	5	8
29	8	5	5	5	9
30	8	6	5	5	9
31	8	6	6	5	9
32	9	6	6	6	10
33	9	6	6	6	10
34	9	6	6	6	10
35	9	6	7	7	11
36	9	7	7	7	11
37	9	7	7	7	12
38	10	7	7	7	12
39	10	7	8	8	12
40	10	7	8	8	13
41	10	8	8	8	13
42	10	8	9	9	13
43	11	8	9	9	14
44	11	8	9	9	14
45	11	8	10	10	15
46	11	9	10	10	15
47	11	9	10	11	16
48	12	9	11	11	16
49	12	9	11	11	16
50	12	10	11	12	17
51	12	10	12	12	17
52	12	10	12	13	18
53	13	10	13	13	18
54	13	11	13	14	19
55	13	11	14	14	19
56	13	11	14	15	20
57	13	11	15	15	20
58	14	12	15	16	21
59	14	12	16	16	21
60 older	14	12	16	17	22

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PROTOCOL HISTORY:
Passed: 5/29/2001

DIAGNOSIS AND INITIAL TREATMENT OF OCCUPATIONAL ASTHMA

I. BACKGROUND

A. Asthma is an airways disease of the lungs characterized by the following:

1. Airway inflammation
2. Increased airway responsiveness to a variety of stimuli; and
3. Airway obstruction that is partially or completely reversible, either spontaneously or with treatment.

The two essential *clinical* elements for the diagnosis of asthma are airways obstruction which is partially or totally reversible with treatment, and/or airways hyperreactivity. *Occupational asthma* is asthma that has its onset in association with workplace exposure(s). *Occupationally-aggravated asthma* is asthma that is aggravated by workplace exposure(s).

B. Causative agents are classified as sensitizers (including but not limited to the appended list) or irritants. Sensitizers cause inflammation through one or more immunologic mechanisms, whereas irritants directly inflame the airway. Occupational environments are often complex, and it may be difficult to identify a single specific causal agent.

C. A delay in diagnosis resulting in continued exposure of the worker to even minute amounts of sensitizers can lead to permanent and irreversible airways disease or *death*.

D. An acute high level inhalation exposure to an irritant may result in a permanent asthmatic condition known as Reactive Airways Dysfunction Syndrome (RADS).

E. This guideline is meant to cover the majority of tests and treatments that may be used to diagnose and initially stabilize occupational and occupationally-aggravated asthma. This guideline does not include parameters of care for long term management of either occupational or occupationally-aggravated asthma. It is expected that approximately 10% of cases will fall outside this guideline and require review on a case-by-case basis.

II. Criteria for Diagnosis:

A. Diagnosis of Occupational Asthma

1. Diagnosis of asthma within these guidelines by a medical doctor, using the appended algorithm
2. Historical association between the onset of asthma and work,

AND

3. At least one of the following criteria:

a. Documentation (see Occupational History, Section III.B) of workplace exposure to a category of agents or processes associated with asthma;

b. Work-related change in FEV1 or in peak expiratory flow (PEF);

c. Onset of respiratory signs and/or symptoms within hours after an acute high level occupational inhalation exposure to an irritant (RADS)

B. Diagnosis of Occupationally-Aggravated Asthma: There must be a history of asthma prior to the occupational exposure in question. Other diagnostic criteria are the same as for new onset occupational asthma.

III. Medical Diagnosis and Initial Stabilization:

Physician Visits Allowed. The number of physician visits needed to diagnose and stabilize cases of occupational and occupationally-aggravated asthma is likely to vary from patient to patient. Physicans must use their judgment to determine the number of physician visits necessary for diagnosis and initial stabilization.

IV. Establishing the Diagnosis:

A. Medical History:

1. Characteristic symptoms: wheeze, cough, chest tightness, shortness of breath

2. Past respiratory history: prior diagnosis of asthma, allergies, eczema, rhinitis, bronchitis, sinusitis, hayfever, chest colds, and respiratory symptoms upon exertion, exposure to minor irritants, or exposure to cold air

3. Review of systems: history of other diseases with symptoms that could mimic or precipitate asthma; e.g., cardiovascular disease with left ventricular dysfunction; gastroesophageal reflux

4. Family history: asthma, atopy

5. Smoking history: average # packs of cigarettes per day x # years smoked (pack years of smoking)

6. List of current medications

7. Home, hobby, and environmental exposure history to exclude other causal or contributing factors

B. Occupational History:

1. Description of the patient's work tasks, exposures and related processes, both past and present

2. Effect(s) of workplace exposures on respiratory symptoms, with emphasis on temporal associations. Note whether symptoms change on weekends and/or vacation.

