1000 DEPARTMENT OF LABOR

1300 Division of Industrial Affairs

1340 The Office of Workers' Compensation

1342 Health Care Practice Guidelines

PART A Carpal Tunnel Syndrome Guidelines

1.0 Introduction

Pursuant to 19 **Del.C.** §2322C, health care practice guidelines have been adopted and recommended by the Health Care Advisory Panel to guide utilization of health care treatments in workers' compensation including, but not limited to, care provided for the treatment of employees by or under the supervision of a licensed health care provider, prescription drug utilization, inpatient hospitalization and length of stay, diagnostic testing, physical therapy, chiropractic care and palliative care. The health care practice guidelines apply to all treatments provided after the effective date of the regulation adopted by the Department of Labor, May 23, 2008, and regardless of the date of injury.

The guidelines are, to the extent permitted by the most current medical science or applicable science, based on well-documented scientific research concerning efficacious treatment for injuries and occupational disease. To the extent that well-documented scientific research regarding the above is not available at the time of adoption of the guidelines, or is not available at the time of any revision to the guidelines, the guidelines have been and will be based upon the best available information concerning national consensus regarding best health care practices in the relevant health care community.

The guidelines, to the extent practical and consistent with the Act, address treatment of those physical conditions which occur with the greatest frequency, or which require the most expensive treatments, for work-related injuries based upon currently available Delaware data.

Services rendered by any health care provider certified pursuant to 19 **Del.C.** §2322D(a) to provide treatment or services for injured employees shall be presumed, in the absence of contrary evidence, to be reasonable and necessary if such treatment and/or services conform to the most current version of the Delaware health care practice guidelines.

Services rendered outside the Guidelines and/or variation in treatment recommendations from the Guidelines may represent acceptable medical care, be considered reasonable and necessary treatment and, therefore, determined to be compensable, absent evidence to the contrary, and may be payable in accordance with the Fee Schedule and Statute, accordingly.

Services provided by any health care provider that is not certified pursuant to 19 **Del.C.** §2322D(a) shall not be presumed reasonable and necessary unless such services are pre-authorized by the employer or insurance carrier, subject to the exception set forth in 19 **Del.C.** §2322D(b).

Treatment of conditions unrelated to the injuries sustained in an industrial accident may be denied as unauthorized if the treatment is directed toward the non-industrial condition, unless the treatment of the unrelated injury is rendered necessary as a result of the industrial accident.

The Health Care Advisory Panel and Department of Labor recognized that acceptable medical practice may include deviations from these Guidelines, as individual cases dictate. Therefore, these Guidelines are not relevant as evidence of a provider's legal standard of professional care.

In accordance with the requirements of the Act, the development of the health care guidelines has been directed by a predominantly medical or other health professional panel, with recommendations then made to the Health Care Advisory Panel.

2.0 General Guideline Principles

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

2.1 **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 CTS 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.

2.2 **TREATMENT PARAMETER** 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 comorbitities and availability of services. Clinical judgment may substantiate the need to accelerate or decelerate modify the time frames total number of visits discussed in this document. The majority of injured workers with Carpal Tunnel Syndrome often will achieve resolution of their condition within 12 to 56 visits (Guide To Physical Therapy Practice – Second Edition). It is anticipated that most injured workers will not require the maximum number of visits described in these guidelines. They are designed to be a ceiling and care extending beyond the maximum allowed visits may warrant utilization review.

2.3 **ACTIVE INTERVENTIONS** emphasizing patient responsibility, such as therapeutic exercise and/or functional treatment, are generally emphasized over passive modalities, especially as treatment progresses. Generally, passive interventions are viewed as a means to facilitate progress in an active rehabilitation program with concomitant attainment of objective functional gains. All rehabilitation programs must incorporate “Active Interventions” no later than three weeks after the onset of treatment. Reimbursement for passive modalities only after the first three weeks of treatment without clear evidence of Active Interventions will require supportive documentation.

2.4 **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.

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

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

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

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

2.9 **RETURN-TO-WORK** is therapeutic, assuming the work is not likely to aggravate the basic problem or increase long-term pain. The practitioner must provide specific physical limitations per the Physician’s Form. The following physical limitations should be considered and modified as recommended: lifting, pushing, pulling, crouching, walking, using stairs, bending at the waist, awkward and/or sustained postures, tolerance for sitting or standing, hot and cold environments, data entry and other repetitive motion tasks, sustained grip, tool usage and vibration factors. Even if there is residual chronic pain, return-to-work is not necessarily contraindicated.

The practitioner should understand all of the physical demands of the patient’s job position before returning the patient to full duty and should receive clarification of the patient’s job duties.

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

2.11 **GUIDELINE RECOMMENDATIONS AND INCLUSION OF MEDICAL EVIDENCE** Guidelines are recommendations based on available evidence and/or consensus recommendations.

Those procedures considered inappropriate, unreasonable, or unnecessary are designated in the guideline as being “not recommended.”

17 DE Reg. 322 (09/01/13)

3.0 Definition

Carpal tunnel syndrome (CTS) is one of the most common mononeuropathies (a disorder involving only a single nerve). The median nerve is extremely vulnerable to compression and injury in the region of the wrist and palm. In this area, the nerve is bounded by the wrist bones and the transverse carpal ligament. The most common site of compression is at the proximal edge of the flexor retinaculum (an area near the crease of the wrist). There is often a myofascial component in the patient's presentation. This should be considered when proceeding with the diagnostic workup and therapeutic intervention.

Studies have repeatedly confirmed that the diagnosis cannot be made based on any single historical factor or physical examination finding. Electrodiagnostic tests may be negative in surgically confirmed cases. Conversely, electrodiagnostic testing may be positive in asymptomatic individuals. The diagnosis of CTS, therefore, remains a clinical diagnosis based on a preponderance of supportive findings.

Classic findings of CTS include subjective numbness or dysesthesias confined to the median nerve distribution, worsening of symptoms at night, and positive exam findings. Please refer to other appropriate upper extremity guidelines as necessary.

4.0 Initial Diagnostic Procedures

4.1 **INTRODUCTION** The two standard procedures that are to be utilized when initially evaluating a work-related carpal tunnel complaint are History Taking, and Physical Examination.

History-taking and Physical Examination are generally accepted, well-established, and widely used procedures which establish the foundation/basis for and dictate all ensuing stages of diagnostic and therapeutic procedures. When findings of clinical evaluation and those of other diagnostic procedures do not complement each other, the objective clinical findings should have preference.

4.2 **HISTORY**

4.2.1 **Description of symptoms - should address at least the following:**

4.2.1.1 Numbness, tingling, and/or burning of the hand involving the distal median nerve distribution; however, distribution of the sensory symptoms may vary considerably between individuals. Although the classic median nerve distribution is to the palmar aspect of the thumb, the index finger, the middle finger and radial half of the ring finger, patients may report symptoms in any or all of the fingers. The Katz Hand diagram (see Fig. 1) may be useful in documenting the distribution of symptoms; the classic pattern of carpal tunnel affects at least two of the first three digits and does not involve dorsal and palmar aspects of the hand. A probable pattern involves the palmar but not dorsal aspect of the hand (excluding digits).

