Cigna Medical Coverage Policy

Subject **Nerve Conduction Velocity Studies and Electromyography**

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Coverage Policy

NERVE CONDUCTION/ELECTROMYOGRAPHY; PERFORMED TOGETHER

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

- myopathy, including but not limited to ANY of the following:
  - polymyositis
  - dermatomyositis
  - myotonic myopathy
  - congenital myopathy
- disorder of brachial or lumbosacral plexus
- plexopathy (e.g., idiopathic, trauma, infiltration)
- focal neuropathy, entrapment neuropathy, compressive lesion/syndrome, including but not limited to ANY of the following:
  - carpal tunnel
  - cubital tunnel syndrome
  - tarsal tunnel syndrome
  - peroneal nerve compression
  - thoracic outlet syndrome
- diagnosis or confirmation of a generalized neuropathy, including but not limited to ANY of the following:
  - metabolic and nutritional [diabetic, uremic, amyloidosis, hypothyroidism, immune, vitamin B_{12} or thiamine deficiency])

  - toxic neuropathy (e.g., vincristine, amiodarone)
  - hereditary polyneuropathy (e.g., Charcot-Marie Tooth disease)
  - infectious neuropathy (e.g., HIV, Lyme disease, Leprosy)
  - demyelinating neuropathy (e.g., Guillain-Barre syndrome)
  - idiopathic peripheral neuropathy
- repetitive stimulation in the diagnosis of a neuromuscular junction disorder (e.g., myasthenia gravis, myasthenic syndrome, botulism)
- neurotrauma (e.g., traumatic nerve lesion)
- 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
- motor neuron disease (e.g., amyotrophic lateral sclerosis)
- spine disorder and BOTH of the following:
  - appropriate imaging studies (e.g., CT scan, MRI, myelogram) confirm nerve root impingement
  - any one of the following:
    - to differentiate radiculopathy from other neuropathies or non-neuropathic processes
    - to establish whether imaging findings are responsible for reported pain
    - to reconcile when pattern of pain, sensory impairment, or weakness does not match imaging findings
    - to document degree of axonal nerve damage in an individual with weakness

NERVE CONDUCTION OR EMG: PERFORMED ALONE

Cigna covers nerve conduction velocity (NCV) testing when performed alone as medically necessary for ANY of the above indications, in ANY of the following clinical presentations:

- as a follow-up study of a neuromuscular structure that has undergone previous electrodiagnostic evaluation
- current use of an anticoagulant
- presence of lymphedema
- carpal tunnel syndrome

Cigna covers NEMG testing when performed for determination of precise muscle location for an injection.

NEUROMUSCULAR JUNCTION TESTING

Cigna covers neuromuscular junction testing as 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
  - fatigue/weakness that progresses with repetitive activity

NOT COVERED

Cigna does not cover neuromuscular junction testing for ANY other indication because it is considered not medically necessary.

Cigna does not cover nerve conduction velocity testing when performed with NEMG testing for ANY other indication, including the following because it 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

Cigna does not cover any of the following electrodiagnostic tests because each is considered experimental, investigational or unproven:

- 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
- 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
- automated noninvasive nerve conduction testing (e.g., NC-stat System, Brevio® nerve conduction monitoring system)
- macro electromyography (EMG)
- surface electromyography (e.g., surface EMG [SEMG], surface scanning EMG, high-density SEMG, HD-sEMG)
- paraspinal SEMG
- 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

INTRAOPERATIVE EMG MONITORING

Cigna covers intraoperative monitoring* (IOM) of electromyographic responses as medically necessary when ALL of the following conditions are met:

- There is significant risk of nerve or spinal cord injury during a surgical procedure, such as the following (this list may not be all inclusive):
  - monitoring of a cranial nerve during head and/or neck surgery (e.g., resection of skull base tumor, resection of tumor involving a cranial nerve, cavernous sinus tumor, oval or round window graft, thyroid tumor surgery, neck dissection)
  - risk for cerebral ischemia (e.g., surgery of the aortic arch, thoracic aorta, internal carotid artery endarterectomy, intracranial arteriovenous malformation, bronchial artery arteriovenous malformation or tumor, cerebral aneurysm)
  - monitoring of facial nerve function during surgery (e.g., acoustic neuroma, microvascular decompression of the facial nerve for hemifacial spasm, parotid tumor resection)
  - monitoring of nerve root function during a spinal procedure (e.g., pedicle screw placement, mechanical spinal distraction, correction of scoliosis surgery, spinal cord tumor, spinal fracture)

