Cigna Medical Coverage Policy- Therapy Services Electrodiagnostic Testing (EMG/NCV)

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GUIDELINES

Medically Necessary

NERVE CONDUCTION/ELECTROMYOGRAPHY: PERFORMED TOGETHER

Nerve conduction velocity (NCV) testing AND needle electromyography testing (NEMG) are considered medically necessary when they are conducted and interpreted at the same time for ANY of the following indications:

- myopathy, including but not limited to ANY of the following:
  - inflammatory myopathy and myositis (i.e., polymyositis, dermatomyositis, inclusion body myositis)

    - congenital and hereditary dystrophic and nondystrophic myopathies, including myotonic muscular dystrophy
    - acquired myopathies (drug induced myopathy associated with statins, thyroid related)
    - metabolic myopathies (such as McArdle disease)
- disorder of brachial or lumbosacral plexus (e.g., inflammatory idiopathic, traumatic, infiltrative plexopathy, thoracic outlet syndrome, Parsonage Turner syndrome)
- cervical or lumbar radiculopathy after failure of 4-6 weeks of conservative care
- motor or sensory neuropathy or ganglionopathy (e.g., amyotrophic lateral sclerosis, primary lateral sclerosis, progressive muscular atrophy or Kennedy's Disease)
- multifocal motor neuropathy
- neuromuscular junction disorder (e.g., myasthenia gravis, Lambert-Eaton myasthenic syndrome, botulism)
- focal or generalized sensory and motor neuropathies including but not limited to ANY of the following after failure of 4-6 weeks of conservative care (e.g., physical therapy, exercise, bracing):
    - carpal tunnel syndrome
    - cubital tunnel syndrome or ulnar neuropathy
    - tarsal tunnel syndrome
- inflammatory/autoimmune polyneuropathy (e.g., Guillain-Barre syndrome, chronic inflammatory demyelinating polyneuropathy [CIDP], mononeuritis multiplex and neuropathy associated with rheumatologic disorders)
- hereditary neuropathies (e.g., Charcot-Marie-Tooth disease, hereditary neuropathy with liability to pressure palsies, Friedreich's ataxia)
- diabetic polyneuropathy and diabetic radiculoplexus neuropathy (diabetic amyotrophy)
- metabolic and nutritional neuropathy (e.g., vitamin B12 or thiamine deficiency)
- toxic neuropathy (associated with drugs vincristine, amiodarone or environmental toxins such as organophosphates)
- infectious neuropathy (e.g., HIV, Lyme disease, Leprosy, polio)
- cranial neuropathy (Bell's or facial palsy)
- idiopathic peripheral neuropathy
- symptom-based presentation suggesting nerve root, peripheral nerve, muscle, or neuromuscular junction involvement, when pre-test evaluations are inconclusive and clinical assessment supports the need for the study, such as for ANY of the following:
    - muscle weakness
    - muscle atrophy
    - muscle fasciculation
    - myokymia
    - myotonia
    - loss of dexterity
    - spasticity
    - hyperreflexia
    - sensory deficits
    - diplopia
    - ptosis
    - swallowing dysfunction
    - dysarthria
    - impaired bowel motility

Nerve conduction velocity testing when performed with NEMG testing for ANY other indication, including the following is considered not medically necessary:

- screening of the general population, in the absence of related symptoms
- screening, monitoring of disease intensity or monitoring of treatment efficacy for polyneuropathy of diabetes
- screening, monitoring of disease intensity or monitoring of treatment efficacy for end stage renal disease

NERVE CONDUCTION: PERFORMED ALONE

Nerve conduction velocity (NCV) testing performed alone is considered medically necessary for ANY of the above indications, in ANY of the following clinical presentations:

- current use of an anticoagulant
- presence of significant lymphedema
- for facial nerve monitoring in Bell's palsy
- suspected tarsal tunnel syndrome
- suspected fibular nerve palsy
- thoracic outlet syndrome
- suspected acute nerve injury within 3 weeks of occurrence
- carpal tunnel syndrome with BOTH of the following:
  - with high pre-test probability (e.g., positive Tinel's, thenar muscle atrophy or paresthesias in the radial three digits)
  - after failure of 4-6 weeks of conservative care (e.g., physical therapy, exercise, bracing)

NEMG testing is considered medically necessary when performed for determination of precise muscle location for an injection (i.e., prior to botulism toxin injection for localization; prior to injection of phenol or other substances for nerve blocking or chemodenervation).

Single fiber EMG (SFEMG) is medically necessary for diagnosis of myasthenia gravis if repetitive nerve stimulation is negative or inconclusive.

Nerve conduction velocity (NCV) testing performed alone is considered not medically necessary for the following indication:

- nerve conduction velocity (NCV) testing performed without needle electromyography, other than when performed for follow-up testing, with current use of anticoagulants, the presence of lymphedema, or for carpal tunnel syndrome

NEUROMUSCULAR JUNCTION TESTING

Neuromuscular junction testing is considered medically necessary for ANY of the following indications:

- myopathy
- motor neuropathy (e.g., ALS)
- botulinum toxicity
- Myasthenia Gravis
- Lambert Eaton myasthenic syndrome
- the presence of ANY of the following:
  - diplopia
  - dysphagia and dysarthria
  - fatigue/weakness that progresses with repetitive activity

Neuromuscular junction testing for ANY other indication is considered not medically necessary.

SOMATOSENSORY EVOKED POTENTIALS (SSEPs)

Somatosensory evoked potentials (SSEPs) are considered medically necessary when prior diagnostic testing has failed to confirm a diagnosis for ANY of the following:

- coma following traumatic, hypoxic/ischemic and other diffuse brain injuries
- myoclonus

- multiple sclerosis and other demyelinating diseases (e.g., adrenoleukodystrophy, adrenomyeloneuropathy, metachromatic leukodystrophy, and Pelizaeus-Merzbacher disease)
- spinocerebellar degeneration
- spinal cord lesions secondary to trauma when the need for surgical intervention is uncertain
- acute (within 72 hours) anoxic encephalopathy
- to localize the cause of a central nervous system deficit identified on clinical exam when not explained by appropriate imaging studies (i.e., CT, MRI)
- suspected brain death

Experimental, Investigational, Unproven

The following electrodiagnostic tests are each considered experimental, investigational and/or unproven:

- macro electromyography (EMG)
- surface electromyography (e.g., surface EMG [SEMG], surface scanning EMG, high-density SEMG, HD-sEMG) and macro EMGs
- paraspinal SEMG
- exclusive testing of intrinsic foot muscles in the diagnosis of proximal lesions
- definitive diagnostic conclusions based on paraspinal EMG in regions bearing scar of past surgeries (e.g., previous laminectomies)
- pattern-setting limited limb muscle examinations, without paraspinal muscle testing for a diagnosis of radiculopathy
- multiple uses of EMG in the same patient at the same location of the same limb for the purpose of optimizing botulinum toxin injections.

Not Medically Necessary

The following electrodiagnostic tests are each considered not medically necessary:

- automated noninvasive nerve conduction testing (e.g., NC-stat System, Brevio® nerve conduction monitoring system)
- EMG testing shortly after trauma, before EMG abnormalities would have reasonably had time to develop
- macro electromyography (EMG)
- needle electromyography study performed without a nerve conduction velocity study and/or late response study for any indication, other than injection localization or intraoperative monitoring
- nerve conduction testing where the interpretation is delayed and not completed at the time of testing
- nerve conduction velocity testing performed without the direct supervision of a trained electrodiagnostic physician

SSEPs are considered not medically necessary for ANY indication other than those listed above; including the evaluation of disorders of the lumbosacral roots, such as radiculopathies, thoracic root disorders, or cervical root disorders.

DESCRIPTION

This guideline addresses electrodiagnostic testing, including nerve conduction (NCV) studies, neuromuscular junction testing, electromyography (EMG) studies (including surface EMG). This guideline adopts many of the recommendations for the clinical necessity, contraindications, and proper performance of nerve conduction studies, needle electromyography, and somatosensory evoked potentials (SEPs) from the American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM).

GENERAL BACKGROUND

Electrodiagnostic studies are frequently used to evaluate a subset of patients with suspected neuromuscular disorders and include needle electromyography and other nerve stimulation tests such as nerve conduction

studies. Electrodiagnostic testing may provide an important means of diagnosing conditions attributable to nerve, muscle or neuromuscular junction weakness such as myopathies (muscle weakness), radiculopathies (nerve root disease), plexopathies (peripheral neuropathy), neuropathies (nerve disease), neuromuscular junction disorders, and nerve compression syndromes. In addition, electrodiagnostic testing may be indicated for symptom-based presentations, (e.g., pain in limb, muscle weakness) when appropriate pre-test evaluations are inconclusive and the clinical assessment unequivocally supports the need for the study (American Association of Neuromuscular and Electrodiagnostic Medicine [AANEM], 2022).

Electrodiagnostic Testing

Nerve Conduction/Needle Electromyography: Nerve conduction studies (NCS), also referred to as nerve conduction velocity studies, are performed to diagnose disorders of the peripheral nervous system. Nerve conduction studies are used to measure action potentials resulting from peripheral nerve stimulation which are recordable over the nerve or from an innervated muscle. With this technique, responses are measured between two sites of stimulation, or between a stimulus and a recording site. Recording of the electrical response to stimulation of the nerve between these points along its route is conducted and compared to normal responses. The study measures speed (conduction velocity and/or latency), amplitude (size) and the shape of neurologic response for detecting demyelination and axon loss.

Nerve conduction studies are of two general types: sensory and motor. Either surface or needle electrodes can be used to stimulate the nerve or record the response. Axonal damage or dysfunction generally results in loss of nerve or muscle potential response amplitude; whereas, demyelination leads to prolongation of conduction time and slowing of conduction velocity.

Obtaining and interpreting NCS results requires extensive interaction between the performing qualified health care professional and patient, and is most effective when both obtaining raw data and interpretation are performed concurrently on a real-time basis. Results of the NCS reflect on the integrity and function of:

- The myelin sheath (Schwann cell derived insulation covering an axon), and
- The axon (an extension of neuronal cell body) of a nerve.

Interruption of axon and dysfunction of myelin will both affect NCS results. It is often also valuable to test conduction status in proximal segments of peripheral nerves. The stimulation of nerves is similar across all NCSs; the characteristics of motor, sensory, and mixed NCSs are different and are discussed separately below. In each case, an appropriate nerve is stimulated and recording is made either from the appropriate nerves or from muscle supplied by the motor nerve.

- Motor NCSs are performed by applying electrical stimulation at various points along the course of a motor nerve while recording the electrical response from an appropriate muscle. Response parameters include amplitude, latency, configuration, and motor conduction velocity.
- Sensory NCSs are performed by applying electrical stimulation near a nerve and recording the response from a distant site along the nerve. Response parameters include amplitude, latency, and configuration.
- Mixed NCSs are performed by applying electrical stimulation near a nerve containing both motor and sensory fibers (a mixed nerve) and recording from a different location along that nerve that also contains both motor and sensory nerve fibers. Response parameters include amplitude, latency, configuration, and motor conduction velocity."

Electromyography (EMG) is the study and recording of intrinsic electrical properties of skeletal muscles. This is carried out with a needle electrode. Generally, the needles are of two types: monopolar or concentric. EMG is undertaken together with NCS. Unlike NCS, however, EMG testing relies on both auditory and visual feedback to the electromyographer. This testing is also invasive in that it requires needle electrode insertion and adjustment at multiple sites, and at times anatomically critical sites. As in NCS during EMG studies the electromyographer depends on ongoing real-time interpretation-based knowledge of clinical diagnosis being evaluated to decide whether to continue, modify, or conclude a test. This process requires knowledge of anatomy, physiology, and neuromuscular diseases.

EMG results reflect not only on the integrity of the functioning connection between a nerve and its innervated muscle but also on the integrity of a muscle itself. The axon innervating a muscle is primarily responsible for the muscle's volitional contraction, survival, and trophic functions. Thus, interruption of the axon will alter the EMG. A few prime examples of conditions in which EMG is potentially helpful are disc disease producing spinal nerve

dysfunction, advanced nerve compression in peripheral lesions, Amyotrophic Lateral Sclerosis (ALS), polyneuropathy, etc. After an acute neurogenic lesion, EMG changes may not appear for several days to weeks in the innervated muscles. Primary muscle disease such as polymyositis will also alter a normal EMG pattern. Myotonic disorders may show a pattern of spontaneous repetitive discharges on needle exploration.

NCS are generally performed with needle electromyogram (NEMG), enabling the presence and extent of peripheral nerve pathology to be determined (Katirji, 2002; North American Spine Society [NASS], 2003; Aminoff, 2003; Asbury, 2004; AANEM] 2022). EMG studies measure the electrical activity of muscles. When performed together, they can be extremely helpful in detecting whether the pathology originates in the proximal or distal root ganglia and whether the neuromuscular dysfunction relates to peripheral nerve disease.
Both EMGs and NCSs are required for a clinical diagnosis of peripheral nervous system disorders. EMG results reflect on the integrity of the functioning connection between a nerve and its innervated muscle and also on the integrity of a muscle itself. Performance of one does not eliminate the need for the other. Without awareness of the patterns of abnormality expected in different diseases and knowledge that the results of nerve conduction studies and electromyography may be similar in different diseases, diagnosis solely by EMG-NCS findings may be both inadequate and ultimately be detrimental to the patient. For example, EMG-NCS findings may overlap in the following pairs of disorders: inflammatory myopathies and ALS, ALS and multi-level radiculopathies, myotonia of channelopathies (periodic paralyses) and myotonic dystrophies, focal neuropathies as Carpal Tunnel Syndrome and proximal plexopathies. Other instances where knowledge of disease behavior is crucial are Chronic Inflammatory Demyelinating Neuropathy (CIDP) and Multifocal Motor Neuropathy. These entities display electrodiagnostic features that resemble generalized polyneuropathies. Neuromuscular transmission disorders require separation based on clinical presentation and electrical features.

Without awareness of the disease spectrum, diagnosis solely by EMG-NCS findings may be either wrong or detrimental to the patient. Nerve conduction studies performed independent of needle electromyography (EMG) may only provide a portion of the information needed to diagnose muscle, nerve root, and most nerve disorders. When the nerve conduction study (NCS) is used on its own without integrating needle EMG findings or when an individual relies solely on a review of NCS data, the results can be misleading, and important diagnoses may be missed. For example, radiculopathies cannot be definitively diagnosed by NCS alone; EMG is performed to confirm the radiculopathy. According to the American Academy of Neurology (AAN), needle EMG (NEMG), in combination with nerve conduction studies, is the gold standard methodology for assessing the neurophysiologic characteristics of neuromuscular diseases (Pullman, et al., 2000). In summary, axonal and muscle involvement are most sensitively detected by EMGs, and myelin and axonal involvement are best detected by NCSs.

EMG should always be performed by a physician or health care provider who is specially trained in electrodiagnostic medicine (neurologist, physiatrist, clinical neurophysiologist, board-certified physical therapist) with real-time interpretation (performed only by a physician), and is part of the complete electrodiagnostic examination (AANEM, 2022). EMG reports should include documentation of the muscle tested, the presence and type of spontaneous activity and the characteristics of the voluntary unit potentials.

NCS may be performed by a trained technologist under the direct supervision of a physician. Direct supervision implies that a physician is in close proximity to the patient undergoing testing, is immediately available to provide the trained technician with assistance and direction if necessary, and is responsible for determining the nerve conduction studies that are appropriate. In general, a physician assesses the results of the degree of myelination or axonal loss.

H-reflex/F-wave Testing: Late response (H-reflex and F-wave testing) testing is a type of NCS usually performed on nerves more proximal to the spine. The H-reflex involves conduction from the periphery to and from the spinal cord. The H-reflex study involves the assessment of the gastrocnemius/soleus muscle complex in the calf, and is usually performed bilaterally due to the need to assess symmetrical results in determining abnormalities. The F-wave study is a late response similar to the H-reflex. F-wave studies are used to assess the proximal segments of the motor nerve function, and are performed in combination with the examination of motor nerves. Both studies are helpful in diagnosing conditions of radiculopathies, plexopathies, polyneuropathies, and proximal mononeuropathies (AANEM, 2022). Late response studies are additional studies complementary to NCV and are performed during the same patient evaluation.

Single Fiber EMG: Single fiber EMG uses a very highly selective electrode that can focus on a restricted number of muscle fibers. It is utilized to study neuromuscular jitter and muscle fiber density. Fiber density may be increased

in neuromuscular disorders such as myasthenia gravis. Jitter is a measure of variation in neuromuscular transmission times and may be increased in some neuromuscular disorders (Sanders, Howard, 2008; Barboi and Barkhaus, 2004; Sanders, 2004). Single fiber EMG has many uses; however, it is most useful to confirm diagnosis for disorders of the neuromuscular junction in suspected myasthenia gravis when other tests are inconclusive or negative (Sanders, Howard, 2008; Gooch and Pullman, 2004).

Macro EMG: Macro EMG is less selective when compared to standard NEMG or single-fiber EMG and is primarily used in investigational settings. It is a method of analyzing the motor unit quantitatively. A surface electrode is used for reference, and motor unit action potentials (MUAP) are measured from a macro needle. Authors suggest that macro EMG evaluates a large recording area compared to other needle electrodes and is considered representative of the entire MUAP area (Barboi and Barkhous, 2004).

Surface EMG (SEMG): In contrast to NEMG, SEMG, also referred to as surface scanning EMG, is a non-invasive, computer-based technique that records the electrical impulses using electrodes placed on the surface of the skin overlying the nerve at rest (i.e., static) and during activity (i.e., dynamic). The procedure studies the topography of the motor unit action potential (MUAP) and is assessed by computer analysis of the frequency spectrum, amplitude or root mean square of the electrical action potential. The SEMG differs from the NEMG with respect to technical requirements and electrical properties. SEMG electrodes measure from a wide area of muscle, have a relatively narrow frequency band (range 20 to 500 Hz), have low-signal resolution, and are highly susceptible to movement artifact (Pullman, 2000). The proposed use for this type of EMG is to aid in the diagnosis of neuromuscular disorders and low back pain, and to aid in assessing the prognosis of disorders involving muscle lesions. The technology has also been used to monitor bruxism (i.e., grinding and clenching of teeth). The electrical activity of muscle may be recorded with surface EMG, although spontaneous electrical activity and voluntary motor units cannot be (Lange and Trojaborg, 2000). Although not widely used as a diagnostic tool, high-density SEMG (HD-sEMG) is a multichannel SEMG that records the input of multiple electrodes placed on one muscle and is being studied as a possible method of detecting single MU characteristics (Drost, et al. 2006). Nonetheless, the clinical utility of surface EMG testing outside of the investigative setting has not been proven in the peer-reviewed scientific literature.

Paraspinal EMG: Paraspinal EMG scanning, a type of SEMG, also referred to as paraspinal SEMG, has been investigated as a method of assessing the paraspinal muscles of patients which provide support to the spinal column. Impairment of the paraspinal muscles may lead to abnormal motion and pain. The paraspinal SEMG is performed using a single electrode or an array of electrodes placed on the skin surface with recordings that are typically made at rest, in various positions, or after physical activity. The diagnostic utility of paraspinal EMG is not known, and its role in patient management has not been established.

Somatosensory Evoked Potentials (SEPs)

SEPs are an extension of the electrodiagnostic evaluation and can be used to test conduction in various sensory fibers of the peripheral and central nervous systems. SEPs may be used to assess the functional integrity of the central and peripheral sensory pathways. SEPs are noninvasive studies performed by repetitive submaximal stimulation of a sensory or mixed sensorimotor peripheral nerve and recording the averaged responses from electrodes placed over proximal portions of the nerve stimulated, plexus, spine, and scalp (AANEM, 2015). SSEPs are an extension of the electrodiagnostic evaluation and are used to evaluate nerves that cannot be studied by conventional nerve conduction studies, including electromyography. SEPs are typically elicited by stimulating mixed nerves (median, ulnar, tibial, and peroneal) to assess sensory pathways. Therefore, the application of standard SEPs to study radicular disease is necessarily limited to investigating the lumbar and cervical regions because of the limited number of sites to stimulate (AAN, 1997).

The evoked potential response depends on the functional integrity of the nerve that is stimulated. An abnormal SSEP points to a problem in the nerve conduction mechanism that carries the impulse to the brain, however, the SSEP abnormality is not disease specific—an abnormal SSEP indicates impairments associated with certain disorders. An abnormal SSEP signifies an impaired pathway, helps to localize it, and provides a prognostic guide. The SSEP does not provide any indication about the nature of the underlying pathological processes. Although evoked potentials offer additional information regarding function that can be clinically useful, magnetic resonance imaging (MRI) is often the preferred test to determine structural abnormalities and provides more specific information regarding neurologic structures.

