RULE 17 EXHIBIT 4

Shoulder Injury
Medical Treatment Guidelines
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State of Colorado

Department of Labor and Employment
DIVISION OF WORKERS' COMPENSATION

TABLE OF CONTENTS

Return to Table of Contents

DEPARTMENT OF LABOR AND EMPLOYMENT

Division of Workers' Compensation
CCR 1101-3
RULE 17, EXHIBIT 4

SHOULDER INJURY MEDICAL TREATMENT GUIDELINES

A. INTRODUCTION

This document has been prepared by the Colorado Department of Labor and Employment, Division of Workers' Compensation (Division) and should be interpreted within the context of guidelines for physicians/providers treating individuals qualifying under Colorado's Workers' Compensation Act as injured workers with upper extremity involvement.

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

To properly utilize this document, the reader should not skip nor overlook any sections.

Return to Table of Contents

B. GENERAL GUIDELINE PRINCIPLES

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

1. **APPLICATION OF GUIDELINES** The Division provides procedures to implement medical treatment guidelines and to foster communication to resolve disputes among the provider, payer and patient through the Workers' Compensation Rules of Procedure. In lieu of more costly litigation, parties may wish to seek administrative dispute resolution services through the Division or the Office of Administrative Courts.

2. **EDUCATION** of the patient and family, as well as the employer, insurer, policy makers and the community should be the primary emphasis in the treatment of upper extremity pain and disability. Currently, practitioners often think of education last, after medications, manual therapy and surgery. Practitioners must develop and implement an effective strategy and skills to educate patients, employers, insurance systems, policy makers and the community as a whole. An education-based paradigm should always start with inexpensive communication providing reassuring information to the patient. More in-depth education currently exists within a treatment regime employing functional restorative and innovative programs of prevention and rehabilitation. No treatment plan is complete without addressing issues of individual and/or group patient education as a means of facilitating self-management of symptoms and prevention.

3. **TREATMENT PARAMETER DURATION** Time frames for specific interventions commence once treatments have been initiated, not on the date of injury. Obviously, duration will be impacted by patient compliance, as well as availability of services. Clinical judgement judgment may substantiate the need to accelerate or decelerate the time frames discussed in this document.

4. **ACTIVE INTERVENTIONS** Interventions emphasizing patient responsibility, such as therapeutic exercise and/or functional treatment, are generally emphasized over passive modalities, especially as treatment progresses. Generally, passive and palliative interventions are viewed as a means to facilitate progress in an active rehabilitation program with concomitant attainment of objective functional gains.

5. **ACTIVE THERAPEUTIC EXERCISE PROGRAM** Exercise program goals should incorporate patient strength, endurance, flexibility, coordination, and education. This includes functional application in vocational or community settings.

6. **POSITIVE PATIENT RESPONSE** Positive results are defined primarily as functional gains which can be objectively measured. Objective functional gains include, but are not limited to, positional tolerances, range of motion, strength, endurance, activities of daily living, cognition, psychological behavior, and efficiency/velocity measures which can be quantified. Subjective reports of pain and function should be considered and given relative weight when the pain has anatomic and physiologic correlation. Anatomic correlation must be based on objective findings.

7. **RE-EVALUATE TREATMENT EVERY 3-4 WEEKS** If a given treatment or modality is not producing positive results within 3-4 weeks, the treatment should be either modified or discontinued. Reconsideration of diagnosis should also occur in the event of poor response to a seemingly rational intervention.

8. **SURGICAL INTERVENTIONS** Surgery should be contemplated within the context of expected functional outcome and not purely for the purpose of pain relief. The concept of "cure" with respect to surgical treatment by itself is generally a misnomer. All operative interventions must be based upon positive correlation of clinical findings, clinical course and diagnostic tests. A comprehensive assimilation of these factors must lead to a specific diagnosis with positive identification of pathologic condition(s).

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

10. **RETURN-TO-WORK** Even if there is residual chronic pain, return-to-work is not necessarily contraindicated. Return-to-work may be therapeutic, assuming the work is not likely to aggravate the basic problem or increase long-term pain. The practitioner must write detailed restrictions when returning a patient to limited duty. The following functions should be considered and modified as recommended: lifting, pushing, pulling, crouching, walking, using stairs, bending at the waist, awkward and/or sustained postures, tolerance for sitting or standing, hot and cold environments, data entry and other repetitive motion tasks, sustained grip, tool usage and vibration factors. The patient should never be released to "sedentary or light duty" without specific physical limitations. The practitioner must understand all of the physical, demands of the patient's job position before returning the patient to full duty and should request clarification of the patient's job duties. Clarification should be obtained from the employer or, if necessary, including, but not limited to, an occupational health nurse, occupational therapist, vocational rehabilitation specialist, or an industrial hygienist.

11. **DELAYED RECOVERY** Strongly consider a psychological evaluation, if not previously provided, as well as initiating interdisciplinary rehabilitation treatment and vocational goal setting, for those patients who are failing to make expected progress 6-12 weeks after an injury. The Division recognizes that 3-10% of all industrially injured patients will not recover within the timelines outlined in this document despite optimal care. Such individuals may require treatment beyond the limits discussed within this document, but such treatment will require clear documentation by the authorized treating practitioner focusing on objective functional gains afforded by further treatment and impact upon prognosis.

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

Return to Table of Contents

C. INTRODUCTION TO SHOULDER INJURY

This section addresses the shoulder and the ten most common work-related injuries/syndromes/disorders to or involving the shoulder complex. The following format was developed to reduce repetitive text:

1. **HISTORY TAKING AND PHYSICAL EXAMINATION** provides information common to all injuries through a discussion of provider procedures which should be applied to each patient, regardless of the injury and diagnosis (this subsection is standard to all Division medical treatment guidelines).

2. **SPECIFIC DIAGNOSIS, TESTING AND TREATMENT PROCEDURES** provides information unique to each of the following work-related injuries/syndromes/disorders:

    a. Acromioclavicular (AC) Joint Sprains/Dislocations

    b. Adhesive Capsulitis/Frozen Shoulder Disorders

    c. Bicipital Tendon Disorders

    d. Brachial Plexus Injuries

        i. Brachial Plexus

        ii. Axillary Nerve

        iii. Long Thoracic Nerve

        iv. Musculocutaneous Nerve

        v. Spinal Accessory Nerve

        vi. Suprascapular Nerve

    e. Bursitis of the Shoulder

    f. Impingement Syndrome

    g. Rotator Cuff Tears

    h. Rotator Cuff Tendinitis

    i. Shoulder Fractures

        i. Clavicular Fracture

        ii. Proximal Humeral Fracture

        iii. Humeral Shaft Fracture

        iv. Scapular Fracture

        v. Sternoclavicular Dislocation/Fracture

j. Shoulder Instability

Each diagnosis is presented in the following format:

a. A definition of the injury/disorder/syndrome;

b. Discussion of relevant physical findings;

c. Applicable testing and diagnostic procedures;

d. Diagnosis-based, non-operative therapeutic treatment procedures;

e. Options for operative/surgical treatment; and

f. Options for post-operative rehabilitation/treatment procedures.

3. **MEDICATION** provides information common to all injuries through detailed discussions of referenced medications with indications for expected time to produce effect, frequency, and optimum and maximum durations.

4. **NON-OPERATIVE TREATMENT PROCEDURES** provides information common to all injuries through detailed discussions of referenced therapeutic procedures with indications for expected time to produce effect, frequency, and optimum and maximum durations.

   As shoulder injuries frequently involve a complex of problems, it is always necessary to consider the possible interaction of the various parts of the shoulder mechanism when proceeding with a diagnostic workup and a therapeutic treatment plan. Injuries to the shoulder may require the provider to reference and/or use the other Division medical treatment guidelines (i.e., Thoracic Outlet Syndrome Cumulative Trauma Disorder, and/or Complex Regional Pain Syndrome/Reflex Sympathetic Dystrophy.

D. HISTORY TAKING AND PHYSICAL EXAMINATION (Hx & PE)

There are two standard procedures that should be utilized when initially diagnosing work-related shoulder instability. These procedures are generally accepted, well-established and widely used procedures that establish the foundation/basis for and dictate all other following stages of diagnostic and therapeutic procedures. When findings of clinical evaluations and those of other diagnostic procedures are not complementing each other, the objective clinical findings should have preference.

1. **HISTORY TAKING** should address at least the following for each shoulder injury diagnosis:

a. Occupational relationship, and

b. History of non-occupational injury and avocational pursuits need to be specifically documented.

2. **PHYSICAL FINDINGS** are specific to and addressed within each shoulder injury diagnosis noted in this section. Given the complexity of the shoulder mechanism, an evaluation for concomitant injury should be considered.

Return to Table of Contents

E. SPECIFIC DIAGNOSIS, TESTING AND TREATMENT PROCEDURES

1. **ACROMIOCLAVICULAR JOINT SPRAINS/DISLOCATIONS** An acute acromioclavicular (AC) joint injury is frequently referred to as a shoulder separation. There are six classifications of an AC joint separation which are based upon the extent of ligament damage and bony displacement:

Type I Partial disruption of the AC ligament and capsule.

Type II Sprains consisting of a ruptured AC ligament and capsule with incomplete injury to the coracoclavicular (CC) ligament, resulting in minimal AC joint subluxation.

Type III Separation or complete tearing of the AC ligament and/or CC ligaments, possible deltoid trapezius fascial injury, and dislocation of the AC joint.

Type IV Dislocation consisting of a displaced clavicle that penetrates posteriorly through or into the trapezius muscle.

Type V Dislocation consisting of complete separation of the AC and CC ligaments and dislocation of the acromioclavicular joint with a large coracoclavicular interval.

Type VI Dislocation consisting of a displaced clavicle that penetrates inferior to the coracoid.