  - brachial or lumbar plexus surgery, including a decompressive procedure of the spine for myelopathy or claudication when the spinal cord or nerves are at risk
  - the planned surgery poses a potential risk of significant damage to an essential nervous system structure (e.g., neuroma of peripheral nerve, leg lengthening procedure when there is traction on the sciatic nerve)
- IOM is performed by either a licensed physician trained in clinical neurophysiology (e.g., neurologist, physiatrist) or a trained technologist who is practicing within the scope of his/her license/certification as defined by state law or appropriate authorities and is working under the direct supervision of a physician trained in neurophysiology.
- IOM is interpreted by a licensed physician trained in clinical neurophysiology, other than the operating surgeon, who is either physically in attendance in the operating suite or present by means of a real-time remote mechanism for all electroneurodiagnostic (END) monitoring situations and is immediately available to interpret the recording and advise the surgeon.
- Monitoring is conducted and interpreted real-time (either on-site or at a remote location) and continuously communicated to the surgical team.

***Note: IOM for these indications consists of a physician monitoring not more than three cases simultaneously.**

Cigna does not cover intraoperative monitoring* (IOM) of electromyographic responses for ANY other indication, including when used during routine lumbar or cervical laminectomy or fusion in the absence of myelopathy or other complicating conditions which would create significant potential risk of damage to the nerve root or spinal cord, because it is considered not medically necessary.

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], 2010).

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.

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. The nerve is stimulated with surface electrodes placed on the skin over the nerve in various locations, although in some situations needle electrodes may be used. A mild electrical stimulus is applied to the nerve in two or more points. 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.

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] 2004). 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 EMG and NCS are required for a clinical diagnosis of peripheral nervous system disorders (AANEM, 2004). For example, radiculopathies cannot be definitively diagnosed by NCS alone; EMG is performed to confirm the radiculopathy. 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. 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).

EMG should always be performed by a physician who is specially trained in electrodiagnostic medicine (neurologist, physiatrist, clinical neurophysiologist) with real-time interpretation, and is part of the complete electrodiagnostic examination (AANEM, 2004). 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, 2004). 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 surface scanning EMG, 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.

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 (repetitive stimulation) involves recording muscle responses to a series of nerve stimuli applied at differing rates, both before and after exercise or transmission of high-frequency stimuli (AANEM). A surface electrode over, or a percutaneous electrode placed in a corresponding muscle records the evoked muscle action potentials using standard nerve conduction study techniques. 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).

U.S Food and Drug Administration (FDA): EMG devices, (i.e., needle or cutaneous electrodes), are neurological devices and are approved by the FDA as Class II medical devices.

Literature Review: Evidence in the peer reviewed scientific literature including textbook and professional society opinion supports clinical utility for electrodiagnostic testing when used to assist in diagnosing disorders involving the nerves, muscles and neuromuscular junction.

Professional Societies/Organizations: 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.

The minimum standards recommended by the AANEM for NCV testing include the following:

- The testing is medically indicated.
- It is performed using equipment that provides assessment of all parameters of the recorded signals (equipment designed for screening purposes is not acceptable).
- The test is performed by a physician, or by a trained technician under the direct supervision of a trained electrodiagnostic physician
- The EMG must be performed by a trained physician.
- One physician supervises and performs all components of the exam.

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 (AANEM, 2005).

In a position statement published by the AANEM regarding the performance and interpretation of electrodiagnostic studies (AANEM, 2006), the AANEM states, "The performance of or interpretation of NCS separately from the needle EMG component of the testing should clearly be the exception. Nerve conduction studies performed independent of needle EMG may only provide a portion of the information needed to diagnose muscle, nerve root, and most nerve disorders. When the 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. Moreover, individuals who interpret NCV data without patient interaction or who rely on studies that have delayed interpretation, who have interpretation made off-site, and who interpret results without complementary information obtained from EMG studies are not meeting the standards outlined in the AANEM policy recommendations. "

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, 2004). The AANEM (2010) 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 (AANEM, 2004).