3. Documentation of workplace exposures where possible: e.g., Material Safety Data Sheets (MSDS); employer records; industrial hygiene monitoring data from government agencies or private consultants

4. Where data for characterizing exposures is inadequate, worksite evaluation by an appropriate health care provider or industrial hygienist may be necessary and is encouraged.

C. Physical Examination:

1. Examination of head for rhinitis, nasal polyps, conjunctivitis, and sinusitis

2. Chest percussion and auscultation

3. Cardiovascular exam to rule out cardiogenic explanation for respiratory symptoms

4. Skin exam for atopic dermatitis

D. Diagnostic Tests Allowed:

1. A total of 11 spirometry *studies* is allowed. For purposes of this guideline, each *study* shall consist of a minimum of 3 and a maximum of 8 *maneuvers*, with at least the initial study pre- and post-inhaled bronchodilator.

a. Up to 2 follow-up spirometry studies will be allowed to establish a diagnosis of asthma.

b. Up to 8 pre- and post-shift spirometry studies will be allowed at the beginning and end of each work week for 2 weeks.

c. When PEF diary and spirometric monitoring are equivocal, a longer absence from work may be needed to establish or rule out the diagnosis, with

(i) 1 repeat spirometry study allowed at the beginning of the absence from work and 1 repeat spirometry study allowed at the end of the absence from work, and

(ii) the PEF diary monitoring repeated.

2. One Non-Specific Inhalation Challenge Test Allowed:

If there is no significant improvement in FEV1 in response to inhaled bronchodilator, and *if* the existence of airways hyperreactivity remains in question (see appended algorithm), but <u>*only*</u> when:

a. Consistent with this guideline's Appended Algorithm, and

b. Under supervision of a medical doctor experienced in this type of procedure.

3. Ten Specific Skin Tests with relevant antigens allowed, but <u>*only*</u> when:

a. Performed by a medical doctor experienced in this type of procedure, and

b. In a hospital-based outpatient setting.

WARNING: SKIN TESTS ARE NON-EMERGENT PROCEDURES, WITH SIGNIFICANT RISK OF SEVERE REACTION, INCLUDING DEATH.

4. Chest radiograph – 1 postero-anterior and 1 lateral view allowed

5. Latex and laboratory animal dander RAST test(s) for specific work-related exposure – 1 allowed for each antigen.

V. Initial Treatment Program:

A. Prevention of further exposure to causal or precipitating agent(s):

1. When caused by a sensitizing agent, all further exposure to the causal agent must be eliminated because of the increased risk for irreversible airways obstruction, severe bronchospasm and/or *death*. A statement of the physician's discussion of these and other risks with the patient must be documented in the medical record.

2. When caused by an irritant, elimination of exposure is desirable but significant reduction of exposure may be sufficient.

3. When elimination of exposure is not possible, alternative approaches may include, in order of preference:

a. Engineering controls such as local exhaust ventilation

b. Appropriate use of respiratory protection provided by the employer

B. Where these approaches fail and the clinical condition warrants, removal of the workers from the workplace may be necessary.

C. Medications:

1. Medications should only be used in conjunction with prevention of further exposure as outlined in Section V. A. above.

2. Spirometric testing is allowed as needed to monitor effectiveness of therapy, not to exceed a maximum of 11 spirometry studies allowed in Section IV. D. above. Due to its unique nature, Occupational Asthma often requires a more aggressive therapeutic approach than Non-Occupational Asthma. The recommended therapeutic approach is as follows:

a. Step 1: Rapid-onset *B*-agonist as needed for control of symptoms of asthma occurring less than three times per week. If this fails, then:

b. Step 2: Inhaled low-to- medium dose corticosteroids to treat underlying inflammation, combined with a rapid-onset inhaled *B*-agonist as needed to control symptoms of asthma. If this fails, then:

c. Step 3: Increase inhaled corticosteroids to high dose, plus long-acting inhaled *B*-agonist, and/or theophylline with continued use of rapid-onset inhaled *B*-agonist as needed to control symptoms of asthma. If this fails, then:

d. Step 4: Add an oral corticosteroid.