Types I-III are common, while Types IV-VI are not and, when found, require surgical consultation. For AC joint degeneration from repetitive motion that is found to be work-related, see this Section E. 6, Impingement Syndrome.

a. **History and Initial Diagnostic Procedures (AC Joint Sprains/Dislocations):**

- Occupational Relationship - generally, workers sustain an AC joint injury when they land on the point of the shoulder, driving the acromion downward, or fall on an outstretched hand or elbow, creating a backward and outward force on the shoulder. It is important to rule out other sources of shoulder pain from an acute injury, including rotator cuff tear, fracture and nerve injury.

b. **Physical Findings (AC Joint Sprains/Dislocations) may include:**

i. Tenderness at the AC joint with, at times, contusions and/or abrasions at the joint area; prominence/asymmetry of the shoulder can be seen; and/or

ii. One finds decreased shoulder motion and with palpation, the distal end of the clavicle is painful; there may be increased clavicular translation; cross-body adduction can cause exquisite pain.

c. **Laboratory Tests (AC Joint Sprains/Dislocations):** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (AC Joint Sprains/Dislocations):**

i. Plain x-rays may include:

A) AP view;

B) AP radiograph of the shoulder with the beam angled 10° cephalad (Zanca view);

C) Axillary lateral views; and

D) Stress view; side-to-side comparison with 10-15 lbs. of weight in each hand.

e. **Non-operative Treatment Procedures (AC Joint Sprains/Dislocations):** may include:

i. Procedures outlined in this Section G such as thermal treatment and immobilization (up-to-6 weeks for Type I-III AC joint separations). Immobilization treatments for Type III injuries are controversial and may range from a sling to surgery.

ii. Medication, such as nonsteroidal anti-inflammatories and analgesics, would be indicated; narcotics are not normally indicated. In the face of chronic acromioclavicular joint pain, a series of injections with or without cortisone, may be injected 6-8 times per year.

iii. Physical medicine interventions, as outlined in Section G, should emphasize a progressive increase in range of motion without exacerbation of the AC joint injury. With increasing motion and pain control, a strengthening program should be instituted and return to modified/limited duty would be considered at this time. By 8-11 weeks, with restoration of full motion, return to full duty should be anticipated.

f. **Operative Procedures (AC Joint Sprains/Dislocations):**

i. With a Type III AC joint injury, an appropriate orthopedic consultation could be considered initially, but should be considered when conservative care fails to increase function.

ii. With a Type IV-VI AC joint injury, an orthopedic surgical consultation is recommended.

g. **Post-Operative Procedures (AC Joint Sprains/Dislocations):** should be coordinated by the orthopedic and the primary care physician working with the interdisciplinary team. Keeping with the therapeutic and rehabilitation procedures found in this Section G. Non-operative Treatment Procedures, the patient could be immobilized for 2-3 weeks, restricted in activities, both work-related and avocational for 6-8 weeks while undergoing rehabilitation, and be expected to progress to return to full duty based upon the his/her response to rehabilitation and the demands of the job.

2. **ADHESIVE CAPSULITIS/FROZEN SHOULDER DISORDERS** Adhesive capsulitis of the shoulder, also known as frozen shoulder disorder, is a soft tissue lesion of the

glenohumeral joint resulting in restrictions of passive and active range of motion. Occupational adhesive capsulitis arises secondarily to any chest or upper extremity trauma. Primary adhesive capsulitis is rarely occupational in origin. The disorder goes through stages, specifically:

Stage 1 Consists of acute pain with some limitation in range of motion; generally lasting 2-9 months.

Stage 2 Characterized by progressive stiffness, loss of range-of-motion, and muscular atrophy; it may last an additional 4-12 months beyond Stage 1.

Stage 3 Characterized by partial or complete resolution of symptoms and restoration of range-of-motion and strength; it usually takes an additional 6-9 months beyond Stage 2.

a. **History and Initial Diagnostic Procedures (Adhesive Capsulitis/Frozen Shoulder Disorder):**

i. Occupational Relationship - There should be some history of work related injury. Often adhesive capsulitis is seen with impingement syndrome or other shoulder disorders; refer to appropriate subsection of this guideline.

ii. Patient will usually complain of pain in the sub-deltoid region, but occasionally over the long head of the biceps or radiating down the lateral aspect of the arm to the forearm. Pain is often worse at night with difficulty sleeping on the involved side. Motion is restricted and painful.

b. **Physical Findings (Adhesive Capsulitis/Frozen Shoulder Disorder):** Restricted active and passive glenohumeral range of motion is the primary physical finding. It may be useful for the examiner to inject the glenohumeral joint with lidocaine and then repeat range of motion to rule out other shoulder pathology; lack of range of motion confirms the diagnosis. Postural changes and secondary trigger points along with atrophy of the deltoid and supraspinatus muscles may be seen.

c. **Laboratory Tests (Adhesive Capsulitis/Frozen Shoulder Disorder):** are not indicated unless systemic illness or disease is suspected.

d. **Testing Procedures (Adhesive Capsulitis/Frozen Shoulder Disorder):**

i. Plain x-rays are generally not helpful except to rule out concomitant pathology.

ii. Arthrography may be helpful in ruling out other pathology. Arthrography can also be therapeutic as steroids and/or anesthetics may be injected and a brisement or distension arthrogram can be done at the same time (refer to the next subsection on non-operative treatment procedures for further discussion).

e. **Non-operative Treatment Procedures (Adhesive Capsulitis/Frozen Shoulder Disorder):** address the goal to restore and maintain function and may include:

i. Physical medicine interventions are the mainstay of treatment and may include thermal treatment, ultrasound, TENS, manual therapy, and passive and active range-of-motion exercises; as the patient progresses, strengthening exercises should be included in the exercise regimen; refer to Section G, Non-operative Treatment Procedures.

ii. Medications, such as NSAIDs and analgesics, may be helpful; rarely, the use of oral steroids are helpful to decrease acute inflammation; narcotics are indicated only for post-manipulation or post-operative cases; refer to this Section F, Medications.

iii. Occasionally, subacromial bursal and/or glenohumeral steroid injections can decrease inflammation and allow the therapist to progress functional exercise and range of motion. Injections should be limited to two injections to any one site, given at least one month apart.

iv. In cases that are refractory to conservative therapy lasting at least 3-6 months and in whom range of motion remains significantly restricted (abduction less than 90°), the following more aggressive treatment may be considered:

A) Distension arthrography or "brisement" in which saline, an anesthetic and usually a steroid are forcefully injected into the shoulder joint causing disruption of the capsule. Early and aggressive physical medicine to maintain range of motion and restore strength and function should follow distension arthrography or manipulation under anesthesia; return to work with restrictions should be expected within one week of the procedure; return to full duty is expected within 4-6 weeks.

f. **Operative Procedures (Adhesive Capsulitis/Frozen Shoulder Disorder):** For cases failing conservative therapy of at least 3-6 months duration and which are significantly limited in range-of-motion (abduction less than 90°), the following operative procedures may be considered:

i. Manipulation under anesthesia which may be done in combination with steroid injection or distension arthrography; and

ii. In rare cases, refractory to conservative treatment and in which manipulation under anesthesia is contraindicated, an open capsular release or arthroscopy with resection of the coracohumeral and/or coracoacromial ligaments may be done; other disorders, such as impingement syndrome, may also be treated at the same time.

g. **Post-Operative Procedures (Adhesive Capsulitis/Frozen Shoulder Disorder):** would include an individualized rehabilitation program based upon communication between the surgeon and the therapist.

- Early and aggressive physical medicine interventions are recommended to maintain range of motion and progress strengthening; return to work with restrictions after surgery should be discussed with the treating provider; patient should be approaching MMI within 8-12 weeks post-operative, however, coexistence of other pathology should be taken into consideration.

3. **BICIPITAL TENDON DISORDERS** Disorders may include 1) primary bicipital tendinitis which is exceedingly rare; 2) secondary bicipital tendinitis which is generally associated with rotator cuff tendinitis or impingement syndrome (see appropriate diagnosis subsections); 3) subluxation of the biceps tendon which occurs with dysfunction of the transverse intertubercular ligament and massive rotator cuff tears; and 4) acute disruption of the tendon which can result from an acute distractive force or transection of the tendon from direct trauma.

a. **History and Initial Diagnostic Procedures (Bicipital Tendon Disorders):**

i. Occupational Relationship - bicipital tendon disorders may include symptoms of pain and/or achiness that occur after repetitive use of the shoulder and/or blunt trauma to the shoulder. Secondary bicipital tendinitis may be associated with prolonged above-the-shoulder activities, and/or repeated shoulder flexion, external rotation and abduction. Acute trauma to the biceps tendon of the shoulder girdle may also give rise to occupational injury of the biceps tendon.

ii. Occupational disorders of the biceps tendon may accompany scapulothoracic dyskinesis, rotator cuff injury, AC joint separation, subdeltoid bursitis, shoulder instability or other shoulder pathology. Symptoms should be exacerbated or provoked by work that activated the biceps muscle. Symptoms may be exacerbated by other activities that are not necessarily work related.

iii. Symptoms may include aching, burning and/or stabbing pain in the shoulder, usually involving the anterior medial portion of the shoulder girdle. The symptoms are exacerbated with above-the-shoulder activities and those specifically engaging the biceps (flexion at the shoulder, flexion at the elbow and supination of the forearm). Relief occurs with rest. Patients may report nocturnal symptoms which interfere with sleep during the acute stages of inflammation; pain and weakness in shoulder during activities; repeated snapping phenomenon with a subluxing tendon; immediate sharp pain and tenderness along the course of the long head of the biceps following a sudden trauma which would raise suspicions of acute disruption of the tendon; and/or with predominant pain at the shoulder referral patterns which may extend pain into the cervical or distal structures, including the arm, elbow, forearm and wrist.

b. **Physical Findings (Bicipital Tendon Disorders):** may include:

i. If continuity of the tendon has been lost (biceps tendon rupture), inspection of the shoulder would reveal deformity (biceps bunching);

ii. Palpation demonstrates tenderness along the course of the bicipital tendon;

iii. Pain at end range of flexion and abduction as well as biceps tendon activation; and/or

iv. Provocative testing may include:

A) Yeagerson's sign - pain with resisted supination of forearm;

B) Speed's Test - pain with resisted flexion of the shoulder (elbow extended and forearm supinated); or

C) Ludington's Test - pain with contraction of the biceps (hands are placed behind the head placing the shoulders in abduction and external rotation).

c. **Laboratory Tests (Bicipital Tendon Disorders):** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Bicipital Tendon Disorders):**

i. Plain x-rays include:

A) Anterior/Posterior (AP) view visualizes elevation of the humeral head, indicative of absence of the rotator cuff due to a tear;

B) Lateral view in the plane of the scapula or an axillary view determines if there is anterior or posterior dislocation or the presence of a defect in the humeral head (a Hill-Sachs lesion);

C) 30° caudally angulated AP view determines if there is a spur on the anterior/inferior surface of the acromion and/or the far end of the clavicle; and

D) Outlet view determines if there is a downwardly tipped acromion.

ii. Adjunctive testing, such as sonography, MRI or arthrography, should be considered when shoulder pain is refractory to 4-6 weeks of nonoperative conservative treatment and the diagnosis is not readily identified by standard radiographic techniques.