4.2.1.2 Nocturnal symptoms frequently disrupt sleep and consist of paresthesias and/or pain in the hand and/or arm.

4.2.1.3 Pain in the wrist occurs frequently and may even occur in the forearm, elbow or shoulder. While proximal pain is not uncommon, its presence warrants evaluation for other pathology in the cervical spine, shoulder and upper extremity.

4.2.1.4 Shaking the symptomatic hand to relieve symptoms may be reported.

4.2.1.5 Clumsiness of the hand or dropping objects is often reported, but may not be present early in the course.

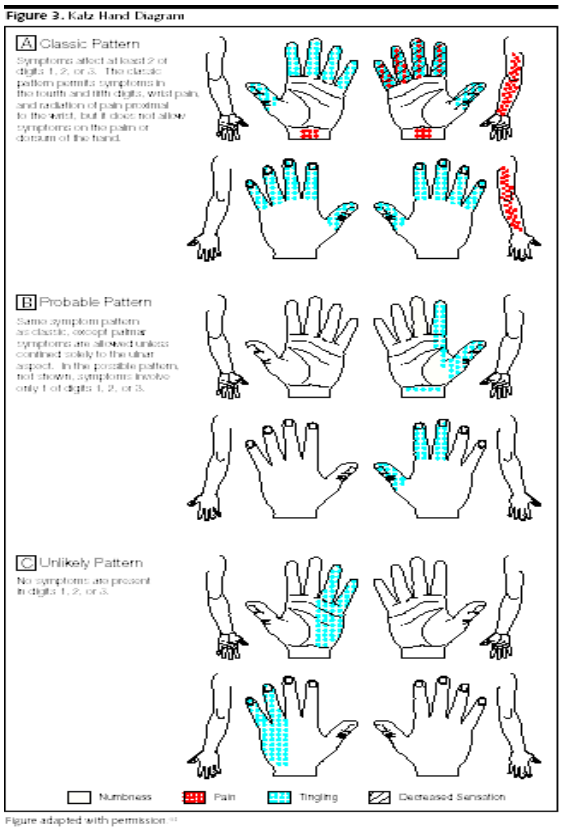

Figure 1 – Katz Hand Diagram Used with permission. JAMA 2000; 283 (23): 3110-17. Copyrighted 2000, American Medical Association.

4.2.2 **Identification of Occupational Risk Factors:** Job title alone is not sufficient information. The clinician is responsible for documenting specific information regarding repetition, force and other risk factors, as listed in the table entitled, 'Risk Factors Associated with CTS'- Table 2. A job site evaluation may be required.

4.2.3 **Demographics:** Age, hand dominance, gender, etc.

4.2.4 **Past Medical History and Review of Systems:** A study of CTS patients showed a 33% prevalence of related disease. Risk factors for CTS include female gender; obesity; Native American, Hispanic, or Black heritage, and certain medical conditions:

4.2.4.1 Pregnancy

4.2.4.2 Arthropathies including connective tissue disorders, rheumatoid arthritis, systemic lupus erythematosus, gout, osteoarthritis and spondyloarthropathy

4.2.4.3 Colles' fracture or other acute trauma

4.2.4.4 Amyloidosis

4.2.4.5 Hypothyroidism, especially in older females

4.2.4.6 Diabetes mellitus, including family history or gestational diabetes

4.2.4.7 Acromegaly

4.2.4.8 Use of corticosteroids or estrogens

4.2.4.9 Vitamin B6 deficiency

4.2.5 **Activities of Daily Living (ADLs):** include such activities as self care and personal hygiene, communication, ambulation, attaining all normal living postures, travel, non-specialized hand activities, sexual function, sleep, and social and recreational activities. Specific movements in this category include pinching or grasping keys/pens/other small objects, grasping telephone receivers or cups or other similar-sized objects, and opening jars. The quality of these activities is judged by their independence, appropriateness, and effectiveness. Assess not simply the number of restricted activities but the overall degree of restriction or combination of restrictions.

4.2.6 **Avocational Activities:** Information must be obtained regarding sports, recreational, and other avocational activities that might contribute to or be impacted by CTD development. Activities such as hand-operated video games, crocheting/needlepoint, home computer operation, golf, racquet sports, bowling, and gardening are included in this category.

4.2.7 **Social History:** Exercise habits, alcohol consumption, and psychosocial factors.

4.3 **PHYSICAL EXAMINATION** Please refer to Table 1 for respective sensitivities and specificities for findings used to diagnose CTS (a-f).

4.3.1 Sensory loss to pinprick, light touch, two-point discrimination or Semmes-Weinstein Monofilament tests in a median nerve distribution may occur

4.3.2 Thenar atrophy may appear, but usually late in the course

4.3.3 Weakness of the abductor pollicis brevis may be present

4.3.4 Phalen's / Reverse Phalen's signs may be positive

4.3.5 Tinel's sign over the carpal tunnel may be positive

4.3.6 Closed Fist test – holding fist closed for 60 seconds reproduces median nerve paresthesia

4.3.7 Evaluation of the contralateral wrist is recommended due to the frequency of bilateral involvement

4.3.8 Evaluation of the proximal upper extremity and cervical spine for other disorders including cervical radiculopathy, thoracic outlet syndrome, other peripheral neuropathies, and other musculoskeletal disorders

4.3.9 Signs of underlying medical disorders associated with CTS, e.g., diabetes mellitus, arthropathy, and hypothyroidism

4.3.10 Myofascial findings requiring treatment may present in soft tissue areas near other CTD pathology, and should be documented. Refer to the Division's Cumulative Trauma Disorder Medical Treatment Guidelines.

Table 1: Sensitivities and Specificities and Evidence Level for Physical Examination findings

Procedure	Sensitivity (%)	Specificity (%)	Validity
1. Sensory testing			
Hypesthesia	15-51	85-93	Good
Katz Hand Diagram	62-89	73-88	Good
Two-point discrimination	22-33	81-100	Some
Semmes-Weinstein	52-91	59-80	Some
Vibration	20-61	71-81	None
2. Phalen's	51-88	32-86	Some
3. Tinel's	25-73	55-94	Some
4. Carpal tunnel compression	28-87	33-95	Some
5. Thenar atrophy	3-28	82-100	Good
Abductor pollicis brevis weakness	63-66	62-66	Good
6. Closed fist test	61	92	Some
7. Tourniquet test	16-65	36-87	None

4.4 **RISK FACTORS** A critical review of epidemiologic literature identified a number of physical exposures associated with CTS. For example, trauma and fractures of the hand and wrist may result in CTS. Other physical exposures considered risk factors include: repetition, force, vibration, pinching and gripping, and cold environment. When workers are exposed to several risk factors simultaneously, there is an increased likelihood of CTS. Not all risk factors have been extensively studied. Exposure to cold environment, for example, was not examined independently; however, there is good evidence that combined with other risk

factors cold environment increases the likelihood of a CTS. Table 2 at the end of this section entitled, "Risk Factors Associated CTS," summarizes the results of currently available literature.

