

## **Model Policy for Needle Electromyography and Nerve Conduction Studies**

The electrodiagnostic (EDX) evaluation is an extension of the neuromuscular portion of the physical examination. EDX evaluations are performed by physicians, almost exclusively neurologists or physiatrists. An EDX evaluation requires a detailed knowledge of a patient and his/her disease. During an EDX evaluation, physicians typically perform needle electromyography (EMG) and nerve conduction studies (NCSs). Training to perform these procedures should occur in conjunction with training in the clinical diagnostic and management aspects of neuromuscular disease. This training allows for the proper performance of an EDX evaluation and the correct interpretation of EDX test results. Physicians performing an EDX evaluation must be aware of the patterns of abnormality observed in different diseases. Physicians must also be able to interpret the results of NCSs and needle EMG and combine these results with the patient's history, physical examination, and other test results to reach a diagnosis. EDX results may be similar in different diseases therefore a thorough knowledge of EDX evaluation is important to assure quality patient care. Non-physician providers, including physical therapists, chiropractors, physician assistants, and others, do not have the appropriate training and knowledge to perform and interpret EMG studies and interpret NCSs. These providers, along with appropriately trained and supervised technologists, may perform NCS with direct physician supervision. Both EMGs and NCSs are usually required for a clinical diagnosis of peripheral nervous system disorders. Performance of one test does not eliminate the need for the other. The number of EMG and NCSs needed to determine a diagnosis are matters of clinical judgment. The complexity and extent of testing needed is determined after the initial pre-test evaluation and often modified during the testing procedure. NCSs may be performed without EMG on some occasions, e.g., entrapment neuropathies, but this should be the exception rather than the normal practice pattern.

Decisions to continue, modify, or conclude an EDX study rely on knowledge of anatomy, physiology, and neuromuscular diseases. Ongoing real-time assessment of data is required during the clinical diagnostic evaluation and especially during the needle EMG examination. The EDX physician is integrally involved in performing and interpreting the needle EMGs as the study progresses. A needle EMG may not be performed at one time and "read" at another time; the diagnostic decision-making is simultaneous with performance.

After conducting a history and physical examination, the EDX physician develops a working diagnosis that may modify the referral diagnosis. The EDX physician's working diagnosis also may be modified as the EDX evaluation proceeds. A number of tests may be needed to address the referral and working diagnoses and to arrive at the correct final diagnosis. Other diagnoses are often considered during testing, the final diagnosis therefore may not accurately reflect all the decisions made throughout the testing process or all the work the physician performed to reach the final diagnosis. EDX testing does not always establish an etiologic diagnosis. When "rule-out" diagnoses are not accepted, only a symptomatic diagnosis (e.g., ICD-10-CM codes M79.601-M79.676 "pain in limb" or R20.0-R20.9 "disturbance in skin sensation") can be coded, regardless of the work involved in performing the EDX examination.

### **Indications**

EDX testing is used to evaluate the integrity and function of the peripheral nervous system (most cranial nerves, spinal roots, plexi, and nerves, neuromuscular junction, muscles), and the central nervous system (brain and spinal cord).

A typical EDX examination includes the following:

- a. Development of a differential diagnosis by the EDX physician, based upon appropriate history and physical examination and the referring physician's concerns if applicable
- b. NCSs of a number of nerves by recording and studying the electrical responses from peripheral nerves or the muscles they innervate, following electrical stimulation of the nerve. Usually surface electrodes are used for both stimulation and recording, though needle electrodes may be required in special cases.
- c. Needle EMG testing of selected muscles. This is accomplished by inserting a needle electrode into appropriate muscles, one at a time.

EDX testing is indicated for the following scenarios:

1. Focal neuropathies, entrapment neuropathies, or compressive lesions/syndromes such as carpal tunnel syndrome, ulnar neuropathies, or root lesions, for localization
2. Traumatic nerve lesions, for diagnosis and prognosis
3. Generalized neuropathies, such as diabetic, uremic, metabolic, toxic, hereditary or immune-mediated
4. Neuromuscular junction disorders such as myasthenia gravis, myasthenic syndrome or botulism
5. Symptom-based presentations such as "pain in limb", weakness, disturbance of skin sensation or "paraesthesia" when appropriate pre-test evaluations are inconclusive and the clinical assessment unequivocally supports the need for the study
6. Radiculopathy-cervical, lumbosacral
7. Plexopathy-idiopathic, traumatic, inflammatory or infiltrative
8. Myopathy-including polymyositis and dermatomyositis, myotonic disorders, and congenital myopathies
9. Precise muscle location for injections such as botulinum toxin, phenol, etc.