D. Patient Education (The following shall be discussed with the patient at the initial physician visit and repeated thereafter as necessary):

1. Key points about signs and symptoms of asthma and characteristic airway changes in asthma.
2. Asthma triggers and how to avoid them.
3. How medications work and their potential adverse effects; instruction and demonstration in the correct use of all medications (e.g., proper use of MDIs).
4. Techniques of monitoring status of asthma, such as PEF readings.
5. Indications for emergency care.

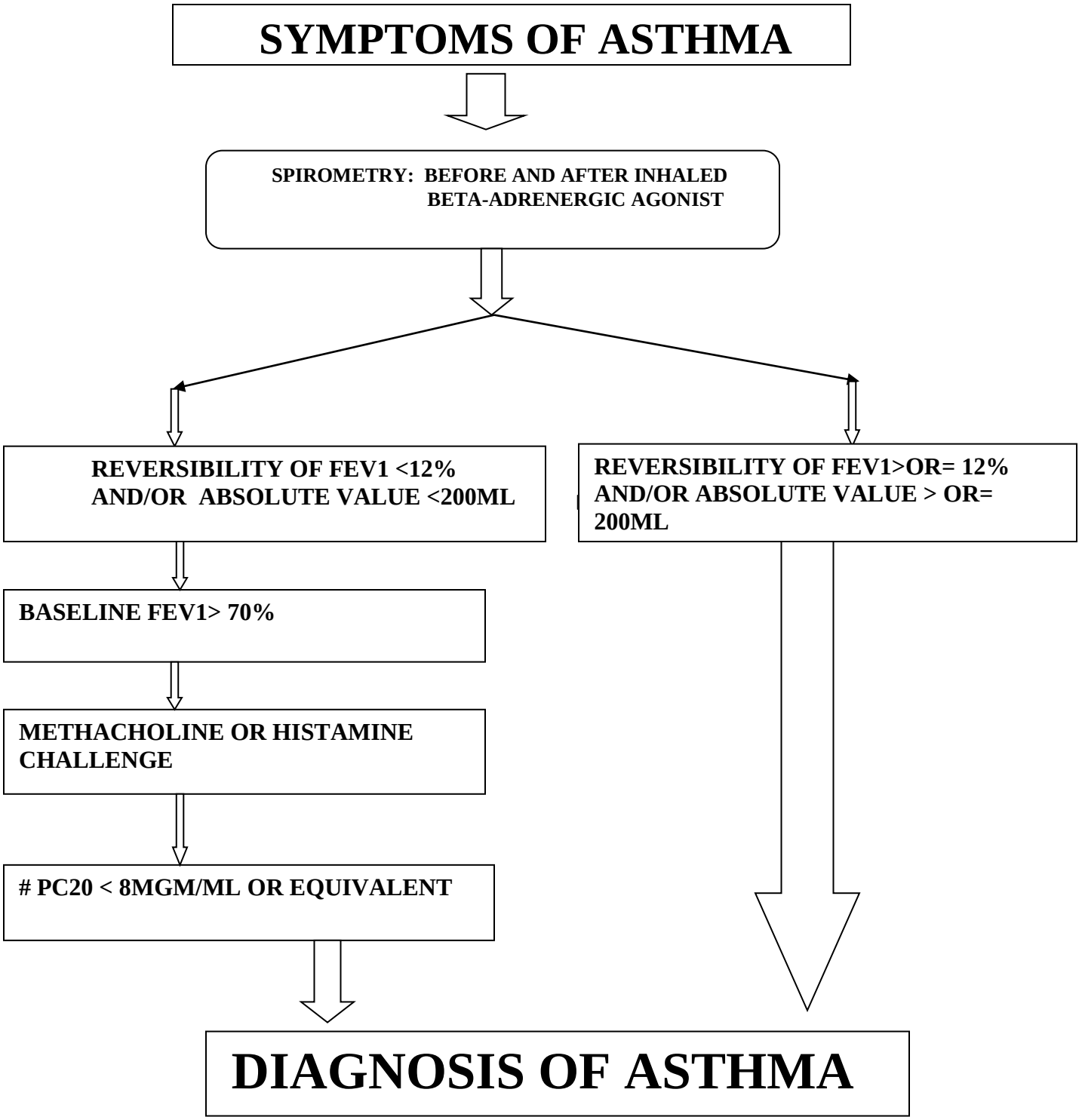
VI. Discharge Plan:

A. Future medical care will depend upon the outcome of initial medical management. This guideline is meant to address only the diagnosis and initial stabilization of occupational and occupationally-aggravated asthma.