SSEPs are altered by impairment of the somatosensory pathway which may occur as a result of both diffuse (e.g., diseases of myelin, hereditary system degenerations, coma) or local disorders (e.g., tumors, vascular lesions). SSEP abnormalities can be detected in a variety of different settings; therefore, the electrophysiologic findings should be interpreted in the clinical context in which they are obtained (e.g., assessing functional integrity, diagnostic purposes, determining the course of neurological disorders, determining pathological involvement). SSEPS are helpful in evaluating ill-defined complaints. A physician assesses the patient and determines a preliminary differential diagnosis; SSEP testing may then be performed by a trained technologist under the direct supervision of a trained electrodiagnostic physician. Direct supervision implies that a physician is in close proximity to the patient undergoing testing, is immediately available to provide the trained technician with assistance and direction if necessary, and is responsible for determining the SSEP studies that are appropriate.

Evoked potentials are used to assist in diagnosing ill-defined neurological conditions and to categorize afferent pathways that may be responsible for the resulting symptoms experienced by the patient. Conditions for which SSEPS offer clinical utility include (American Association of Neuromuscular and Electrodiagnostic Medicine [AANEM], 2015):

- spinal cord trauma
- subacute combined degeneration
- non traumatic spinal cord lesions (e.g., cervical spondylosis)
- multiple sclerosis
- spinocerebellar degeneration
- myoclonus
- coma

SSEPs have been utilized to evaluate other peripheral nerve disorders such as acute inflammatory demyelinating polyradiculoneuropathy and focal neuropathies (e.g., entrapment neuropathies, carpal tunnel syndrome, lateral femoral cutaneous neuropathy, medial and lateral plantar neuropathy, saphenous neuropathy, intercostals neuropathy, trigeminal neuropathy, plexopathy) in addition to nerve root dysfunction (i.e., lumbosacral root [acute radiculopathies], thoracic root, cervical root). However, the diagnostic utility of SSEPs for these conditions remains controversial (AANEM, 2015). The AANEM reported that the available evidence is not convincing that SSEPs for these indications provide information that cannot be obtained with conventional nerve conduction studies or needle electromyography. SSEPS are rarely used to assess peripheral neuropathy as standard nerve conduction velocity studies are the preferred test. There are no data to suggest a role for SSEPs in the evaluation of behavioral health disorders. The usefulness of evoked potential testing in psychiatry, including SSEPs, is still under investigation (Guse and Love, 2005). Recordings of SSEP can be normal even in patients with extreme sensory deficits due to the presence of multiple parallel, afferent somatosensory pathways. This procedure is often performed to investigate patients with multiple sclerosis (MS); various coma states, such as those from post-traumatic injury or post-anoxia; suspected brain death; and to indicate the extensiveness of lesion damage in spinal cord injuries. The return or presence of a cortically-generated response to stimulation of a nerve below the injured portion of the cord indicates an incomplete lesion and therefore may offer a better prognosis. SSEP testing is typically performed bilaterally. Depending on the clinical situation being investigated, several nerves in one extremity may have to be tested and compared with the opposite limb. The physician's SSEP report should indicate which nerves were tested, latencies at various testing points and an evaluation of whether the results were normal or abnormal.

Neuromuscular Junction Testing: The neuromuscular unit is made up of four components: the anterior horn cells of the spinal cord, the peripheral nerve, the neuromuscular junction, and the muscle being innervated. The level of disease determines the signs and symptoms an individual develops. Neuromuscular junction testing involves the stimulation of an individual motor nerve by means of repetitive electrical impulses with measurement of the resulting electrical activity of a muscle supplied by that nerve. Supramaximal electrical stimuli are delivered to the nerve. A surface electrode over, or percutaneous electrode placed in, a corresponding muscle records the evoked muscle action potentials using standard nerve conduction study techniques. The nerve is then stimulated electrically in a repetitive train at 2-3 Hz, or in special circumstances at higher rates up to 50 Hz. Testing may be performed in addition to NCS of the same nerves and/or EMG. In diseases of the neuromuscular junction, characteristic changes of a progressive decrease (decrement) in the compound action potential amplitude may be seen during the repetitive stimulation. Testing is indicated for suspected diseases of the neuromuscular junction (generally associated with progressive motor fatigability) which include myopathy, focal neuropathy, myasthenia gravis and Lambert Eaton myasthenic syndrome. Another condition that testing may be indicated for, botulism, is associated

with a decrease in the amount of acetycholine released, and results in weakness (Juel, 2012; Shearer, Jagoda, 2009).

Automated Nerve Conduction Testing: Proponents of automated nerve conduction tests suggest that they can be used in a variety of clinical settings, including a physician's office, without the need for specialized training or equipment, theoretically obtaining results within minutes. Portable, automated devices have been developed to provide nerve conduction studies at the point of care (e.g., primary care setting), particularly for carpal tunnel evaluation and evaluation of diabetic peripheral neuropathy, as an alternative to or as an adjunct to other conventional testing methods. Manufacturers state these devices have computational algorithms, provide delivery of stimulus, measure and analyze the patient's response, and provide a detailed report of study results.

The NC-stat System and ADVANCETM NCS system (NEUROMetrix® Inc., Waltham, MA) are hand-held, noninvasive, automated nerve conduction testing systems that have been proposed as an alternative to conventional nerve conduction testing. The devices have been marketed for use in an office or clinic setting, to assess nerves of the upper and lower extremities assisting in the diagnosis of peripheral nerve disorders such as carpal tunnel syndrome, diabetic peripheral neuropathy, and sciatica. The manufacturer suggests that data can be analyzed and readily available within minutes and then transmitted to the physician via email, internet or as a faxed document. A computerized system interprets the data. The proposed benefits of these devices are ease of use and rapid results.

Another device proposed for automated testing of peripheral nerves is the Brevio nerve conduction monitoring system (Neurotron Medical, Inc., West Trenton, NJ). According to the manufacturer, the device calculates latency and amplitude for sensory, motor, and f-wave responses using a single noninvasive neuro-sensor for testing performed on the patient. Similar to the NC-stat device, when testing is performed, the results can be immediately sent to a printer in the office or through a Web service for an electronic report.

Electrodiagnostic Testing General Principles
Electrodiagnostic testing of nerve function is established as having diagnostic utility and is professionally recognized when such tests are ordered to clarify or confirm findings from history and physical examination including a neurological examination as described within this guideline. Current guidelines do not support the use of these tests for initial or routine screening of patients in the absence of findings from physical examination or when the results of such tests are unlikely to influence treatment planning or patient management.

In order to establish the necessity for special diagnostic testing, one needs to consider at least the following:

- Is there historical or chief complaint information that suggests a condition or lesion that can only be appropriately evaluated using special tests or was an appropriate physical examination performed that brought forth findings suggestive of a condition or lesion that can only be appropriately evaluated using special tests?
- For nerve function tests specifically, was a neurological examination of reflexes, sensory integrity, and motor function performed as part of the physical examination and were findings indicative of nerve insult (diminished reflexes, dermatome-specific sensory deficits, or nerve-root-specific muscle weakness)?
- Would the information or clarification anticipated from the results of the special tests influence treatment planning?
- If there is a strong indication for special testing because of suspicious findings on history or physical examination, would positive findings on special tests necessitate referral to a specialist where such testing might be repeated or duplicated; specifically, is the test most appropriately performed or ordered by the clinician evaluating the patient or by a specialist to whom the patient should be referred?

When patients present with neck or low back pain with associated extremity complaints of pain, numbness, or tingling it is hoped that a pattern match can be made between these complaints and objective physical examination demonstration of sensory loss, motor loss, or an associated deep tendon reflex decrease. Use of provocative maneuvers such as compression, distraction, or percussive maneuvers (e.g., Cervical Compression Test, Straight Leg Raise, Tinel's sign) may further clarify the diagnosis. Other sources of the complaint should also be evaluated including referral from trigger points or facet irritation. Management should be based on the suspected cause. Consideration of electrodiagnostic testing may be warranted when:

- The diagnosis and treatment plan is not confirmed by the history and physical examination,
- A preliminary diagnosis and trial of treatment are not resulting in improvement,

- The patient's condition does not respond to treatment or worsens, or
- In order to make a proper diagnosis and treatment plan.

However, in most cases (i.e. for the conditions referenced above), it would be appropriate to initiate conservative care (e.g. 4-6 weeks), being sure to monitor for worsening or non-response to care, prior to utilizing invasive electrodiagnostic procedures (Souza, 2009). The electrodiagnostic evaluation is an extension of the neurologic portion of the physical examination. Both require a detailed knowledge of a patient and his/her disease. The electrodiagnostic consultation provides useful information in the evaluation of motor, sensory and autonomic neurons, nerve roots, brachial and lumbar plexi, peripheral nerves, neuromuscular junction, and muscles. Electrodiagnostic studies should enhance, but not replace, a careful history and physical examination. Training in the performance of electrodiagnostic procedures in isolation of knowledge about clinical diagnostic and management aspects of neuromuscular diseases, may not be adequate for proper performance of an electrodiagnostic evaluation and correct interpretation of electrodiagnostic test results.

The broad diagnostic scope of NCS is recognizable by the foregoing description. There may be instances where questions about an indication, or need for a study, will arise. The clinical history and examination, carried out before the study, must always describe and document clearly and comprehensibly the need for the planned test. A "rule-out" diagnosis is typically not acceptable. Often, pain, paresthesia, or weakness in an extremity is the reason for an NCS or EMG. These common symptoms result not only from axonal and myelin dysfunction but also from systemic, non-neurological illnesses. EMG and NCV may help in making this distinction. Therefore, symptom-based diagnoses such as "pain in limb" weakness, disturbance in skin sensation or "paresthesia" are acceptable provided the clinical assessment unequivocally supports the need for a study. To cite but one example of many, an EMG or NCS is irrelevant as a first order diagnostic test for limb pain resulting from immediate antecedent trauma or acute bone injury.

The intensity and extent of testing with EMG and NCS are matters of clinical judgment developed after the initial pre-test evaluation, and later modified during the testing procedure. Decisions to continue, modify or conclude a test also rely on a knowledge base of anatomy, physiology and neuromuscular diseases. There is a requirement for ongoing real-time clinical diagnostic evaluation, especially during EMG examination. Also, EMG examination is invasive. Needle placement in the exact muscle of interest is essential. It requires needle exploration near vital structures as the pleura, femoral neurovascular bundle, peritoneum, intraspinal spaces, carotid artery, orbit and brachial plexus. Risk of infection from AIDS, Hepatitis B-E, Creutzfeldt-Jakob encephalopathy, and hemorrhage from anticoagulation can be managed by proper techniques. Needle EMG is relatively contraindicated in persons on anti-coagulant therapy with coumadin (Warfarin) or heparins that cannot be interrupted. Oh (2003) observed that patients with a variety of bleeding disorders may be referred for needle EMG. Oh (2003) recommended that the referring physician and the electromyographer examine each case individually, carefully weighing the potential risks and benefits. Cardiac pacemakers and implanted cardiac defibrillators (ICDs) are increasingly used in clinical practice, and no evidence exists indicating that performing routine electrodiagnostic studies on patients with these devices poses a safety hazard. However, there are theoretical concerns that electrical impulses of nerve conduction studies (NCSs) could be erroneously sensed by devices and result in unintended inhibition or triggering of output or reprogramming of the device (Schoeck, 2007). In general, the closer the stimulation site is to the pacemaker and pacing leads, the greater the chance for inducing a voltage of sufficient amplitude to inhibit the pacemaker. Despite such concerns, no immediate or delayed adverse effects have been reported with routine NCS (AANEM, 2020).

In patients with external cardiac pacemakers, the conductive lead, inserted into the heart (usually transvenous) and connected to the external cardiac pacemaker, presents a serious potential hazard of electric injury to the heart (Al-Shekhlee et al., 2003). NCSs are not recommended in any patient with an external conductive lead terminating in or near the heart.

The nature of recurrent and frequent electrical impulses that may occur with repetitive stimulation or eliciting somatosensory evoked potentials (SEP) pose a special circumstance. Nerve stimulation in the lower extremities or in distal upper extremities would be unlikely to have untoward effects upon pacemakers or ICDs. Repetitive stimulation for assessing integrity of the neuromuscular junction typically necessitates study of proximal and/or cranial nerve-innervated muscles, which may place the stimulating electrode closer to the cardiac device. Nonetheless, as there are no data to determine the safety of performing these procedures in patients with pacemakers or ICDs, proximal upper extremity and cranial nerve stimulation sites should be avoided for repetitive and SEP stimulation (AANEM, 2020).

Needle EMG recording does not introduce electrical current into the body and, therefore, poses no risk of interference with implanted cardiac devices.

No known contraindications exist from performing needle EMG and NCSs on pregnant patients. In addition, no complications from these procedures have been reported in the literature. Evoked response testing, likewise, has not been reported to cause any problems when performed during pregnancy (AANEM, 2020).

The minimum standards recommended by the AANEM for electrodiagnostic testing (EDX) include the following:

- EDX testing should be medically indicated.
- Testing should be performed using EDX equipment that provides assessment of all parameters of the recorded signals. Studies performed with devices designed only for "screening purposes" rather than diagnosis are not acceptable.
- The number of tests performed should be the minimum needed to establish an accurate diagnosis.
- NCSs should be either (a) performed directly by a physician or (b) performed by a trained individual under the direct supervision of a physician. Direct supervision means that the physician is in close physical proximity to the EDX laboratory while testing is underway, is immediately available to provide the trained individual with assistance and direction, and is responsible for selecting the appropriate NCSs to be performed.
- The needle EMG examination must be performed by a physician specially trained in EDX medicine, as these tests are simultaneously performed and interpreted. The EDX laboratory must have the ability to perform needle EMG. The needle EMG must include evaluation of both resting and voluntary activities. NCSs should not be performed without needle EMG except in unique circumstances. EMG and NCSs should be performed together in the same EDX evaluation when possible.
- It is appropriate for only 1 attending physician to perform or supervise all of the components of the EDX testing (e.g., history taking, physical evaluation, supervision and/or performance of the EDX test, and interpretation) for a given patient and for all the testing to occur on the same date of service. The reporting of NCS and needle EMG study results should be integrated into a unifying diagnostic impression.
- In contrast, dissociation of NCS and needle EMG results into separate reports is inappropriate unless specifically explained by the physician. Performance and/or interpretation of NCSs separately from that of the needle EMG component of the test should clearly be the exception (e.g. when testing an acute nerve injury) rather than an established practice pattern for a given practitioner.

In a position statement published by the AANEM regarding the performance and interpretation of electrodiagnostic studies (AANEM, 2020), the AANEM states, "To reach a diagnosis based on EDX testing, it is imperative that the physician has obtained a history and examined the patient and designed the NCSs and EMG testing based on the information obtained from the patient. Using a predetermined or standardized battery of NCSs for all patients is inappropriate because it may be possible to obtain the data needed to reach a diagnosis with fewer studies. Alternatively, a pre-determined battery may not include the appropriate NCSs and/or EMG tests to determine the diagnosis. If the EDX studies are not based on the patient's history and physical examination findings, substandard care is being provided. If the NCS results a physician is relying on are interpreted offsite without integrating information from the needle EMG, substandard care is being provided. It is the opinion of the AANEM that relying on NCSs alone to make health care decisions is usually inadequate and inappropriate."

Except in limited clinical situations, performing nerve conduction studies (NCS) together with needle electromyography (NEMG) is required to diagnose peripheral nervous system disorders. According to the AANEM circumstances under which NCS and EMG should not be performed together include, but are not limited to, limited follow-up studies of neuromuscular structures that have undergone previous electrodiagnostic evaluation, the current use of anticoagulants, or the presence of lymphedema. In addition, the AANEM indicates that for suspected carpal tunnel syndrome, the extent of the needle EMG examination depends on the results of the NCSs and the differential diagnosis considered for the individual patient (AANEM, 2020). The AANEM (2022) does not support screening testing, monitoring disease intensity, or monitoring of treatment efficacy for polyneuropathy of diabetes or polyneuropathy of end stage renal disease (ESRD). NEMG is also not recommended for any of the following:

- testing of intrinsic foot muscles in the diagnosis of proximal lesions

- definitive diagnostic conclusion from paraspinal EMG in regions bearing scars of previous surgeries, such as previous laminectomy
- pattern setting limited limb muscle examinations without paraspinal muscle testing for diagnosis of radiculopathy
- needle EMG testing performed shortly after trauma

Number of Services Recommended; Table 1 summarizes the recommendations of the AANEM regarding the reasonable maximum number of studies per diagnostic category necessary for a physician to arrive at a diagnosis for 90% of patients with that final diagnosis, within a 12 month timeframe (AANEM, 2022).

Table 1: Number of Services Recommended:

Indication	Limbs Studied by Needle Electromyography (95860-95864, 95867-95870, 95885-95887)	Nerve Conduction Studies (Total nerve studied, 95907-95913)	Neuromuscular Junction Testing (Repetitive Stimulation)
Carpal Tunnel (unilateral)	1	7	--
Carpal Tunnel (bilateral)	2	10	--
Radiculopathy	2	7	--
Mononeuropathy	1	8	--
Polyneuropathy/ Mononeuropathy Multiplex	3	10	--
Myopathy	2	4	2
Motor Neuronopathy (e.g., ALS)	4	6	2
Plexopathy	2	12	--
Neuromuscular Junction	2	2	3
Tarsal Tunnel Syndrome (unilateral)	1	8	--
Tarsal Tunnel Syndrome (bilateral)	2	11	--
Weakness, Fatigue, Cramps, or Twitching (focal)	2	7	2
Weakness, Fatigue, Cramps, or Twitching (general)	4	8	2

Pain, Numbness, or Tingling (unilateral)	1	9	--
Pain, Numbness, or Tingling (bilateral)	2	12	--

Carpal Tunnel Syndrome
For suspected carpal tunnel syndrome (CTS), bilateral median motor and sensory NCSs are often indicated. The studies in the contralateral asymptomatic limb serve as controls in cases where values are borderline and may establish the presence of bilateral CTS. Two to 4 additional sensory or mixed NCSs can be compared to the median sensory NCSs to increase the diagnostic sensitivity of the testing. The additional sensory NCSs and an additional motor NCS (usually ulnar) are indicated to exclude a generalized neuropathy or multiple mononeuropathies. If 2 sensitive sensory NCSs are performed at the beginning start, additional sensory testing on the same limb is rarely needed. For suspected bilateral CTS, bilateral median motor and sensory NCSs are indicated. Up to 2 additional motor and 2 additional sensory NCSs are often indicated. The extent of the needle EMG examination depends on the results of the NCSs and the differential diagnosis considered in the individual patient. Additional testing may be indicated in patients with a differential diagnosis which includes peripheral neuropathy, cervical radiculopathy, brachial plexopathy, or more proximal median neuropathy.

Radiculopathy
A minimal evaluation for radiculopathy includes 1 motor and 1 sensory NCS and a needle EMG examination of the involved limb. However, the EDX testing can include up to 3 motor NCSs (in cases of an abnormal motor NCS, the same nerve in the contralateral limb and another motor nerve in the ipsilateral limb can be studied) and 2 sensory NCSs. Bilateral studies are often necessary to exclude a central disc herniation with bilateral radiculopathies or spinal stenosis or to differentiate between radiculopathy and plexopathy, polyneuropathy, or mononeuropathy. H reflexes and F waves may provide useful complementary information and assist in confirmation of root dysfunction Radiculopathies cannot be diagnosed by NCS alone; needle EMG must be performed to confirm a radiculopathy. Therefore, these studies should be performed together by 1 physician/qualified health care practitioner supervising and/or performing all aspects of the study.

Polyneuropathy/Mononeuropathy Multiplex
In order to characterize the nature of the polyneuropathy (axonal or demyelinating, diffuse or multifocal) and in order to exclude polyradiculopathy, plexopathy, neuronopathy, or multiple mononeuropathies, it may be necessary to study 4 motor and 4 sensory nerves, consisting of 2 motor and 2 sensory NCSs in 1 leg, 1 motor and 1 sensory NCS in the opposite leg, and 1 motor and 1 sensory NCS in 1 arm. H-reflex studies and F-wave studies from 2 nerves may provide additional diagnostic information. At least 2 limbs should be studied by a needle EMG examination. Studies of related paraspinal muscles are indicated to exclude some conditions such as polyradiculopathy.