e. **Non-operative Treatment Procedures (Bicipital Tendon Disorders):**

i. Benefit may be achieved through procedures outlined in Section G. Non-operative Treatment Procedures, such as thermal therapy, immobilization, alteration of occupation and/or work station, manual therapy and biofeedback.

ii. Medication, such as nonsteroidal anti-inflammatories and analgesics, would be indicated; narcotics are not normally indicated. Refer to Section G. Non-operative Treatment Procedures for further discussions.

iii. Physical medicine and rehabilitation interventions, as outlined in Section G. Non-operative Treatment Procedures, should emphasize a progressive increase in range of motion without exacerbation of the AC joint injury. With increasing motion and pain control, a strengthening program should be instituted and return to modified/limited duty would be considered at this time. By 8-11 weeks, with restoration of full motion, return to full duty should be anticipated.

iv. Biceps tendon injections may be therapeutic if the patient responds positively to an injection of an anesthetic. Injection of the corticosteroids directly into the tendon should be avoided due to possible tendon

breakdown and degeneration, limited to 3 injections per year at the same site, and avoided in patients under 30 years of age.

f. **Operative Procedures (Bicipital Tendon Disorders):**

i. Bicipital Tendinitis: Conservative care prior to potential surgery must address flexibility and strength imbalances. Surgical remedies would be considered after 12 weeks of appropriate conservative care has failed. Since impingement of the biceps tendon could cause continued irritation, an acromioplasty may be necessary, especially when the presence of an obstructing osteophyte is demonstrated on plain x-rays.

ii. Subluxing Bicipital Tendon: The decision to surgically stabilize the bicipital tendon is not commonly indicated. In the vast majority of cases, optimal outcome is achieved through successful rehabilitation procedures and appropriate conservative measures should be maximized prior to surgical intervention.

iii. Acute Disruption of the Bicipital Tendon: Surgical treatment shows variable responses. Conservative care should be the mainstay of treatment with particular attention given to the patient's age, work description and motivation.

g. **Post-Operative Procedures (Bicipital Tendon Disorders):** would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. Rehabilitation, lasting 6-12 weeks, is necessary to facilitate maximum medical improvement (MMI). Rehabilitation procedures discussed in Section G, Non-operative Treatment Procedures should be referenced and used.

4. **BRACHIAL PLEXUS INJURIES** to the nerves and shoulder girdle region resulting in loss of motor and sensory function, pain and instability of the shoulder. Signs and symptoms vary with the degree of mechanism of injury. The two modes of injury are: 1) acute direct trauma, and 2) repetitive motion or overuse. Transient compression, stretch or traction (neuropraxia) causes sensory and motor signs lasting days to weeks. Damage to the axon (axonomesis) without disruption of the nerve framework may cause similar symptoms. The recovery time is delayed and depends upon axon regrowth distally from the site of injury. Laceration or disruption of the entire nerve with complete loss of framework (neuromesis) is the most severe form of nerve injury. Return of function is dependent upon regrowth of the nerve distal to the injury site.

Electromyography (EMG) is the most commonly used diagnostic modality to analyze nerve injuries. Electrophysiologic studies, such as electromyography and nerve conduction studies, are generally accepted, well-established and widely used for localizing the source of neurological symptoms. These studies should be utilized as an extension of the history and clinical examination.

Slowing of motor nerve conduction velocities due to demyelinization localizes regions of entrapment and injury. Denervation demonstrated on the electromyographic portion is indicative of motor axonal or anterior horn cell loss. Studies should be performed 3-4 weeks following injury or description of symptoms. If the symptoms have been present for longer than 3-4 weeks, studies may be performed immediately after the initial evaluation. Serial studies may be indicated if initial studies are negative and may also be useful for gauging prognosis. Limb temperature should be controlled at 30-40°

centigrade. There are six relatively common nerve injuries to the shoulder girdle; each type will be addressed separately.

a. **Brachial Plexus:** is formed by the nerve roots of C5-C8 and T1; these nerve roots exit the cervical spine and pass through the scalene musculature; after leaving the scalene musculature, at the level of the clavicle, they form trunks, division and chords which ultimately form the peripheral nerves of the arm.

i. History and Initial Diagnostic Procedures (Brachial Plexus)

A) Occupational Relationship - direct injury to brachial plexus results in widespread sensory and motor loss. Direct trauma, subluxation to shoulder, clavicular fractures, shoulder depression, head deviation away to the arm may result in variable brachial plexus lesions. It is important to differentiate injuries to the brachial plexus from the acquired (nonwork-related) syndrome of brachial plexus neuritis, Parsonage-Turner Syndrome and/or neuralgia demyotrophy.

ii. Physical Findings (Brachial Plexus) may include:

A Inspection for evidence of trauma or deformity;

B) Identification of sensory loss and demonstration of weakness which relates to the severity and anatomy of the injury to the brachial plexus; and/or

C) Pain with recreation of the motions during the mechanism of injury.

iii. Laboratory Tests (Brachial Plexus) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Brachial Plexus) would include EMG and Nerve Conduction Studies. If they do not localize and give sufficient information, then additional information may be obtained from MRI and/or myelography. These studies are employed to differentiate root avulsion from severe brachial plexus injuries.

v. Non-operative Treatment Procedures (Brachial Plexus)

A) In closed injuries, observation is favored; repeat electrophysiologic studies may be helpful to follow recovery.

B) Rehabilitation can be utilized using procedures set forth in this Section G, Non-operative Treatment Procedures. However, utilization of ultrasound, cold and heat should be discussed with the Primary Care Physician since these modalities can aggravate nerve injury.

C) Medications, such as analgesics, nonsteroidal anti-inflammatories and anti-convulsants, are indicated; steroids may be prescribed to help diminish the inflammatory response, and

narcotics may be indicated acutely; all medications should be prescribed as seen in this Section F, Medications.

vi. Operative Procedures (Brachial Plexus): In open injuries, exploration may be worthwhile if there is poor progression of recovery from a conservative approach; in closed injuries, if progressive weakness and loss of function is documented after 4-6 months of conservative care, then exploration is also warranted.

vii. Post-Operative Procedures (Brachial Plexus) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program would begin with 4-6 weeks of rest followed by progressive increase in motion and strength.

b. Axillary Nerve: is derived from the 5th and 6th cervical roots; it passes around the shoulder and supplies motor branches to the teres minor and the three heads of the deltoid; it gives sensation to the top of the shoulder at the level of the deltoid.

i. History and Initial Diagnostic Procedures (Axillary Nerve):

Occupational Relationship - direct injury and penetrating wounds to the shoulder and upward pressure on the axilla can cause injury to the axillary nerve; abnormalities of the nerve can also be seen with fractures of the surgical neck of the humerus and dislocation of the shoulder; finally, axillary nerve injury can be seen with shoulder surgery in and of itself.

ii. Physical Findings (Axillary Nerve) may include:

A) Weakness and atrophy of the deltoid muscle;

B) Strength is lost in abduction, flexion and extension of the shoulder; and/or

C) Sensory loss can be seen over the upper arm.

iii. Laboratory Tests (Axillary Nerve) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Axillary Nerve) would include EMG and Nerve Conduction Studies.

v. Nonoperative Treatment Procedures (Axillary Nerve)

A) Rehabilitation can be utilized using procedures set forth in this Section G. Non-operative Treatment Procedures. Utilization of ultrasound, cold and heat should be discussed with the Primary Care Physician since these modalities can aggravate the nerve injury.

B) Medications such as analgesics, nonsteroidal anti-inflammatories and anti-convulsants are indicated and narcotics may be

indicated acutely; all medications should be prescribed as seen in this Section F. Medications.

vi. Operative Procedures (Axillary Nerve) are usually not necessary, since most injuries to the axillary nerve are due to stretch and/or traction. One may consider surgery after 4-6 months with EMG/NCV documentation of ongoing denervation and loss of function.

vii. Post-Operative Procedures (Axillary Nerve) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program would begin with 4-6 weeks of rest followed by progressive increase in motion and strength.

c. Long Thoracic Nerve: is formed by the cervical fifth, sixth, and seventh roots; it crosses the border of the first rib and descends along the posterior surface of the thoracic wall to the serratus anterior.

i. History and Initial Diagnostic Procedures (Long Thoracic Nerve)

A) Occupational Relationship - injury can occur by direct trauma to the posterior triangle of the neck or trauma may be the result of chronically repeated or forceful shoulder depression. Repeated forward motion of the arms as well as stretch or compression of the nerve with the arms abducted can lead to long thoracic nerve dysfunction.

ii. Physical Findings (Long Thoracic Nerve) may include:

A) Dull ache in the region of the shoulder without sensory loss;

B) Scapular deformity and/or winging may be described by patient or family; and/or

C) Serratus Anterior (scapular winging) may be demonstrated by asking the patient to extend and lean on his arms, such as against a wall and/or the examiner resisting protraction.

iii. Laboratory Tests (Long Thoracic Nerve) are not indicated unless a systemic illness or disease is suspected

iv. Testing Procedures (Long Thoracic Nerve) EMG and Nerve Conduction Studies are used to define the anatomy and severity of the injury; side-to-side comparisons of the nerve can be helpful to confirm the diagnosis; studies may also exclude more widespread brachial plexus involvement.

v. Non-operative Treatment (Long Thoracic Nerve)

A) Rehabilitation can be utilized using procedures set forth in Section G. Non-operative Treatment Procedures. Utilization of ultrasound, cold, and heat should be discussed with the Primary Care Physician since these modalities can aggravate nerve injury.

B) Medications, such as analgesics, nonsteroidal anti-inflammatories and anti-convulsants, are indicated and narcotics may be indicated acutely; all medications should be prescribed as seen in this Section F. Medications.

vi. Operative Procedures (Long Thoracic Nerve) such as scapular fixation, may be recommended but only in the most severe cases where there is documented significant loss of function.

vii. Post-Operative Procedures (Long Thoracic Nerve) should include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

d. Musculocutaneous Nerve: is derived from the fifth and sixth cervical roots; it innervates the coracobrachialis, biceps and brachioradialis muscles and also provides sensation to the lateral aspect of the forearm; trauma (including surgery) or penetrating wound to the brachial plexus, coracobrachialis, and shoulder often can cause nerve injury.

i. History and Initial Diagnostic Procedures (Musculocutaneous Nerve)

A) Occupational Relationship - most commonly a stretch/traction injury due to forceful extension of the elbow induces nerve dysfunction; trauma can be seen to the sensory component (lateral antebrachial cutaneous nerve) which delineates loss of sensation to the forearm.

ii. Physical Findings (Musculocutaneous Nerve) may include:

- Pain in the arm;
- Weakness and atrophy in the biceps and brachialis; and/or
- Sensory loss over the lateral aspect of the forearm; however, is not always seen.

iii. Laboratory Tests (Musculocutaneous Nerve) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Musculocutaneous Nerve) include EMG and nerve conduction studies; side-to-side comparisons of the motor and sensory components of the nerve may be useful since standard norms are not always reliable.

v. Non-operative Treatment Procedures (Musculocutaneous Nerve)

A) Rehabilitation can be utilized using procedures set forth in this Section G. Non-operative Treatment Procedures. Utilization of ultrasound, cold, and heat should be discussed with the Primary Care Physician, since these modalities can aggravate nerve injury.