### **Nerve Conduction Studies**

1. NCSs are performed to assess the integrity and diagnose diseases of the peripheral nervous system. Specifically, they assess action potentials resulting from peripheral nerve stimulation which are recordable over the nerve or from an innervated muscle, the speed (conduction velocity and/or latency), size (amplitude), and shape of the response. Pathological findings include conduction slowing, conduction block, or reduced response. Results of the NCS reflect on the integrity and function of: (I) the myelin sheath, and (II) the axon of a nerve. Interruption of axon and dysfunction of myelin will both affect NCS results. This portion of EDX evaluation is performed by the physician alone or by a trained allied health professional under direct supervision of a physician trained in electrodiagnostic medicine.
2. Motor, sensory, and mixed NCSs and late responses (F-wave and H-reflex studies) are frequently complementary and performed during the same patient evaluation.
3. Although 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 a muscle supplied by the motor nerve.
  - a. 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.
  - b. 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, configuration, and sensory conduction velocity.
  - c. 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 both sensory and motor conduction velocity.
  - d. NCSs performed with preconfigured electrode arrays (CPT code 95905) utilize anatomically specific electrodes to perform both motor and sensory nerve conduction testing. This service has

previously been reported using HCPCS code S3905 or CPT code 95999. Parenthetical CPT instructions direct 95905 to be reported once per limb, and not in conjunction with 95885, 95886, or 95907-95913. Devices that utilize preconfigured electrode arrays are highly automated and further addressed in the limitation section below.

4. NCS reports should document the nerves evaluated, the distance between the stimulation and recording sites, the conduction velocity, latency, and amplitude. The temperature of the studied limbs should be included. A final diagnosis, which, in some cases, may be a symptom diagnosis or a diagnosis of normal, is then made.
5. The CPT header for 95907-95913 clarifies: (1) The number of nerves tested should be the minimum necessary to address the clinical issue. Standardized screening tests are not equivalent to carefully designed NCSs and do not entail the same physician work. In almost all studies, testing will appropriately include evaluation of 1 or more nerves that have normal test results. (2) Waveforms must be reviewed on site. (3) Reports must be prepared on site.
6. The CPT descriptor language, codes 95907-95913 describe one or more nerve conduction studies. For the purposes of coding, a single conduction study is defined as a sensory conduction test, a motor conduction test with or without an F-wave test, or an H-reflex test. Each type of nerve conduction study is counted only once when multiple sites on the same nerve are stimulated or recorded. The number of these separate tests should be added to determine which code to use. For a list of nerves, refer to the List of Nerves in CPT Appendix J. Each line on the list of nerves refers to a different nerve and should be counted as an individual unit to determine the correct CPT code to be billed. It is inappropriate to count more than one unit for “inching” or studying the same nerve by moving the stimulating electrode closer to the recording electrode.

#### **Late Responses: H-Reflex and F-Wave Studies**

1. Late responses are performed to evaluate nerve conduction in more proximal portions of the nerve that are inaccessible to direct assessment using conventional techniques. Electrical stimulation is applied on the skin surface near a nerve site in a manner that sends impulses both proximally and distally. Characteristics of the response are assessed, including latency.
2. F-wave and H-reflex studies provide information in the evaluation of radiculopathies, plexopathies, polyneuropathies (especially with multifocal conduction block, Guillain-Barré syndrome or chronic inflammatory demyelinating polyneuropathy), and proximal mononeuropathies. In some cases, they may be the only abnormal study.
3. The physician’s report should identify the nerves evaluated and the F-wave and H-reflex characteristics, including latency.

#### **Needle Electromyography**

1. Needle EMG (CPT codes 95860-95870 and 95885-95887) is performed to exclude, diagnose, describe, and follow diseases of the peripheral nervous system. Needle EMG refers to the recording and study of electrical activity of skeletal muscle using a needle electrode. This portion of the EDX evaluation should always be performed by the physician.  
The needle electrode allows the muscle’s electrical characteristics at rest and during activation to be interpreted by the EDX physician. This interpretation includes analysis of oscilloscope tracings and the characteristic sounds produced by electrical potentials. Needle EMG studies are interpreted in real time, as they are being performed. The final interpretation of the study is a synthesis by the EDX physician of the patient’s history, physical examination, and the preceding and following portions of the study.
3. The muscles studied will vary depending upon the differential diagnosis and the ongoing synthesis of new information obtained by the EDX physician while the test is being performed. To report a needle EMG code of “complete” extremity, a minimum of 5 muscles innervated by 3 nerves (for example, radial, ulnar, median, tibial, peroneal, femoral, not sub branches) or 4 spinal levels must be evaluated.