Table 1 Number of Services Recommended:

Indication	Needle Electromyography (EMG) CPT™ Codes 95860-95864 and 95867-95870	Nerve Conduction Studies (NCS) CPT™ Codes 95900,95903, 95904		Other Electromyographic Studies CPT Codes 95934, 95936, 95937	
		Motor NCS with and/or without F Waves	Sensory NCS	H-Reflex	Neuromuscular Junction Testing (Repetitive Stimulation)
Carpal Tunnel (unilateral)	1	3	4	n/a	n/a
Carpal Tunnel (bilateral)	2	4	6	n/a	n/a
Radiculopathy	2	3	2	2	n/a

Mononeuropathy	1	3	3	2	n/a
Polyneuropathy/Mononeuropathy Multiplex	3	4	4	2	n/a
Myopathy	2	2	2	n/a	2
Motor Neuropathy (e.g., ALS)	4	4	2	n/a	2
Plexopathy	2	4	6	2	n/a
Neuromuscular Junction	2	2	2	n/a	3
Tarsal Tunnel Syndrome (unilateral)	1	4	4	n/a	n/a
Tarsal Tunnel Syndrome (bilateral)	2	5	6	n/a	n/a
Weakness, fatigue, cramps, or twitching (local)	2	3	4	n/a	2
Weakness, fatigue, cramps, or twitching (general)	4	4	4	n/a	2
Pain, numbness, or tingling (unilateral)	1	3	4	2	n/a
Pain, numbness, or tingling (bilateral)	2	4	6	2	n/a

Summary: Evidence in the peer-reviewed, scientific literature indicates that nerve conduction velocity studies and needle electromyography are performed to aid in the diagnosis of neuromuscular disorders when the results of the testing will impact patient management. The diagnostic accuracy of these tests and improvement in health outcomes as a result of treatment have been demonstrated in the medical literature for a select subset of individuals. Some published evidence has shown a correlation of automated portable nerve conduction test results with standard testing. However, the diagnostic utility of portable automated nerve conduction testing and subsequent improvement in health outcomes has not been clearly demonstrated in the medical literature. Concerns remain regarding misdiagnosis, lack of specialist interpretation and absence of needle EMG studies. The role of automated/portable hand-held devices for nerve conduction testing when used in clinical practice has not been established.

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.

One device, the NC-stat System (NEUROMetrix® Inc., Waltham, MA) is a hand-held, noninvasive, automated nerve conduction testing system that has been proposed as an alternative to conventional nerve conduction testing. The device has 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 the device 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.

U.S Food and Drug Administration (FDA): Several nerve conduction measurement devices have received approval through the FDA 510(k) process for marketing in the U.S as point of care devices. These devices are regulated as Class II devices and are subject to controls. Examples of FDA approved devices include, but are not limited to, the NC-stat System (NEUROMetrix, Inc., Waltham, MA); the Brevio (Neurotron Medical, Inc., West Trenton, NJ); and the Virtual Medical Systems VT 3000 (Scientific Imaging, Inc., Larkspur, CO).

Literature Review: Evidence evaluating the diagnostic utility of the Brevio and Virtual Medical Systems VT 3000 nerve conduction monitor systems 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 (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 (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).

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, 2006). The AANEM (2010) 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).

Summary: Despite some reports of high sensitivity and specificity, the clinical utility of automated NCV testing for diagnosing peripheral nerve disorders has not been clearly demonstrated. There is insufficient evidence to support improvement in health outcomes such as accurate diagnosis and successful treatment, as a result of point of service testing. Diagnostic value has not been clearly established and few studies evaluate the effect of automated testing on clinical management (i.e., treatment).

Intraoperative Monitoring–Electromyography

Intraoperative EMG monitoring is commonly used to monitor the integrity of neural pathways during high-risk neurosurgical, orthopedic, and other surgeries that may result in injury to the nervous system. This type of monitoring is performed in the operating room where the goal is to improve patient safety by identifying nerve impairment early so permanent deficits do not result in injuries to the CNS pathways, thus improving surgical outcomes.

Intraoperative EMG monitoring is often performed with somatosensory evoked potentials. SSEP and EMG monitoring combined allows for an intraoperative evaluation that is both sensitive to damage and specific with regards to predicting outcome. SSEPs have low sensitivity to predict damage but high specificity whereas EMG has high sensitivity to nerve root function but low specificity in terms of predicting a persistent neurological deficit (Gunnarsson, et al., 2004).