B. If causal or aggravating exposure is eliminated or reduced and asthma symptoms resolve without medication, no further medical management is needed. If symptoms have resolved with medication, a period of medical follow-up will be needed to determine the necessity for continued medication and to establish an effective maintenance regimen. Practitioners should consult other guidelines, practice parameters and/or standards of care for guidance in the long-term management of persistent symptoms of asthma.

PROTOCOL HISTORY:
Passed: 4/20/2004
Revised: 1/31/2011

DIAGNOSIS OF ASTHMA ALGORITHM



Note: FEV1 improvement after steroid trial may suggest asthma; however, other pulmonary etiologies also may result in similar effect and improvement in pulmonary function. From a diagnostic standpoint, therefore, a positive response is not necessarily diagnostic of asthma.

OCCUPATIONAL ASTHMA CAUSING AGENTS:

*List of Known Sensitizers as of 6/5/97**

Organic Chemicals

Acrylates

Methyl methacrylate, cyanoacrylates
Ethylcyanoacrylate ester
Plexiglass

Alcohols

Furfuryl alcohol (furan based resin)
Alkylarul polyether alcohol, polypropylene glycol
(combination)

Aldehydes

Formaldehyde
Glutaraldehyde
Urea formaldehyde

Aliphatic Amines:

Ethylene diamine
Hexamethylene tetramine
Triethylene tetramine

Aliphatic Amines: Ethanolamines

Monoethanolamine
Aminoethylethanolamine
Dimethylethanolamine

Anhydrides

Phthalic anhydride
Trimellitic anhydride
Tetrachlorophthalic anhydride
Pyromellitic dianhydride
Methyl tetrahydrophthalic anhydride
Himic anhydride

Amines, Aliphatic: Other

3-(Dimethylamino)-propylamine

Amines, Heterocyclic

Piperazine hydrochloride
N-methylmorpholine

Amines: Other

Chloramine T

Aromatic Hydrocarbons, NOS

Styrene

Azo Compounds

Azodicarbonamide
Diazonium salt
Azobisformamide

Chlorinated Compounds

Chlorhexidine

Fluorinated Compounds

Freon

Isocyanates

Toluene Diisocyanate
Diphenylmethane diisocyanate
1,5 Naphthylene diisocyanate
Isophorone diisocyanate
TDI, MDI, HDI, PPI (combination)
TDI, MDI, HDI (combination)
TDI, MDI (combination)

Phenols

Hexachlorophene

Polymers

Latex, synthetic
Polyvinyl chloride (fumes or powder)

Sulphonates

Iso-nonanyl oxybenzene sulphonate

Inorganic Chemicals

Metals

Aluminum
Chromium and Nickel (combination)
Cobalt and Nickel
Platinum
Nickel
Zinc fumes
Tungsten carbide
Chromium

Nonmetallic Elements

Fluorine

Miscellaneous Chemicals

Pharmaceuticals

Penicillins and Ampicillin
Penicillamine
Cephalosporins
Phenylglycine acid chloride
Psyllium
Methyl dopa
Spiramycin
Salbutamol intermediate
Amprolium
Tetracycline
Isonicotinic acid hydrazide
Hydralazine
Tylosin tartrate
Ipecacuanha
Cimetidine
Rose Hips

Dyes

Levafix brilliant yellow E36
Drimaren brilliant yellow K-3GL
Cibachrome brilliant scarlet 32
Drimaren brilliant blue K-BL
Persulphate salts and henna
Reactive dyes

Fluxes

Colophony
Zinc chloride, ammonium chloride (mixture)
Alkylarul polyether alcohol, polypropylene glycol
(combination)
Pylene glycol