Myopathy
To diagnose a myopathy, a needle EMG examination of 2 limbs is indicated. To help exclude other disorders such as polyneuropathy or neuronopathy, 2 motor and 2 sensory NCSs are indicated. Two repetitive motor nerve stimulation studies may be performed to exclude a disorder of NM transmission.

Motor Neuronopathy
In order to establish the diagnosis of motor neuronopathy (for example, amyotrophic lateral sclerosis and to exclude other disorders in the differential diagnosis, such as multifocal motor neuropathy or polyneuropathy, up to 4 motor nerves and 2 sensory nerves may be studied. Needle EMG of up to 4 extremities (or 3 limbs and facial or tongue muscles) is often necessary to document widespread denervation and to exclude a myopathy. One repetitive motor nerve stimulation study may be indicated to exclude a disorder affecting NM transmission.

Plexopathy
To characterize a brachial plexopathy and to differentiate it from cervical radiculopathy and mononeuropathies it may be necessary to perform additional sensory studies (e.g., medial and lateral antebrachial cutaneous nerves)

for a total of up to 6 sensory studies. It may also be necessary to perform up to 4 motor studies. To characterize a lumbosacral plexopathy and to differentiate it from lumbosacral radiculopathy, mononeuropathies and polyneuropathy, it may be necessary to perform up to 4 sensory studies, up to 4 motor studies and up to 2 H-reflex studies. For both brachial and lumbosacral plexopathies, up to 2 additional studies (sensory and/or motor) may be performed in the contralateral (at times asymptomatic) limb to better definite the diagnosis.

Neuromuscular Junction
To demonstrate and characterize abnormal NM transmission, repetitive nerve stimulation studies should be performed in up to 2 nerves and single fiber EMG (SFEMG) in up to 2 muscles. If any of these are abnormal, up to 2 motor and 2 sensory NCSs may be performed to exclude neuropathies that can be associated with abnormal NM transmission. At least 1 motor and 1 sensory NCS should be performed in a clinically involved limb, preferably in the distribution of a nerve studied with repetitive stimulation or SFEMG. At least 1 distal and 1 proximal muscle should be studied by a needle EMG examination to exclude a neuropathy or myopathy that can be associated with abnormal repetitive stimulation studies or SFEMG. At least 1 of the muscles should be clinically involved and both muscles should be in clinically involved limbs.

In combination, NCSs and a needle EMG examination may be most helpful when performed several weeks after the injury has occurred. However, NCSs are often useful acutely after nerve injury, for example, if there is concern that a nerve has been severed. In fact, if studies are delayed, the opportunity to precisely identify the region of injury or to intervene may be lost. In some cases, even needle EMG testing performed immediately after a nerve injury may demonstrate abnormal motor unit action potential (MUAP) recruitment and/or provide information that can be helpful to document preexisting conditions, date the injury, or serve as a baseline for comparison with later studies.

Because of the variability of different nerve injuries, a standard rule on the timing of EDX testing cannot easily be established, and the AANEM does not have specific recommendations in this regard. In all instances, the AANEM encourages dialogue between physicians and payers, and encourages the appropriate use of the physician's clinical judgment in determining when studies are most appropriately performed and what studies should be conducted.

Frequency of Electrodiagnostic Testing in a Given Patient
There are many clinical situations where good medical management requires repeat testing, such as in the following examples:

- Second diagnosis. Where a single diagnosis is made on the first visit but the patient subsequently develops a new set of symptoms, further evaluation is required for a second diagnosis before treatment can begin.
- Inconclusive diagnosis. When a serious diagnosis (e.g., ALS) is suspected but the results of the needle EMG/NCS examination are insufficient to be conclusive, follow-up studies are needed to establish or exclude the diagnosis.
- Rapidly evolving disease. Initial EDX testing in some diseases may not show any abnormality (e.g., Guillain-Barré syndrome) in the first 1 to 2 weeks. An early diagnosis confirmed by repeat electrodiagnosis must be made quickly so treatment can begin. Follow-up testing can be extremely useful in establishing prognosis and monitoring patient status.
- Course of the disease. Certain treatable diseases such as polymyositis and myasthenia gravis follow a fluctuating course with variable response to treatment. The physician treating such patients needs to monitor the disease progress and the response to therapeutic interventions. The results of follow-up evaluations may be necessary to guide treatment decisions.
- Unexpected disease course. In certain situations, management of a diagnosed condition may not yield expected results or new, questionably related problems may occur (e.g., failure to improve following surgery for radiculopathy). In these instances, reexamination is appropriate.
- Recovery from injury. Repeat evaluations may be needed to monitor recovery, to help establish prognosis, and/or to determine the need for and timing of surgical intervention (e.g., traumatic nerve injury), and to assess recovery over time following peripheral nerve surgery.

Repeat EDX evaluation is, therefore, sometimes necessary and, when justifiable, should be reimbursed. Reasonable limits can be set concerning the frequency of repeat EDX testing per year in a given patient by a given EDX evaluation for a given diagnosis. The following numbers of tests per 12-month period per diagnosis

per physician are acceptable:

- Two tests for carpal tunnel-unilateral, carpal tunnel-bilateral, radiculopathy, mononeuropathy, polyneuropathy, myopathy, and neuromuscular junction (NMJ) disorders.
- Three tests for motor neuronopathy, plexopathy, acute inflammatory demyelinating polyradiculoneuropathy/Guillain Barré Syndrome (AIDP/GBS), and following peripheral nerve surgery.

These limits should not apply if the patient requires evaluation by more than 1 EDX physician (i.e., a second opinion or an expert opinion at a tertiary care center) in a given year or if the patient requires evaluation for a second diagnosis in a given year. Additional studies then may be required or appropriate above these guidelines. In such situations, the reason for the repeat study should be included in the body of the report or in the patient's chart. Comparison with the previous test results should be documented. This additional documentation from the physician regarding the necessity for the additional repeat testing would be appropriate. Repeat EDX testing should not be necessary in a 12-month period in 80% of all cases

The Professional Practice Committee of the AANEM developed the following recommendations as part of the ABIM Choosing Wisely Initiative (AANEM, 2015):

- Don't do a needle electromyography (EMG) test for isolated neck or back pain after a motor vehicle accident, as a needle EMG is unlikely to be helpful.
- Don't do a four limb needle EMG/nerve conduction study (NCS) testing for neck and back pain after trauma.
- Don't do nerve conduction studies without also doing a needle EMG for testing for radiculopathy, a pinched nerve in the neck or back.

Sensitivity and specificity reports for electrodiagnostic testing methods (in general) vary. A clearly established measure of comparison is lacking in the medical literature, making comparisons across studies difficult. Some studies have compared results with clinical examination findings, imaging studies such as magnetic resonance imaging, computed tomography, myelography, or the observation of nerve root compression during surgery. Interobserver differences, the variety of tests employed, the presence of symptoms that may influence patient outcomes (e.g., pain), the presence of abnormal imaging studies in asymptomatic patients, and the subjectivity of the surgeon's interpretations may all lead to variances in sensitivity and specificity results. Despite these variances however, electrodiagnostic testing is commonly used to assist in diagnosing disorders involving the nerves, muscles and neuromuscular junction. Sensitivity and specificity data for automated/portable devices, used instead of or as an adjunct to standard nerve conduction testing, is insufficient to draw conclusions regarding predictive value.

DOCUMENTATION GUIDELINES

Documentation required justifying electrodiagnostic testing:

- Reason for the study, clinical history and examination findings are required
- Numerical values are required – latency, amplitude and nerve conduction
- Type of needle – monopolar or concentric
- When documentation is required submit hard copy of waveforms and complete written report, including test interpretation
- Name, signature, professional designation of all individuals performing, interpreting or supervising the test must be included

Inadequate Documentation:

- Narrative reports alluding to 'normal' or 'abnormal' results without numerical data
- Description of F-wave without reference to corresponding motor conduction data
- Pattern-setting unilateral H-reflex measurements
- Absence of clinical history, preferably written by the referral source, indicating the need for the test
- Absence of documentation to support repeat testing on the same beneficiary or testing every beneficiary referred for pain

Nerve conduction studies must provide a number of response parameters in a real-time fashion to facilitate provider interpretation. Those parameters include amplitude, latency, configuration and conduction velocity,

temperature of limb. Diagnostic studies that do not provide this information or those that provide delayed interpretation as substitutes for nerve conduction studies are not accepted. Raw measurement data obtained and transmitted trans-telephonically or over the Internet, therefore, does not qualify for the payment of the electrodiagnostic service codes included in this policy.

Claims for nerve conduction testing accomplished with discriminatory devices that use fixed anatomic templates and computer-generated reports used as an adjunct to physical examination routinely on all patients are not accepted.

The AANEM provides specific recommendations for reporting needle EMG and NCV results. According to the AANEM, the recommendation for documentation of nerve conduction and EMG testing should include (but are not limited to) a description of the patient's clinical problem (demographics, reason for referral), the electrodiagnostic tests performed (techniques, distances, lab reference values, and temperature monitoring), all relevant data derived from these tests (nerves/muscles tested, numerical values for latencies and action potential), and the diagnostic interpretation of the data, including limitations. Complete NCV test measurements should also include amplitude measurements, normal reference values and criteria for abnormalities. The recommendations also include confirmation that limb temperature was monitored continuously during the NCS and repetitive stimulation and that (a) the hand temperature was maintained between 32°C and 36°C and (b) the foot temperature was maintained between 30°C and 36°C. NCS abnormalities such as prolonged distal sensory or motor latencies could otherwise be due to coolness of the limb. For repetitive stimulation, if the limb is not warmed, the results may be assessed inaccurately as normal (AANEM, 2019).

LITERATURE REVIEW

Automated Nerve Conduction Testing

Evidence evaluating the diagnostic utility of the Brevio and Virtual Medical Systems VT 3000 nerve conduction monitor systems (Automated Nerve Conduction Testing) is lacking. Evidence evaluating the diagnostic utility of the NC-stat System consists mainly of case series, case control studies and retrospective reviews. Some of these studies compare results obtained using automated devices with results obtained from standard diagnostic testing (NCV testing and EMG), other studies did not have a comparison to conventional testing. Most of the published clinical studies have evaluated use of the NC-stat device for assessment of median and ulnar nerves (Dale, et al., 2015; Megerian, et al., 2007; Kong, et al., 2006; Vinik, et al., 2004); other published studies evaluated use of the device for disorders such as lumbosacral radiculopathies (Fisher, et al., 2008) and sensorimotor polyneuropathy in diabetic patients (Perkins et al., 2008). In some of these studies a strong correlation has been demonstrated when comparing NC-stat with reference standards (Perkins, et al., 2006; Kong, et al., 2006). The diagnostic accuracy for other conditions, such as those involving the lower extremities, has not been sufficiently demonstrated in the literature. Data regarding diagnostic performance, sensitivity and specificity of the automated NCV testing devices compared to standard testing is inconsistent and does not lead to strong conclusions; the studies are not well-designed, involve small populations and the results cannot be generalized. In some studies authors have reported high sensitivity and specificity when examining NC-stat accuracy for carpal tunnel syndrome compared to controls (Dale, et al., 2015; Leffler, et al., 2000; Rotman, et al., 2004), other authors however have reported NC-stat is no more sensitive or specific than a traditionally performed distal motor latency for the diagnosis of carpal tunnel syndrome (Katz, 2006). In 2008 Armstrong and colleagues published the outcomes of a cohort study comparing the results obtained with the NC-stat device to traditional nerve conduction studies for carpal tunnel screening (n=33). All correlations were significant. The authors reported sensitivity, with respect to the traditional results, ranged from 93.8% to 100% and specificity ranged from 84.6% to 94.1%. Nonetheless, the authors did not address limitations such as lack of needle EMG testing and did not evaluate the clinical relevance to the results (Armstrong, et al., 2008). In a longitudinal study (n=134), Dale and colleagues (2015) compared automated nerve conduction using the NC Stat device to traditional electrodiagnostic studies for 62 subjects, who had prior evaluation for carpal tunnel syndrome in the parent study (n=780). The authors reported that NC Stat results agreed with traditional electrodiagnostic studies for detecting median nerve conduction abnormalities within a general population of workers. Ulnar nerve testing results were not as favorable however median nerve testing results had high sensitivity and specificity (86-100%) for median motor and sensory latency. The study is limited by small sample population of industrial workers; results cannot be generalized to the standard population. A

technology assessment conducted by the Washington State Department of Labor and Industries (2006) concluded that the scientific evidence does not show NC-stat to be equivalent to conventional methods for nerve conduction testing. Authors generally agree that further studies are needed to determine the role automated testing has as a component of clinical care. Furthermore, some concerns remain among specialists regarding lack of standard EMG testing and incomplete assessment when using automated NCV testing devices. The AANEM recommends electrodiagnostic studies be performed by properly trained physicians and that interpretation of nerve conduction study data alone, absent face-to-face patient interaction and control over the process, provides substandard care (AANEM, 2024). The AANEM (2022) does not support the following:

- electrodiagnostic testing with automated, noninvasive nerve conduction testing devices
- screening testing, monitoring disease intensity, or monitoring treatment efficacy for polyneuropathy of diabetes or polyneuropathy of end stage renal disease (ESRD)

Schmidt and colleagues (2011) reported on the use of an automated hand-held nerve conduction device compared to NCS or needle electrode examination (standard electrodiagnostic tests) in the evaluation of individuals with unilateral leg symptoms. A total of 50 participants with complaints of unilateral leg pain, numbness or weakness were included in the study and underwent history with physical exam and standard electrodiagnostic testing. The participants were then tested using an automated hand-held nerve conduction device. A total of 22 participants had findings consistent with radiculopathy on standard electrodiagnostic test and 28 participants had a normal electrodiagnostic exam or evidence of another distinct neuromuscular diagnosis. During initial data analysis, a significant discrepancy was revealed between the results of standard electrodiagnostic tests and the automated test. For this reason, another 25 participants were recruited to serve as the control group. The control group participants had upper limb symptoms such as cervical radiculopathy, carpal tunnel syndrome or ulnar neuropathy. Of the 50 participants initially recruited, 28 were found to have normal standard electrodiagnostic tests. The automated tests corroborated the findings in 4 cases only. In the control group, all standard electrodiagnostic tests were normal, but the automated testing showed 18 of 25 participants had findings consistent with radiculopathy or polyneuropathy. Automated and standard testing correlated in 14 of 75 participants studied (11 of whom had normal exams with both testing methods). While this study has a small number of participants, the authors stated that "it is unlikely that larger study numbers would have increased specificity to acceptable levels of a clinically useful test, given the 95% confidence levels for the current data."

In a position statement on the Proper Performance and Interpretation of Electrodiagnostic Studies and the Recommended Use of Electrodiagnostic Medicine from the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM, 2006, 2014 and 2020), although no specific reference to or recommendation for automated nerve conduction testing devices is made, it is noted that “Because needle EMG studies offer information needed for an accurate diagnosis, except in unique situations, it is the AANEM’s position that NCSs and needle EMGs should be performed together in the same setting.” The document also notes that using only NCS may provide incomplete diagnostic information which could lead to inadequate or inappropriate treatment”

And: Individuals without a medical education in neuromuscular disorders and without special training in EDX procedures typically are not qualified to interpret the waveforms generated by NCSs and needle EMGs or to correlate the findings with other clinical information to reach a diagnosis. It is also the recommendation of the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM) that electrodiagnostic testing/consultations are conducted by physicians who have a comprehensive knowledge of neurological and neuromusculoskeletal diseases, and in the application of neurophysiologic techniques for evaluation of those disorders.

Although portable, automated, noninvasive testing of nerve conduction has been suggested as an easier method for providers to obtain rapid results, the AANEM recommended that EDX studies of EMG and NCS be performed “by physicians with medical education in neuromuscular disorders and special training in EDX testing” (AANEM, 2020). Currently, there is insufficient evidence in peer-reviewed published literature to demonstrate that automated nerve conduction testing devices provide better measures in the diagnosis of peripheral nerve disease. In addition, it remains unclear how testing with portable devices improves clinical outcomes for populations such as diabetics compared to clinical detection through neurological examination.

Since the clearance of the NC-stat, several other devices have also received FDA clearance listing the NC-stat as the predicate device. However to date there has been very limited published evidence to demonstrate the

safety and efficacy of automated, noninvasive nerve conduction testing devices, as compared to conventional "gold standard" electrodiagnostic testing using EMG and NCS. Most of the published clinical studies have evaluated use of an automated device for assessment of the median and ulnar nerves only (Katz, 2006; Kong, 2006).

Other Electrodiagnostic Testing
Evidence in the peer reviewed scientific literature including textbook and professional society opinion supports clinical utility for electrodiagnostic testing, including neuromuscular junction testing, when used to assist in diagnosing disorders involving the nerves, muscles and neuromuscular junction. The AANEM has published guidance for the performance of nerve conduction studies and EMG. According to the AANEM a typical nerve conduction examination includes: development of a differential diagnosis based upon appropriate history and physical exam, the NCV study (recording and studying of electrical responses from peripheral nerves or muscles) and the completion of indicated needle EMG studies to evaluate the differential diagnosis and to complement the nerve conduction study. In addition, the AANEM supports that when performing nerve conduction studies the waveform must be reviewed on site and in real time, with reports prepared onsite by the examiner, consistent with current procedural terminology descriptions (AANEM, 2019). The AANEM defines the use of the term onsite as that where the history and physical, performance of NCV and EMG, analysis of electrodiagnostic data and determination of diagnosis occur in the same location, typically an electrodiagnostic laboratory. Similarly, real time is defined as that which allows for information from the physical and history to be integrated with the performance of testing, allowing for the testing of both NCV and EMG to be tailored/modified to the individual circumstance as needed before leaving the lab.

The use of nerve conduction studies including F-wave and H-reflex tests for the diagnosis of early stage polyneuropathies and proximal nerve lesions is confirmed in several reviews and studies (Choi and Maria, 2021; Maccabee et al., 2011; Kostera-Pruszczyk et al., 2004; Trujillo-Hernandez et al., 2005; Bal et al., 2006; Kocer et al., 2005; Mesrati and Vecchierini, 2004). The published scientific literature demonstrates somatosensory evoked potential (SEP) studies are useful when used to aid in the diagnosis of various neuromuscular disorders and have varying degrees of sensitivity and specificity.

Nerve conduction studies are indicated for the following conditions: peripheral nerve entrapment (Vij et al., 2021; Omejec, 2014; Park, 2014; Calfee, 2012; Kwon, 2008); generalized neuropathies (Choi and Maria, 2021; Holiner,2013; Derr, 2009, Dyck, 2010, De Sousa, 2009); polyneuropathies (Choi and Maria, 2021; de Souza, 2015; Emeryk-Szajewska, 1998, Torvin Moller, 2009); plexopathy (Mullins, 2007); neuromuscular junction disorders (Meriggioli, 2005); myopathies including polymyositis, dermatomyositis, and congenital myopathies (Wang, 2010); motor neuron disease (Hammad, 2007); spine disorders and radiculopathy (Pawar, 2013; Alrawi, 2007; Haig, 2006); and guidance for botulinum toxin injection for spasmodic dysphonia or segmental dystonia, when it is difficult to isolate affected muscles (Molloy, 2002).

Karami-Mohajeri et al (2014) presented a systematic review of the recent literature on the scientific support of EMG and NCV in diagnosing the exposure and toxicity of organophosphorus pesticides (OP). Specifically, this review focused on changes in EMG, NCV, occurrence of intermediate syndrome (IMS), and OP-induced delayed polyneuropathy (OPIDN) in human. All relevant bibliographic databases were searched for human studies using the key words "OP poisoning", "electromyography", "nerve conduction study," and "muscles disorders". Intermediate syndrome usually occurs after an acute cholinergic crisis, while OPIDN occurs after both acute and chronic exposures. Collection of these studies supported that IMS is a neuromuscular junction disorder and can be recorded upon the onset of respiratory failure. Due to heterogeneity of reports on outcomes of interest such as motor NCV and EMG amplitude in acute cases and inability to achieve precise estimation of effect in chronic cases meta-analysis was not helpful to this review. The OPIDN after both acute and low-level prolonged exposures develops peripheral neuropathy without preceding cholinergic toxicity and the progress of changes in EMG and NCV is parallel with the development of IMS and OPIDN. Persistent inhibition of acetylcholinesterase (AChE) is responsible for muscle weakness, but this is not the only factor involved in the incidence of this weakness in IMS or OPIDN suggestive of AChE assay not useful as an index of nerve and muscle impairment. The authors concluded that although several mechanisms for induction of this neurodegenerative disorder have been proposed, among them oxidative stress and resulting apoptosis can be emphasized. Nevertheless, they stated that there is little synchronized evidence on subclinical electrophysiological findings that limit these investigators to reach a strong conclusion on the diagnostic or prognostic use of EMG and NCV for acute and occupational exposures to OPs.