No single epidemiologic study will fulfill all criteria for causality. The clinician must recognize that currently available epidemiologic data is based on population results, and that individual variability lies outside the scope of these studies. Many published studies are limited in design and methodology, and, thus, preclude conclusive results. Most studies' limitations tend to attenuate, rather than inflate, associations between workplace exposures and CTS.

These guidelines are based on current epidemiologic knowledge. As with any scientific work, the guidelines are expected to change with advancing knowledge. The clinician should remain flexible and incorporate new information revealed in future studies.

Table 2: Risk Factors Associated with Carpal Tunnel Syndrome

Diagnosis	Strong Evidence	Good evidence	Some evidence	Insufficient or conflicting evidence
Carpal Tunnel Syndrome	Combination of high exertional force (Varied from greater than 6 kg) and high repetition (work cycles less than 30 sec or greater than 50% of cycle time performing same task, length of shortest task less than 10 sec).	Repetition or force independently, use of vibration hand tools.	Wrist ulnar deviation and extension.	Pinch/grip, keyboarding.

4.5 **LABORATORY TESTS** Laboratory tests are generally accepted, well-established, and widely used procedures. Patients should be carefully screened at the initial exam for signs or symptoms of diabetes, hypothyroidism, arthritis, and related inflammatory diseases. The presence of concurrent disease does not negate work-relatedness of any specific case. When a patient's history and physical examination suggest infection, metabolic or endocrinologic disorders, tumorous conditions, systemic musculoskeletal disorders (e.g., rheumatoid arthritis), or potential problems related to prescription of medication (e.g., renal disease and nonsteroidal anti-inflammatory medications), then laboratory tests, including, but not limited to, the following can provide useful diagnostic information:

4.5.1 Serum rheumatoid factor and Antinuclear Antigen (ANA) for rheumatoid work-up;

4.5.2 Thyroid Stimulating Hormone (TSH) for hypothyroidism;

4.5.3 Fasting glucose - recommended for obese men and women over 40 years of age, patients with a history of family diabetes, those from high-risk ethnic groups, and with a previous history of impaired glucose tolerance. A fasting blood glucose greater than 125mg/dl is diagnostic for diabetes. Urine dipstick positive for glucose is a specific but not sensitive screening test. Quantitative urine glucose is sensitive and specific in high-risk populations;

4.5.4 Serum protein electrophoresis;

4.5.5 Sedimentation rate, nonspecific, but elevated in infection, neoplastic conditions and rheumatoid arthritis;

4.5.6 Serum calcium, phosphorus, uric acid, alkaline and acid phosphatase for metabolic, endocrine and neoplastic conditions;

4.5.7 Complete Blood Count (CBC), liver and kidney function profiles for metabolic or endocrine disorders or for adverse effects of various medications;

4.5.8 Bacteriological (microorganism) work-up for wound, blood and tissue;

4.5.9 Serum B6 – routine screening is not recommended due to the fact that vitamin B6 supplementation has not been proven to affect the course of carpal tunnel syndrome. However, it may be appropriate for patients on medications that interfere with the effects of vitamin B6, or for those with significant nutritional problems.

The Department recommends the above diagnostic procedures be considered, at least initially, the responsibility of the workers' compensation carrier to ensure that an accurate diagnosis and treatment plan can be established.

5.0 Follow-Up Diagnostic Testing Procedures

5.1 **ELECTRODIAGNOSTIC (EDX) STUDIES** are well established and widely accepted for evaluation of patients suspected of having CTS. The results are highly sensitive and specific for the diagnosis. Studies may confirm the diagnosis or direct the examiner to alternative disorders. Studies require clinical correlation due to the occurrence of false positive and false negative results. Symptoms of CTS may occur with normal EDX studies, especially early in the clinical course.

EDX findings in CTS reflect slowing of median motor and sensory conduction across the carpal tunnel region due to demyelination. Axonal loss, when present, is demonstrated by needle electromyography in median nerve-supplied thenar muscles. Findings include fibrillations, fasciculations, neurogenic recruitment and polyphasic units (reinnervation).

5.1.1 Needle electromyography of a sample of muscles innervated by the C5 to T1 spinal roots, including a thenar muscle innervated by the median nerve of the symptomatic limb, is frequently required.

5.1.2 The following EDX studies are not recommended to confirm a clinical diagnosis of CTS:

5.1.2.1 Low sensitivity and specificity compared to other EDX studies: multiple median F wave parameters, median motor nerve residual latency, and sympathetic skin response

5.1.2.2 Investigational studies: evaluation of the effect on median NCS of limb ischemia, dynamic hand exercises, and brief or sustained wrist positioning

5.1.3 To assure accurate testing, temperature should be maintained at 30-34C preferably recorded from the hand/digits. For temperature below 30C the hand should be warmed.

5.1.4 All studies must include normative values for their laboratories.

5.1.5 Positive Findings – Any of these nerve conduction study findings must be accompanied by median nerve symptoms to establish the diagnosis.

5.1.5.1 Slowing of median distal sensory and/or motor conduction through the carpal tunnel region

5.1.5.2 Electromyographic changes in the median thenar muscles in the absence of proximal abnormalities

5.1.6 Because laboratories establish their own norms, a degree of variability from the suggested guideline values is acceptable.

5.1.7 In all cases, normative values are to be provided with the neurodiagnostic evaluation.

5.1.8 Suggested grading scheme by electrodiagnostic criteria for writing a consultation or report may be:

5.1.8.1 Mild CTS-prolonged (relative or absolute) median sensory or mixed action potential distal latency (orthodromic, antidromic, or palmar).

5.1.8.2 Moderate CTS-abnormal median sensory latencies as above, and prolongation (relative or absolute) of median motor distal latency.

5.1.8.3 Severe CTS-prolonged median motor and sensory distal latencies, with either absent sensory or palmar potential, or low amplitude or absent thenar motor action potential. Needle examination reveals evidence of acute and chronic denervation with axonal loss.

5.1.9 Frequency of Studies/Maximum Number of Studies:

5.1.9.1 Indications for Initial Testing:

5.1.9.1.1 Patients who do not improve symptomatically or functionally with conservative measures for carpal tunnel syndrome over a 3-4 week period

5.1.9.1.2 Patients in whom the diagnosis is in question

5.1.9.1.3 Patients for whom surgery is contemplated

5.1.9.1.4 To rule out other nerve entrapments or a radiculopathy

5.1.9.2 Repeated studies may be performed:

5.1.9.2.1 To determine disease progression. 8-12 weeks is most useful when the initial studies were normal and CTS is still suspected

5.1.9.2.2 For inadequate improvement with non-surgical treatment for 8-12 weeks

5.1.9.2.3 For persistent or recurrent symptoms following carpal tunnel release, post-op 3-6 months, unless an earlier evaluation is required by the surgeon

5.2 **IMAGING STUDIES**

5.2.1 **Radiographic Imaging:** Not generally required for most CTS diagnoses. However, it may be necessary to rule out other pathology in the cervical spine, shoulder, elbow, wrist or hand. Wrist and elbow radiographs would detect degenerative joint disease, particularly scapholunate dissociation and thumb carpometacarpal abnormalities which occasionally occur with CTS.