Interpretation of IOM of EMG signals primarily relies on the presence or absence of muscle activity in general and not on the specific section of the muscle that is reacting. IOM is distinct from clinical diagnostic needle electromyography and nerve conduction studies (AANEM, 2008). According to the AANEM position statement for IOM, while the electrode placement for IOM can be performed by a technologist under the supervision of a trained physician, diagnostic needle electromyography should be performed personally by a qualified physician.

The AANEM and the AAN published guidance for intraoperative monitoring. According to a position statement by the AANEM (2008) regarding the role of the intraoperative monitoring team, during intraoperative monitoring baseline tracings should be obtained prior to the surgical intervention. Monitoring should continue until closing of the surgical procedure, but may be terminated earlier upon discretion of the surgeon. A logbook should be completed for each patient and include the time of the procedure, the time of each surgical manipulation of the central or peripheral nervous system, and the name, dose and times of anesthetics administered which may affect the central or peripheral nervous system or muscle.

The intraoperative monitoring team should consist of surgeons who have a fundamental background in neurophysiology, a monitoring team with a fundamental background in intraoperative monitoring, and anesthesiologists. In addition, according to the AANEM (2008), the IOM team must include a trained clinical neurophysiologist (MD or DO).

Monitoring must be performed by qualified personnel acting within the scope of his/her license/certification as defined by state law or appropriate authorities. According to a guideline by the AAN (2008), it is expected that a specifically trained technologist or non-physician monitorist, preferably with credentials from the American Board of Neurophysiologic Monitoring or the American Board of Registration of Electrodiagnostic Technologists (ABRET), will be in continuous attendance in the operating room, with either the physical or electronic capacity for real-time communication with the supervising physician. Although credentialing varies among professional organizations, the AANEM and AAN both provide guidance that the monitoring technologist should be under the direct supervision of a clinical neurophysiologist (AAN, 2008; AANEM, 2008).

Typically the physician acts as a remote backup, with the actual intra-operative monitoring being performed in the operating room by a technologist. Some operating rooms have a central physician monitoring room, where a physician may simultaneously monitor cases. The number of procedures being monitored by the clinical neurophysiologist physician is determined by the nature of the surgical procedure. However, monitoring more than three cases simultaneously is not recommended (AAN, 2008). The severity of the case being monitored may determine the location of the neurophysiologist; they may be located in the operating room, in the same building, monitoring real-time recordings from a remote location, or at a location from which the operating room is accessible within minutes to view the recording procedure.

When performing intraoperative monitoring, the electroneurodiagnostic technologist should monitor only one surgical procedure at a time; multiple monitoring could result in restricted surgical efficiency, prolonged anesthesia, and possible compromise of judgment (American Society of Electroneurodiagnostic Technologists [ASET], 2005).

Real-time monitoring allows for timely intervention to prevent risk of damage. Consequently, it is imperative that either the physical (on-site) or electronic capacity (off-site, remote location) for real-time communication exists between the monitoring team and surgeon.

Indications: Evidence in the published literature (Kinney and Slimp, 2007; Crum and Strommen, 2007, Liem, 2006; Edwards and Kileny, 2005; Lehman 2004; Holland, 2002) and textbook sources (Mahla, et al., 2005; Yingling and Ashram, 2005), indicate assessment of intraoperative EMG responses are recommended for patients undergoing surgical procedures that result in significant risk of damage to nerve structures. However, evidence is not conclusive regarding the impact on surgical and health outcomes. Nonetheless, intraoperative monitoring may provide information that allows for immediate intervention thus preventing or minimizing postoperative neurological deficits. Examples of surgical procedures where there is significant potential risk for nerve injury and where intraoperative EMG monitoring may be recommended include the following (this list may not be all inclusive):

- surgeries that place the facial nerve at risk for injury (e.g., acoustic neuroma, microvascular decompression of the facial nerve for hemifacial spasm, parotid tumor resection)
- other head and/or neck surgery that places the cranial nerves at risk for injury (e.g., resection of skull base tumors, thyroid tumor surgery, neck dissections)
- brachial or lumbar plexus surgery
- spinal surgery, for nerve root monitoring (e.g., pedicle screw placement, mechanical spinal distraction)

Summary: Evidence in the peer–reviewed, published scientific literature, textbook sources and professional society recommendations indicates that electrodiagnostic testing (electromyography [EMG] and nerve conduction studies [NCS]) is useful in diagnosing various neuromuscular disorders when the results of the testing will impact patient management. It is the recommendation of the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM) that electrodiagnostic testing/consultations, including those performed intraoperatively, 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. There is insufficient evidence in the literature to support the use of surface electromyography (SEMG), high-density SEMG, macro EMG or paraspinal SEMG at this time. Well-designed clinical trials are needed to demonstrate the diagnostic utility of these procedures. The scientific literature supports that intraoperative EMG monitoring is indicated for monitoring the integrity of neural pathways during high-risk neurosurgical, orthopedic, and other surgeries that may result in injury to the nervous system.