Asad et al. (2009) compared the nerve conduction studies in clinically undetectable and detectable sensorimotor polyneuropathy in type 2 diabetics. Diagnosed diabetics (n = 60) were divided in two groups. Group 1 (n1 = 30) with clinically undetectable and group 2 (n2 = 30) with clinically detectable Diabetic Polyneuropathy. Detection of the sensorimotor neuropathy was done according to Diabetic Neuropathy Symptom Score and Diabetic Neuropathy Examination scores. The simplified nerve conduction studies protocol was followed in recording amplitudes, velocities and latencies of minimum two (Sural, Peroneal) and maximum six i.e. three sensory (Sural, Ulnar, Median) and three motor (Peroneal, Ulnar, Tibial) nerves. The comparisons were done between different parameters of nerve conduction studies with the neurological scores in undetectable and detectable groups using Pearson's chi square test. The amplitudes, velocities, latencies, outcome and grading of neuropathy in nerve conduction studies when compared with neurological detection scores showed a significant relation in each group regarding evaluation ($p = 0.005$, $p = 0.004$, $p = 0.05$, $p = 0.00001$, $p = 0.003$ respectively). Diabetic Neuropathy Symptom Score and Diabetic Neuropathy Examination Score together can help in prompt evaluation of the diabetic sensorimotor polyneuropathy though nerve conduction study is more powerful test and can help in diagnosing subclinical cases.

Surface Electromyography (SEMG)

There is a wide variety of Surface Electromyography (SEMG) hardware and software that is used depending upon the specific clinical purpose intended. However, all SEMG hardware and software have in common the following:

- Electrical signals are measured from skeletal muscles.
- Sensing electrodes are placed on the skin overlying the muscle of interest.
- The electrical activity is measured when the muscle is active.
- SEMG records a narrow frequency of electrical activity (20-500 Hz).
- SEMG findings are based on computer analysis of either the frequency spectrum (spectral analysis), amplitude of signal, or root mean square of electrical action potentials.

<u>The Evaluation of Specific Neuromuscular Pathologies</u>

The literature on the subject of SEMG use for neuromuscular disorders indicates that it is inferior in all parameters (sensitivity, specificity, spatial resolution, signal to noise ratio) to the invasive procedures such as needle electromyography (NEMG) or fine-wire electromyography (FWEMG) and thus cannot be used as a substitute for those procedures. Both systematic reviews of this subject explicitly reject SEMG for the diagnosis of neuromuscular disease.

The gold standard for this type of evaluation is either NEMG or FWEMG. Because these procedures are both invasive and painful, there is an obvious desire to find equally useful, but less onerous diagnostic tests. There are, however, several inherent limitations to the use of SEMG for the analysis of neuromuscular pathology. SEMG records input from a much wider spatial field than do either of the invasive procedures. Muscles adjacent to those of interest can produce signals that appear to originate from the target muscles (which are located immediately beneath the sensing electrodes). Thus, the specificity of SEMG findings is always in doubt. SEMG is also very susceptible to movement artifact. Even with the most careful procedural safeguards, small (and even imperceptible) body movements may produce spurious signals. There is a much poorer signal to noise ratio with SEMG. This is particularly a problem when target muscles are located more than 10 mm below the skin surface. Finally, the electrical activity that is recorded by SEMG is only of skeletal muscle origins. It is not possible to capture any electrical activity along motor neuron axons, as it is with NEMG or FWEMG.

<u>The Evaluation of Movement and Gait Disturbances</u>

There are a variety of experimental applications such as studies of human movement, the study of nerve conduction velocities after electrical stimulation of peripheral nerves, etc., in which SEMG is considered standard. Because of its relative ease of use and non-invasive nature, SEMG is considered superior to NEMG and FWEMG for many of these applications. There are also thought to be advantages in using SEMG to evaluate/study movement disorders of CNS origins such as tremor, dystonia, dyskinesia, and myoclonus. While it is thought that SEMG can accurately measure these disorders, it is less clear what the clinical utility of these measurements might be. This is the only application for which the American Medical Association (AMA) Current Procedural Terminology (CPT) coding committee has developed a procedure code.

<u>The Evaluation of Functional Back Pain</u>

There are a number of studies that have investigated the possibility that SEMG may differentiate between those with and those without back pain by evaluating muscle fatigue through “spectral shift”. However, the findings are

inconsistent and contradictory, the relationship between muscle fatigue and back pain is not established, and there may be unrelated factors affecting spectral shift.

The clinical context in which chiropractors are most likely to use SEMG is for the evaluation of functional low back pain and neck pain. There are two proposed mechanisms by which SEMG is thought to relate to back pain. First is the presumed relationship between muscle fatigue and back pain. The theory posits that excessive muscle fatigue, due to deconditioning, may result in back pain. Further, it has been shown that when muscles fatigue they produce a different set of electrical frequencies as measured by SEMG. This phenomenon has been dubbed the "spectral shift." Thus, it has been hypothesized that by using dynamic SEMG (recording muscle activity while exercising) it should be possible to differentiate those with back pain from those without back pain. There are a number of studies that have investigated this possibility and some have had success in doing so. However, this success is tempered by several caveats. First, these findings are inconsistent and somewhat contradictory. Second, the exact nature of the relationship between muscle fatigue and back pain is uncertain. In fact, the direction of the relationship is uncertain—does muscle fatigue cause back pain or does back pain cause muscle fatigue? Third, it is unclear what other factors might cause a spectral shift making the specificity of such findings doubtful.

There is another mechanism by which it is proposed that SEMG can assist in the evaluation of back pain: the identification of hypertonic muscles. It is this mechanism that the leading chiropractic proponents of SEMG suggest is the most relevant to patient management. In effect, it is proposed that SEMG is a more objective and accurate tool than palpation in locating hypertonic muscles and thereby the identification of vertebral subluxations. The literature relative to this mechanism is even more limited and of much poorer quality than is the literature on muscle fatigue and SEMG. It is also speculated that the finding of SEMG asymmetry is an indication of spinal dysfunction. There is no literature that finds a relationship between back pain and such asymmetry and at least one study that casts doubt on this hypothesis. SEMG is not reliable for assessing spinal dysfunction or subluxation.

An analysis by Triano, et al. (2013) examined the techniques and procedures used by chiropractors to identify the appropriate site for the application of spinal manipulation. Consistent with previous reviews they found limited support for reliability of SEMG to identify cohorts of patients with abnormal neuromuscular control. However the review concluded that there was no support for the use of SEMG to localize treatment to a specific site. Another area of research for SEMG is its use as a prognostic tool. Studies have looked at flexion and extension movements to determine the prognosis of the patient relative to their low back pain recovery. Hu et al. (2014) evaluated the prognostic value of quantitative SEMG topographic analysis and attempted to verify the accuracy of the performance of proposed time-varying topographic parameters for identifying the patients who have better response toward the rehabilitation program. Thirty-eight patients with chronic nonspecific LBP and 43 healthy subjects were included in the study. These patients suffered from chronic nonspecific LBP without the history of back surgery and any medical conditions causing acute exacerbation of LBP during the clinical test were enlisted to perform the clinical test during the 12-week physiotherapy (PT) treatment. Low back pain patients were classified into two groups: "responding" and "nonresponding" based on the clinical assessment. The responding group referred to the LBP patients who began to recover after the PT treatment, whereas the nonresponding group referred to some LBP patients who did not recover or got worse after the treatment. The quantitative time-varying analysis of SEMG topography showed significant difference between the healthy and LBP groups. The discrepancies in quantitative dynamic SEMG topography of LBP group from normal group, were able to identify those LBP subjects who would respond to a conservative rehabilitation program focused on functional restoration of lumbar muscle. More research is needed to confirm results and evaluate its utility clinically.

In assessing the appropriateness of SEMG for functional back pain, there are three levels of analysis to consider that remain pertinent:

1. **Technical performance of the instrument.** To what extent does the instrument accurately measure what it purports to measure (e.g., muscle fatigue, muscle spasm)? The above discussion regarding neuromuscular disorders identifies several inherent limitations in the technical performance of SEMG. All of those limitations (with the exception of the inability to measure axonal signals) are relevant to this issue as well. The lack of specificity, poor signal to noise ratio, and the problem of movement artifacts will all limit the accuracy and validity of SEMG for the evaluation of functional back pain.

2. **Whether and how the instrument findings can be used in patient management.** The use of SEMG as a "subluxation detector" that can help identify specific levels of spinal dysfunction has not been substantiated and is entirely speculative.

If it has been determined that it is possible to identify hypo- or hypertonic muscles through the use of SEMG (keeping in mind the inherent technical limitations affecting specificity, accuracy, and validity), the question becomes how this information will be used in the management of the patient. To date, the only clinical correlation that has been established is that there *may* be differences between subjects with back pain and control subjects in their muscle fatigability as measured by SEMG. In other words, it may be possible to differentiate those with and without back pain using SEMG. But as one of the systematic reviews points out, the gold standard for the presence or absence of back pain is the clinical history, and it is far easier and more reliable to simply ask the person whether he or she has back pain. While potentially, it might be possible to use SEMG to identify malingerers, the procedure is currently far too unreliable to permit any such determination to be predicated on SEMG findings. In addition, several established malingering tests are available as taught within standard orthopedic examination courses in chiropractic, osteopathic, and medical schools.

3. **Whether the use of an instrument results in better clinical outcomes.** There is no evidence (and very little theory) to indicate how specific SEMG findings should be used to manage individuals with back pain in order to produce better clinical outcomes.

   Ultimately what matters is whether or not the use of SEMG results in better clinical outcomes than does the management of back pain without the use of SEMG information. There have been no clinical trials that have addressed this question. In fact, there are no clinical trials of back pain that have used SEMG in any aspect of the diagnosis of subjects, in measuring outcomes of treatment, or otherwise evaluating the effectiveness of the therapeutic intervention (e.g., chiropractic treatment).

Coding Information

Notes:

1. This list of codes may not be all-inclusive since the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS) code updates may occur more frequently than policy updates.
2. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Nerve Conduction Testing/Electromyography Testing: Performed Together

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

CPT®* Codes	Description
95885	Needle electromyography, each extremity, with related paraspinal areas, when performed, done with nerve conduction, amplitude and latency/velocity study; limited (List separately in addition to code for primary procedure)
95886	Needle electromyography, each extremity, with related paraspinal areas, when performed, done with nerve conduction, amplitude and latency/velocity study; complete, five or more muscles studied, innervated by three or more nerves or four or more spinal levels (List separately in addition to code for primary procedure)
95887	Needle electromyography, non-extremity (cranial nerve supplied or axial) muscle(s) done with nerve conduction, amplitude and latency/velocity study (List separately in addition to code for primary procedure)

Considered Medically Necessary when a NCV study (Table 1) is conducted and interpreted at the same time as needle electromyography (NEMG) study (Table 2):

Table 1: NCV

CPT®* Codes	Description

95907	Nerve conduction studies; 1-2 studies
95908	Nerve conduction studies; 3-4 studies
95909	Nerve conduction studies; 5-6 studies
95910	Nerve conduction studies; 7-8 studies
95911	Nerve conduction studies; 9-10 studies
95912	Nerve conduction studies; 11-12 studies
95913	Nerve conduction studies; 13 or more studies

Table 2: EMG

CPT®* Codes	Description
92265	Needle oculoelectromyography, 1 or more extraocular muscles, 1 or both eyes, with interpretation and report
95860	Needle electromyography; 1 extremity with or without related paraspinal areas
95861	Needle electromyography; 2 extremities with or without related paraspinal areas
95863	Needle electromyography; 3 extremities with or without related paraspinal areas
95864	Needle electromyography; 4 extremities with or without related paraspinal areas
95865	Needle electromyography; larynx
95866	Needle electromyography; hemidiaphragm
95867	Needle electromyography; cranial nerve supplied muscle(s), unilateral
95868	Needle electromyography; cranial nerve supplied muscles, bilateral
95869	Needle electromyography; thoracic paraspinal muscles (excluding T1 or T12)
95870	Needle electromyography; limited study of muscles in 1 extremity or non-limb (axial) muscles (unilateral or bilateral), other than thoracic paraspinal, cranial nerve supplied muscles, or sphincters
95872	Needle electromyography using single fiber electrode, with quantitative measurement of jitter, blocking and/or fiber density, any/all sites of each muscle studied

ICD-10-CM Diagnosis Codes	Description
A30.0	Indeterminate leprosy
A30.1	Tuberculoid leprosy
A30.2	Borderline tuberculoid leprosy
A30.3	Borderline leprosy
A30.4	Borderline lepromatous leprosy
A30.5	Lepromatous leprosy
A30.8	Other forms of leprosy
A30.9	Leprosy, unspecified
A52.15	Late syphilitic neuropathy
A69.20	Lyme disease, unspecified
A80.0	Acute paralytic poliomyelitis, vaccine-associated
A80.1	Acute paralytic poliomyelitis, wild virus, imported
A80.2	Acute paralytic poliomyelitis, wild virus, indigenous
A80.30	Acute paralytic poliomyelitis, unspecified
A80.39	Other acute paralytic poliomyelitis
A80.4	Acute nonparalytic poliomyelitis
A80.9	Acute poliomyelitis, unspecified
B02.21	Postherpetic geniculate ganglionitis
B02.22	Postherpetic trigeminal neuralgia
B02.23	Postherpetic polyneuropathy
B02.24	Postherpetic myelitis

B02.29	Other postherpetic nervous system involvement
B20	Human immunodeficiency virus [HIV] disease
B26.84	Mumps polyneuropathy
B91	Sequelae of poliomyelitis
E08.40	Diabetes mellitus due to underlying condition with diabetic neuropathy, unspecified
E08.41	Diabetes mellitus due to underlying condition with diabetic mononeuropathy
E08.42	Diabetes mellitus due to underlying condition with diabetic polyneuropathy
E08.43	Diabetes mellitus due to underlying condition with diabetic autonomic (poly)neuropathy
E08.44	Diabetes mellitus due to underlying condition with diabetic amyotrophy
E08.49	Diabetes mellitus due to underlying condition with other diabetic neurological complication
E08.610	Diabetes mellitus due to underlying condition with diabetic neuropathic arthropathy
E09.40	Drug or chemical induced diabetes mellitus with neurological complications with diabetic neuropathy, unspecified
E09.41	Drug or chemical induced diabetes mellitus with neurological complications with diabetic mononeuropathy
E09.42	Drug or chemical induced diabetes mellitus with neurological complications with diabetic polyneuropathy
E09.43	Drug or chemical induced diabetes mellitus with neurological complications with diabetic autonomic (poly)neuropathy
E09.44	Drug or chemical induced diabetes mellitus with neurological complications with diabetic amyotrophy
E09.49	Drug or chemical induced diabetes mellitus with neurological complications with other diabetic neurological complication
E09.610	Drug or chemical induced diabetes mellitus with diabetic neuropathic arthropathy
E10.40	Type 1 diabetes mellitus with diabetic neuropathy, unspecified
E10.41	Type 1 diabetes mellitus with diabetic mononeuropathy
E10.42	Type 1 diabetes mellitus with diabetic polyneuropathy
E10.43	Type 1 diabetes mellitus with diabetic autonomic (poly)neuropathy
E10.44	Type 1 diabetes mellitus with diabetic amyotrophy
E10.49	Type 1 diabetes mellitus with other diabetic neurological complication
E10.610	Type 1 diabetes mellitus with diabetic neuropathic arthropathy
E11.40	Type 2 diabetes mellitus with diabetic neuropathy, unspecified
E11.41	Type 2 diabetes mellitus with diabetic mononeuropathy
E11.42	Type 2 diabetes mellitus with diabetic polyneuropathy
E11.43	Type 2 diabetes mellitus with diabetic autonomic (poly)neuropathy
E11.44	Type 2 diabetes mellitus with diabetic amyotrophy
E11.49	Type 2 diabetes mellitus with other diabetic neurological complication
E11.610	Type 2 diabetes mellitus with diabetic neuropathic arthropathy
E13.40	Other specified diabetes mellitus with diabetic neuropathy, unspecified
E13.41	Other specified diabetes mellitus with diabetic mononeuropathy
E13.42	Other specified diabetes mellitus with diabetic polyneuropathy
E13.43	Other specified diabetes mellitus with diabetic autonomic (poly)neuropathy
E13.44	Other specified diabetes mellitus with diabetic amyotrophy
E13.49	Other specified diabetes mellitus with other diabetic neurological complication
E13.610	Other specified diabetes mellitus with diabetic neuropathic arthropathy
E71.40	Disorder of carnitine metabolism, unspecified
E71.41	Primary carnitine deficiency
E71.42	Carnitine deficiency due to inborn errors of metabolism
E71.43	Iatrogenic carnitine deficiency
E71.440	Ruvalcaba-Myhre-Smith syndrome
E71.448	Other secondary carnitine deficiency
E74.00	Glycogen storage disease, unspecified
E74.01	von Gierke disease
E74.02	Pompe disease
E74.03	Cori disease

E74.04	McArdle disease
E74.05	Lysosome-associated membrane protein 2 [LAMP2] deficiency
E74.09	Other glycogen storage disease
E79.2	Myoadenylate deaminase deficiency
E88.810	Metabolic syndrome
E88.811	Insulin resistance syndrome, Type A
E88.818	Other insulin resistance
E88.9	Metabolic disorder, unspecified
G04.1	Tropical spastic paraplegia
G11.0	Congenital nonprogressive ataxia
G11.2	Late-onset cerebellar ataxia
G11.3	Cerebellar ataxia with defective DNA repair
G11.4	Hereditary spastic paraplegia
G11.8	Other hereditary ataxias
G11.9	Hereditary ataxia, unspecified
G11.11	Friedreich ataxia
G12.0	Infantile spinal muscular atrophy, type I [Werdnig-Hoffman]
G12.1	Other inherited spinal muscular atrophy
G12.20	Motor neuron disease, unspecified
G12.21	Amyotrophic lateral sclerosis
G12.22	Progressive bulbar palsy
G12.23	Primary lateral sclerosis
G12.24	Familial motor neuron disease
G12.25	Progressive spinal muscle atrophy
G12.29	Other motor neuron disease
G12.8	Other spinal muscular atrophies and related syndromes
G12.9	Spinal muscular atrophy, unspecified
G13.0	Paraneoplastic neuromyopathy and neuropathy
G13.1	Other systemic atrophy primarily affecting central nervous system in neoplastic disease
G14	Postpolio syndrome
G23.0	Hallervorden-Spatz disease
G23.1	Progressive supranuclear ophthalmoplegia [Steele-Richardson-Olszewski]
G23.2	Striatonigral degeneration
G23.8	Other specified degenerative diseases of basal ganglia
G23.9	Degenerative disease of basal ganglia, unspecified
G24.02	Drug induced acute dystonia
G24.1	Genetic torsion dystonia
G24.2	Idiopathic nonfamilial dystonia
G24.3	Spasmodic torticollis
G24.4	Idiopathic orofacial dystonia
G24.5	Blepharospasm
G24.8	Other dystonia
G24.9	Dystonia, unspecified
G25.3	Myoclonus
G25.70	Drug induced movement disorder, unspecified
G25.79	Other drug induced movement disorders
G25.89	Other specified extrapyramidal and movement disorders
G25.9	Extrapyramidal and movement disorder, unspecified
G32.0	Subacute combined degeneration of spinal cord in diseases classified elsewhere
G35	Multiple sclerosis
G36.0	Neuromyelitis optica [Devic]
G36.1	Acute and subacute hemorrhagic leukoencephalitis [Hurst]
G36.8	Other specified acute disseminated demyelination
G36.9	Acute disseminated demyelination, unspecified
G37.0	Diffuse sclerosis of central nervous system