B) Medications, such as analgesics, nonsteroidal anti-inflammatories and anticonvulsants, are indicated and narcotics may be indicated; all medications should be prescribed as seen in this Section F. Medications.

vi. Operative Procedures (Musculocutaneous Nerve) are usually not necessary unless there has been increasing loss of function over 4-6 months and/or a laceration to the nerve has been identified.

vii. Post-Operative Procedures (Musculocutaneous Nerve) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

e. **Spinal Accessory Nerve:** is the eleventh cranial nerve; the nerve innervates the ipsilateral sternocleidomastoid and trapezius muscles which are extremely important for scapular control and ultimately shoulder function.

i. History and Initial Diagnostic Procedures (Spinal Accessory Nerve)

A) Occupational Relationship - direct trauma to the posterior neck, forceful compression of the shoulder downward and/or deviation of the head away from the traumatized shoulder can lead to injury to this nerve; surgical resection of the posterior neck can disrupt the nerve.

ii. Physical Findings (Spinal Accessory Nerve) may include:

- Pain in the shoulder;
- Weakness or paralysis of the trapezius which is seen as winging with the arms out to the side (abduction); and/or
- Drooping of the shoulder.

iii. Laboratory Tests (Spinal Accessory Nerve) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Spinal Accessory Nerve) include EMG and Nerve Conduction Studies are used to define the anatomy and severity of the injury; side-to-side comparisons of the nerve can be helpful to confirm the diagnosis; radiographic procedures may be necessary to exclude lesion at the base of the brain or upper cervical spine.

v. Non-operative Treatment Procedures (Spinal Accessory Nerve)

A) Rehabilitation can be utilized using procedures set forth in Section G. Non-operative Treatment Procedures. Utilization of ultrasound, cold, and heat should be discussed with the Primary Care Physician, since these modalities can aggravate nerve injury.

B) Medications, such as analgesics, nonsteroidal anti-inflammatories and anticonvulsants, are indicated and narcotics may be indicated acutely; all medications should be prescribed as seen in Section F. Medications.

vi. Operative Procedures (Spinal Accessory Nerve) are usually not necessary unless increased loss of function over 4-6 months has been documented and/or a laceration to the nerve has been identified.

vii. Post-Operative Procedures (Spinal Accessory Nerve) would include an individualized rehabilitation program based upon communications between the surgeon and the therapist. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

f. **Suprascapular Nerve:** is derived from the fifth and sixth cervical root, superior trunk of the brachialplexus, and it innervates the supraspinatus and infraspinatus muscles of the rotator cuff.

i. History and Initial Diagnostic Procedures (Suprascapular Nerve)

A) Occupational Relationship - supraclavicular trauma, stretch, and friction through the suprascapular notch or against the transverse ligament at the notch can cause injury to the nerve; repetitive use of the arm has been shown on occasion to cause traction to the nerve.

ii. Physical Findings (Suprascapular Nerve) may include:

- Pain at the shoulder;
- Wasting at the supraspinatus and/or infraspinatus muscles with weakness; and/or
- Tinel's can help to elicit a provocative pain response.

iii. Laboratory Tests (Suprascapular Nerve) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Suprascapular Nerve) include EMG and nerve conduction studies; side-to-side comparisons may be useful since standard norms are not always reliable. If one suspects a mass lesion at the suprascapular notch, then an MRI may be indicated.

v. Non-operative Treatment Procedures (Suprascapular Nerve)

A) Rehabilitation can be utilized using procedures set forth in Section G. Non-operative Treatment Procedures. Utilization of ultrasound, cold, and heat should be discussed with the Primary Care Physician, since these modalities can aggravate nerve injury.

B) Medications, such as analgesics, nonsteroidal anti-inflammatories and anti-convulsants, are indicated and narcotics

may be indicated acutely; all medications should be prescribed as seen in this Section F. Medications.

vi. Operative Treatment Procedures (Suprascapular Nerve) involving surgical release at the suprascapular notch or spinoglenoid region is warranted depending upon the results of the electrophysiologic studies and/or absence of improvement with conservative management.

vii. Post-Operative Procedures (Suprascapular Nerve) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program would begin with 8-10 weeks of rest followed by progressive increase in motion and strength.

5. **BURSITIS OF THE SHOULDER** Acute or chronic inflammation of the bursa (a potential fluid filled sac) that may be caused by trauma, chronic overuse, inflammatory arthritis, and acute or chronic infection that generally presents with localized pain and tenderness of the shoulder.

a. History and Initial Diagnostic Procedures (Bursitis of the Shoulder):

- Occupational Relationship - onset of symptoms, date, mechanism of onset, and occupational history and current requirements should be correlated with the intensity, character, duration and frequency of associated pain and discomfort.

- History may include nocturnal pain, pain with over-the-shoulder activities, feeling of shoulder weakness, prior treatment for presenting complaint(s), specific limitations of movement and pertinent familial history.

b. Physical Findings (Bursitis of the Shoulder): may include:

- Palpation elicits localized tenderness over the particular bursa or inflamed tendon; loss of motion during activity;

- Painful arc may be seen between 40-120° and/or

- Bursitis may be associated with other shoulder injury diagnoses such as impingement, rotator cuff instability, tendinitis, etc.; refer to applicable diagnosis subsections for additional guidelines.

c. Laboratory Tests (Bursitis of the Shoulder): may be used to rule out systemic illness or disease when proper clinical presentation indicates the necessity for such testing. Testing could include sedimentation rate, rheumatoid profile, complete blood count (CBC) with differential, serum uric acid level, routine screening of other medical disorders may be necessary, as well as bursal aspiration with fluid analysis.

d. Testing Procedures (Bursitis of the Shoulder):

i. Plain x-rays include:

A) AP view visualizes elevation of the humeral head, indicative of absence of the rotator cuff due to a tear;

B) Lateral view in the plane of the scapula or an axillary view determines if there is anterior or posterior dislocation or the presence of a defect in the humeral head (a Hill-Sachs lesion);

C) 30° caudally angulated AP view determines if there is a spur on the anterior/ interior surface of the acromion and/or the far end of the clavicle; and

D) Outlet view determines if there is a downwardly tipped acromion.

e. **Non-operative Treatment Procedures (Bursitis of the Shoulder):**

i. Benefits may be achieved through procedures outlined in Section G. Non-operative Treatment Procedures, such as immobilization, therapeutic exercise, alteration of occupation and work station, thermal therapy, TENS unit, and ultrasound.

ii. May return to work without overhead activities and lifting with involved arm until cleared by physician for those and heavier activities.

iii. Additional modalities/treatment procedures may include biofeedback; physical medicine and rehabilitation including instruction in therapeutic exercise, proper work technique and manual therapy; psychosocial intervention; vocational rehabilitation, vocational assessment and interdisciplinary team approach.

iv. Medications such as nonsteroidal anti-inflammatories and analgesics. Subacromial space injection may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Injection of the corticosteroids directly into the tendons should be

A) Avoided due to possible tendon breakdown and degeneration,

B) Limited to 3 injections per year at the same site, and

C) Avoided in patients under 30 years of age.

f. **Operative Procedures (Bursitis of the Shoulder):** are not commonly indicated for pure bursitis; refer to other appropriate diagnoses in Section E. Specific Diagnosis Testing and Treatment.

6. **IMPINGEMENT SYNDROME** A collection of symptoms, not a pathologic diagnosis. The symptoms result from the encroachment of the acromion, coracoacromial ligament, coracoid process, and/or the AC joint of the rotator cuff mechanism that passes beneath them as the shoulder is moved. The cuff mechanism is intimately related to the coracoacromial arch. Separated only by the thin lubricating surfaces of the bursa, compression and friction can be minimized by several factors, such as

- Shape of the coracoacromial arch that allows passage of the subjacent rotator cuff;
- Normal undersurface of the AC Joint;
- Normal bursa;

- Normal capsular laxity; and
- Coordinated scapulothoracic function.

The impingement syndrome may be associated with AC joint arthritis and both partial- and full-thickness rotator cuff tears, as well as adhesive capsulitis/frozen shoulder. Normal function of the rotator cuff mechanism and biceps tendon assist to diminish impingement syndrome.

a. History and Initial Diagnostic Procedures (Impingement Syndrome):

i Occupational Relationship - established repetitive overuse of the upper extremity; many times this is seen with constant overhead motion.

ii. History may include:

A) Delayed presentation; since the syndrome is usually not an acute problem; patients will access care if their symptoms have not resolved with rest, time and "trying to work it out";

B) Complaints of functional losses due to pain, stiffness, weakness and catching when the arm is flexed and internally rotated; and

C) Poor sleep is common and pain is often felt down the lateral aspect of the upper arm near the deltoid insertion or over the anterior proximal humerus.

b. Physical Findings (Impingement Syndrome): may include:

i. Inspection of the shoulder may reveal deltoid and rotator cuff atrophy;

ii. Range of motion is limited particularly in internal rotation and in cross-body adduction;

iii. Passive motion through the 60-90° arc of flexion may be accompanied by pain and crepitus; this is accentuated as the shoulder is moved in-and-out of internal rotation;

iv. Active elevation of the shoulder is usually more uncomfortable than passive elevation;

v. Pain on maximum active forward flexion is frequently seen with impingement syndrome, but is not specific for diagnosis;

vi. Strength testing may reveal weakness of flexion and external rotation in the scapular plane; this weakness may be the result of disuse, tendon damage, or poor scapulothoracic mechanics;

vii. Pain On Resisted Abduction Or External Rotation May Also Indicate That The Integrity Of The Rotator Cuff Tendons May Be Compromised; And/Or

vii. Weakness of the posterior scapular stabilizers can also be seen as a contributing factor to impingement syndrome by altering the mechanics of the glenohumeral joint.