Miscellaneous Chemicals, NOS

Tetraxzene
Oil mist

Biological Agents

Animal/Animal Materials

Laboratory animal
Egg protein (Egg producers)
Chicken
Pig
Frog
Lacloserum
Casein (cow's milk)
Bat guano

Fish/Fish Materials

Crab
Prawn
Hoya
Cuttle-fish
Trout
Shrimpmeal
Fish-feed, Echinodorus lava
Red soft coral

Insect/Insect Materials

Grain mite
Locust
Screw Worm Fly
Cricket
Bee moth
Moth
Butterfly
Mexican bean weevil
Fruit fly
Honeybee
L. Caesar larvae
Lesser mealworm, (Grain and poultry workers)
Fowl mite, (Poultry workers)
Barn mite, (Farmers)
Parasites (Flour Handlers)
Mites, (Flour Handlers)
Acarian, (Apple Growers)
Daphnia, (Fish food store)
Weeping Fig, (Plant Keepers)
Sheep Blowfly, (Technicians)

Biological Agents, con't

Larva of Silkworm

Plants/Plant Material

Grain dust
Wheat, Rye
Soya Flour
Lathyrus sativus
Vicia sativa
Buckwheat
Gluten
Coffee bean
Caster bean
Tea
Herbal Tea
Tobacco Leaf
Hops
Baby's Breath
Freesia
Paprika
Mushroom
Cacoon seed
Chicory
Sunflower
Garlic dust
Lycopodium
Sericin
Nacre dust
Henna

Vegetable Gums

Gum, Acacia
Gum, Tragacanth
Gum, Guar
Latex, natural rubber

Wood Dust or Bark

Western red cedar, (Thuja plicata)
California redwood, (Sequoia sempervirens)
Cedar of Lebanon, (Cedra Libani)
Cocabolla, (Dalbergia retusa)
Iroko, (Chlorophora excelsa)
Oak, (Quercus robur)
Mahogany, (Shoreal Sp)
Abiruana, (Pouteria)
African Maple, (Triplochiton scleroxylon)
Tanganyika aningre
Central American Walnut, (Juglans olanchana)
Kejaat, (Pterocarpus angolensis)
African zebrawood, (Microberlinia)
Ramin, (Gonystylus bancanus)
Quillaja bark
Fernambouc, (Caesalpinia echinata)
Ashwood, (Fraxinus americana)
Eastern red cedar, (Thuja occidentalis)
Ebony wood, (Disospyros crassiflora)
Kotibe wood, (Nesorgordonia papverifera)
Cinnamon, (Cinnamomum Zeylanicum)

Biologic Enzymes

B.subtilis
Trypsin
Papain
Pepsin
Pancealin
Flaviastase
Bromelin
Fungal amylase
Fungal amyloglucosidade
Fungal hemicellulase
Esperase

*Adapted from: Chan-Yeung M. Malo JL. Actiological Agents in Occupational Asthma. European Respiratory Journal. 1994. Vol.7. pp.346-371.

**** FEV1** = Forced Expiratory Volume in one second*
***# PC20** = Provocative concentration to cause a 20% decline in FEV1*

RE:

Administrative Filing of the Medical Treatment Protocols
of the
Medical Advisory Board
of the
Rhode Island Workers' Compensation Court

In accordance with the applicable statutes, in the State of Rhode Island, relating to Administrative Procedures, the attached Protocols and Standards for Treatment for Compensable Injuries (hereinafter referred to as "Protocols and Standards"), as promulgated by the Medical Advisory Board for the Workers' Compensation Court, in accordance with R.I.G.L. §28-30-22 and formally approved and adopted by the Chief Judge of the Workers' Compensation Court, are heretofore presented and filed with the office of the Rhode Island Secretary of State.

It is of utmost importance, however, that it be noted that these Protocols and Standards are filed out of an abundance of caution and in strict adherence to the Rhode Island Administrative Procedures Act, so-called, as set forth in R.I.G.L. §42-35-1 et seq. The Protocols and Standards are in no way intended to be, nor as they to be used as a binding rule or regulation. These Protocols and Standards are intended to outline options of appropriate methods and types of intervention to be utilized by physicians and other healthcare providers for what is believed to be some of the most frequent work-related injuries seen in Rhode Island.

It is in this spirit that these Protocols and Standards are to be used, and no other purpose or reason is intended.