5.2.2 **Magnetic Resonance Imaging (MRI):** Considered experimental and not recommended for diagnosis of Carpal Tunnel Syndrome. Trained neuroradiologists have not identified a single MRI parameter that is highly sensitive and specific. MRI is less accurate than standard electrodiagnostic testing, and its use as a diagnostic tool is not recommended.

5.2.3 **Sonography:** This tool has not been sufficiently studied to define its diagnostic performance relative to electrodiagnostic studies. It is not a widely applied test. Sonography may detect synovial thickening in CTS caused by rheumatoid arthritis. It may be useful if space-occupying lesions, such as, lipomas, hemangiomas, fibromas, and ganglion cysts, are suspected. Its routine use in CTS is not recommended.

5.3 **ADJUNCTIVE TESTING** Clinical indications for the use of tests and measurements are predicated on the history and systems review findings, signs observed on physical examination, and information derived from other sources and records. They are not designed to be the definitive indicator of dysfunction.

5.3.1 **Electromyography: i**s a generally accepted, well-established procedure. It is indicated when acute and/or chronic neurogenic changes in the thenar eminence are associated with the conduction abnormalities discussed above.

5.3.2 **Electroneurometer:** May serve as a diagnostic tool as it helps to detect early distal sensorineural impairment.

5.3.3 **Portable Automated Electrodiagnostic Device:** Measures distal median nerve motor latency and F-wave latency at the wrist and has been tested in one research setting. It performed well in this setting following extensive calibration of the device. Motor nerve latency compared favorably with conventional electrodiagnostic testing, but F-wave latency added little to diagnostic accuracy. It remains an investigational instrument whose performance in a primary care setting is as yet not established, and is not recommended as a substitute for conventional electrodiagnostic testing in clinical decision-making.

5.3.4 **Quantitative Sensory Testing (QST):** May be used as a screening tool in clinical settings pre- and post-operatively. Results of tests and measurements of sensory integrity are integrated with the history and systems review findings and the results of other tests and measures. QST has been divided into two types of testing:

5.3.4.1 Threshold tests measure topognosis, the ability to exactly localize a cutaneous sensation, and pallesthesia, the ability to sense mechanical using vibration discrimination testing (quickly adapting fibers); Semmes-Wienstein monofilament testing (slowly adapting fibers);

5.3.4.2 Density Tests also measure topognosis and pallesthesia using static two-point discrimination (slowly adapting fibers); moving two-point discrimination (quickly adapting fibers).

5.3.5 **Pinch and Grip Strength Measurements:** May be accepted as a diagnostic tool for CTS. Strength is defined as the muscle force exerted by a muscle or group of muscles to overcome a resistance under a specific set of circumstances. Pain, the perception of pain secondary to abnormal sensory feedback, and/ or the presence of abnormal sensory feedback affecting the sensation of the power used in grip/pinch may cause a decrease in the force. When all five handle settings of the dynamometer are used, a bell-shaped curve, reflecting maximum strength at the most comfortable handle setting, should be present. These measures provide a method for quantifying strength that can be used to follow a patient's progress and to assess response to therapy. In the absence of a bell-shaped curve, clinical reassessment is indicated.

5.3.6 **Laboratory Tests** In one study of carpal tunnel patients seen by specialists, 9% of patients were diagnosed with diabetes, 7% with hypothyroidism, and 15% with chronic inflammatory disease including spondyloarthropathy, arthritis, and systemic lupus erythematosis. Up to two thirds of the patients were not aware of their concurrent disease. Estimates of the prevalence of hypothyroidism in the general population vary widely, but data collected from the Colorado Thyroid Disease Prevalence Study revealed subclinical hypothyroidism in 8.5% of participants not taking thyroid medication. The prevalence of chronic joint symptoms in the Behavioral Risk Factor Surveillance System (BRFSS) from the Centers for Disease Control (CDC) was 12.3%. If after 2-3 weeks, the patient is not improving the physician should strongly consider the following laboratory studies: thyroid function studies, rheumatoid screens, chemical panels, and others, if clinically indicated.

Laboratory testing may be required periodically to monitor patients on chronic medications.

6.0 Therapeutic Procedures – Non-Operative

Before initiation of any therapeutic procedure, the authorized treating provider, employer, and insurer must consider these important issues in the care of the injured worker.

First, patients undergoing therapeutic procedure(s) should be released or returned to modified or restricted duty during their rehabilitation at the earliest appropriate time. Refer to "Return-to-Work" in this section for detailed information.

Second, cessation and/or review of treatment modalities should be undertaken when no further significant subjective or objective improvement in the patient's condition is noted. If patients are not responding within the recommended duration periods, alternative treatment interventions, further diagnostic studies or consultations should be pursued.

Third, providers should provide and document education to the patient. No treatment plan is complete without addressing issues of individual and/or group patient education as a means of facilitating self-management of symptoms.

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

Non-operative treatment procedures for CTS can be divided into two groups: conservative care and rehabilitation. Conservative care is treatment applied to a problem in which spontaneous improvement is expected in 90% of the cases within three months. It is usually provided during the tissue-healing phase and lasts no more than six months, and often considerably less. Rehabilitation is treatment applied to a more chronic and complex problem in a patient with de-conditioning and disability. It is provided during the period after tissue healing to obtain maximal medical recovery. Treatment modalities may be utilized sequentially or concomitantly depending on chronicity and complexity of the problem, and treatment plans should always be based on a diagnosis utilizing appropriate diagnostic procedures.

The following procedures are listed in alphabetical order.

6.1 **ACUPUNCTURE** is an accepted and widely used procedure for the relief of pain and inflammation. The exact mode of action is only partially understood. Western medicine studies suggest that acupuncture stimulates the nervous system at the level of the brain, promotes deep relaxation, and affects the release of neurotransmitters. Acupuncture is commonly used as an alternative or in addition to traditional Western pharmaceuticals. While it is commonly used when pain medication is reduced or not tolerated, it may be used as an adjunct to physical rehabilitation and/or surgical intervention to hasten the return of functional activity. Acupuncture should be performed by MD, DO, DC with appropriate training; or a licensed acupuncturist.

6.1.1 **Definition:** Acupuncture is the insertion and removal of filiform needles to stimulate acupoints (acupuncture points). Needles may be inserted, manipulated, and retained for a period of time. Acupuncture can be used to reduce pain, reduce inflammation, increase blood flow, increase range of motion, decrease the side effect of medication-induced nausea, promote relaxation in an anxious patient, and reduce muscle spasm.