Coding/Billing Information

Note: 1) This list of codes may not be all-inclusive.
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

Covered when medically necessary when a NCV study (Table 1) is conducted and interpreted at the same time as needle electromyography (NEMG) study (Table 2) OR a combined test is requested (Table 3) and medical necessity criteria as outlined in the coverage policy is met:

Table 1: NCV

CPT®* Codes	Description
95900	Nerve conduction, amplitude and latency/velocity study, each nerve; motor, without F-wave study
95903	Nerve conduction, amplitude and latency/velocity study, each nerve; motor, with F-wave study
95904	Nerve conduction, amplitude and latency/velocity study, each nerve; sensory
95934	H-reflex, amplitude and latency study; record gastrocnemius/soleus muscle
95936	H-reflex, amplitude and latency study; record muscle other than gastrocnemius/soleus muscle
95937	Neuromuscular junction testing (repetitive stimulation, paired stimuli), each nerve, any 1 method

Table 2: EMG

CPT®* Codes	Description
92265	Needle oculoelectromyography, 1 or more extraocular muscles, 1 or both eyes, with interpretation and report
95865	Needle electromyography; larynx
95866	Needle electromyography; hemidiaphragm
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
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 one 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

Table 3: Combined testing

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, 5 or more muscles studied, innervated by 3 or more nerves or 4 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)

ICD-9-CM Diagnosis Codes	Description
053.13	Postherpetic polyneuropathy
072.72	Mumps polyneuropathy
138	Late effects of acute poliomyelitis
249.60-249.61	Secondary diabetes mellitus with neurological manifestations
250.60-250.63	Diabetes with neurological manifestations
330.2	Cerebral degeneration in generalized lipidoses
333.0	Other degenerative diseases of the basal ganglia
333.2	Myoclonus
333.6	Genetic torsion dystonia
333.71	Athetoid cerebral palsy
333.72	Acute dystonia due to drugs
333.79	Other acquired torsion dystonia
333.81	Blepharospasm
333.82	Orofacial dyskinesia

333.83	Spasmodic torticollis
333.84	Organic writers' cramp
333.89	Other fragments of torsion dystonia
333.90	Unspecified extrapyramidal disease and abnormal movement disorder
333.99	Other extrapyramidal disease and abnormal movement disorder
334.1	Hereditary spastic paraplegia
334.2	Primary cerebellar degeneration
335.0	Werdnig-Hoffmann disease
335.10	Spinal muscular atrophy, unspecified
335.11	Kugelberg-Welander disease
335.19	Other spinal muscular atrophy
335.20-335.9	Motor neuron disease
336.0-336.9	Other diseases of spinal cord
337.00-337.9	Disorders of the autonomic nervous system
340	Multiple sclerosis
341.0-341.9	Other demyelinating diseases of central nervous system
342.00-342.92	Hemiplegia and hemiparesis
343.0-343.9	Infantile cerebral palsy
344.00-344.9	Other paralytic syndromes
345.90-345.91	Epilepsy, unspecified
348.1	Anoxic brain damage
348.4	Compression of brain
349.82	Toxic encephalopathy
350.1-350.9	Trigeminal neuralgia
351.0-351.9	Facial nerve disorders
352.0-352.9	Disorders of other cranial nerves
353.0-353.9	Nerve root and plexus disorders
354.0-354.9	Mononeuritis of upper limb and mononeuritis multiplex
355.0-355.9	Mononeuritis of upper limb and unspecified site
356.0-356.9	Hereditary and idiopathic peripheral neuropathy
357.0-357.9	Inflammatory and toxic neuropathy
358.00-358.9	Myoneural disorders
359.0	Congenital hereditary muscular dystrophy
359.1	Hereditary progressive muscular dystrophy
359.21-359.29	Myotonic disorders
359.3	Periodic paralysis
359.4	Toxic myopathy
359.5	Myopathy in endocrine diseases classified elsewhere
359.6	Symptomatic inflammatory myopathy in diseases classified elsewhere
359.81-359.89	Other myopathies
359.9	Unspecified myopathy
368.2	Diplopia
374.30-374.34	Ptosis of eyelid
378.00-378.9	Strabismus and other disorders of binocular eye movements
384.20	Perforated tympanic membrane, NOS
384.21	Central perforation of tympanic membrane
385.30-385.35	Cholesteatoma of middle ear and mastoid
434.00-434.91	Occlusion of cerebral arteries
438.30-438.32	Monoplegia of upper limb
438.40-438.42	Monoplegia of lower limb