G37.1	Central demyelination of corpus callosum
G37.2	Central pontine myelinolysis
G37.3	Acute transverse myelitis in demyelinating disease of central nervous system
G37.4	Subacute necrotizing myelitis of central nervous system
G37.5	Concentric sclerosis [Balo] of central nervous system
G37.89	Other specified demyelinating diseases of central nervous system
G37.9	Demyelinating disease of central nervous system, unspecified
G50.0	Trigeminal neuralgia
G50.1	Atypical facial pain
G50.8	Other disorders of trigeminal nerve
G50.9	Disorder of trigeminal nerve, unspecified
G51.0	Bell's palsy
G51.1	Geniculate ganglionitis
G51.2	Melkersson's syndrome
G51.31	Clonic hemifacial spasm, right
G51.32	Clonic hemifacial spasm, left
G51.33	Clonic hemifacial spasm, bilateral
G51.39	Clonic hemifacial spasm, unspecified
G51.4	Facial myokymia
G51.8	Other disorders of facial nerve
G51.9	Disorder of facial nerve, unspecified
G52.0	Disorders of olfactory nerve
G52.1	Disorders of glossopharyngeal nerve
G52.2	Disorders of vagus nerve
G52.3	Disorders of hypoglossal nerve
G52.7	Disorders of multiple cranial nerves
G52.8	Disorders of other specified cranial nerves
G52.9	Cranial nerve disorder, unspecified
G54.0	Brachial plexus disorders
G54.1	Lumbosacral plexus disorders
G54.2	Cervical root disorders, not elsewhere classified
G54.3	Thoracic root disorders, not elsewhere classified
G54.4	Lumbosacral root disorders, not elsewhere classified
G54.5	Neuralgic amyotrophy
G54.6	Phantom limb syndrome with pain
G54.7	Phantom limb syndrome without pain
G54.8	Other nerve root and plexus disorders
G54.9	Nerve root and plexus disorder, unspecified
G56.01	Carpal tunnel syndrome, right upper limb
G56.02	Carpal tunnel syndrome, left upper limb
G56.03	Carpal tunnel syndrome, bilateral upper limbs
G56.10	Other lesions of median nerve, unspecified upper limb
G56.11	Other lesions of median nerve, right upper limb
G56.12	Other lesions of median nerve, left upper limb
G56.13	Other lesions of median nerve, bilateral upper limbs
G56.21	Lesion of ulnar nerve, right upper limb
G56.22	Lesion of ulnar nerve, left upper limb
G56.23	Lesion of ulnar nerve, bilateral upper limbs
G56.31	Lesion of radial nerve, right upper limb
G56.32	Lesion of radial nerve, left upper limb
G56.33	Lesion of radial nerve, bilateral upper limbs
G56.41	Causalgia of right upper limb
G56.42	Causalgia of left upper limb
G56.43	Causalgia of bilateral upper limbs
G56.81	Other specified mononeuropathies of right upper limb

G56.82	Other specified mononeuropathies of left upper limb
G56.83	Other specified mononeuropathies of bilateral upper limbs
G56.91	Unspecified mononeuropathy of right upper limb
G56.92	Unspecified mononeuropathy of left upper limb
G56.93	Unspecified mononeuropathy of bilateral upper limbs
G57.00	Lesion of sciatic nerve, unspecified lower limb
G57.01	Lesion of sciatic nerve, right lower limb
G57.02	Lesion of sciatic nerve, left lower limb
G57.03	Lesion of sciatic nerve, bilateral lower limbs
G57.10	Meralgia paresthetica, unspecified lower limb
G57.11	Meralgia paresthetica, right lower limb
G57.12	Meralgia paresthetica, left lower limb
G57.13	Meralgia paresthetica, bilateral lower limbs
G57.20	Lesion of femoral nerve, unspecified lower limb
G57.21	Lesion of femoral nerve, right lower limb
G57.22	Lesion of femoral nerve, left lower limb
G57.23	Lesion of femoral nerve, bilateral lower limbs
G57.30	Lesion of lateral popliteal nerve, unspecified lower limb
G57.31	Lesion of lateral popliteal nerve, right lower limb
G57.32	Lesion of lateral popliteal nerve, left lower limb
G57.33	Lesion of lateral popliteal nerve, bilateral lower limbs
G57.40	Lesion of medial popliteal nerve, unspecified lower limb
G57.41	Lesion of medial popliteal nerve, right lower limb
G57.42	Lesion of medial popliteal nerve, left lower limb
G57.43	Lesion of medial popliteal nerve, bilateral lower limbs
G57.50	Tarsal tunnel syndrome, unspecified lower limb
G57.51	Tarsal tunnel syndrome, right lower limb
G57.52	Tarsal tunnel syndrome, left lower limb
G57.53	Tarsal tunnel syndrome, bilateral lower limbs
G57.60	Lesion of plantar nerve, unspecified lower limb
G57.61	Lesion of plantar nerve, right lower limb
G57.62	Lesion of plantar nerve, left lower limb
G57.63	Lesion of plantar nerve, bilateral lower limbs
G57.70	Causalgia of unspecified lower limb
G57.71	Causalgia of right lower limb
G57.72	Causalgia of left lower limb
G57.73	Causalgia of bilateral lower limbs
G57.80	Other specified mononeuropathies of unspecified lower limb
G57.81	Other specified mononeuropathies of right lower limb
G57.82	Other specified mononeuropathies of left lower limb
G57.83	Other specified mononeuropathies of bilateral lower limbs
G57.90	Unspecified mononeuropathy of unspecified lower limb
G57.91	Unspecified mononeuropathy of right lower limb
G57.92	Unspecified mononeuropathy of left lower limb
G57.93	Unspecified mononeuropathy of bilateral lower limbs
G58.7	Mononeuritis multiplex
G58.8	Other specified mononeuropathies
G58.9	Mononeuropathy, unspecified
G60.0	Hereditary motor and sensory neuropathy
G60.1	Refsum’s disease
G60.2	Neuropathy in association with hereditary ataxia
G60.3	Idiopathic progressive neuropathy
G60.8	Other hereditary and idiopathic neuropathies
G60.9	Hereditary and idiopathic neuropathy, unspecified
G61.0	Guillain-Barre syndrome

G61.81	Chronic inflammatory demyelinating polyneuritis
G61.82	Multifocal motor neuropathy
G61.89	Other inflammatory polyneuropathies
G61.9	Inflammatory polyneuropathy, unspecified
G62.0	Drug-induced polyneuropathy
G62.1	Alcoholic polyneuropathy
G62.2	Polyneuropathy due to other toxic agents
G62.81	Critical illness polyneuropathy
G62.82	Radiation-induced polyneuropathy
G62.89	Other specified polyneuropathies
G62.9	Polyneuropathy, unspecified
G63	Polyneuropathy in diseases classified elsewhere
G65.0	Sequelae of Guillain-Barre syndrome
G65.1	Sequelae of other inflammatory polyneuropathy
G65.2	Sequelae of toxic polyneuropathy
G70.00	Myasthenia gravis without (acute) exacerbation
G70.01	Myasthenia gravis with (acute) exacerbation
G70.1	Toxic myoneural disorders
G70.2	Congenital and developmental myasthenia
G70.80	Lambert-Eaton syndrome, unspecified
G70.81	Lambert-Eaton syndrome in disease classified elsewhere
G70.89	Other specified myoneural disorders
G70.9	Myoneural disorder, unspecified
G71.00	Muscular dystrophy, unspecified
G71.01	Duchenne or Becker muscular dystrophy
G71.02	Facioscapulohumeral muscular dystrophy
G71.031	Autosomal dominant limb girdle muscular dystrophy
G71.032	Autosomal recessive limb girdle muscular dystrophy due to calpain-3 dysfunction
G71.033	Limb girdle muscular dystrophy due to dysferlin dysfunction
G71.0340	Limb girdle muscular dystrophy due to sarcoglycan dysfunction, unspecified
G71.0341	Limb girdle muscular dystrophy due to alpha sarcoglycan dysfunction
G71.0342	Limb girdle muscular dystrophy due to beta sarcoglycan dysfunction
G71.0349	Limb girdle muscular dystrophy due to other sarcoglycan dysfunction
G71.035	Limb girdle muscular dystrophy due to anoctamin-5 dysfunction
G71.038	Other limb girdle muscular dystrophy
G71.039	Limb girdle muscular dystrophy, unspecified
G71.09	Other specified muscular dystrophies
G71.11	Myotonic muscular dystrophy
G71.12	Myotonia congenita
G71.13	Myotonic chondrodystrophy
G71.14	Drug induced myotonia
G71.19	Other specified myotonic disorders
G71.20	Congenital myopathy, unspecified
G71.21	Nemaline myopathy
G71.220	X-linked myotubular myopathy
G71.228	Other centronuclear myopathy
G71.29	Other congenital myopathy
G71.3	Mitochondrial myopathy, not elsewhere classified
G72.0	Drug-induced myopathy
G72.1	Alcoholic myopathy
G72.2	Myopathy due to other toxic agents
G72.3	Periodic paralysis
G72.81	Critical illness myopathy
G72.89	Other specified myopathies

G72.9	Myopathy, unspecified
G73.1	Lambert-Eaton syndrome in neoplastic disease
G73.7	Myopathy in diseases classified elsewhere
G80.0	Spastic quadriplegic cerebral palsy
G80.1	Spastic diplegic cerebral palsy
G80.2	Spastic hemiplegic cerebral palsy
G80.3	Athetoid cerebral palsy
G80.4	Ataxic cerebral palsy
G80.8	Other cerebral palsy
G80.9	Cerebral palsy, unspecified
G81.01	Flaccid hemiplegia affecting right dominant side
G81.02	Flaccid hemiplegia affecting left dominant side
G81.03	Flaccid hemiplegia affecting right nondominant side
G81.04	Flaccid hemiplegia affecting left nondominant side
G81.11	Spastic hemiplegia affecting right dominant side
G81.12	Spastic hemiplegia affecting left dominant side
G81.13	Spastic hemiplegia affecting right nondominant side
G81.14	Spastic hemiplegia affecting left nondominant side
G81.91	Hemiplegia, unspecified affecting right dominant side
G81.92	Hemiplegia, unspecified affecting left dominant side
G81.93	Hemiplegia, unspecified affecting right nondominant side
G81.94	Hemiplegia, unspecified affecting left nondominant side
G82.20	Paraplegia, unspecified
G82.21	Paraplegia, complete
G82.22	Paraplegia, incomplete
G82.50	Quadriplegia, unspecified
G82.51	Quadriplegia, C1-C4 complete
G82.52	Quadriplegia, C1-C4 incomplete
G82.53	Quadriplegia, C5-C7 complete
G82.54	Quadriplegia, C5-C7 incomplete
G83.0	Diplegia of upper limbs
G83.11	Monoplegia of lower limb affecting right dominant side
G83.12	Monoplegia of lower limb affecting left dominant side
G83.13	Monoplegia of lower limb affecting right nondominant side
G83.14	Monoplegia of lower limb affecting left nondominant side
G83.21	Monoplegia of upper limb affecting right dominant side
G83.22	Monoplegia of upper limb affecting left dominant side
G83.23	Monoplegia of upper limb affecting right nondominant side
G83.24	Monoplegia of upper limb affecting left nondominant side
G83.31	Monoplegia, unspecified affecting right dominant side
G83.32	Monoplegia, unspecified affecting left dominant side
G83.33	Monoplegia, unspecified affecting right nondominant side
G83.34	Monoplegia, unspecified affecting left nondominant side
G83.4	Cauda equine syndrome
G83.5	Locked-in state
G83.81	Brown-Sequard syndrome
G83.82	Anterior cord syndrome
G83.83	Posterior cord syndrome
G83.84	Todd’s paralysis (postepileptic)
G83.89	Other specified paralytic syndromes
G83.9	Paralytic syndrome, unspecified
G90.A	Postural orthostatic tachycardia syndrome [POTS]
G90.01	Carotid sinus syncope
G90.09	Other idiopathic peripheral autonomic neuropathy
G90.1	Familial dysautonomia [Riley-Day]

G90.2	Horner’s syndrome
G90.3	Multi-system degeneration of the autonomic nervous system
G90.4	Autonomic dysreflexia
G90.511	Complex regional pain syndrome I of right upper limb
G90.512	Complex regional pain syndrome I of left upper limb
G90.513	Complex regional pain syndrome I of upper limb, bilateral
G90.521	Complex regional pain syndrome I of right lower limb
G90.522	Complex regional pain syndrome I of left lower limb
G90.523	Complex regional pain syndrome I of lower limb, bilateral
G90.59	Complex regional pain syndrome I of other specified site
G90.8	Other disorders of autonomic nervous system (Code deleted 09/30/2024)
G90.81	Serotonin syndrome (Code effective 10/01/2024)
G90.89	Other disorders of autonomic nervous system (Code effective 10/01/2024)
G90.9	Disorder of the autonomic nervous system, unspecified
G92.00	Immune effector cell-associated neurotoxicity syndrome, grade unspecified
G92.01	Immune effector cell-associated neurotoxicity syndrome, grade 1
G92.02	Immune effector cell-associated neurotoxicity syndrome, grade 2
G92.03	Immune effector cell-associated neurotoxicity syndrome, grade 3
G92.04	Immune effector cell-associated neurotoxicity syndrome, grade 4
G92.05	Immune effector cell-associated neurotoxicity syndrome, grade 5
G92.8	Other toxic encephalopathy
G92.9	Unspecified toxic encephalopathy
G93.1	Anoxic brain damage, not elsewhere classified
G93.31	Postviral fatigue syndrome
G93.32	Myalgic encephalomyelitis/chronic fatigue syndrome
G93.39	Other post infection and related fatigue syndromes
G93.5	Compression of brain
G95.0	Syringomyelia and syringobulbia
G95.11	Acute infarction of spinal cord (embolic) (nonembolic)
G95.19	Other vascular myelopathies
G95.20	Unspecified cord compression
G95.29	Other cord compression
G95.81	Conus medullaris syndrome
G95.89	Other specified diseases of spinal cord
G95.9	Disease of spinal cord, unspecified
G99.0	Autonomic neuropathy in diseases classified elsewhere
G99.2	Myelopathy in diseases classified elsewhere
H02.401	Unspecified ptosis of right eyelid
H02.402	Unspecified ptosis of left eyelid
H02.403	Unspecified ptosis of bilateral eyelids
H02.411	Mechanical ptosis of right eyelid
H02.412	Mechanical ptosis of left eyelid
H02.413	Mechanical ptosis of bilateral eyelids
H02.419	Mechanical ptosis of unspecified eyelid
H02.421	Myogenic ptosis of right eyelid
H02.422	Myogenic ptosis of left eyelid
H02.423	Myogenic ptosis of bilateral eyelids
H02.431	Paralytic ptosis of right eyelid
H02.432	Paralytic ptosis of left eyelid
H02.433	Paralytic ptosis of bilateral eyelids
H02.439	Paralytic ptosis unspecified eyelid
H46.2	Nutritional optic neuropathy
H46.3	Toxic optic neuropathy
H47.011	Ischemic optic neuropathy, right eye
H47.012	Ischemic optic neuropathy, left eye

H47.013	Ischemic optic neuropathy, bilateral
H49.01	Third [oculomotor] nerve palsy, right eye
H49.02	Third [oculomotor] nerve palsy, left eye
H49.03	Third [oculomotor] nerve palsy, bilateral
H49.11	Fourth [trochlear] nerve palsy, right eye
H49.12	Fourth [trochlear] nerve palsy, left eye
H49.13	Fourth [trochlear] nerve palsy, bilateral
H49.21	Sixth [abducent] nerve palsy, right eye
H49.22	Sixth [abducent] nerve palsy, left eye
H49.23	Sixth [abducent] nerve palsy, bilateral
H49.30	Total (external) ophthalmoplegia, unspecified eye
H49.31	Total (external) ophthalmoplegia, right eye
H49.32	Total (external) ophthalmoplegia, left eye
H49.33	Total (external) ophthalmoplegia, bilateral
H49.40	Progressive external ophthalmoplegia, unspecified eye
H49.41	Progressive external ophthalmoplegia, right eye
H49.42	Progressive external ophthalmoplegia, left eye
H49.43	Progressive external ophthalmoplegia, bilateral
H49.881	Other paralytic strabismus, right eye
H49.882	Other paralytic strabismus, left eye
H49.883	Other paralytic strabismus, bilateral
H49.889	Other paralytic strabismus, unspecified eye
H49.9	Unspecified paralytic strabismus
H50.00	Unspecified esotropia
H50.011	Monocular esotropia, right eye
H50.012	Monocular esotropia, left eye
H50.021	Monocular esotropia with A pattern, right eye
H50.022	Monocular esotropia with A pattern, left eye
H50.031	Monocular esotropia with V pattern, right eye
H50.032	Monocular esotropia with V pattern, left eye
H50.041	Monocular esotropia with other noncomitancies, right eye
H50.042	Monocular esotropia with other noncomitancies, left eye
H50.05	Alternating esotropia
H50.06	Alternating esotropia with A pattern
H50.07	Alternating esotropia with V pattern
H50.08	Alternating esotropia with other noncomitancies
H50.10	Unspecified exotropia
H50.111	Monocular exotropia, right eye
H50.112	Monocular exotropia, left eye
H50.121	Monocular exotropia with A pattern, right eye
H50.122	Monocular exotropia with A pattern, left eye
H50.131	Monocular exotropia with V pattern, right eye
H50.132	Monocular exotropia with V pattern, left eye
H50.141	Monocular exotropia with other noncomitancies, right eye
H50.142	Monocular exotropia with other noncomitancies, left eye
H50.15	Alternating exotropia
H50.16	Alternating exotropia with A pattern
H50.17	Alternating exotropia with V pattern
H50.18	Alternating exotropia with other noncomitancies
H50.21	Vertical strabismus, right eye
H50.22	Vertical strabismus, left eye
H50.30	Unspecified intermittent heterotropia
H50.311	Intermittent monocular esotropia, right eye
H50.312	Intermittent monocular esotropia, left eye
H50.32	Intermittent alternating esotropia

H50.331	Intermittent monocular exotropia, right eye
H50.332	Intermittent monocular exotropia, left eye
H50.34	Intermittent alternating exotropia
H50.40	Unspecified heterotropia
H50.411	Cyclotropia, right eye
H50.412	Cyclotropia, left eye
H50.42	Monofixation syndrome
H50.43	Accommodative component in esotropia
H50.50	Unspecified heterophoria
H50.51	Esophoria
H50.52	Exophoria
H50.53	Vertical heterophoria
H50.54	Cyclophoria
H50.55	Alternating heterophoria
H50.60	Mechanical strabismus, unspecified
H50.611	Brown's sheath syndrome, right eye
H50.612	Brown's sheath syndrome, left eye
H50.69	Other mechanical strabismus
H50.811	Duane's syndrome, right eye
H50.812	Duane's syndrome, left eye
H50.89	Other specified strabismus
H51.0	Palsy (spasm) of conjugate gaze
H51.11	Convergence insufficiency
H51.12	Convergence excess
H51.21	Internuclear ophthalmoplegia, right eye
H51.22	Internuclear ophthalmoplegia, left eye
H51.23	Internuclear ophthalmoplegia, bilateral
H51.8	Other specified disorders of binocular movement
H51.9	Unspecified disorder of binocular movement
H53.2	Diplopia
H71.01	Cholesteatoma of attic, right ear
H71.02	Cholesteatoma of attic, left ear
H71.03	Cholesteatoma of attic, bilateral
H71.10	Cholesteatoma of tympanum, unspecified ear
H71.11	Cholesteatoma of tympanum, right ear
H71.12	Cholesteatoma of tympanum, left ear
H71.13	Cholesteatoma of tympanum, bilateral
H71.21	Cholesteatoma of mastoid, right ear
H71.22	Cholesteatoma of mastoid, left ear
H71.23	Cholesteatoma of mastoid, bilateral
H71.30	Diffuse cholesteatosis, unspecified ear
H71.31	Diffuse cholesteatosis, right ear
H71.32	Diffuse cholesteatosis, left ear
H71.33	Diffuse cholesteatosis, bilateral
H71.91	Unspecified cholesteatoma, right ear
H71.92	Unspecified cholesteatoma, left ear
H71.93	Unspecified cholesteatoma, bilateral
H72.01	Central perforation of tympanic membrane, right ear
H72.02	Central perforation of tympanic membrane, left ear
H72.03	Central perforation of tympanic membrane, bilateral
H72.10	Attic perforation of tympanic membrane, unspecified ear
H72.11	Attic perforation of tympanic membrane, right ear
H72.12	Attic perforation of tympanic membrane, left ear
H72.13	Attic perforation of tympanic membrane, bilateral
H72.2X1	Other marginal perforations of tympanic membrane, right ear