c. **Laboratory Tests (Impingement Syndrome):** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Impingement Syndrome):**

i. Plain x-rays include:

A) AP view visualizes elevation of the humeral head, indicative of rotator cuff fiber failure with diminished space at the subacromial area;

B) Lateral view in the plane of the scapula or an axillary view can help to determine aspects of instability which can give symptoms similar to impingement syndrome;

C) 30° caudally angulated AP view can assess for a spur on the anterior/inferior surface of the acromion and/or the distal end of the clavicle which can lead to encroachment on the rotator cuff mechanism with motion; and

D) Outlet view determines if there is a downwardly tipped acromion.

ii. Adjunctive testing, such as standard radiographic techniques (sonography, arthrography or MRI), should be considered when shoulder pain is refractory to 4-6 weeks of non-operative conservative treatment and the diagnosis is not readily identified by a good history and clinical examination.

e. **Non-operative Treatment Procedures (Impingement Syndrome):** may include:

i. Medications, such as nonsteroidal anti-inflammatories and analgesics, should be prescribed as seen in Section F. Medications. Subacromial space injection may be therapeutic if the patient responded positively to a diagnostic injection of an anesthetic. Injections of corticosteroids into the subacromial space should be

A) Limited to 3 injections per year at the same site, and

B) Avoided in Patients less than 30 years.

ii. In order to have the most favorable outcome from a conservative approach, an aggressive attempt should be made to define the contributing factors which are driving the syndrome, such as shoulder stiffness, humeral head depressor weakness (rotator cuff fiber failure), and subacromial crowding AC Joint arthritis.

iii. Procedures outlined in Section G. Non-operative Treatment Procedures should be considered, such as relative rest, immobilization, thermal

treatment, ultrasound, therapeutic exercise and physical medicine and rehabilitation.

f. **Operative Procedures (Impingement Syndrome):** should restore functional anatomy by reducing the potential for repeated impingement; procedures might include distal clavicular resection, coracoacromial ligament release, and/or acromioplasty.

g. **Post-Operative Procedures (Impingement Syndrome):** would include an individualized rehabilitation program based upon communication between the surgeon and the therapist.

i. Individualized rehabilitation programs based upon communication between the surgeon and the therapist might include:

A) Sling or abduction splint;

B) Gentle pendulum exercise, passive glenohumeral range of motion and aggressive posterior scapular stabilizing training can be instituted;

C) At 4 weeks post-operative, begin isometrics and ADL involvement; and/or

D) Depending upon the patient's functional response, at 6 weeks post-operative consider beginning light resistive exercise; concomitantly, return to a light/modified duty may be plausible given the ability to accommodate "no repetitive overhead activities."

ii. Progressive resistive exercise from 2 months with gradual returning to full activity at 5-7 months; all active non-operative procedures listed in this Section G. Non-operative Treatment Procedures should be considered.

iii. Work restrictions should be evaluated every 4-6 weeks during post-operative recovery and rehabilitation with appropriate written communications to both the patient and the employer. Should progress plateau, the provider should reevaluate the patient's condition and make appropriate adjustments to the treatment plan.

7. **ROTATOR CUFF TEAR** Partial- or full-thickness tears of the rotator cuff tendons, most often the supraspinatus can be caused by vascular, traumatic or degenerative factors or a combination. Further tear classification includes: a small tear is less than 1cm; medium tear is 1-3cm; large tear is 3-5cm; and massive tear is greater than 5cm, usually with retraction.

a. **History and Initial Diagnostic Procedures (Rotator Cuff Tear):**

i. Occupational Relationship - established with sudden trauma to the shoulder or chronic over-use with repetitive overhead motion with internal or external rotation.

ii. History may include:

A) Partial-thickness cuff tears usually occur in age groups older than 30. Full-thickness tears can occur in younger age groups.

B) Complaints of pain along anterior, lateral or posterior glenohumeral joint.

b. **Physical Findings (Rotator Cuff Tear)** may include:

i. Partial-Thickness Tear

A) There will be pain at the end of range of motion with full passive range-of-motion for abduction, elevation, external rotation; internal rotation is attainable;

B) Active range of motion will be limited and painful for abduction and external rotation, as well as internal rotation and forward flexion;

C) A painful arc may be present with active elevation;

D) Pain will be positive for resisted tests (abduction, flexion, external rotation, internal rotation, abduction/internal rotation at 90°, and abduction/external rotation at 45°; and/or

E) If there are positive impingement signs, see this Section E.6, Impingement Syndrome.

ii. Full-Thickness Tears

A) Passive and resisted findings are similar to those for partial-thickness tears; and/or

B) Active elevation will be severely limited with substitution of scapular rotation being evident.

c. **Laboratory Tests (Rotator Cuff Tear):** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Rotator Cuff Tear):**

i. Plain x-rays include:

A) AP view visualizes elevation of the humeral head, indicative of absence of the rotator cuff due to a tear;

B) Lateral view in the plane of the scapula or an axillary view determines if there is anterior or posterior dislocation or the presence of a defect in the humeral head (a Hill-Sachs lesion);

C) 30° caudally angulated AP view determines if there is a spur on the anterior/inferior surface of the acromion and/or the far end of the clavicle; and

D) Outlet view determines if there is a downwardly tipped acromion.

ii. Adjunctive testing should be considered when shoulder pain is refractory to 4-6 weeks of non-operative conservative treatment and the diagnosis is not readily identified by standard radiographic techniques, then sonography, arthrography or MRI may be indicated.

e. **Non-operative Treatment Procedures (Rotator Cuff Tear):**

i. Medications, such as nonsteroidal anti-inflammatories and analgesics, would be indicated; acute rotator cuff tear could indicate the need for limited narcotics use.

ii Relative rest and procedures outlined in Section G. Non-operative Treatment Procedures, such as immobilization, therapeutic exercise, alteration of occupation/work station, thermal treatment, TENS unit, therapeutic ultrasound, return-to-work, biofeedback and physical medicine and rehabilitation. If no increase in function for a partial- or full-thickness tear is observed after 6-12 weeks, a surgical consultation is indicated. Early surgical intervention produces better surgical outcome due to healthier tissues and often less limitation of movement prior to and after surgery.

f. **Operative Procedures (Rotator Cuff Tear):** options would include arthroscopic repair or an open debridement and repair. Goals of surgical intervention are to restore functional anatomy by reestablishing continuity of the rotator cuff, and to reduce the potential for repeated impingement by the performance of procedures such as distal clavicular resection, coracoacromial ligament release, and/or anterior acromioplasty.

g. **Post-Operative Procedures (Rotator Cuff Tear):** would include an individualized rehabilitation program based upon communication between the surgeon and the therapist.

i. Individualized rehabilitation program-based on communication between the surgeon and the therapist might include:

- Sling or abduction splint;
- Gentle pendulum exercise, passive glenohumeral range of motion in flexion and external rotation to prevent adhesions and maintain mobilization;
- At 6 weeks post-operative begin isometrics and ADL involvement;
- Active assisted range-of-motion in supine with progression to sitting;
- At 6-8 weeks, depending on quality of tissue, begin light resistive exercise;
- Pool exercise, manual resistive exercise to 90°, scapula mobilization exercise with glenohumeral stabilization; and
- Scapular plane exercise.

ii. Progressive resistive exercise from 3-6 months, with gradual returning to full activity at 6-9 months. All active non-operative procedures listed in this Section G. Non-operative Treatment Procedures should be considered.

iii. Work restrictions should be evaluated every 4-6 weeks during post-operative recovery and rehabilitation with appropriate written communications to both the patient and employer. Should progress plateau, the provider should reevaluate the patient's condition and make appropriate adjustments to the treatment plan.

8. **ROTATOR CUFF TENDINITIS** Inflammation of one or more of the four musculotendinous structures which arise from the scapula and insert on the lesser or greater tuberosity of the humerus. These structures include one internal rotator (subscapularis), and two external rotators (infraspinatus and teres minor), and the supraspinatus which assists in abduction.

a. **History and Initial Diagnostic Procedures (Rotator Cuff Tendinitis):**

- Occupational Relationship - may include symptoms of pain and/or achiness that occur after repetitive use of the shoulder and/or blunt trauma to the shoulder.

b. **Physical Findings (Rotator Cuff Tendinitis)** may include:

i. Pain with palpation to the shoulder with active or passive abduction and external rotation of the shoulder (painful arc);

ii. Pain with impingement signs; and/or

iii. Pain with specific activation of the involved muscles.

c. **Laboratory Tests (Rotator Cuff Tendinitis):** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Rotator Cuff Tendinitis)** may include:

i. Plain x-ray films including AP lateral, axial, 30° caudally angulated AP, Outlet view.

ii. If shoulder pain is refractory to 4-6 weeks of non-operative care and the diagnosis is not readily identified by standard radiographic techniques, then adjunctive testing, such as MRI, sonography or arthrography, may be indicated.

iii. Subacromial space injection can be used as a diagnostic procedure by injecting an anesthesia, such as sensorcaine or xylocaine solutions, into the space. If the pain is alleviated with the injection the diagnosis is confirmed.

e. **Non-operative Treatment Procedures (Rotator Cuff Tendinitis)** may include:

i. Medications, such as nonsteroidal anti-inflammatories and analgesics: Subacromial space injection may be therapeutic if the patient responded

positively to a diagnostic injection of an anesthetic. Injection of the corticosteroids directly into the tendons should be:

A) Avoided due to possible tendon breakdown and degeneration,

B) Limited to 3 injections per year at the same site, and

C) Avoided in patients under 30 years of age.

ii. Procedures outlined in Section G. Non-operative Treatment Procedures such as relative rest, immobilization, thermal treatment, ultrasound, therapeutic exercise, physical medicine and rehabilitation.

f. **Operative Procedures (Rotator Cuff Tendinitis):** are not indicated for this diagnosis.

9. **SHOULDER FRACTURES** There are five common types of shoulder fractures; each type will be addressed separately and in the order of most frequent occurrence.

a. **Clavicular Fracture:**

i. History and Initial Diagnostic Procedures (Clavicular Fracture)

- Occupational Relationship - can result from direct blows or axial loads applied to the upper limb; commonly associated injuries include rib fractures, long-bone fractures of the ipsilateral limb and scapulothoracic dislocations.

ii. Physical Findings (Clavicular Fracture) may include:

A) Pain in the clavicle;

B) Abrasions on the chest wall, clavicle and shoulder can be seen;

C) Deformities can be seen in the above regions; and/or

D) Pain with palpation and motion at the shoulder joint area.

iii. Laboratory Tests (Clavicular Fracture) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Clavicular Fracture) would usually include routine chest x-rays. If they do not reveal sufficient information, then a 20E caudalcranial AP view centered over both clavicles can be done.

v. Non-operative Treatment Procedures (Clavicular Fracture)

A. Most are adequately managed by closed techniques and do not require surgery. After reduction, the arm is immobilized in a sling or figure-8 bandage. Shoulder rehabilitation is begun with pendulum exercises 10-14 days after injury. Subsequently, with pain control, the therapy program can be progressed with therapeutic approaches as seen in this Section G. Non-operative Treatment Procedures.