478.30-478.34	Paralysis of vocal cords or larynx
478.75	Laryngeal spasm
478.79	Other diseases of larynx
596.51	Hypertonicity of bladder
596.54	Neurogenic bladder, NOS
625.6	Stress incontinence, Female
646.40-646.44	Peripheral neuritis in pregnancy
710.3	Dermatomyositis
710.4	Polymyositis
715.90-715.98	Osteoarthrosis, unspecified
717.9	Unspecified Internal derangement of knee
719.40-719.49	Pain in joint
721.1	Cervical spondylosis with myelopathy
721.2	Thoracic spondylosis without myelopathy
721.41-721.42	Thoracic or lumbar spondylosis with myelopathy
721.7	Traumatic spondylopathy
721.91	Spondylosis of unspecified site with myelopathy
722.0	Displacement of cervical intervertebral disc without myelopathy
722.10-722.11	Displacement of thoracic or lumbar intervertebral disc without myelopathy
722.2	Displacement of intervertebral disc, site unspecified, without myelopathy
722.4	Degeneration of cervical intervertebral disc
722.51-722.52	Degeneration of thoracic lumbar intervertebral disc
722.6	Degeneration of intervertebral disc, site unspecified
722.70-722.73	Intervertebral disc disorder with myelopathy
722.80-722.83	Postlaminectomy syndrome
722.90-722.93	Other and unspecified disc disorder
723.0	Spinal stenosis in cervical region
723.1	Cervicalgia
723.4	Brachial neuritis or radiculitis nos.
723.5	Torticollis, unspecified
723.9	Unspecified musculoskeletal disorders and symptoms referable to neck
724.00	Spinal stenosis, unspecified region
724.01	Spinal stenosis of thoracic region
724.03	Spinal stenosis of lumbar region, with neurogenic claudication
724.09	Spinal stenosis , other region other than cervical
724.1	Pain in thoracic spine
724.2	Lumbago
724.3	Sciatica
724.4	Thoracic or lumbosacral neuritis or radiculitis, unspecified
724.5	Unspecified backache
724.6	Disorders of sacrum
725	Polymyalgia rheumatica
726.2	Other affections of shoulder region, not elsewhere classified
728.0	Infective myositis
728.2	Muscular wasting and disuse atrophy, not elsewhere classified
728.85	Spasm of muscle
728.87	Muscle weakness (generalized)
728.9	Unspecified disorder of muscle, ligament, and fascia
729.0	Rheumatism, unspecified and fibrositis
729.1	Myalgia and myositis, unspecified

729.2	Neuralgia, neuritis, and radiculitis, unspecified
729.4	Fasciitis, unspecified
729.5	Pain in limb
729.82	Cramp of limb
729.89	Other musculoskeletal symptoms referable to limbs
736.05	Wrist drop (acquired)
736.06	Claw hand (acquired)
736.09	Other acquired deformities of forearm, excluding fingers
736.79	Other acquired deformity of ankle and foot
737.30	Scoliosis (and kyphoscoliosis), idiopathic
738.4	Acquired spondylolisthesis
747.81-747.89	Anomalies of cerebrovascular system
756.11	Congenital spondylolysis, lumbosacral region
756.12	Congenital spondylolisthesis
767.4	Injury to spine and spinal cord
767.5	Facial nerve injury
767.6	Injury to brachial plexus
767.7	Other cranial and peripheral nerve injuries
781.2	Abnormality of gait
781.3	Lack of coordination
781.4	Transient paralysis of limb
781.6	Meningismus
781.7	Tetany
781.93	Ocular torticollis
781.99	Other symptoms involving nervous and musculoskeletal systems
782.0	Disturbance of skin sensation
784.40	Voice and resonance disorder, unspecified
784.42	Dysphonia
784.49	Other voice and resonance disorders
784.51	Dysarthria
784.59	Other speech disturbance
787.20-787.29	Dysphagia
787.60-787.63	Incontinence of feces
788.21	Incomplete bladder emptying
788.30-788.39	Urinary incontinence
796.1	Abnormal reflex
951.0-951.9	Injury to other cranial nerves
952.00-952.09	Spinal cord injury without evidence of spinal bone injury
953.0-953.9	Injury to nerve root and spinal plexus
954.0-954.9	Injury to other nerve(s), excluding shoulder and pelvic girdles
955.0-955.9	Injury to peripheral nerve(s) of shoulder girdle and upper limb
956.0-956.9	Injury to peripheral nerve(s) of pelvic girdle and lower limb
957.0-957.9	Injury to other and unspecified nerves