H72.2X2	Other marginal perforations of tympanic membrane, left ear
H72.2X3	Other marginal perforations of tympanic membrane, bilateral
H72.2X9	Other marginal perforations of tympanic membrane, unspecified ear
H72.811	Multiple perforations of tympanic membrane, right ear
H72.812	Multiple perforations of tympanic membrane, left ear
H72.813	Multiple perforations of tympanic membrane, bilateral
H72.819	Multiple perforations of tympanic membrane, unspecified ear
H72.821	Total perforations of tympanic membrane, right ear
H72.822	Total perforations of tympanic membrane, left ear
H72.823	Total perforations of tympanic membrane, bilateral ear
H72.829	Total perforations of tympanic membrane, unspecified ear
H72.91	Unspecified perforation of tympanic membrane, right ear
H72.92	Unspecified perforation of tympanic membrane, left ear
H72.93	Unspecified perforation of tympanic membrane, bilateral
I63.30	Cerebral infarction due to thrombosis of unspecified cerebral artery
I63.311	Cerebral infarction due to thrombosis of right middle cerebral artery
I63.312	Cerebral infarction due to thrombosis of left middle cerebral artery
I63.313	Cerebral infarction due to thrombosis of bilateral middle cerebral arteries
I63.319	Cerebral infarction due to thrombosis of unspecified middle cerebral artery
I63.321	Cerebral infarction due to thrombosis of right anterior cerebral artery
I63.322	Cerebral infarction due to thrombosis of left anterior cerebral artery
I63.323	Cerebral infarction due to thrombosis of bilateral anterior arteries
I63.329	Cerebral infarction due to thrombosis of unspecified anterior cerebral artery
I63.331	Cerebral infarction due to thrombosis of right posterior cerebral artery
I63.332	Cerebral infarction due to thrombosis of left posterior cerebral artery
I63.333	Cerebral infarction due to thrombosis of bilateral posterior cerebral arteries
I63.339	Cerebral infarction due to thrombosis of unspecified posterior cerebral artery
I63.341	Cerebral infarction due to thrombosis of right cerebellar artery
I63.342	Cerebral infarction due to thrombosis of left cerebellar artery
I63.343	Cerebral infarction due to thrombosis of bilateral cerebellar arteries
I63.349	Cerebral infarction due to thrombosis of unspecified cerebellar artery
I63.39	Cerebral infarction due to thrombosis of other cerebral artery
I63.40	Cerebral infarction due to embolism of unspecified cerebral artery
I63.411	Cerebral infarction due to embolism of right middle cerebral artery
I63.412	Cerebral infarction due to embolism of left middle cerebral artery
I63.413	Cerebral infarction due to embolism of bilateral middle cerebral arteries
I63.419	Cerebral infarction due to embolism of unspecified middle cerebral artery
I63.421	Cerebral infarction due to embolism of right anterior cerebral artery
I63.422	Cerebral infarction due to embolism of left anterior cerebral artery
I63.423	Cerebral infarction due to embolism of bilateral anterior cerebral arteries
I63.429	Cerebral infarction due to embolism of unspecified anterior cerebral artery
I63.431	Cerebral infarction due to embolism of right posterior cerebral artery
I63.432	Cerebral infarction due to embolism of left posterior cerebral artery
I63.433	Cerebral infarction due to embolism of bilateral posterior cerebral arteries
I63.439	Cerebral infarction due to embolism of unspecified posterior cerebral artery
I63.441	Cerebral infarction due to embolism of right cerebellar artery
I63.442	Cerebral infarction due to embolism of left cerebellar artery
I63.443	Cerebral infarction due to embolism of bilateral cerebellar arteries
I63.449	Cerebral infarction due to embolism of unspecified cerebellar artery
I63.49	Cerebral infarction due to embolism of other cerebral artery
I63.50	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery
I63.511	Cerebral infarction due to unspecified occlusion or stenosis of right middle cerebral artery
I63.512	Cerebral infarction due to unspecified occlusion or stenosis of left middle cerebral artery
I63.513	Cerebral infarction due to unspecified occlusion or stenosis of bilateral middle cerebral arteries
I63.519	Cerebral infarction due to unspecified occlusion or stenosis of unspecified middle cerebral artery

I63.521	Cerebral infarction due to unspecified occlusion or stenosis of right anterior cerebral artery
I63.522	Cerebral infarction due to unspecified occlusion or stenosis of left anterior cerebral artery
I63.523	Cerebral infarction due to unspecified occlusion or stenosis of bilateral anterior cerebral arteries
I63.529	Cerebral infarction due to unspecified occlusion or stenosis of unspecified anterior cerebral artery
I63.531	Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery
I63.532	Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery
I63.533	Cerebral infarction due to unspecified occlusion or stenosis of bilateral posterior cerebral arteries
I63.539	Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery
I63.541	Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery
I63.542	Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery
I63.543	Cerebral infarction due to unspecified occlusion or stenosis of bilateral cerebellar arteries
I63.549	Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebellar artery
I63.59	Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery
I63.6	Cerebral infarction due to cerebral venous thrombosis, nonpyogenic
I63.81	Other cerebral infarction due to occlusion or stenosis of small artery
I63.89	Other cerebral infarction
I63.9	Cerebral infarction, unspecified
I66.01	Occlusion and stenosis of right middle cerebral artery
I66.02	Occlusion and stenosis of left middle cerebral artery
I66.03	Occlusion and stenosis of bilateral middle cerebral arteries
I66.09	Occlusion and stenosis of unspecified middle cerebral artery
I66.11	Occlusion and stenosis of right anterior cerebral artery
I66.12	Occlusion and stenosis of left anterior cerebral artery
I66.13	Occlusion and stenosis of bilateral anterior cerebral arteries
I66.19	Occlusion and stenosis of unspecified anterior cerebral artery
I66.21	Occlusion and stenosis of right posterior cerebral artery
I66.22	Occlusion and stenosis of left posterior cerebral artery
I66.23	Occlusion and stenosis of bilateral posterior cerebral arteries
I66.29	Occlusion and stenosis of unspecified posterior cerebral artery
I66.3	Occlusion and stenosis of cerebellar arteries
I66.8	Occlusion and stenosis of other cerebral arteries
I66.9	Occlusion and stenosis of unspecified cerebral artery
I69.031	Monoplegia of upper limb following nontraumatic subarachnoid hemorrhage affecting right dominant side
I69.032	Monoplegia of upper limb following nontraumatic subarachnoid hemorrhage affecting left dominant side
I69.033	Monoplegia of upper limb following nontraumatic subarachnoid hemorrhage affecting right non-dominant side
I69.034	Monoplegia of upper limb following nontraumatic subarachnoid hemorrhage affecting left non-dominant side
I69.039	Monoplegia of upper limb following nontraumatic subarachnoid hemorrhage affecting unspecified side
I69.041	Monoplegia of lower limb following nontraumatic subarachnoid hemorrhage affecting right dominant side
I69.042	Monoplegia of lower limb following nontraumatic subarachnoid hemorrhage affecting left dominant side
I69.043	Monoplegia of lower limb following nontraumatic subarachnoid hemorrhage affecting right non-dominant side
I69.044	Monoplegia of lower limb following nontraumatic subarachnoid hemorrhage affecting left non-dominant side
I69.049	Monoplegia of lower limb following nontraumatic subarachnoid hemorrhage affecting unspecified side

I69.051	Hemiplegia and hemiparesis following nontraumatic subarachnoid hemorrhage affecting right dominant side
I69.052	Hemiplegia and hemiparesis following nontraumatic subarachnoid hemorrhage affecting left dominant side
I69.053	Hemiplegia and hemiparesis following nontraumatic subarachnoid hemorrhage affecting right non-dominant side
I69.054	Hemiplegia and hemiparesis following nontraumatic subarachnoid hemorrhage affecting left non-dominant side
I69.131	Monoplegia of upper limb following nontraumatic intracerebral hemorrhage affecting right dominant side
I69.132	Monoplegia of upper limb following nontraumatic intracerebral hemorrhage affecting left dominant side
I69.133	Monoplegia of upper limb following nontraumatic intracerebral hemorrhage affecting right non-dominant side
I69.134	Monoplegia of upper limb following nontraumatic intracerebral hemorrhage affecting left non-dominant side
I69.139	Monoplegia of upper limb following nontraumatic intracerebral hemorrhage affecting unspecified side
I69.141	Monoplegia of lower limb following nontraumatic intracerebral hemorrhage affecting right dominant side
I69.142	Monoplegia of lower limb following nontraumatic intracerebral hemorrhage affecting left dominant side
I69.143	Monoplegia of lower limb following nontraumatic intracerebral hemorrhage affecting right non-dominant side
I69.144	Monoplegia of lower limb following nontraumatic intracerebral hemorrhage affecting left non-dominant side
I69.149	Monoplegia of lower limb following nontraumatic intracerebral hemorrhage affecting unspecified side
I69.151	Hemiplegia and hemiparesis following nontraumatic intracerebral hemorrhage affecting right dominant side
I69.152	Hemiplegia and hemiparesis following nontraumatic intracerebral hemorrhage affecting left dominant side
I69.153	Hemiplegia and hemiparesis following nontraumatic intracerebral hemorrhage affecting right non-dominant side
I69.154	Hemiplegia and hemiparesis following nontraumatic intracerebral hemorrhage affecting left non-dominant side
I69.231	Monoplegia of upper limb following other nontraumatic intracranial hemorrhage affecting right dominant side
I69.232	Monoplegia of upper limb following other nontraumatic intracranial hemorrhage affecting left dominant side
I69.233	Monoplegia of upper limb following other nontraumatic intracranial hemorrhage affecting right non-dominant side
I69.234	Monoplegia of upper limb following other nontraumatic intracranial hemorrhage affecting left non-dominant side
I69.239	Monoplegia of upper limb following other nontraumatic intracranial hemorrhage affecting unspecified side
I69.241	Monoplegia of lower limb following other nontraumatic intracranial hemorrhage affecting right dominant side
I69.242	Monoplegia of lower limb following other nontraumatic intracranial hemorrhage affecting left dominant side
I69.243	Monoplegia of lower limb following other nontraumatic intracranial hemorrhage affecting right non-dominant side
I69.244	Monoplegia of lower limb following other nontraumatic intracranial hemorrhage affecting left non-dominant side
I69.249	Monoplegia of lower limb following other nontraumatic intracranial hemorrhage affecting unspecified side

I69.251	Hemiplegia and hemiparesis following other nontraumatic intracranial hemorrhage affecting right dominant side
I69.252	Hemiplegia and hemiparesis following other nontraumatic intracranial hemorrhage affecting left dominant side
I69.253	Hemiplegia and hemiparesis following other nontraumatic intracranial hemorrhage affecting right non-dominant side
I69.254	Hemiplegia and hemiparesis following other nontraumatic intracranial hemorrhage affecting left non-dominant side
I69.331	Monoplegia of upper limb following cerebral infarction affecting right dominant side
I69.332	Monoplegia of upper limb following cerebral infarction affecting left dominant side
I69.333	Monoplegia of upper limb following cerebral infarction affecting right non-dominant side
I69.334	Monoplegia of upper limb following cerebral infarction affecting left non-dominant side
I69.339	Monoplegia of upper limb following cerebral infarction affecting unspecified side
I69.341	Monoplegia of lower limb following cerebral infarction affecting right dominant side
I69.342	Monoplegia of lower limb following cerebral infarction affecting left dominant side
I69.343	Monoplegia of lower limb following cerebral infarction affecting right non-dominant side
I69.344	Monoplegia of lower limb following cerebral infarction affecting left non-dominant side
I69.349	Monoplegia of lower limb following cerebral infarction affecting unspecified side
I69.351	Hemiplegia and hemiparesis following cerebral infarction affecting right dominant side
I69.352	Hemiplegia and hemiparesis following cerebral infarction affecting left dominant side
I69.353	Hemiplegia and hemiparesis following cerebral infarction affecting right non-dominant side
I69.354	Hemiplegia and hemiparesis following cerebral infarction affecting left non-dominant side
I69.831	Monoplegia of upper limb following other cerebrovascular disease affecting right dominant side
I69.832	Monoplegia of upper limb following other cerebrovascular disease affecting left dominant side
I69.833	Monoplegia of upper limb following other cerebrovascular disease affecting right non-dominant side
I69.834	Monoplegia of upper limb following other cerebrovascular disease affecting left non-dominant side
I69.839	Monoplegia of upper limb following other cerebrovascular disease affecting unspecified side
I69.841	Monoplegia of lower limb following other cerebrovascular disease affecting right dominant side
I69.842	Monoplegia of lower limb following other cerebrovascular disease affecting left dominant side
I69.843	Monoplegia of lower limb following other cerebrovascular disease affecting right non-dominant side
I69.844	Monoplegia of lower limb following other cerebrovascular disease affecting left non-dominant side
I69.849	Monoplegia of lower limb following other cerebrovascular disease affecting unspecified side
I69.851	Hemiplegia and hemiparesis following other cerebrovascular disease affecting right dominant side
I69.852	Hemiplegia and hemiparesis following other cerebrovascular disease affecting left dominant side
I69.853	Hemiplegia and hemiparesis following other cerebrovascular disease affecting right non-dominant side
I69.854	Hemiplegia and hemiparesis following other cerebrovascular disease affecting left non-dominant side
I69.931	Monoplegia of upper limb following unspecified cerebrovascular disease affecting right dominant side
I69.932	Monoplegia of upper limb following unspecified cerebrovascular disease affecting left dominant side
I69.933	Monoplegia of upper limb following unspecified cerebrovascular disease affecting right non-dominant side
I69.934	Monoplegia of upper limb following unspecified cerebrovascular disease affecting left non-dominant side
I69.939	Monoplegia of upper limb following unspecified cerebrovascular disease affecting unspecified side
I69.941	Monoplegia of lower limb following unspecified cerebrovascular disease affecting right dominant side

I69.942	Monoplegia of lower limb following unspecified cerebrovascular disease affecting left dominant side
I69.943	Monoplegia of lower limb following unspecified cerebrovascular disease affecting right non-dominant side
I69.944	Monoplegia of lower limb following unspecified cerebrovascular disease affecting left non-dominant side
I69.949	Monoplegia of lower limb following unspecified cerebrovascular disease affecting unspecified side
I69.951	Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting right dominant side
I69.952	Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting left dominant side
I69.953	Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting right non-dominant side
I69.954	Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting left non-dominant side
J38.00	Paralysis of vocal cords and larynx, unspecified
J38.01	Paralysis of vocal cords and larynx, unilateral
J38.02	Paralysis of vocal cords and larynx, bilateral
J38.5	Laryngeal spasm
J38.7	Other diseases of larynx
M05.411	Rheumatoid myopathy with rheumatoid arthritis of right shoulder
M05.412	Rheumatoid myopathy with rheumatoid arthritis of left shoulder
M05.421	Rheumatoid myopathy with rheumatoid arthritis of right elbow
M05.422	Rheumatoid myopathy with rheumatoid arthritis of left elbow
M05.431	Rheumatoid myopathy with rheumatoid arthritis of right wrist
M05.432	Rheumatoid myopathy with rheumatoid arthritis of left wrist
M05.441	Rheumatoid myopathy with rheumatoid arthritis of right hand
M05.442	Rheumatoid myopathy with rheumatoid arthritis of left hand
M05.451	Rheumatoid myopathy with rheumatoid arthritis of right hip
M05.452	Rheumatoid myopathy with rheumatoid arthritis of left hip
M05.461	Rheumatoid myopathy with rheumatoid arthritis of right knee
M05.462	Rheumatoid myopathy with rheumatoid arthritis of left knee
M05.471	Rheumatoid myopathy with rheumatoid arthritis of right ankle and foot
M05.472	Rheumatoid myopathy with rheumatoid arthritis of left ankle and foot
M05.49	Rheumatoid myopathy with rheumatoid arthritis of multiple sites
M05.50	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified site
M05.511	Rheumatoid polyneuropathy with rheumatoid arthritis of right shoulder
M05.512	Rheumatoid polyneuropathy with rheumatoid arthritis of left shoulder
M05.519	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified shoulder
M05.521	Rheumatoid polyneuropathy with rheumatoid arthritis of right elbow
M05.522	Rheumatoid polyneuropathy with rheumatoid arthritis of left elbow
M05.529	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified elbow
M05.531	Rheumatoid polyneuropathy with rheumatoid arthritis of right wrist
M05.532	Rheumatoid polyneuropathy with rheumatoid arthritis of left wrist
M05.539	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified wrist
M05.541	Rheumatoid polyneuropathy with rheumatoid arthritis of right hand
M05.542	Rheumatoid polyneuropathy with rheumatoid arthritis of left hand
M05.549	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified hand
M05.551	Rheumatoid polyneuropathy with rheumatoid arthritis of right hip
M05.552	Rheumatoid polyneuropathy with rheumatoid arthritis of left hip
M05.559	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified hip
M05.561	Rheumatoid polyneuropathy with rheumatoid arthritis of right knee
M05.562	Rheumatoid polyneuropathy with rheumatoid arthritis of left knee
M05.569	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified knee

M05.571	Rheumatoid polyneuropathy with rheumatoid arthritis of right ankle and foot
M05.572	Rheumatoid polyneuropathy with rheumatoid arthritis of left ankle and foot
M05.579	Rheumatoid polyneuropathy with rheumatoid arthritis of unspecified ankle and foot
M05.59	Rheumatoid polyneuropathy with rheumatoid arthritis of multiple sites
M21.331	Wrist drop, right wrist
M21.332	Wrist drop, left wrist
M21.339	Wrist drop, unspecified wrist
M21.511	Acquired clawhand, right hand
M21.512	Acquired clawhand, left hand
M21.519	Acquired clawhand, unspecified hand
M21.521	Acquired clubhand, right hand
M21.522	Acquired clubhand, left hand
M21.529	Acquired clubhand, unspecified hand
M21.531	Acquired clawfoot, right foot
M21.532	Acquired clawfoot, left foot
M21.539	Acquired clawfoot, unspecified foot
M21.541	Acquired clubfoot, right foot
M21.542	Acquired clubfoot, left foot
M21.6X1	Other acquired deformities of right foot
M21.6X2	Other acquired deformities of left foot
M21.831	Other specified acquired deformities of right forearm
M21.832	Other specified acquired deformities of left forearm
M25.50	Pain in unspecified joint
M25.511	Pain in right shoulder
M25.512	Pain in left shoulder
M25.519	Pain in unspecified shoulder
M25.521	Pain in right elbow
M25.522	Pain in left elbow
M25.529	Pain in unspecified elbow
M25.531	Pain in right wrist
M25.532	Pain in left wrist
M25.539	Pain in unspecified wrist
M25.541	Pain in joints of right hand
M25.542	Pain in joints of left hand
M25.549	Pain in joints of unspecified hand
M25.551	Pain in right hip
M25.552	Pain in left hip
M25.559	Pain in unspecified hip
M25.561	Pain in right knee
M25.562	Pain in left knee
M25.569	Pain in unspecified knee
M25.571	Pain in right ankle and joints of right foot
M25.572	Pain in left ankle and joints of left foot
M25.579	Pain in unspecified ankle and joints of unspecified foot
M33.00	Juvenile dermatomyositis, organ involvement unspecified
M33.01	Juvenile dermatomyositis with respiratory involvement
M33.02	Juvenile dermatomyositis with myopathy
M33.09	Juvenile dermatomyositis with other organ involvement
M33.10	Other dermatomyositis, organ involvement unspecified
M33.11	Other dermatomyositis with respiratory involvement
M33.12	Other dermatomyositis with myopathy
M33.19	Other dermatomyositis with other organ involvement
M33.20	Polymyositis, organ involvement unspecified
M33.21	Polymyositis with respiratory involvement
M33.22	Polymyositis with myopathy