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

- Time to produce effect: 3 to 6 treatments
- Frequency: 1 to 3 times per week
- Course duration: 14 treatments

6.1.2 **Acupuncture with Electrical Stimulation:** is the use of electrical current (micro- amperage or milli-amperage) on the needles at the acupuncture site. It is used to increase effectiveness of the needles by continuous stimulation of the acupoint. Physiological effects (depending on location and settings) can include endorphin release for pain relief, reduction of inflammation, increased blood circulation, analgesia through interruption of pain stimulus, and muscle relaxation.

It is indicated to treat chronic pain conditions, radiating pain along a nerve pathway, muscle spasm, inflammation, scar tissue pain, and pain located in multiple sites.

- Time to produce effect: 3 to 6 treatments
- Frequency: 1 to 3 times per week
- Course duration: 14 treatments

6.1.3 **Other Acupuncture Modalities:** Acupuncture treatment is based on individual patient needs and therefore treatment may include a combination of procedures to enhance treatment effect. Other procedures may include the use of heat, soft tissue manipulation/massage, and exercise. Refer to sections F 12 and 13 Active Therapy and Passive Therapy for a description of these adjunctive acupuncture modalities.

- Time to produce effect: 3 to 6 treatments
- Frequency: 1 to 3 times per week
- Course duration: 14 treatments

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

6.2 **BIOFEEDBACK** is a form of behavioral medicine that helps patients learn self-awareness and self-regulation skills for the purpose of gaining greater control of their physiology, such as muscle activity, brain waves, and measures of autonomic nervous system activity. Electronic instrumentation is used to monitor the targeted physiology and then displayed or fed back to the patient visually, auditorially or tactilely, with coaching by a biofeedback specialist. Biofeedback is provided by clinicians certified in biofeedback and/or who have documented specialized education, advanced training, or direct or supervised experience qualifying them to provide the specialized treatment needed (e.g., surface EMG, EEG, or other).

Treatment is individualized to the patient's work-related diagnosis and needs. Home practice of skills is required for mastery and may be facilitated by the use of home training tapes. The ultimate goal in biofeedback treatment is normalizing the physiology to the pre-injury status to the extent possible and involves transfer of learned skills to the workplace and daily life. Candidates for biofeedback therapy or training must be motivated to learn and practice biofeedback and self-regulation techniques.

Indications for biofeedback include individuals who are suffering from musculoskeletal injury where muscle dysfunction or other physiological indicators of excessive or prolonged stress response affects and/or delays recovery. Other applications include training to improve self-management of emotional stress/pain responses such as anxiety, depression, anger, sleep disturbance, and other central and autonomic nervous system imbalances. Biofeedback is often utilized along with other treatment modalities.

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

6.3 **INJECTIONS-THERAPEUTIC** Steroids Injections - Beneficial effects of injections are well-established, but generally considered to be temporary. Recurrence of symptoms is frequent. It is not clear whether or not injections slow progression of electrodiagnostic changes. Therefore, although symptoms may be temporarily improved, nerve damage may be progressing. When motor changes are present, surgery is preferred over injections.

- Time to produce effect: 2-5 days
- Frequency: every 6-8 weeks
- Optimum number: 2 injections
- Maximum number: 3 injections in 6 months

If following the first injection, symptomatic relief is followed by recurrent symptoms, the decision to perform a second injection must be weighed against alternative treatments such as surgery. Surgery may give more definitive relief of symptoms.

6.4 **JOB SITE ALTERATION** Early evaluation and training of body mechanics and other ergonomic factors are essential for every injured worker and should be done by a qualified individual. In some cases, this requires a job site evaluation. Some evidence supports alteration of the job site in the early treatment of Carpal Tunnel Syndrome (CTS). There is no single factor or combination of factors that is proven to prevent or ameliorate CTS, but a combination of ergonomic and psychosocial factors is generally considered to be important. Physical factors that may be considered include use of force, repetition, awkward positions, upper extremity vibration, cold environment, and contact pressure on the carpal tunnel. Psychosocial factors to be considered include pacing, degree of control over job duties, perception of job stress, and supervisory support.

The job analysis and modification should include input from the employee, employer, and ergonomist or other professional familiar with work place evaluation. The employee must be observed performing all job functions in order for the job site analysis to be valid. Periodic follow-up is recommended to evaluate effectiveness of the intervention and need for additional ergonomic changes.

6.4.1 **Ergonomic changes:** should be made to modify the hazards identified. In addition workers should be counseled to vary tasks throughout the day whenever possible. Occupational Safety and Health Administration (OSHA) suggests that workers who perform repetitive tasks, including keyboarding, take 15-30 second breaks every 10 to 20 minutes, or 5-minute breaks every hour. Mini breaks should include stretching exercises.

6.4.2 **Interventions:** should consider engineering controls, e.g., mechanizing the task, changing the tool used, or adjusting the work site, or administrative controls, e.g., adjusting the time an individual performs the task.

6.4.3 **Seating Description:** The following description may aid in evaluating seated work positions: The head should incline only slightly forward, and if a monitor is used, there should be 18-24 inches of viewing distance with no glare. Arms should rest naturally, with forearms parallel to the floor, elbows at the sides, and wrists straight or minimally extended. The back must be properly supported by a chair, which allows change in position and backrest adjustment. There must be good knee and legroom, with the feet resting comfortably on the floor or footrest. Tools should be within easy reach, and twisting or bending should be avoided.

6.4.4 **Job Hazard Checklist:** The following Table 3 is adopted from Washington State's job hazard checklist, and may be used as a generally accepted guide for identifying job duties which may pose ergonomic hazards. The fact that an ergonomic hazard exists at a specific job, or is suggested in the table, does not establish a causal relationship between the job and the individual with a musculoskeletal injury. However, when an individual has a work-related injury and ergonomic hazards exist that affect the injury, appropriate job modifications should be made. Proper correction of hazards may prevent future injuries to others, as well as aid in the recovery of the injured worker.

Table 3: Identifying Job Duties Which May Pose Ergonomic Hazards

Type of Job Duty	Hours per Day
Pinching an unsupported object(s) weighing 2 lbs or more per hand, or pinching with a force of 4 lbs or more per hand (comparable to pinching a half a ream of paper): 1. Highly repetitive motion 2. Palmar flexion greater than 30 degrees, dorsiflexion greater than 45 degrees, or radial deviation greater than 30 degrees ---------- 3. No other risk factors	More than 3 hours total/day ---------- More than 4 hours total/day
Gripping an unsupported object(s) weighing 10 lbs or more/hand, or gripping with a force of 10 lbs or more/hand (comparable to clamping light duty automotive jumper cables onto a battery): *Handles should be rounded and soft, with at least 1-2.5" in diameter grips at least 5" long. 1. Highly repetitive motion 2. Palmar flexion greater than 30 degrees, dorsiflexion greater than 45 degrees, or radial deviation greater than 30 degrees ---------- 3. No other risk factors	More than 3 hours total/day ---------- More than 4 hours total/day