Not Medically Necessary/Not Covered:

ICD-9-CM Diagnosis Codes	**Description**
357.2	Polyneuropathy in diabetes
585.6	End stage renal disease

V82.9	Screening for unspecified condition
	All other codes

Nerve Conduction Velocity Testing : Performed Alone

Covered as medically necessary for the following situations (Table 4) when performed alone for a medically necessary indication listed above in any of the clinical presentations listed:

CPT®* Codes	Description
95900	Nerve conduction, amplitude and latency/velocity study, each nerve; motor, without F-wave study
95903	Nerve conduction, amplitude and latency/velocity study, each nerve; motor, with F-wave study
95904	Nerve conduction, amplitude and latency/velocity study, each nerve; sensory
95934	H-reflex, amplitude and latency study; record gastrocnemius/soleus muscle
95936	H-reflex, amplitude and latency study; record muscle other than gastrocnemius/soleus muscle

Table 4: Medical conditions supporting NCV testing without EMG

ICD-9-CM Diagnosis Codes	Description
286.9	Other and unspecified coagulation defects
354.0	Carpal tunnel syndrome
457.0-457.9	Lymphedema

EMG Injection Localization: Performed Alone

Covered as medically necessary for determination of precise muscle location for an injection (Table 5):

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

Table 5: Injection criteria

ICD-9-CM Diagnosis Codes	Description
333.6	Genetic torsion dystonia
333.71	Athetoid cerebral palsy
333.72	Acute dystonia due to drugs
333.82	Orofacial dyskinesia
333.83	Spasmodic torticollis
333.84	Organic writers' cramp
333.89	Other fragments of torsion dystonia
340	Multiple sclerosis
341.9	Demyelinating disease of central nervous system, unspecified
342.11	Spastic hemiplegia affecting dominant side
342.12	Spastic hemiplegia affecting nondominant side
343.0-343.9	Infantile cerebral palsy
351.8	Other facial nerve disorders
625.6	Stress incontinence, female
728.85	Spasm of muscle

Neuromuscular Junction Testing

Covered as medically necessary:

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

ICD-9-CM Diagnosis Codes	Description
005.1	Botulism food poisoning
040.42	Wound botulism
335.20-335.24	Amyotrophic lateral sclerosis
335.29	Other motor neuron disease
335.8	Other anterior horn cell diseases
335.9	Anterior horn cell disease, unspecified
357.0	Acute infective polyneuritis
357.82	Critical illness polyneuropathy
358.00-358.01	Myaesthenia gravis
358.2	Toxic myoneural disorder
358.30-358.39	Lambert Eaton syndrome
358.9	Myoneural disorders
359.21	Myotonic muscular dystrophy
359.22	Myotonia congenital
359.23	Myotonic chondrodystrophy
359.29	Other specified myotonic disorder
359.3	Periodic paralysis
359.79	Other inflammatory and immune myopathies, NEC
359.81	Critical illness myopathy
359.89	Other myopathies
359.9	Myopathy, unspecified
368.2	Diplopia
374.30	Ptosis of eyelid, unspecified
728.87	Muscle weakness (generalized)
784.51	Dysarthria
784.59	Other speech disturbance
787.20-787.29	Dysphagia

Not Medically Necessary/Not Covered:

ICD-9-CM Diagnosis Codes	Description
	All other codes

Automated Hand-held Noninvasive Nerve Conduction Testing

Experimental, investigational or unproven and not covered 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