M33.29	Polymyositis with other organ involvement
M33.90	Dermatopolymyositis, unspecified, organ involvement unspecified
M33.91	Dermatopolymyositis, unspecified with respiratory involvement
M33.92	Dermatopolymyositis, unspecified with myopathy
M33.99	Dermatopolymyositis, unspecified with other organ involvement
M34.83	Systemic sclerosis with polyneuropathy
M35.3	Polymyalgia rheumatica
M36.0	Dermato(poly)myositis in neoplastic disease
M41.00	Infantile idiopathic scoliosis, site unspecified
M41.02	Infantile idiopathic scoliosis, cervical region
M41.03	Infantile idiopathic scoliosis, cervicothoracic region
M41.04	Infantile idiopathic scoliosis, thoracic region
M41.05	Infantile idiopathic scoliosis, thoracolumbar region
M41.06	Infantile idiopathic scoliosis, lumbar region
M41.07	Infantile idiopathic scoliosis, lumbosacral region
M41.08	Infantile idiopathic scoliosis, sacral and sacrococcygeal region
M41.112	Juvenile idiopathic scoliosis, cervical region
M41.113	Juvenile idiopathic scoliosis, cervicothoracic region
M41.114	Juvenile idiopathic scoliosis, thoracic region
M41.115	Juvenile idiopathic scoliosis, thoracolumbar region
M41.116	Juvenile idiopathic scoliosis, lumbar region
M41.117	Juvenile idiopathic scoliosis, lumbosacral region
M41.119	Juvenile idiopathic scoliosis, site unspecified
M41.122	Adolescent idiopathic scoliosis, cervical region
M41.123	Adolescent idiopathic scoliosis, cervicothoracic region
M41.124	Adolescent idiopathic scoliosis, thoracic region
M41.125	Adolescent idiopathic scoliosis, thoracolumbar region
M41.126	Adolescent idiopathic scoliosis, lumbar region
M41.127	Adolescent idiopathic scoliosis, lumbosacral region
M41.129	Adolescent idiopathic scoliosis, site unspecified
M41.20	Other idiopathic scoliosis, site unspecified
M41.22	Other idiopathic scoliosis, cervical region
M41.23	Other idiopathic scoliosis, cervicothoracic region
M41.24	Other idiopathic scoliosis, thoracic region
M41.25	Other idiopathic scoliosis, thoracolumbar region
M41.26	Other idiopathic scoliosis, lumbar region
M41.27	Other idiopathic scoliosis, lumbosacral region
M43.00	Spondylolysis, site unspecified
M43.01	Spondylolysis, occipito-atlanto-axial region
M43.02	Spondylolysis, cervical region
M43.03	Spondylolysis, cervicothoracic region
M43.04	Spondylolysis, thoracic region
M43.05	Spondylolysis, thoracolumbar region
M43.06	Spondylolysis, lumbar region
M43.07	Spondylolysis, lumbosacral region
M43.08	Spondylolysis, sacral and sacrococcygeal region
M43.09	Spondylolysis, multiple sites in spine
M43.10	Spondylolisthesis, site unspecified
M43.11	Spondylolisthesis, occipito-atlanto-axial region
M43.12	Spondylolisthesis, cervical region
M43.13	Spondylolisthesis, cervicothoracic region
M43.14	Spondylolisthesis, thoracic region
M43.15	Spondylolisthesis, thoracolumbar region
M43.16	Spondylolisthesis, lumbar region
M43.17	Spondylolisthesis, lumbosacral region

M43.18	Spondylolisthesis, sacral and sacrococcygeal region
M43.19	Spondylolisthesis, multiple sites in spine
M43.6	Torticollis
M46.40	Discitis, unspecified, site unspecified
M46.41	Discitis, unspecified, occipito-atlanto-axial region
M46.42	Discitis, unspecified, cervical region
M46.43	Discitis, unspecified, cervicothoracic region
M46.44	Discitis, unspecified, thoracic region
M46.45	Discitis, unspecified, thoracolumbar region
M46.46	Discitis, unspecified, lumbar region
M46.47	Discitis, unspecified, lumbosacral region
M46.48	Discitis, unspecified, sacral and sacrococcygeal region
M46.49	Discitis, unspecified, multiple sites in spine
M47.10	Other spondylosis with myelopathy, site unspecified
M47.11	Other spondylosis with myelopathy, occipito-atlanto-axial region
M47.12	Other spondylosis with myelopathy, cervical region
M47.13	Other spondylosis with myelopathy, cervicothoracic region
M47.14	Other spondylosis with myelopathy, thoracic region
M47.15	Other spondylosis with myelopathy, thoracolumbar region
M47.16	Other spondylosis with myelopathy, lumbar region
M47.20	Other spondylosis with radiculopathy, site unspecified
M47.21	Other spondylosis with radiculopathy, occipito-atlanto-axial region
M47.22	Other spondylosis with radiculopathy, cervical region
M47.23	Other spondylosis with radiculopathy, cervicothoracic region
M47.24	Other spondylosis with radiculopathy, thoracic region
M47.25	Other spondylosis with radiculopathy, thoracolumbar region
M47.26	Other spondylosis with radiculopathy, lumbar region
M47.27	Other spondylosis with radiculopathy, lumbosacral region
M47.28	Other spondylosis with radiculopathy, sacral and sacrococcygeal region
M47.811	Spondylosis without myelopathy or radiculopathy, occipito-atlanto-axial region
M47.812	Spondylosis without myelopathy or radiculopathy, cervical region
M47.813	Spondylosis without myelopathy or radiculopathy, cervicothoracic region
M47.814	Spondylosis without myelopathy or radiculopathy, thoracic region
M47.815	Spondylosis without myelopathy or radiculopathy, thoracolumbar region
M47.816	Spondylosis without myelopathy or radiculopathy, lumbar region
M47.817	Spondylosis without myelopathy or radiculopathy, lumbosacral region
M47.818	Spondylosis without myelopathy or radiculopathy, sacral and sacrococcygeal region
M47.819	Spondylosis without myelopathy or radiculopathy, site unspecified
M47.891	Other spondylosis, occipito-atlanto-axial region
M47.892	Other spondylosis, cervical region
M47.893	Other spondylosis, cervicothoracic region
M47.894	Other spondylosis, thoracic region
M47.895	Other spondylosis, thoracolumbar region
M47.896	Other spondylosis, lumbar region
M47.897	Other spondylosis, lumbosacral region
M47.898	Other spondylosis, sacral and sacrococcygeal region
M47.899	Other spondylosis, site unspecified
M48.00	Spinal stenosis, site unspecified
M48.01	Spinal stenosis, occipito-atlanto-axial region
M48.02	Spinal stenosis, cervical region
M48.03	Spinal stenosis, cervicothoracic region
M48.04	Spinal stenosis, thoracic region
M48.05	Spinal stenosis, thoracolumbar region
M48.061	Spinal stenosis, lumbar region without neurogenic claudication
M48.062	Spinal stenosis, lumbar region with neurogenic claudication

M48.07	Spinal stenosis, lumbosacral region
M48.08	Spinal stenosis, sacral and sacrococcygeal region
M48.30	Traumatic spondylopathy, site unspecified
M48.31	Traumatic spondylopathy, occipito-atlanto-axial region
M48.32	Traumatic spondylopathy, cervical region
M48.33	Traumatic spondylopathy, cervicothoracic region
M48.34	Traumatic spondylopathy, thoracic region
M48.35	Traumatic spondylopathy, thoracolumbar region
M48.36	Traumatic spondylopathy, lumbar region
M48.37	Traumatic spondylopathy, lumbosacral region
M48.38	Traumatic spondylopathy, sacral and sacrococcygeal region
M50.00	Cervical disc disorder with myelopathy, unspecified cervical region
M50.01	Cervical disc disorder with myelopathy, high cervical region
M50.020	Cervical disc disorder with myelopathy, mid-cervical region, unspecified level
M50.021	Cervical disc disorder at C4-C5 level with myelopathy
M50.022	Cervical disc disorder at C5-C6 level with myelopathy
M50.023	Cervical disc disorder at C6-C7 level with myelopathy
M50.03	Cervical disc disorder with myelopathy, cervicothoracic region
M50.10	Cervical disc disorder with radiculopathy, unspecified cervical region
M50.11	Cervical disc disorder with radiculopathy, high cervical region
M50.120	Mid-cervical disc disorder, unspecified level
M50.121	Cervical disc disorder at C4-C5 level with radiculopathy
M50.122	Cervical disc disorder at C5-C6 level with radiculopathy
M50.123	Cervical disc disorder at C6-C7 level with radiculopathy
M50.13	Cervical disc disorder with radiculopathy, cervicothoracic region
M50.20	Other cervical disc displacement, unspecified cervical region
M50.21	Other cervical disc displacement, high cervical region
M50.220	Other cervical disc displacement, mid-cervical region, unspecified level
M50.221	Other cervical disc displacement at C4-C5 level
M50.222	Other cervical disc displacement at C5-C6 level
M50.223	Other cervical disc displacement at C6-C7 level
M50.23	Other cervical disc displacement, cervicothoracic region
M50.30	Other cervical disc degeneration, unspecified cervical region
M50.31	Other cervical disc degeneration, high cervical region
M50.320	Other cervical disc degeneration, mid-cervical region, unspecified level
M50.321	Other cervical disc degeneration at C4-C5 level
M50.322	Other cervical disc degeneration at C5-C6 level
M50.323	Other cervical disc degeneration at C6-C7 level
M50.33	Other cervical disc degeneration, cervicothoracic region
M50.90	Cervical disc disorder, unspecified, unspecified cervical region
M50.91	Cervical disc disorder, unspecified, high cervical region
M50.920	Unspecified cervical disc disorder, mid-cervical region, unspecified level
M50.921	Unspecified cervical disc disorder at C4-C5 level
M50.922	Unspecified cervical disc disorder at C5-C6 level
M50.923	Unspecified cervical disc disorder at C6-C7 level
M50.93	Cervical disc disorder, unspecified, cervicothoracic region
M51.04	Intervertebral disc disorders with myelopathy, thoracic region
M51.05	Intervertebral disc disorders with myelopathy, thoracolumbar region
M51.06	Intervertebral disc disorders with myelopathy, lumbar region
M51.14	Intervertebral disc disorders with radiculopathy, thoracic region
M51.15	Intervertebral disc disorders with radiculopathy, thoracolumbar region
M51.16	Intervertebral disc disorders with radiculopathy, lumbar region
M51.17	Intervertebral disc disorders with radiculopathy, lumbosacral region
M51.24	Other intervertebral disc displacement, thoracic region
M51.25	Other intervertebral disc displacement, thoracolumbar region

M51.26	Other intervertebral disc displacement, lumbar region
M51.27	Other intervertebral disc displacement, lumbosacral region
M51.34	Other intervertebral disc degeneration, thoracic region
M51.35	Other intervertebral disc degeneration, thoracolumbar region
M51.36	Other intervertebral disc degeneration, lumbar region (Code deleted 09/30/2024)
M51.361	Other intervertebral disc degeneration, lumbar region with lower extremity pain only (Code effective 10/01/2024)
M51.362	Other intervertebral disc degeneration, lumbar region with discogenic back pain and lower extremity pain (Code effective 10/01/2024)
M51.369	Other intervertebral disc degeneration, lumbar region without mention of lumbar back pain or lower extremity pain (Code effective 10/01/2024)
M51.37	Other intervertebral disc degeneration, lumbosacral region (Code deleted 09/30/2024)
M51.371	Other intervertebral disc degeneration, lumbosacral region with lower extremity pain only (Code effective 10/01/2024)
M51.372	Other intervertebral disc degeneration, lumbosacral region with discogenic back pain and lower extremity pain (Code effective 10/01/2024)
M51.379	Other intervertebral disc degeneration, lumbosacral region without mention of lumbar back pain or lower extremity pain (Code effective 10/01/2024)
M51.86	Other intervertebral disc disorders, lumbar region
M51.87	Other intervertebral disc disorders, lumbosacral region
M51.9	Unspecified thoracic, thoracolumbar and lumbosacral intervertebral disc disorder
M53.2X1	Spinal instabilities, occipito-atlanto-axial region
M53.2X2	Spinal instabilities, cervical region
M53.2X3	Spinal instabilities, cervicothoracic region
M53.2X4	Spinal instabilities, thoracic region
M53.2X5	Spinal instabilities, thoracolumbar region
M53.2X6	Spinal instabilities, lumbar region
M53.2X7	Spinal instabilities, lumbosacral region
M53.2X8	Spinal instabilities, sacral and sacrococcygeal region
M53.2X9	Spinal instabilities, site unspecified
M53.3	Sacrococcygeal disorders, not elsewhere classified
M53.82	Other specified dorsopathies, cervical region
M53.88	Other specified dorsopathies, sacral and sacrococcygeal region
M54.10	Radiculopathy, site unspecified
M54.11	Radiculopathy, occipito-atlanto-axial region
M54.12	Radiculopathy, cervical region
M54.13	Radiculopathy, cervicothoracic region
M54.14	Radiculopathy, thoracic region
M54.15	Radiculopathy, thoracolumbar region
M54.16	Radiculopathy, lumbar region
M54.17	Radiculopathy, lumbosacral region
M54.18	Radiculopathy, sacral and sacrococcygeal region
M54.2	Cervicalgia
M54.30	Sciatica, unspecified side
M54.31	Sciatica, right side
M54.32	Sciatica, left side
M54.40	Lumbago with sciatica, unspecified side
M54.41	Lumbago with sciatica, right side
M54.42	Lumbago with sciatica, left side
M54.50	Low back pain, unspecified
M54.51	Vertebrogenic low back pain
M54.59	Other low back pain
M54.6	Pain in thoracic spine
M54.89	Other dorsalgia
M54.9	Dorsalgia, unspecified

M60.000	Infective myositis, unspecified right arm
M60.001	Infective myositis, unspecified left arm
M60.003	Infective myositis, unspecified right leg
M60.004	Infective myositis, unspecified left leg
M60.011	Infective myositis, right shoulder
M60.012	Infective myositis, left shoulder
M60.021	Infective myositis, right upper arm
M60.022	Infective myositis, left upper arm
M60.031	Infective myositis, right forearm
M60.032	Infective myositis, left forearm
M60.041	Infective myositis, right hand
M60.042	Infective myositis, left hand
M60.044	Infective myositis, right finger(s)
M60.045	Infective myositis, left finger(s)
M60.051	Infective myositis, right thigh
M60.052	Infective myositis, left thigh
M60.061	Infective myositis, right lower leg
M60.062	Infective myositis, left lower leg
M60.070	Infective myositis, right ankle
M60.071	Infective myositis, left ankle
M60.073	Infective myositis, right foot
M60.074	Infective myositis, left foot
M60.076	Infective myositis, right toe(s)
M60.077	Infective myositis, left toe(s)
M60.08	Infective myositis, other site
M60.09	Infective myositis, multiple sites
M60.80	Other myositis, unspecified site
M60.811	Other myositis, right shoulder
M60.812	Other myositis, left shoulder
M60.821	Other myositis, right upper arm
M60.822	Other myositis, left upper arm
M60.829	Other myositis, unspecified upper arm
M60.831	Other myositis, right forearm
M60.832	Other myositis, left forearm
M60.839	Other myositis, unspecified forearm
M60.841	Other myositis, right hand
M60.842	Other myositis, left hand
M60.849	Other myositis, unspecified hand
M60.851	Other myositis, right thigh
M60.852	Other myositis, left thigh
M60.859	Other myositis, unspecified thigh
M60.861	Other myositis, right lower leg
M60.862	Other myositis, left lower leg
M60.869	Other myositis, unspecified lower leg
M60.871	Other myositis, right ankle and foot
M60.872	Other myositis, left ankle and foot
M60.879	Other myositis, unspecified ankle and foot
M60.88	Other myositis, other site
M60.89	Other myositis, multiple sites
M60.9	Myositis, unspecified
M62.40	Contracture of muscle, unspecified site
M62.411	Contracture of muscle, right shoulder
M62.412	Contracture of muscle, left shoulder
M62.419	Contracture of muscle, unspecified shoulder
M62.421	Contracture of muscle, right upper arm

M62.422	Contracture of muscle, left upper arm
M62.429	Contracture of muscle, unspecified upper arm
M62.431	Contracture of muscle, right forearm
M62.432	Contracture of muscle, left forearm
M62.441	Contracture of muscle, right hand
M62.442	Contracture of muscle, left hand
M62.449	Contracture of muscle, unspecified hand
M62.451	Contracture of muscle, right thigh
M62.452	Contracture of muscle, left thigh
M62.461	Contracture of muscle, right lower leg
M62.462	Contracture of muscle, left lower leg
M62.471	Contracture of muscle, right ankle and foot
M62.472	Contracture of muscle, left ankle and foot
M62.48	Contracture of muscle, other site
M62.49	Contracture of muscle, multiple sites
M62.5A0	Muscle wasting and atrophy, not elsewhere classified, back, cervical
M62.5A1	Muscle wasting and atrophy, not elsewhere classified, back, thoracic
M62.5A2	Muscle wasting and atrophy, not elsewhere classified, back, lumbosacral
M62.5A9	Muscle wasting and atrophy, not elsewhere classified, back, unspecified level
M62.50	Muscle wasting and atrophy, not elsewhere classified, unspecified site
M62.511	Muscle wasting and atrophy, not elsewhere classified, right shoulder
M62.512	Muscle wasting and atrophy, not elsewhere classified, left shoulder
M62.519	Muscle wasting and atrophy, not elsewhere classified, unspecified shoulder
M62.521	Muscle wasting and atrophy, not elsewhere classified, right upper arm
M62.522	Muscle wasting and atrophy, not elsewhere classified, left upper arm
M62.529	Muscle wasting and atrophy, not elsewhere classified, unspecified upper arm
M62.531	Muscle wasting and atrophy, not elsewhere classified, right forearm
M62.532	Muscle wasting and atrophy, not elsewhere classified, left forearm
M62.539	Muscle wasting and atrophy, not elsewhere classified, unspecified forearm
M62.541	Muscle wasting and atrophy, not elsewhere classified, right hand
M62.542	Muscle wasting and atrophy, not elsewhere classified, left hand
M62.549	Muscle wasting and atrophy, not elsewhere classified, unspecified hand
M62.551	Muscle wasting and atrophy, not elsewhere classified, right thigh
M62.552	Muscle wasting and atrophy, not elsewhere classified, left thigh
M62.559	Muscle wasting and atrophy, not elsewhere classified, unspecified thigh
M62.561	Muscle wasting and atrophy, not elsewhere classified, right lower leg
M62.562	Muscle wasting and atrophy, not elsewhere classified, left lower leg
M62.569	Muscle wasting and atrophy, not elsewhere classified, unspecified lower leg
M62.571	Muscle wasting and atrophy, not elsewhere classified, right ankle and foot
M62.572	Muscle wasting and atrophy, not elsewhere classified, left ankle and foot
M62.579	Muscle wasting and atrophy, not elsewhere classified, unspecified ankle and foot
M62.58	Muscle wasting and atrophy, not elsewhere classified, other site
M62.59	Muscle wasting and atrophy, not elsewhere classified, multiple sites
M62.81	Muscle weakness (generalized)
M62.831	Muscle spasm of calf
M62.838	Other muscle spasm
M62.9	Disorder of muscle, unspecified
M72.9	Fibroblastic disorder, unspecified
M79.0	Rheumatism, unspecified
M79.10	Myalgia, unspecified site
M79.11	Myalgia of mastication muscle
M79.12	Myalgia of auxiliary muscles, head and neck
M79.18	Myalgia, other site
M79.2	Neuralgia and neuritis, unspecified
M79.601	Pain in right arm

M79.602	Pain in left arm
M79.603	Pain in arm, unspecified
M79.604	Pain in right leg
M79.605	Pain in left leg
M79.606	Pain in leg, unspecified
M79.609	Pain in unspecified limb
M79.621	Pain in right upper arm
M79.622	Pain in left upper arm
M79.631	Pain in right forearm
M79.632	Pain in left forearm
M79.641	Pain in right hand
M79.642	Pain in left hand
M79.644	Pain in right finger(s)
M79.645	Pain in left finger(s)
M79.651	Pain in right thigh
M79.652	Pain in left thigh
M79.661	Pain in right lower leg
M79.662	Pain in left lower leg
M79.671	Pain in right foot
M79.672	Pain in left foot
M79.674	Pain in right toe(s)
M79.675	Pain in left toe(s)
M96.1	Postlaminectomy syndrome, not elsewhere classified
N31.0	Uninhibited neuropathic bladder, not elsewhere classified
N31.1	Reflex neuropathic bladder, not elsewhere classified
N31.2	Flaccid neuropathic bladder, not elsewhere classified
N31.8	Other neuromuscular dysfunction of bladder
N31.9	Neuromuscular dysfunction of bladder, unspecified
N32.81	Overactive bladder
N39.3	Stress incontinence (female) (male)
N39.41	Urge incontinence
N39.42	Incontinence without sensory awareness
N39.43	Post-void dribbling
N39.44	Nocturnal enuresis
N39.45	Continuous leakage
N39.46	Mixed incontinence
N39.490	Overflow incontinence
N39.491	Coital incontinence
N39.498	Other specified urinary incontinence
O26.821	Pregnancy related peripheral neuritis, first trimester
O26.822	Pregnancy related peripheral neuritis, second trimester
O26.823	Pregnancy related peripheral neuritis, third trimester
O26.829	Pregnancy related peripheral neuritis, unspecified trimester
P11.3	Birth injury to facial nerve
P11.4	Birth injury to other cranial nerves
P11.5	Birth injury to spine and spinal cord
P14.0	Erb’s paralysis due to birth injury
P14.1	Klumpke’s paralysis due to birth injury
P14.3	Other brachial plexus birth injuries
P14.8	Birth injuries to other parts of peripheral nervous system
P14.9	Birth injury to peripheral nervous system, unspecified
Q28.2	Arteriovenous malformation of cerebral vessels
Q28.3	Other malformations of cerebral vessels
Q76.2	Congenital spondylolisthesis
R13.0	Aphagia