Repetitive Motion (using the same motion with little or no variation every few seconds), excluding keying activities: 1. High, forceful exertions with the hands, with palmar flexion greater than 30 degrees, dorsiflexion greater than 45 degrees, or radial deviation greater than 30 degrees ---------- 2. No other risk factors	More than 2 hours total/day ---------- More than 6 hours total/day
Intensive Keying: 1. Palmar flexion greater than 30 degrees, dorsiflexion greater than 45 degrees, or radial deviation greater than 30 degrees ---------- 2. No other risk factors	More than 4 hours total/day ---------- More than 7 hours total/day
Repeated Impact: 1. Using the hand (heel/base of palm) as a hammer more than once/minute	More than 2 hours total/day
Vibration: Two determinants of the tolerability of segmental vibration of the hand are the frequency and the acceleration of the motion of the vibrating tool, with lower frequencies being more poorly tolerated at a given level of imposed acceleration, expressed below in multiples of the acceleration due to gravity (10m/sec/sec). 1. Frequency range 8-15 Hz and acceleration 6 g 2. Frequency range 80 Hz and acceleration 40 g 3. Frequency range 250 Hz and acceleration 250 g ---------- 4. Frequency range 8-15 Hz and acceleration 1.5 g 5. Frequency range 80 Hz and acceleration 6 g 6. Frequency range 250 Hz and acceleration 20 g	More than 30 minutes at a time ---------- More than 4 hours at a time

6.5 **MEDICATIONS** including nonsteroidal anti-inflammatory medications (NSAIDS), oral steroids, diuretics, and pyridoxine (Vitamin B6) have not been shown to have significant long-term beneficial effect in treating Carpal Tunnel Syndrome. Although NSAIDS are not curative, they and other analgesics may provide symptomatic relief. All narcotics and habituating medications should be prescribed with strict time, quantity, and duration guidelines with a definite cessation parameter.

6.5.1 **Vitamin B6:** Randomized trials have demonstrated conflicting results. Higher doses may result in development of a toxic peripheral neuropathy. In the absence of definitive literature showing a beneficial effect, use of Vitamin B6 cannot be recommended.

6.5.2 **Oral Steroids**: have been shown to have short-term symptomatic benefit but no long-term functional benefit and are only rarely recommended due to possible side effects.

6.6 **OCCUPATIONAL REHABILITATION PROGRAMS**

6.6.1 **Non-Interdisciplinary:** These programs are work-related, outcome-focused, individualized treatment programs. Objectives of the program include, but are not limited to, improvement of cardiopulmonary and neuromusculoskeletal functions (strength, endurance, movement, flexibility, stability, and motor control functions), patient education, and symptom relief. The goal is for patients to gain full or optimal function and return to work. The service may include the time-limited use of passive modalities with progression to achieve treatment and/or simulated/real work.

6.6.1.1 Work Conditioning/Simulation

This program may begin once a patient is out of the acute phase of injury and will be able to tolerate this program.

These programs are usually initiated after the acute phase has been completed and offered at any time throughout the recovery phase. Work conditioning should be initiated when imminent return of

a patient to modified or full duty is not an option, but the prognosis for returning the patient to work at completion of the program is at least fair to good.

The need for work place simulation should be based upon the results of a Functional Capacity Evaluation and/or Jobsite Analysis.

- Length of visit: 1 to 4 hours per day.
- Frequency: 2 to 5 visits per week
- Maximum duration: 8 weeks. Participation in a program beyond six weeks must be documented with respect to need and the ability to facilitate positive symptomatic or functional gains.

6.6.1.2 Work Hardening

Work Hardening is an interdisciplinary program addressing a patient's employability and return to work. It includes a progressive increase in the number of hours per day that a patient completes work simulation tasks until the patient can tolerate a full workday. This is accomplished by addressing the medical, behavioral, physical, functional, and vocational components of employability and return-to-work.

This can include a highly structured program involving a team approach or can involve any of the components thereof. The interdisciplinary team should, at a minimum, be comprised of a qualified medical director who is board certified with documented training in occupational rehabilitation; team physicians having experience in occupational rehabilitation; occupational therapist; physical therapist; case manager; and psychologist. As appropriate, the team may also include: chiropractor, RN, vocational specialist or Certified Biofeedback Therapist.

- Length of visit: Up to 8 hours/day
- Frequency: 2 to 5 visits per week
- Maximum duration: 8 weeks. Participation in a program beyond six weeks must be documented with respect to need and the ability to facilitate positive symptomatic or functional gains.

6.7 **ORTHOTICS/IMMOBILIZATION WITH SPLINTING** is a generally accepted, well-established and widely used therapeutic procedure. There is some evidence that splinting leads to more improvement in symptoms and hand function than watchful waiting alone. Because of limited patient compliance with day and night splinting in published studies, evidence of effectiveness is limited to nocturnal splinting alone. Splints should be loose and soft enough to maintain comfort while supporting the wrist in a relatively neutral position. This can be accomplished using a soft or rigid splint with a metal or plastic support. Splint comfort is critical and may affect compliance. Although off-the-shelf splints are usually sufficient, custom thermoplastic splints may provide better fit for certain patients.

Splints may be effective when worn at night or during portions of the day, depending on activities. Most studies show that full time night splinting for a total of 4 to 6 weeks is the most effective protocol. Depending on job activities, intermittent daytime splinting can also be helpful. Splint use is rarely mandatory. Providers should be aware that over-usage is counterproductive, and should counsel patients to minimize daytime splint use in order avoid detrimental effects such as stiffness and dependency over time.

Splinting is generally effective for milder cases of CTS. Long-term benefit has not been established. An effect should be seen in 2-4 weeks.

- Time to produce effect: 1-4 weeks. If, after 4 weeks, the patient has partial improvement, continue to follow since neuropathy may worsen, even in the face of diminished symptoms.
- Frequency: Nightly. Daytime intermittent, depending on symptoms and activities
- Maximum duration: 2 to 4 months. If symptoms persist, consideration should be given to either repeating electrodiagnostic studies or to more aggressive treatment.

6.8 **PATIENT EDUCATION** No treatment plan is complete without addressing issues of individual and/or group patient education as a means of prolonging the beneficial effects of treatment, as well as facilitating self-management of symptoms and injury prevention. The patient should be encouraged to take an active role in the establishment of functional outcome goals. They should be educated on their specific injury, assessment findings, and plan of treatment. Instruction on proper body mechanics and posture, positions to avoid, self-care for exacerbation of symptoms, and home exercise should also be addressed.

- Time to produce effect: Varies with individual patient
- Frequency: Should occur at every visit

6.9 **RESTRICTION OF ACTIVITIES** Continuation of normal daily activities is the recommendation for acute and chronic pain without neurologic symptoms. There is good evidence against the use of bed rest in cases without neurologic symptoms. Bed rest may lead to de-conditioning and impair rehabilitation. Complete work cessation should be avoided, if possible, since it often further aggravates the pain presentation. Modified return-to-work is almost always more efficacious and rarely contraindicated in the vast majority of injured workers with Carpal Tunnel Syndrome

Medication use in the treatment of Carpal Tunnel Syndrome is appropriate for controlling acute and chronic pain and inflammation. Use of medications will vary widely due to the spectrum of injuries from simple strains to post-surgical healing. All drugs should be used according to patient needs. A thorough medication history, including use of alternative and over the counter medications, should be performed at the time of the initial visit and updated periodically.