B) Medication, such as analgesics and nonsteroidal anti-inflammatories, would be indicated; narcotics may be indicated acutely for fracture and should be prescribed as indicated use is indicated in Section F. Medications.

vi. Operative Procedures (Clavicular Fracture) would be indicated for open fractures, vascular or neural injuries requiring repair, bilateral fractures, ipsilateral scapular or glenoid neck fractures, scapulothoracic dislocations, flail chest and nonunion displaced-closed fractures that show no evidence of union after 4-6 months. Also a Type II fracture/dislocation at the AC joint where the distal clavicular fragment remains with the acromion and the coracoid, and the large proximal fragment is displaced upwards.

vii. Post-Operative Procedures (Clavicular Fracture) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program would begin with 2-3 weeks of rest with a shoulder immobilizer while encouraging isometric deltoid strengthening; pendulum exercises with progression to assisted forward flexion and external rotation would follow; strengthening exercises should be started at 10-12 weeks as seen in Section G. Non-operative Treatment Procedures.

b. Proximal Humeral Fractures:

i. History and Initial Diagnostic Procedures (Proximal Humeral Fractures)

A) Occupational Relationship - may be caused by a fall onto an abducted arm; may also be caused by high-energy (velocity or crush) trauma with an abducted or non-abducted arm; associated injuries are common, such as glenohumeral dislocation, stretch injuries to the axillary, musculocutaneous, and radial nerves; axillary artery injuries with high energy accident.

ii. Physical Findings (Proximal Humeral Fractures) may include:

A) Pain in the upper arm;

B) Swelling and bruising in the upper arm, shoulder and chest wall;

C) Abrasions about the shoulder; and/or

D) Pain with any attempted passive or active shoulder motion.

iii. Laboratory Tests (Proximal Humeral Fractures) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Proximal Humeral Fracture)

A) X-ray trauma series (3 views) are needed; AP view, axillary view and a lateral view in the plane of the scapula. The latter two views are needed to determine if there is a glenohumeral dislocation.

B) Vascular studies are obtained emergently if the radial and brachial pulses are absent.

C) Classification is by the Neer Method; there can be four fragments - the humeral shaft, humeral head, greater tuberosity, and the lesser tuberosity. The fragments are not truly considered fragments unless they are separated by 1cm or are angulated 45°. or more.

v. Non-operative Treatment Procedures (Proximal Humeral Fractures)

A) Impacted fractures of the humeral neck or greater tuberosity are managed non-operatively.

B) Isolated and minimally displaced (less than 1cm) fractures are treated non-operatively.

C) Anterior or posterior dislocation associated with minimally displaced fractures can usually be reduced by closed means, but a general anesthetic is needed.

D) Immobilization is provided with a sling, to support the elbow, or with an abduction immobilizer if a non-impacted greater tuberosity fragment is present.

E) Immobilization is continued for 4-6 weeks

F) Shoulder rehabilitation is begun with pendulum exercises 10-14 days after injury. Subsequently, with pain control, the therapy program can be progressed with therapeutic approaches as seen in Section G. Non-operative Treatment Procedures.

vi. Operative Procedures (Proximal Humeral Fractures)

A) Indications for operative treatment would include:

1) Unstable surgical neck fractures (no contact between the fracture fragments).

2) Partially unstable fractures (only partial contact) with associated same upper extremity injuries.

3) Displaced 3- and 4-part fractures may be managed by a prosthetic hemiarthroplasty and reattachment of the tuberosities.

vii. Post-Operative Procedures (Proximal Humeral Fractures) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist.

A) See this Section IV. G, Shoulder Fracture, Non-operative Treatment Procedures.

B) Schanz pins are removed from the greater tuberosity fragment at 2-3 weeks.

C) Schanz pins across the humeral neck are removed at 4-6 weeks.

c. Humeral Shaft Fractures:

i. History and Initial Diagnostic Procedures (Humeral Shaft Fractures)

- Occupational Relationship - a direct blow can fracture the humeral shaft at the junction of its middle and distal thirds; twisting injuries to the arm will cause a spiral humeral shaft fracture; high energy (velocity or crush) will cause a comminuted humeral shaft fracture.

ii. Physical Findings (Humeral Shaft Fractures) may include:

A) Deformity of the arm;

B) Bruising and swelling; and/or

C) Possible sensory and/or motor dysfunction of the radial nerve.

iii. Laboratory Tests (Humeral Shaft Fractures) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Humeral Shaft Fractures)

A) Plain x-rays including AP view and lateral of the entire humeral shaft.

B) Vascular studies if the radial pulse is absent.

C) Compartment pressure measurements if the surrounding muscles are swollen, tense and painful and particularly if the fracture resulted from a crush injury.

v. Non-operative Treatment Procedures (Humeral Shaft Fractures)

A) Most isolated humeral shaft fractures can be managed non-operatively.

B) A coaptation splint may be applied. The splint is started in the axilla, extended around the elbow and brought up to the level of the acromion. It is held in place with large elastic bandages.

C) At 2-3 weeks after injury, a humeral fracture orthosis may be used to allow for full elbow motion.

vi. Operative Treatment (Humeral Shaft Fractures)

A) Indications for operative care would include:

- Open fracture;

- Associated forearm or elbow fracture (i.e., the floating elbow injury);
- Burned upper extremity;
- Associated paraplegia;
- Multiple injuries (polytrauma);
- A radial nerve palsy which came on after closed reduction; and/or
- Pathologic fracture related to an occupational injury.

B) Accepted methods of internal fixation include:

(1) A broad plate and screws; and/or

(2) Intramedullary rodding with or without cross-locking screws.

vii. Post-Operative Procedures (Humeral Shaft Fractures) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. Following rigid internal fixation, therapy may be started to obtain passive and later active shoulder motion using appropriate therapeutic approaches as seen in Section G. Non-operative Treatment Procedures. Active elbow and wrist motion may be started immediately.

d. Scapular Fractures:

i. History and Initial Diagnostic Procedures (Scapular Fractures)

- ❖ Occupational Relationship - these are the least common of the fractures about the shoulder and include acromial, glenoid, glenoid neck and scapular body fractures. With the exception of anterior glenoid lip fractures caused by an anterior shoulder dislocation, all other scapular fractures are due to a high energy injury.

ii. Physical Findings (Scapular Fractures) may include:

A) Pain about the shoulder and thorax;

B) Bruising and abrasions;

C) Possibility of associated humeral or rib fractures; and/or

D) Vascular problems (pulse evaluation and Doppler examination).

iii. Laboratory Tests (Scapular Fractures), because of the association of high energy trauma, may include a complete blood count, urinalysis and chest x-ray are warranted.

iv. Testing Procedures (Scapular Fractures)

A) Trauma x-ray series - AP view axillary view, and a lateral view in the plane of the scapula.

B) Arteriography if a vascular injury is suspected.

C) Electromyographic exam if nerve injuries are noted.

v. Non-operative Treatment Procedures (Scapular Fractures)

A) Non-displaced acromial, coracoid, glenoid, glenoid neck and scapular body fractures may all be treated with the use of a shoulder immobilizer.

B) Pendulum exercises may be started within the first week.

C) Progress to assisted range of motion exercises at 3-4 weeks using appropriate therapeutic procedures as seen in this Section G. Non-operative Treatment Procedures.

vi Operative Treatment (Scapular Fractures)

A) Acromial fractures which are displaced should be internally fixed to prevent a nonunion. These fractures may be fixed with lagged screws and a superiorly placed plate to neutralize the muscular forces.

B) Glenoid fractures which are displaced greater than 2-3 mm should be fixed internally. The approach is determined by studying the results of a CT scan.

C) Scapular body fractures require internal fixation if the lateral or medial borders are displaced to such a degree as to interfere with scapulothoracic motion.

D) Displaced fractures of the scapular neck and the ipsilateral clavicle require internal fixation of the clavicle to reduce the scapular neck fracture.

vii. Post-Operative Treatment (Scapular Fractures) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist using the appropriate therapeutic procedures seen in Section G. Non-operative Treatment Procedures, a shoulder immobilizer is utilized, pendulum exercises at one week, deltoid isometric exercises are started early, and, at 4-6 weeks, active range of motion is commenced.

e. Sternoclavicular Dislocation/Fracture:

i. History and Initial Diagnostic Procedures (Sternoclavicular Dislocation/Fracture)

- Occupational Relationship - established with sudden trauma to the shoulder/ anterior chest wall; anterior dislocations of the sternoclavicular joint usually do not require active treatment; however, symptomatic posterior dislocations will require reduction.

ii. Physical Findings (Sternoclavicular Dislocation/Fracture) may include:

A) Pain at the sternoclavicular area;

B) Abrasions on the chest wall, clavicle and shoulder can be seen;

C) Deformities can be seen in the above regions; and/or

D) Pain with palpation and motion at the sternoclavicular joint area.

iii. Laboratory Tests (Sternoclavicular Dislocation/Fracture) are not indicated unless a systemic illness or disease is suspected.

iv. Testing Procedures (Sternoclavicular Dislocation/Fracture)

A) Plain x-rays of the sternoclavicular joint are routinely done. When indicated, comparative views of the contralateral limb may be necessary.

B) X-rays of other shoulder areas and chest wall may be done if clinically indicated.

C) Vascular studies should be considered if the history and clinical examination indicate extensive injury.

v. Non-operative Treatment Procedures (Sternoclavicular Dislocation /Fracture)

A) Symptomatic posterior dislocations should be reduced in the operating room under general anesthesia.

B) Immobilize with a sling for 3-4 weeks. Subsequently, further rehabilitation may be utilized using procedures set forth in Section G. Non-operative Treatment Procedures.