ICD-9-CM Diagnosis	Description

Codes	
	All codes

Surface Electromyography/Paraspinal SEMG/Macro EMG

Experimental/Investigational/Unproven/Not Covered:

HCPCS Codes	Description
S3900	Surface electromyography (EMG)

ICD-9-CM Diagnosis Codes	Description
	All codes

Intraoperative Monitoring

Covered as medically necessary:

CPT®* Codes	Description
95920	Intraoperative neurophysiology testing, per hour (List separately in addition to code for primary procedure)

ICD-9-CM Diagnosis Codes	Description
170.2	Malignant neoplasm of vertebral column, excluding sacrum and coccyx
192.0-192.9	Malignant neoplasm of other and unspecified parts of nervous system
193	Malignant neoplasm of thyroid gland
198.3	Secondary malignant neoplasm of brain and spinal cord
198.4	Secondary malignant neoplasm of other parts of nervous system
210.2	Benign neoplasm major salivary glands
225.0-225.9	Benign neoplasm of brain and other parts of nervous system
226	Benign neoplasm of thyroid glands
237.4	Neoplasm of uncertain behavior, of endocrine glands and nervous system, other and unspecified endocrine glands
237.70-237.79	Neurofibromatosis disorders
237.9	Neurofibromatosis, other and unspecified parts of nervous system
239.6	Neoplasm of brain
324.1	Intraspinal abscess
343.8-343.9	Infantile cerebral palsy
348.4	Compression of brain
350.1	Trigeminal neuralgia
350.2	Atypical face pain
352.9	Unspecified disorder of cranial nerves
353.0	Brachial plexus lesions
353.1	Lumbosacral plexus lesions
353.2	Cervical root lesions, not elsewhere classified
353.3	Thoracic root lesions, not elsewhere classified
353.4	Lumbosacral root lesions, not elsewhere classified
384.20-384.25	Perforation of tympanic membrane

385.30-385.35	Cholesteatoma of middle ear and mastoid
430	Subarachnoid hemorrhage
431	Intracerebral hemorrhage
432.1	Subdural hemorrhage
432.9	Unspecified intracranial hemorrhage
433.00-433.01	Occlusion and stenosis of basilar artery
433.10-433.11	Occlusion and stenosis of carotid artery
433.20-433.21	Occlusion and stenosis of vertebral artery
433.30-433.31	Occlusion and stenosis of multiple and bilateral precerebral arteries
433.80-433.81	Occlusion and stenosis of other specified precerebral arteries
433.90-433.91	Occlusion and stenosis of unspecified precerebral arteries
434.00-434.01	Cerebral thrombosis
434.10-434.11	Cerebral embolism
434.90-434.91	Cerebral artery occlusion
435.0-435.9	Transient cerebral ischemia
437.3	Cerebral aneurysm, nonruptured
437.5	Moyamoya disease
441.00-441.9	Dissection of aorta
443.21-443.29	Arterial dissection
721.1	Cervical spondylosis with myelopathy
721.41	Thoracic spondylosis with myelopathy
721.91	Spondylosis of unspecified site, with myelopathy
722.70-722.73	Intervertebral disc disorder with myelopathy
737.10-737.19	Kyphosis (acquired)
737.20-737.22	Lordosis (acquired)
737.30-737.39	Kyphoscoliosis and scoliosis
737.40-737.43	Curvature of spine associated with other conditions
737.8	Other curvatures of spine
741.00-741.03	Spina bifida with hydrocephalus
741.90-741.93	Spina bifida without mention of hydrocephalus
747.81	Anomalies of cerebrovascular system
747.82	Spinal vessel anomaly
767.4	Injury to spine and spinal cord
767.5	Facial nerve injury
767.6	Injury to brachial plexus
767.7	Other cranial and peripheral nerve injuries
806.01-806.39	Fracture of vertebral column with spinal cord injury~~; cervical, thoracic~~

806.4-806.5	Fracture of vertebral column with spinal cord injury, lumbar
806.70-806.9	Fracture of vertebral column with spinal cord injury; sacrum, coccyx
850.4	Concussion with prolonged loss of consciousness, without return to pre-existing conscious level
953.0-953.9	Injury to nerve roots and spinal plexus

Not Medically Necessary /Not Covered:

ICD-9-CM Diagnosis Codes	Description
	All other codes

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