6.10 **RETURN TO WORK** Early return-to-work should be a prime goal in treating Carpal Tunnel Syndrome given the poor prognosis for the injured employee who is out of work for more than six months. The employee and employer should be educated in the benefits of early return-to-work. When attempting to return an employee with CTS to the workplace, clear, objective physical restrictions that apply to both work and non-work related activities should be specified by the provider. Good communication between the provider, employee, and employer is essential.

Return-to-work is any work or duty that the employee can safely perform, which may not be the worker's regular job activities. Due to the large variety of jobs and the spectrum of severity of CTS, it is not possible for the Division to make specific return-to-work guidelines, but the following general approach is recommended:

6.10.1 **Establishment of Return-To-Work:** Ascertainment of return-to-work status is part of the medical treatment and rehabilitation plan, and should be addressed at every visit. Limitations in ADLs should also be reviewed at every encounter, and help to provide the basis for work restrictions provided they are consistent with objective findings. The Division recognizes that employers vary in their ability to accommodate restricted duty, but encourages employers to be active participants and advocates for early return-to-work. In most cases, the patient can be returned to work in some capacity, either at a modified job or alternate position, immediately unless there are extenuating circumstances, which should be thoroughly documented and communicated to the employer. Return-to-work status should be periodically reevaluated, at intervals generally not to exceed three weeks, and should show steady progression towards full activities and full duty.

6.10.2 **Establishment of Activity Level Restrictions:** It is the responsibility of the physician/provider to provide both the employee and employer clear, concise, and specific restrictions that apply to both work and non-work related activities. The employer is responsible to determine whether modified duty can be provided within the medically determined restrictions.

6.10.3 **Compliance with Activity Level Restrictions:** The employee's compliance with the activity level restrictions is an important part of the treatment plan and should be reviewed at each visit. In some cases, a job site analysis, a functional capacity evaluation, or other special testing may be required to facilitate return-to-work and document compliance. Refer to the “Job Site Alteration” and “Work Tolerance Screening” sections.

6.11 **THERAPY-PASSIVE** Passive therapy includes those treatment modalities that do not require energy expenditure on the part of the patient. They are principally effective during the early phases of treatment and are directed at controlling symptoms such as pain, inflammation and swelling and to improve the rate of healing soft tissue injuries. They should be used in adjunct with active therapies. They may be used intermittently as a therapist deems appropriate or regularly if there are specific goals with objectively measured functional improvements during treatment. Diathermies have not been shown to be beneficial to patients with CTS and may interfere with nerve conduction.

6.11.1 **Manual Therapy Techniques: a**re passive interventions in which the providers use his or her hands to administer skilled movements designed to modulate pain; increase joint range of motion; reduce/eliminate soft tissue swelling, inflammation, or restriction; induce relaxation; and improve contractile and non-contractile tissue extensibility. These techniques are applied only after a thorough examination is performed to identify those for whom manual therapy would be contraindicated or for whom manual therapy must be applied with caution.

6.11.1.1 Mobilization (Soft Tissue)

Mobilization of soft tissue is the skilled application of manual techniques designed to normalize movement patterns through the reduction of soft tissue pain and restrictions. Indications include muscle spasm around a joint, trigger points, adhesions, and neural compression.

Nerve Gliding: consist of a series of flexion and extension movements of the hand, wrist, elbow, shoulder, and neck that produce tension and longitudinal movement along the length of the median and other nerves of the upper extremity. These exercises are based on the principle that the tissues of the peripheral nervous system are designed for movement, and that tension and glide (excursion) of nerves may have an effect on neurophysiology through alterations in vascular and axoplasmic flow. Biomechanical principles have been more thoroughly studied than clinical outcomes. Nerve gliding performed on a patient by the clinician should be reinforced by patient performance of similar techniques as part of a home exercise program at least twice per day.

- Time to produce effect: 4 to 6 treatments
- Frequency: 2 to 3 times per week
- Maximum duration: 30 visits (CPT codes 97124 and 97140 cannot exceed 30 visits in combination).

6.11.1.2 **Massage: Manual or Mechanical -** Massage is manipulation of soft tissue with broad ranging relaxation and circulatory benefits. This may include stimulation of acupuncture points and acupuncture channels (acupressure), application of suction cups and techniques that include pressing, lifting, rubbing, pinching of soft tissues by or with the practitioner's hands. Indications include edema, muscle spasm, adhesions, the need to improve peripheral circulation and range of motion, or to increase muscle relaxation and flexibility prior to exercise.

- Time to produce effect: Immediate.
- Frequency: 1 to 3 times per week
- Maximum duration: 12 visits

6.11.2 **Ultrasound:** There is some evidence that ultrasound may be effective in symptom relief and in improving nerve conduction in mild to moderate cases of CTS. No studies have demonstrated long-term functional benefit. It may be used in conjunction with an active therapy program for non-surgical patients who do not improve with splinting and activity modification. It is not known if there are any long-term deleterious neurological effects from ultrasound.

6.11.3 **Microcurrent TENS and LASER:** There is some evidence that concurrent application of microamperage TENS applied to distinct acupuncture points and low-level laser treatment may be useful in treatment of mild to moderate CTS. This treatment may be useful for patients not responding to initial conservative treatment or who wish to avoid surgery. Patient selection criteria should include absence of denervation on EMG and motor latencies not exceeding 7 ms. The effects of microamperage TENS and low-level laser have not been differentiated; there is no evidence to suggest whether only one component is effective or the combination of both is required.

- Time to produce effect: 1 week
- Frequency: 3 sessions per week
- Maximum duration: 4 weeks

6.11.4 **Other Passive Therapy:** For associated myofascial symptoms, please refer to the Cumulative Trauma Disorder guideline.

6.12 **THERAPY-ACTIVE** Active therapies are based on the philosophy that therapeutic exercises and/or activities are beneficial for restoring flexibility, strength, endurance, function, range of motion, and alleviating discomfort. Active therapy requires an internal effort by the individual to complete a specific exercise or task, and thus assists in developing skills promoting independence to allow self-care to continue after discharge. This form of therapy requires supervision from a therapist or medical provider such as verbal, visual, and/or tactile instructions(s). At times a provider may help stabilize the patient or guide the movement pattern, but the energy required to complete the task is predominately executed by the patient.

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

Interventions are selected based on the complexity of the presenting dysfunction with ongoing examination, evaluation and modification of the plan of care as improvement or lack thereof occurs. Change and/or discontinuation of an intervention should occur if there is attainment of expected goals/outcome, lack of

progress, lack of tolerance and/or lack of motivation Passive interventions/ modalities may only be used as adjuncts to the active program.

6.12.1 **Activities of Daily Living:** Supervised instruction, active-assisted training, and/or adaptation of activities or equipment to improve a person's capacity in normal daily living activities such as self-care, work re-integration training, homemaking, and driving.