C) Medications, such as analgesics and nonsteroidal anti-inflammatories, would be indicated; narcotics may be indicated acutely for fracture and should be prescribed as indicated use is indicated in this Section F. Medications.

vi. Operative Procedures (Sternoclavicular Dislocation/Fracture) would be warranted following failure of reduction by manipulation with pointed reduction forceps. Caution should be utilized when pins or screws are used for stabilization secondary to migration.

vii. Post-Operative Procedures (Sternoclavicular Dislocation/Fracture) would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. This program

would begin with 4-6 weeks of rest with a shoulder immobilizer and be followed by pendulum exercises with progression to assisted forward flexion and external rotation. Strengthening exercises should be started at 8-10 weeks.

10. **SHOULDER INSTABILITY** Subluxation (partial dislocation) or dislocation of the glenohumeral joint in either an anterior, interior, posterior or multidirectional position.

a. **History and Initial Diagnostic Procedures (Shoulder Instability):**

i. Occupational Relationship - instability should be apparent following a direct traumatic blow to the shoulder, or indirectly by falling on an outstretched arm, or while applying significant traction to the arm, or may also develop with a cumulative trauma to the shoulder. Symptoms should be exacerbated or provoked by work and initially alleviated with a period of rest. Symptoms may be exacerbated by other activities that are not necessarily work related (e.g., driving a car).

ii. History may include:

A) A slipping sensation in the arm;

B) Severe pain with inability to move the arm;

C) Abduction and external rotation produce a feeling that the shoulder might "come out"; or

D) Feeling of shoulder weakness.

iii. In subacute and/or chronic instabilities, age of onset of instability is important in the history. Older age group (over age 30) has a propensity not to re-dislocate. Younger age groups need a more aggressive treatment plan.

iv. Avoid any aggressive treatment in patients with history of voluntary subluxation or dislocation. These patients may need a psychiatric evaluation.

b. **Physical Findings (Shoulder Instability)** may include:

i. Anterior dislocations would likely include loss of normal shoulder contour; a fullness in the axilla; pain over the shoulder with any motion and often the patient holding the extremity in a very still position;

ii. Posterior dislocations usually occur with a direct fall on the shoulder or outstretched arm resulting in posteriorly directed forces to the humeral head. These patients present with inability to externally rotate the shoulder;

iii. Neurologic examination could reveal most commonly axillary nerve injuries, but occasionally musculocutaneous nerve injuries are seen; and/or

iv. Abduction and external rotation positioning will produce pain in those who have anterior instability. Direct posterior stress in a supine position will produce pain in those with posterior instability. Longitudinal traction will produce a "sulcus sign" (a large dimple on the lateral side of the shoulder) when there is inferior instability.

c. **Laboratory Tests (Shoulder Instability):** are not indicated unless a systemic illness or disease is suspected.

d. **Testing Procedures (Shoulder Instability):**

i. Plain x-rays to rule out bony deficit on the glenoid, including AP, axillary view, lateral in the plane of the scapula and possibly the West Point view. Axillary view to identify larger Hill-Sachs lesion of humeral head.

ii. On more difficult diagnostic cases with subtle history and physical findings suggesting instability, MRI, or a CT assisted arthrogram or MRI assisted arthrogram may be ordered for lateral detachment after 4-8 weeks of therapy. (This is done only after other conservative therapies have failed.)

e. **Non-operative Treatment Procedures (Shoulder Instability):**

i. First-Time Acute Severe Bony Involvement:

A) Therapeutic Procedures

1) Immobilization

2) Therapeutic Exercise

3) Alteration of Occupation & Work Station

4) Thermal Treatment

5) TENS Unit

6) Ultrasound

B) May not return to work with overhead activity or lifting with involved arm until cleared by physician for heavier activities.

C) Additional modalities may include:

1) Biofeedback

2) Physical Medicine and Rehabilitation

a) Instruction in Therapeutic Exercise and Proper Work Techniques

b) Manual Therapy Techniques

3) Psychosocial Intervention

4) Work Conditioning

a) Vocational Rehabilitation

b) Vocational Assessment

c) Interdisciplinary Team Approach

i. Work Hardening

ii. Functional Restoration Programs

iii. Pain Clinics

D) Medications - medication discussions are in Section F. Medications

1) Analgesics

2) Anti-inflammatories

ii. Acute or chronic dislocations with large fracture fragments contributing to instability;

a) Attempt to treat with immobilization if in acceptable position, otherwise repair surgically

b) Return-to-work may be directly related to time it takes for the fracture to heal

iii. Subacute and/or chronic instability:

a) Provocative dislocation should first be treated similarly to acute dislocation.

b) If acute treatment is unsuccessful, and still having findings of instability, would consider operative repair.

f. Operative Procedures (Shoulder Instability):

i. Identify causative agent for the instability (i.e., labral detachment, bony lesion, or multidirectional instability), then proceed with:

a) Bony block transfer;

b) Capsular tightening; or

c) Bankart lesion repair.

g. Post-Operative Procedures (Shoulder Instability): would include an individualized rehabilitation program based upon communication between the surgeon and the therapist. Depending upon the type of surgery, the patient will be immobilized for 3-6 weeks. As soon as it is safe to proceed without damaging the repair, progressive therapy with consultation involving an occupational and/or

physical therapist should begin with therapeutic exercise, physical medicine and rehabilitation (refer to Section G. Non-operative Treatment Procedures). During this period of time, the patient could resume working when:

i. A job assessment results in the treating physician's identification of needed modifications and restrictions;

ii. The patient has attained a general level of comfort;

iii. Medications which would predispose to injury are no longer being prescribed or used; and

iv. The treating physician has cleared the patient for the specific vocational activities.

MMI can be expected 3 months after non-operative medications and 3-6 months after operative medications. Further job assessment and adjusted work restrictions may be needed prior to the patients return to full duty.

F. MEDICATIONS

For shoulder disorders, medications play a secondary role and should never be the sole modality of treatment. If a patient's symptoms resolve quickly with medications or any other passive modality, the practitioner should still consider prescribing a brief course in shoulder and upper extremity education and safety. When required, a wide range of medication is available. Modalities in this group are generally accepted, established and widely used. All narcotics and habituating medications should be prescribed with strict time, quantity and duration guidelines with a definite cessation parameter. Prescribing these drugs on an as-needed basis (PRN) should almost always be avoided.

1. **NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs)** are probably the most useful medications in acute and chronic shoulder injury. In mild cases, they may be the only drug required for analgesia. There are several classes of NSAIDs and the response of the individual patient to a specific medication is unpredictable. For this reason, a range of anti-inflammatory medications may be tried in each case with the most effective preparation being continued.

   - Time to produce effect
     acute pain: 3 to 7 days,
     chronic pain: 3 to 7 days

   - Frequency
     acute pain: 1 to 4 times/day
     chronic pain: 1 to 4 times/day

   - Optimum duration
     acute pain: 2 weeks
     chronic pain: up to 1 year

   - Maximum continuous duration
     acute pain: 6 weeks;
     chronic pain: 1 year

   For prolonged use of NSAIDs greater than 1-3 months, patients should be monitored for adverse reactions. Appropriate intervals for metabolic screening are dependent upon the patient's age, general health status and should be within parameters listed for each specific medication.

2. **ANALGESICS** (acetaminophen and aspirin are the common choice for non-narcotic analgesia.

   - Time to produce effect: immediate, usually ineffective in severe attacks

   - Frequency: 3-5 times/day

   - Optimum duration: 3-4 days

   - Maximum continuous duration: 6 weeks

3. **PSYCHOTROPIC MEDICATION** may be used in patients with a high level of anxiety or depression. A variety of psychotropic drugs may be used. In acute or subacute shoulder injury, these medications are generally unnecessary except for the use of tricyclic

antidepressants as substitutes for hypnotics and/or analgesics. In most cases, major tranquilizers, anxiolytics and antidepressants are reserved for chronic pain disorders. Patients whose chief complaint is shoulder injury, but require use of major tranquilizers or anxiolytics for greater than two weeks, should be considered for psychological and/or psychiatric consultation. In particular, benzodiazepams are almost always contraindicated in patients with shoulder injury unless a severe anxiety state exist requiring psychiatric supervision or in cases of extremely severe, objectively visualized acute muscle spasm. In this type of acute scenario, the maximum duration for benzodiazepam administration should be limited to less than five days.

- Time to produce effect: 2-3 weeks
- Frequency: For tricyclics, prefer single dose at night
- Optimum duration: 1-6 months
- Maximum duration: 6-12 months, with monitoring

4. **HYPNOTICS** may be given to shoulder injury sufferers because of a chief complaint of "inability to sleep." Such medication must be used with caution because of their dependence-producing capabilities. The Division recommends consideration of sedating tricyclic antidepressants as an alternative when necessary. Physical methods of restoring a normal sleep pattern can usually be employed as an alternative to medication.

   - Time to produce effect: 1-3 days
   - Frequency: At night
   - Optimum duration: 1 week
   - Maximum duration: 2-3 weeks

5. **NARCOTICS** should be primarily reserved for the treatment of acute shoulder injury or the treatment of patients with objectively documented acute exacerbations. The action of these drugs is central, affecting the patient's perception of pain rather than the pain process itself.

   - Time to produce effect: Immediate
   - Frequency: Every 3-4 hours
   - Optimum duration: 3 days
   - Maximum duration: 2 weeks

   Narcotics are rarely indicated in the treatment of patients with pure shoulder injury without fracture. In mild to moderate cases of upper extremity pain, narcotic medication should not be used at all. Adverse effects include respiratory depression and the development of physical and psychological dependence.

6. **MINOR TRANQUILIZERS/MUSCLE RELAXANTS** should be primarily reserved for the treatment of acute shoulder with muscle spasm or the treatment of patients with objectively documented acute exacerbations. Muscle relaxants may have a significant effect on the early phases of acute shoulder disorders. Their action is central and with no

effect on the neuromuscular junction of the muscles themselves. Purported peripheral effects are difficult to separate from the anxiolytic central action.

- Time to produce effect: 1 day
- Frequency: 1-4 times/day; preferably just at night
- Optimum duration: 1 week
- Maximum duration: 4 weeks

G. NON-OPERATIVE TREATMENT PROCEDURES

1. **IMOBILIZATION** time is dependent upon type of injury, then progress with muscle girdle strengthening

   - ❖ Time to produce effect: 1 day
   - ❖ Frequency: Once
   - ❖ Optimum duration: 1 week
   - ❖ Maximum duration: 12 weeks

   The arm is immobilized in a sling for 1-12 weeks post-injury, depending upon the age of the patient. The patient is instructed in ısometric exercises while in the sling for the internal and external rotators and the deltoid.

2. **RELATIVE REST** may last 3-5 weeks and require job modification/modified duty so as not to exacerbate the acute inflamed shoulder.