R13.10	Dysphagia, unspecified
R13.11	Dysphagia, oral phase
R13.12	Dysphagia, oropharyngeal phase
R13.13	Dysphagia, pharyngeal phase
R13.14	Dysphagia, pharyngoesophageal phase
R13.19	Other dysphagia
R15.0	Incomplete defecation
R15.1	Fecal smearing
R15.2	Fecal urgency
R15.9	Full incontinence of feces
R20.0	Anesthesia of skin
R20.1	Hypoesthesia of skin
R20.2	Paresthesia of skin
R20.3	Hyperesthesia
R20.8	Other disturbances of skin sensation
R20.9	Unspecified disturbances of skin sensation
R25.2	Cramp and spasm
R26.0	Ataxic gait
R26.1	Paralytic gait
R26.2	Difficulty in walking, not elsewhere classified
R26.81	Unsteadiness on feet
R26.89	Other abnormalities of gait and mobility
R26.9	Unspecified abnormalities of gait and mobility
R27.0	Ataxia, unspecified
R27.8	Other lack of coordination
R27.9	Unspecified lack of coordination
R29.0	Tetany
R29.1	Meningismus
R29.2	Abnormal reflex
R29.5	Transient paralysis
R29.818	Other symptoms and signs involving the nervous system
R29.891	Ocular torticollis
R29.90	Unspecified symptoms and signs involving the nervous system
R32	Unspecified urinary incontinence
R33.0	Drug induced retention of urine
R33.8	Other retention of urine
R33.9	Retention of urine, unspecified
R39.14	Feeling of incomplete bladder emptying
R47.02	Dysphasia
R47.1	Dysarthria and anarthria
R47.89	Other speech disturbances
R49.0	Dysphonia
R49.8	Other voice and resonance disorders
R49.9	Unspecified voice and resonance disorder
S04.10XD	Injury of oculomotor nerve, unspecified side, subsequent encounter
S04.10XS	Injury of oculomotor nerve, unspecified side, sequela
S04.11XA-S04.11XS	Injury of oculomotor nerve, right side
S04.12XA-S04.12XS	Injury of oculomotor nerve, left side
S04.20XD	Injury of trochlear nerve, unspecified side, subsequent encounter
S04.20XS	Injury of trochlear nerve, unspecified side, sequela
S04.21XA-S04.21XS	Injury of trochlear nerve, right side

S04.22XA-S04.22XS	Injury of trochlear nerve, left side
S04.30XD	Injury of trigeminal nerve, unspecified side, subsequent encounter
S04.30XS	Injury of trigeminal nerve, unspecified side, sequela
S04.31XA-S04.31XS	Injury of trigeminal nerve, right side
S04.32XA-S04.32XS	Injury of trigeminal nerve, left side
S04.40XD	Injury of abducent nerve, unspecified side, subsequent encounter
S04.40XS	Injury of abducent nerve, unspecified side, sequela
S04.41XA-S04.41XS	Injury of abducent nerve, right side
S04.42XA-S04.42XS	Injury of abducent nerve, left side
S04.50XD	Injury of facial nerve, unspecified side, subsequent encounter
S04.50XS	Injury of facial nerve, unspecified side, sequela
S04.51XA-S04.51XS	Injury of facial nerve, right side
S04.52XA-S04.52XS	Injury of facial nerve, left side
S04.60XD	Injury of acoustic nerve, unspecified side, subsequent encounter
S04.60XS	Injury of acoustic nerve, unspecified side, sequela
S04.61XA-S04.61XS	Injury of acoustic nerve, right side
S04.62XA-S04.62XS	Injury of acoustic nerve, left side
S04.70XD	Injury of accessory nerve, unspecified side, subsequent encounter
S04.70XS	Injury of accessory nerve, unspecified side, sequela
S04.71XA-S04.71XS	Injury of accessory nerve, right side
S04.72XA-S04.72XS	Injury of accessory nerve, left side
S04.811A-S04.811S	Injury of olfactory [1st] nerve, right side
S04.812A-S04.812S	Injury of olfactory [1st] nerve, left side
S04.819A-S04.819S	Injury of olfactory [1st] nerve, unspecified side
S04.891A-S04.891S	Injury of other cranial nerves, right side
S04.892A-S04.892S	Injury of other cranial nerves, left side
S04.899D	Injury of other cranial nerves, unspecified side, subsequent encounter
S04.899S	Injury of other cranial nerves, unspecified side, sequela
S04.9XXA-S04.9XXS	Injury of unspecified cranial nerve
S14.0XXA-S14.0XXS	Concussion and edema of cervical spinal cord
S14.101A-S14.9XXS	Other and unspecified injuries of cervical spinal cord
S24.0XXA-S24.0XXS	Concussion and edema of thoracic spinal cord
S24.101A-S24.9XXS	Other and unspecified injuries of thoracic spinal cord
S34.01XA-S34.01XS	Concussion and edema of lumbar spinal cord

S34.02XA-S34.02XS	Concussion and edema of sacral spinal cord
S34.101A-S34.9XXS	Other and unspecified injury of lumbar and sacral spinal cord
S44.00XA-S44.92XS	Injury of nerves at shoulder and upper arm level
S54.00XA-S54.92XS	Injury of ulnar nerve at forearm level
S64.00XA-S64.92XS	Injury of nerves at wrist and hand level
S74.00XA-S74.92XS	Injury of nerves at hip and thigh level
S84.00XA-S84.00XS	Injury of tibial nerve at lower leg level, unspecified leg
S84.01XA-S84.01XS	Injury of tibial nerve at lower leg level, right leg
S84.02XA-S84.02XS	Injury of tibial nerve at lower leg level, left leg
S84.20XA-S84.20XS	Injury of cutaneous sensory nerve at lower leg level, unspecified leg
S84.21XA-S84.21XS	Injury of cutaneous sensory nerve at lower leg level, right leg
S84.22XA-S84.22XS	Injury of cutaneous sensory nerve at lower leg level, left leg
S84.801A-S84.801S	Injury of other nerves at lower leg level, right leg
S84.802A-S84.802S	Injury of other nerves at lower leg level, left leg
S84.809A-S84.809S	Injury of other nerves at lower leg level, unspecified leg
S84.90XA-S84.90XS	Injury of unspecified nerve at lower leg level, unspecified leg
S84.91XA-S84.91XS	Injury of unspecified nerve at lower leg level, right leg
S84.92XA-S84.92XS	Injury of unspecified nerve at lower leg level, left leg
S94.00XA-S94.00XS	Injury of lateral plantar nerve, unspecified leg
S94.01XA-S94.01XS	Injury of lateral plantar nerve, right leg
S94.02XA-S94.02XS	Injury of lateral plantar nerve, left leg
S94.10XA-S94.10XS	Injury of medial plantar nerve, unspecified leg
S94.11XA-S94.11XS	Injury of medial plantar nerve, right leg
S94.12XA-S94.12XS	Injury of medial plantar nerve, left leg
S94.30XA-S94.30XS	Injury of cutaneous sensory nerve at ankle and foot level, unspecified leg
S94.31XA-S94.31XS	Injury of cutaneous sensory nerve at ankle and foot level, right leg
S94.32XA-S94.32XS	Injury of cutaneous sensory nerve at ankle and foot level, left leg
S94.8X1A-S94.8X1S	Injury of other nerves at ankle and foot level, right leg

S94.8X2A-S94.8X2S	Injury of other nerves at ankle and foot level, left leg
S94.8X9A-S94.8X9S	Injury of other nerves at ankle and foot level, unspecified leg
S94.90XA-S94.90XS	Injury of unspecified nerve at ankle and foot level, unspecified leg
S94.91XA-S94.91XS	Injury of unspecified nerve at ankle and foot level, right leg
S94.92XA-S94.92XS	Injury of unspecified nerve at ankle and foot level, left leg

Medical conditions supporting NCV testing without EMG

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

CPT®* Codes	Description
95907	Nerve conduction studies; 1-2 studies
95908	Nerve conduction studies; 3-4 studies
95909	Nerve conduction studies; 5-6 studies
95910	Nerve conduction studies; 7-8 studies
95911	Nerve conduction studies; 9-10 studies
95912	Nerve conduction studies; 11-12 studies
95913	Nerve conduction studies; 13 or more studies

ICD-10-CM Diagnosis Codes	Description
G51.0	Bells' palsy
G56.01	Carpal tunnel syndrome, right upper limb
G56.02	Carpal tunnel syndrome, left upper limb
G56.03	Carpal tunnel syndrome, bilateral upper limbs
I89.0	Lymphedema, not classified elsewhere
I89.1	Lymphangitis
I89.8	Other specified noninfective disorders of lymphatic vessels and lymph nodes
I89.9	Noninfective disorder of lymphatic vessels and lymph nodes, unspecified
I97.2	Postmastectomy lymphedema syndrome
Z79.01	Long term (current) use of anticoagulants

Considered Not Medically Necessary:

ICD-10-CM Diagnosis Codes	Description
	All other codes

EMG Injection Localization: Performed Alone

Considered Medically Necessary for determination of precise muscle location for an injection:

CPT®* Codes	Description
95874	Needle electromyography for guidance in conjunction with chemodenervation (List separately in addition to code for primary procedure)

Neuromuscular Junction Testing

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

CPT®* Codes	Description
95937	Neuromuscular junction testing (repetitive stimulation, paired stimuli), each nerve, any 1 method

ICD-10-CM Diagnosis Codes	Description
A05.1	Botulism food poisoning
A48.52	Wound botulism
G12.21	Amyotrophic lateral sclerosis
G12.22	Progressive bulbar palsy
G12.23	Primary lateral sclerosis
G12.24	Familial motor neuron disease
G12.25	Progressive spinal muscle atrophy
G12.29	Other motor neuron disease
G12.8	Other spinal muscular atrophies and related syndromes
G12.9	Spinal muscular atrophy, unspecified
G61.0	Guillain-Barre syndrome
G62.81	Critical illness polyneuropathy
G70.01	Myasthenia gravis with (acute) exacerbation
G70.1	Toxic myoneural disorders
G70.80	Lambert-Eaton syndrome, unspecified
G70.81	Lambert-Eaton syndrome in disease classified elsewhere
G70.9	Myoneural disorder, unspecified
G71.11	Myotonic muscular dystrophy
G71.12	Myotonia congenita
G71.13	Myotonic chondrodystrophy
G71.19	Other specified myotonic disorders
G71.3	Mitochondrial myopathy, not elsewhere classified
G71.8	Other primary disorders of muscles
G71.9	Primary disorder of muscle, unspecified
G72.3	Periodic paralysis
G72.49	Other inflammatory and immune myopathies, not elsewhere classified
G72.81	Critical illness myopathy
G72.89	Other specified myopathies
G72.9	Myopathy, unspecified
G73.1	Lambert-Eaton syndrome in neoplastic disease
H02.401	Unspecified ptosis of right eyelid
H02.402	Unspecified ptosis of left eyelid
H02.403	Unspecified ptosis of bilateral eyelids
H53.2	Diplopia
M62.81	Muscle weakness (generalized)
R13.0	Aphagia
R13.10	Dysphagia, unspecified
R13.11	Dysphagia, oral phase
R13.12	Dysphagia, oropharyngeal phase
R13.13	Dysphagia, pharyngeal phase
R13.14	Dysphagia, pharyngoesophageal phase
R13.19	Other dysphagia
R47.02	Dysphasia
R47.1	Dysarthria and anarthria
R47.81	Slurred speech
R47.89	Other speech disturbances
R47.9	Unspecified speech disturbances

Considered Not Medically Necessary:

ICD-10-CM Diagnosis Codes	Description
	All other codes

Somatosensory Evoked Potentials (SSEPs)

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

CPT®* Codes	Description
95925	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper limbs
95926	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in lower limbs
95927	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in the trunk or head
95938	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper and lower limbs

ICD-10-CM Diagnosis Codes	Description
C72.0	Malignant neoplasm of spinal cord
C72.1	Malignant neoplasm of cauda equina
C79.31	Secondary malignant neoplasm of brain
C79.49	Secondary malignant neoplasm of other parts of nervous system
D33.4	Benign neoplasm of spinal cord
D43.0	Neoplasm of uncertain behavior of brain, supratentorial
D43.1	Neoplasm of uncertain behavior of brain, infratentorial
D43.2	Neoplasm of uncertain behavior of brain, unspecified
D43.4	Neoplasm of uncertain behavior of spinal cord
E03.5	Myxedema coma
E71.50-E71.548	Peroxisomal disorders
E75.23	Krabbe disease
E75.25	Metachromatic leukodystrophy
E75.29	Other sphingolipidosis
G04.1	Tropical spastic paraplegia
G11.0	Congenital nonprogressive ataxia
G11.10	Early-onset cerebellar ataxia, unspecified
G11.11	Friedreich ataxia
G11.19	Other early-onset cerebellar ataxia
G11.2	Late-onset cerebellar ataxia
G11.3	Cerebellar ataxia with defective DNA repair
G11.4	Hereditary spastic paraplegia
G11.8	Other hereditary ataxias
G11.9	Hereditary ataxia, unspecified
G25.3	Myoclonus

G32.0	Subacute combined degeneration of spinal cord in diseases classified elsewhere
G32.81	Cerebellar ataxia in diseases classified elsewhere
G35	Multiple sclerosis
G36.0-G36.9	Other acute disseminated demyelination
G37.0	Diffuse sclerosis of central nervous system
G37.1	Central demyelination of corpus callosum
G37.2	Central pontine myelinolysis
G37.3	Acute transverse myelitis in demyelinating disease of central nervous system
G37.4	Subacute necrotizing myelitis of central nervous system
G37.5	Concentric sclerosis [Balo] of central nervous system
G37.89	Other specified demyelinating diseases of central nervous system
G37.9	Demyelinating disease of central nervous system, unspecified
G82.20	Paraplegia, unspecified
G82.21	Paraplegia, complete
G82.22	Paraplegia, incomplete
G93.1	Anoxic brain damage, not elsewhere classified
G93.82	Brain death
G95.0	Syringomyelia and syringobulbia
G95.20	Unspecified cord compression
G95.29	Other cord compression
G95.9	Disease of spinal cord, unspecified
G96.9	Disorder of central nervous system, unspecified
M47.011-M47.019	Anterior spinal artery compression syndromes
M47.021-M47.029	Vertebral artery compression syndromes
M47.11	Other spondylosis with myelopathy, occipito-atlanto-axial region
M47.12	Other spondylosis with myelopathy, cervical region
M47.13	Other spondylosis with myelopathy, cervicothoracic region
M47.14	Other spondylosis with myelopathy, thoracic region
M47.15	Other spondylosis with myelopathy, thoracolumbar region
M47.16	Other spondylosis with myelopathy, lumbar region
M48.01	Spinal stenosis, occipito-atlanto-axial region
M48.02	Spinal stenosis, cervical region
M48.03	Spinal stenosis, cervicothoracic region
M48.04	Spinal stenosis, thoracic region
M48.05	Spinal stenosis, thoracolumbar region
M48.061	Spinal stenosis, lumbar region without neurogenic claudication
M48.062	Spinal stenosis, lumbar region with neurogenic claudication
M50.00	Cervical disc disorder with myelopathy, unspecified cervical region
M50.01	Cervical disc disorder with myelopathy, high cervical region
M50.020	Cervical disc disorder with myelopathy, mid-cervical region, unspecified level
M50.021	Cervical disc disorder at C4-C5 level with myelopathy
M50.022	Cervical disc disorder at C5-C6 level with myelopathy
M50.023	Cervical disc disorder at C6-C7 level with myelopathy
M50.03	Cervical disc disorder with myelopathy, cervicothoracic region
M99.20	Subluxation stenosis of neural canal of head region
M99.21	Subluxation stenosis of neural canal of cervical region

M99.22	Subluxation stenosis of neural canal of thoracic region
M99.30	Osseous stenosis of neural canal of head region
M99.31	Osseous stenosis of neural canal of cervical region
M99.32	Osseous stenosis of neural canal of thoracic region
M99.40	Connective tissue stenosis of neural canal of head region
M99.41	Connective tissue stenosis of neural canal of cervical region
M99.42	Connective tissue stenosis of neural canal of thoracic region
M99.50	Intervertebral disc stenosis of neural canal of head region
M99.51	Intervertebral disc stenosis of neural canal of cervical region
M99.52	Intervertebral disc stenosis of neural canal of thoracic region
M99.60	Osseous and subluxation stenosis of intervertebral foramina of head region
M99.61	Osseous and subluxation stenosis of intervertebral foramina of cervical region
M99.62	Osseous and subluxation stenosis of intervertebral foramina of thoracic region
M99.70	Connective tissue and disc stenosis of intervertebral foramina of head region
M99.71	Connective tissue and disc stenosis of intervertebral foramina of cervical region
M99.72	Connective tissue and disc stenosis of intervertebral foramina of thoracic region
P11.5	Birth injury to spine and spinal cord
Q06.0	Amyelia
Q06.1	Hypoplasia and dysplasia of spinal cord
Q06.3	Other congenital cauda equina malformations
Q06.8	Other specified congenital malformations of spinal cord
Q06.9	Congenital malformation of spinal cord, unspecified
R40.20	Unspecified coma
R40.2110-R40.2114	Coma scale, eyes open never
R40.2120-R40.2124	Coma scale, eyes open, to pain
R40.2130-R40.2134	Coma scale, eyes open, to sound
R40.2140-R40.2144	Coma scale, eyes open, spontaneous
R40.2210-R40.2214	Coma scale, best verbal response, none
R40.2220-R40.2224	Coma scale, best verbal response, incomprehensible words
R40.2230-R40.2234	Coma scale, best verbal response, inappropriate words
R40.2240-R40.2244	Coma scale, best verbal response, confused conversation
R40.2310-R40.2314	Coma scale, best motor response, none
R40.2320-R40.2324	Coma scale, best motor response, extension
R40.2330-R40.2334	Coma scale, best motor response, abnormal flexion
R40.2340-R40.2344	Coma scale, best motor response, flexion withdrawal
R40.2350-R40.2354	Coma scale, best motor response, localizes pain
R40.2360-R40.2364	Coma scale, best motor response, obeys commands

R40.2420-R40.2424	Glasgow coma scale score 9-12
R40.2430-R40.2434	Glasgow coma scale score 3-8
S14.0XXA-S14.0XXS	Concussion and edema of cervical spinal cord
S14.101A-S14.109S	Other and unspecified injury of cervical spinal cord
S14.111A-S14.119S	Complete lesion of cervical spinal cord
S14.121A-S14.129S	Central cord syndrome of cervical spinal cord
S14.131A-S14.139S	Anterior cord syndrome of cervical spinal cord
S14.141A-S14.149S	Brown-Sequard syndrome of cervical spinal cord
S14.151A-S14.159S	Other incomplete lesion of cervical spinal cord
S24.0XXA-S24.0XXS	Concussion and edema of thoracic spinal cord
S24.101A-S24.109S	Unspecified injury at level of thoracic spinal cord
S24.111A-S24.119S	Complete lesion at level of thoracic spinal cord
S24.131A-S24.139S	Anterior cord syndrome of thoracic spinal cord
S24.141A-S24.149S	Brown-Sequard syndrome of thoracic spinal cord
S24.151A-S24.159S	Other incomplete lesion of thoracic spinal cord
S34.01XA-S34.01XS	Concussion and edema of lumbar spinal cord
S34.02XA-S34.02XS	Concussion and edema of sacral spinal cord
S34.101A-S34.109S	Unspecified injury to lumbar spinal cord
S34.111A-S34.119S	Complete lesion of lumbar spinal cord
S34.121A-S34.129S	Incomplete lesion of lumbar spinal cord
S34.131A-S34.139S	Complete lesion of sacral spinal cord
S34.3XXA-S34.3XXS	Injury of cauda equina

Considered Not Medically Necessary:

ICD-10-CM Diagnosis Codes	**Description**
	All other codes

<u>Automated Hand-held Noninvasive Nerve Conduction Testing</u>

Considered Not Medically Necessary when used to report automated or portable hand-held noninvasive nerve conduction testing/devices:

CPT®* Codes	Description
95905	Motor and/or sensory nerve conduction, using preconfigured electrode array(s), amplitude and latency/velocity study, each limb, includes F-wave study when performed, with interpretation and report

Macro EMG/Surface Electromyography/Paraspinal SEMG

Considered Experimental/Investigational and/or Unproven:

HCPCS Codes	Description
S3900	Surface electromyography (EMG)

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