- Time to produce effect: 4 to 5 treatments
- Maximum of 10 sessions

6.12.2 **Functional Activities:** are the use of therapeutic activity to enhance mobility, body mechanics, employability, coordination, and sensory motor integration.

- Time to produce effect: 4 to 5 treatments
- Frequency: 3 to 5 times per week
- Maximum duration: 24 visits

Total number of visit 97110 and 97530 should not exceed 36 visits without pre-authorization

6.12.3 **Neuromuscular Re-education:** is the skilled application of exercise with manual, mechanical, or electrical facilitation to enhance strength, movement patterns, neuromuscular response, proprioception, kinesthetic sense, coordination education of movement, balance, and posture. Indications include the need to promote neuromuscular responses through carefully timed proprioceptive stimuli, to elicit and improve motor activity in patterns similar to normal neurologically developed sequences, and improve neuromotor response with independent control.

- Time to produce effect: 2 to 6 treatments
- Frequency: 3-5 times per week
- Maximum duration: 24 visits

6.12.4 **Proper Work Techniques:** Please refer to the "Job Site Evaluation" and "Job Site Alteration" sections of these guidelines.

6.12.5 **Therapeutic Exercise:** with or without mechanical assistance or resistance may include isoinertial, isotonic, isometric and isokinetic types of exercises. Indications include the need for cardiovascular fitness, reduced edema, improved muscle strength, improved connective tissue strength and integrity, increased bone density, promotion of circulation to enhance soft tissue healing, improvement of muscle recruitment, increased range of motion, and are used to promote normal movement patterns. Can also include complementary/alternative exercise movement therapy.

- Time to produce effect: 2 to 6 treatments
- Frequency: 3 to 5 times per week
- Maximum duration: 36 visits

Total number of visit 97110 and 97530 should not exceed 36 visits without pre-authorization

17 DE Reg. 322 (09/01/13)

7.0 Therapeutic Procedures - Operative

7.1 **SURGICAL DECOMPRESSION** is well-established, generally accepted, and widely used and includes open and endoscopic techniques. There is good evidence that surgery is more effective than splinting in producing long-term symptom relief and normalization of median nerve conduction velocity.

7.1.1 **Endoscopic Techniques:** have had a higher incidence of serious complications (up to 5%) compared to open techniques (less than 1%). The most commonly seen serious complications are incomplete transection of the transverse carpal ligament and inadvertent nerve or vessel injuries. The incidence of complications may be lower for surgeons who have extensive experience and familiarity with certain endoscopic techniques. Choice of technique should be left to the discretion of the surgeon.

7.1.2 **Indications for Surgery:** include positive history, abnormal electrodiagnostic studies, and/or failure of conservative management. Job modification should be considered prior to surgery. Please refer to the "Job Site Alteration" section for additional information on job modification.

7.1.3 **Surgery as an Initial Therapy: S**urgery should be considered as an initial therapy in situations where:

7.1.3.1 Median nerve trauma has occurred; "acute carpal tunnel syndrome", or

7.1.3.2 Electrodiagnostic evidence of moderate to severe neuropathy. EMG findings showing evidence of acute or chronic motor denervation suggest the possibility that irreversible damage may be occurring.

7.1.4 **Surgery When Electrodiagnostic Testing is Normal:** Surgery may be considered in cases where electrodiagnostic testing is normal. An opinion from a hand surgeon may be considered. The following criteria should be considered in deciding whether to proceed with surgery:

7.1.4.1 The patient experiences significant temporary relief following steroid injection into the carpal tunnel; or

7.1.4.2 The patient has failed 3-6 months of conservative treatment including work site change, if such changes are available; and

7.1.4.3 The patient's signs and symptoms are specific for carpal tunnel syndrome

7.1.5 **Suggested parameters for return-to-work are:**

Time Frame	Activity Level
2 Days	Return to Work with Restrictions on utilizing the affected extremity
2-3 Weeks	Sedentary and non-repetitive work
4-6 Weeks	Case-by-case basis
6-12 Weeks	Heavy Labor, forceful and repetitive

Note: All return-to-work decisions are based upon clinical outcome.

7.2 **NEUROLYSIS** has not been proven advantageous for carpal tunnel syndrome. Internal neurolysis should never be done. Very few indications exist for external neurolysis.

7.3 **TENOSYNOVECTOMY** has not proven to be of benefit in primary carpal tunnel syndrome but occasionally can be beneficial in certain patients with co-existing or systemic disorders.

7.4 **CONSIDERATIONS FOR REPEAT SURGERY** The single most important factor in predicting symptomatic improvement following carpal tunnel release is the severity of preoperative neuropathy. Patients with moderate electrodiagnostic abnormalities have better results than those with either very severe or no abnormalities. Incomplete cutting of the transverse carpal ligament or iatrogenic injury to the median nerve are rare.

If median nerve symptoms do not improve following initial surgery or symptoms improve initially and then recur, but are unresponsive to non-operative therapy (see Section.F, Therapeutic Procedures, Non-Operative) consider the following:

7.4.1 Recurrent synovitis;

7.4.2 Repetitive work activities may be causing “dynamic” CTS;

7.4.3 Scarring;

7.4.4 Work-up of systemic diseases

A second opinion by a hand surgeon and new electrodiagnostic studies required if repeat surgery is contemplated. The decision to undertake repeat surgery must factor in all of the above possibilities. Results of surgery for recurrent carpal tunnel syndrome vary widely depending on the etiology of recurrent symptoms.

7.5 **POST-OPERATIVE TREATMENT** Considerations for post-operative therapy are:

7.5.1 Immobilization: There is some evidence showing that immediate mobilization of the wrist following surgery is associated with less scar pain and faster return to work. Final decisions regarding the need for splinting post-operatively should be left to the discretion of the treating physician based upon his/her understanding of the surgical technique used and the specific conditions of the patient.

7.5.2 Home Program: It is generally accepted that all patients should receive a home therapy protocol involving stretching, ROM, scar care, and resistive exercises. Patients should be encouraged to use the hand as much as possible for daily activities, allowing pain to guide their activities.

7.5.3 Supervised Therapy Program: may be helpful in patients who do not show functional improvements post-operatively, in patients with heavy or repetitive job activities and certain high-risk patients. The therapy program may include some of the generally accepted elements of soft tissue healing and return to function:

7.5.3.1 Soft tissue healing/remodeling: May be used after the incision has healed. It may include all of the following: evaluation, whirlpool, electrical stimulation, soft tissue mobilization, scar desensitivation, heat/cold application, splinting or edema control may be used as indicated. Following wound healing, ultrasound and iontophoresis with Sodium Chloride (NaCl) may be considered for soft tissue remodeling. Diathermy is a non-acceptable adjunct.

7.5.3.2 Return to function: Range of motion and stretching exercises, strengthening, activity of daily living adaptations, joint protection instruction, posture/body mechanics education; worksite modifications may be indicated.

- Time to produce effect: 2-4 weeks
- Frequency: 2-5 times/week
- Maximum duration: 36 visits

11 DE Reg. 1661 (06/01/08)
12 DE Reg. 67 (07/01/08)