3. **THERAPEUTIC EXERCISE** where the therapist instructs the patient in a supervised clinic and home program to increase strength of the supporting shoulder musculature. Motions and muscles to be strengthened include shoulder internal and external rotators, abductors and scapula stabilizers. Isometrics are performed initially, progressing to Isotonic exercises as tolerated.

   - ❖ Frequency of visits: 2-3 times/week for 8-12 wks
   - ❖ Weeks 1-3: Isometrics in sling
   - ❖ Weeks 3-8: Progressive Isotonic exercises
   - ❖ Weeks 8-12: Begin overhead activities when the rotator cuff strength is normalized and full active elevation has been achieved.

4. **ALTERATION OF OCCUPATION AND WORK STATION** early evaluation and training of body mechanics and joint protection and other ergonomic factors is essential and should be done by a qualified individual. Ergonomic risk factors to be addressed include repetitive overhead work, lifting and/or tool use.

5. **THERMAL TREATMENT** includes applications of heat and cold (superficial and deep); therapeutic modalities in this group are generally accepted, established and widely used procedures.

   - ❖ Time to produce effect: 2-4 treatments
   - ❖ Frequency: 2-3 times/week up to 3 weeks, decreasing to 1-2 times/week, after 1 month. Ongoing thermal treatment may be self-administered by the unsupervised patient
   - ❖ Optimum duration: 2-3 months in conjunction with other therapies

6. **TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)** is generally accepted, established and widely used but the mode of action is poorly understood.

- Time to produce effect: 1 or 2 sessions per trial, up to 3 trials
- Frequency: 2-3 times/week (supervised) for 3 weeks; during this supervised period, the patient may utilize the TENS unit daily on a self-monitored basis after receiving instructions
- Optimum duration: 1-3 months

Initially, TENS should be prescribed within a supervised setting in order to assure proper electrode placement and patient education. TENS can be used for short-term pain control. If the response to three treatments is beneficial, it may be continued for 1-3 months and for intermittent unsupervised use thereafter if it facilitates objective functional gains. The Division would not recommend purchase of a TENS unit until efficacy has been substantiated after a 90-day trial period. It may be occasionally useful in specific myofascial pain cases within the above time frames.

7. **THERAPEUTIC ULTRASOUND WITH OR WITHOUT ELECTRIC STIMULATION** using sonic generators to deliver acoustic energy for therapeutic thermal and/or non-thermal soft tissue treatment. There may be a concurrent delivery of electrical energy and/or medication (iontophoresis). Indications include scar tissue, adhesions, collagen fiber and muscle spasm, and the need to extend muscle tissue or accelerate the soft tissue healing.

- Time to produce effect: 6-15 treatments
- Frequency: 3 times/week
- Optimum duration: 4 weeks

8. **ELECTRICAL THERAPEUTIC MODALITY** can be utilized as an adjunct for recovery. In order to justify its use, one must provide documentation regarding functional gains.

- Time to produce effect: 8-12 sessions
- Frequency: 3 times/week
- Optimum duration: 4 weeks

9. **RETURN-TO-WORK** May return to work with no overhead activity, lifting, or repetitive motion with the involved arm until cleared by the primary treating physician for heavier activities. Each case regarding task tolerance should be individualized based on the diagnosis and job demands.

10. **BIOFEEDBACK** is the use of physiological monitoring equipment to:

a. Improve the patient's awareness and control of muscle activity;

b. Reinforce the release of muscle tension that is being obtained from stretches and exercises;

c. Decrease sympathetic arousal that is associated with stress;

d. Improve the patient's ability to feel like they can affect their physical responses and symptoms;

e. Assist in avoiding re-injury through the individual returning to repetitive movement and bracing patterns; or

f. Prepare for surgery.

Treatment time may or may not overlap return-to-work or MMI.

- ❖ Time to produce effect: 3-4 sessions
- ❖ Frequency: 1-2 times/week
- ❖ Optimum duration: 5-6 sessions
- ❖ Maximum duration: 10-12 sessions

11. PHYSICAL MEDICINE AND REHABILITATION

a. Instruction in Therapeutic Exercise and Proper Work Techniques: an active therapeutic exercise program may be beneficial and should contain elements of improving patient flexibility, mobility, posture/ body mechanics, activities-of-daily-living, splinting, bracing, sensory reeducation, endurance, strength and education.

- ❖ Time to produce effect: 2 weeks
- ❖ Frequency: 2-3 times/week
- ❖ Optimum duration: 4-6 weeks
- ❖ Maximum duration: 12 weeks

b. Manual Therapy Techniques: soft tissue mobilization/manipulation techniques may be used as an adjunctive treatment modality.

c. Post-Operative Treatment: may include scar/adhesion reduction techniques.

12. WORK SIMULATION modalities are generally accepted, well-established and widely used. They are simulated activities of daily living including those generally performed by disabled workers in the work place. If placement at modified duty at the work place is unavailable, work simulation should run concurrently or sequentially based upon analysis of physical capacity and job analysis:

- ❖ Time to produce effect: 1-3 weeks
- ❖ Frequency: 2-5 times/week
- ❖ Optimum duration: 2-3 weeks
- ❖ Maximum duration: 3-6 weeks

Work simulation is generally followed either by work hardening, return to work, or a combination thereof (see Work Hardening for additional discussion).

13. **PERSONALITY/PSYCHOLOGICAL/PSYCHOSOCIAL EVALUATIONS** are generally accepted and well-established diagnostic procedures with selected use in the shoulder population, but have more widespread use in the subacute and chronic shoulder population. These procedures may be useful for patients with delayed recovery, chronic pain, recurrent painful conditions, suspected concomitant closed head injury, disability problems and pre-operative evaluation, as well as a possible predictive value for post-operative response. Results may provide clinicians with a better understanding of the patient, thus allowing for more effective rehabilitation. Formal psychological or psychosocial screening should be performed on patients not making expected progress within 6-12 weeks following injury and whose subjective symptoms do not correlate with objective signs and tests. This testing will determine the need for further psychosocial interventions. Evaluations should be performed by an individual with PH.D., PSY.D., L.S.W. or Psychiatric M.D./D.O. credentials. Initial psychological screening is generally completed within one hour. If psychometric testing is indicated as a portion of the initial screening process, the time for such testing should not exceed an additional two hours of professional time.

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

15. **VOCATIONAL ASSESSMENT** Once an authorized practitioner has reasonably determined and objectively documented that a patient will not be able to return to his/her former employment and can reasonably prognosticate final restrictions and date of MMI, then implementation of a timely vocational assessment can provide valuable guidance in the determination of future rehabilitation program design. Clarification of rehabilitation goals, optimize both patient motivation and utilization of rehabilitation resources. Except in the most extenuating circumstances, this process should be implemented within 3-12 months post-injury at the latest, if prognosis for return to former occupation is determined to be guarded to poor. Declaration of MMI should not be delayed solely due to lack of attainment of a vocational assessment.

16. **INTERDISCIPLINARY TEAM APPROACH** interventions are generally accepted, well-established and widely used. This approach includes work hardening programs, functional restoration programs and pain clinics. In general, these programs are more comprehensive, time consuming and costly and are, therefore, appropriate for patients with greater levels of (perceived) disability, dysfunction, de-conditioning and psychological involvement. For shoulder injury cases, all interdisciplinary teams should include a physical therapist and/or occupational therapist who specializes in the upper extremity.

    a. **Functional Restoration Programs:** are intended for patients with both physical de-conditioning and/or significant psychological and socioeconomic involvement. It encompasses work hardening, quantification of function, disability management, adjustment counseling and outcome review. The interdisciplinary team must consist of physicians and therapists working in a structured environment.

    The Division recommends an interdisciplinary team include physical therapy, occupational therapy and psychology or at least related supervised personnel addressing the physiologic, psychologic and ergonomic factors impacting a patient's shoulder injury presentation. Regular, documented interdisciplinary team meetings to discuss patient progress and upgrade rehabilitation goals must

be a part of any credible interdisciplinary approach. The Division recommends programs which meet criteria consistent with those for work hardening established by Commission for the Accreditation of Rehabilitation Facilities (CARF). In non-surgical shoulder injury patients with evidence of delayed recovery, the Division strongly recommends referral to an interdisciplinary/functional restoration program within three months post-injury.

- Time to produce effect: 4-6 weeks
- Frequency: 2-6 times week
- Optimum duration: 6-12 weeks
- Maximum duration: 4 months

b. **Work Hardening Programs:** are generally more comprehensive than work simulation programs and include education, reconditioning and specific work simulation with respect to task quality, quantity and intensity (for further discussion, refer to Work Simulation). The Division recommends the Commission for the Accreditation of Rehabilitation Facilities (CARF) eligibility and/or accreditation of work hardening programs for all facilities treating injured workers to assure that such programs meet certain standards involving program design and efficacy. Work hardening is generally initiated after reconditioning or functional restoration has been completed if imminent return of a patient to modified or full duty is not an option but the prognosis for returning the patient to work at completion of the program is at least fair to good. As discussed in Vocational Assessment, identification of realistic vocational goals is essential for the successful completion of a work hardening program. Generally, work hardening programs entail a progressive increase in the number of hours per day that a patient completes work simulation tasks until the patient can tolerate a full work day:

- Time to produce effect: 2-4 weeks
- Frequency: 2-5 times/week
- Optimum duration: 4-6 weeks
- Maximum duration: 2-3 months

c. **Pain Clinics:** have been the traditional rehabilitation program for chronically disabled shoulder patients who have not responded to functional restoration interventions. In general, pain clinics deal with irreversible, painful neurological disorders and psychological issues, including drug dependence, high levels of stress and anxiety, failed surgery and pre-existing or latent psychopathology. The Division recommends CARF eligibility and/or accreditation of pain clinics treating injured workers to assure that such programs meet certain standards involving program design and efficacy.

The Division also recommends consideration of referral to a pain clinic within 6 months post-injury in those patients with delayed recovery unless surgical interventions or other medical complications intervene. It may be useful in determining the appropriateness of referral to a pain clinic to consider the Colorado Foundation for Medical Care's "Criteria for Outpatient (or Inpatient) Management of Chronic Pain."

- Time to produce effect: 3-8 weeks
- Frequency: 2-7 times/week for first month decreasing to 2-3 times/week thereafter
- Optimum duration: 6-12 weeks, including follow-up for outpatient pain clinics; 3-4 weeks for inpatient pain clinics
- Maximum duration: 4 months, including follow-up

Periodic review and monitoring on an as-needed basis is thereafter founded upon the documented maintenance of functional gains.