4. Normal findings and abnormalities uncovered during the study are documented and interpreted. Needle EMG reports should document the muscles tested and report the presence and type of spontaneous activity, as well as the characteristics of the voluntary unit potentials. A final diagnosis, which, in some cases, may be a symptom diagnosis or a diagnosis of normal, is made.

## **Limitations**

### *Nerve Conduction Studies*

EDX testing with automated, noninvasive nerve conduction testing devices is considered investigational and not medically necessary for all indications, including as an alternative method of performing NCSs.

Screening testing for polyneuropathy of diabetes or end stage renal disease (ESRD) is NOT covered. Testing for the sole purpose of monitoring disease intensity or treatment efficacy in these two conditions is not covered.

Psychophysical measurements (electrical, vibratory or thermal perceptions), even though they may involve delivery of a stimulus, are not covered.

Current Perception Threshold/Sensory Nerve Conduction Threshold Test (sNCT) is investigational and not covered. This procedure is different and distinct from assessment of nerve conduction velocity, amplitude, and latency. It is also different from short-latency somatosensory evoked potentials (SSEPs). Codes designated for eliciting nerve conduction velocity, latency, or amplitude and those designed for SSEPs are not to be used for sNCT. sNCT has a unique G code, G0255. Effective on October 1, 2002, CMS initially concluded that there was insufficient scientific or clinical evidence to consider the sNCT test and the device used in performing this test reasonable and necessary within the meaning of section 1862(a)(1)(A) of the law. Therefore, sNCT was not covered. Based on a reconsideration [in March, 2004] of current Medicare policy for sNCT, CMS concluded that there continues to be insufficient scientific or clinical evidence to consider the sNCT test and the device used in performing this test as reasonable and necessary within the meaning of section 1862(a)(1)(A) of the law (CMS Publication 100-3, Medicare National Coverage Issues Manual, Chapter 1, Section 160.23).

Examination using portable hand-held devices, which are incapable of real-time wave-form display and analysis, will be included in the evaluation & management (E/M) service. They will not be paid separately.

### *Needle Electromyography*

Beginning in 2012, three new CPT codes (95885, 95886 and 95887) have been created to report EMG studies performed the same day as nerve conduction testing. Each of these codes should be reported in conjunction with CPT Codes 95907-95913. Codes 95885 and 95886 can be reported together up to a combined total of four units per patient when all four extremities are tested. None of these codes should be reported with 95860-95864, 95870 or 95905.

It is expected that providers will use CPT code 95870 for sampling muscles other than the paraspinals associated with extremities, which have been tested. This code should not be billed when the paraspinal muscles corresponding to an extremity are tested and when the extremity EMG code 95860, 95861, 95863, 95864, 95885 or 95886 is also billed. If nerve conduction studies are performed on the same day, CPT Code 95885 is used instead.

The necessity and reasonableness of the following uses of needle EMG studies have not been established:

1. exclusive testing of intrinsic foot muscles in the diagnosis of proximal lesions
2. definitive diagnostic conclusions based on paraspinal EMG in regions bearing scar of past surgeries (e.g., previous laminectomies)

3. pattern-setting limited limb muscle examinations, without paraspinal muscle testing for a diagnosis of radiculopathy
4. needle EMG testing shortly after trauma, before needle EMG abnormalities would have reasonable time to develop
5. surface and macro EMGs
6. multiple uses of needle EMG in the same patient at the same location for the purpose of optimizing botulinum toxin injections.

**Maximum Number of Tests Necessary in 90% of Cases**

Table 1, “Maximum Number of Studies,” summarizes the American Association of Neuromuscular & Electrodiagnostic’s (AANEM) recommendations regarding a reasonable maximum number of studies per diagnostic category necessary for a physician to arrive at a diagnosis in 90% of patients with that final diagnosis. Each number in the “Maximum Number of Studies Table” represents 1 study or unit. The table is designed as a tool to identify outlier trends and prevent abuse and overutilization. It is not an absolute maximum threshold and should not be used to automatically deny reimbursement over the maximum.

The maximum numbers, as shown in the table, are designed to apply to a diversity of practice styles, as well as practice types, including those at referral centers where more complex testing is frequently necessary. In simple and straightforward cases, fewer tests will be necessary. This is particularly true when results of the most critical tests are normal. In complex cases, the maximum numbers in the table will be insufficient for the physician to arrive at a complete diagnosis. In cases where there are borderline findings, additional tests may be required to determine if the findings are significant.

The appropriate number of studies to be performed should be left to the judgment of the physician performing the EDX evaluation; however, in the small number of cases which require testing in excess of the numbers listed in the table (the AANEM estimates 10% of cases), the physician should be able to provide supplementary documentation to justify the additional testing. Such documentation should explain what other differential diagnostic problems needed to be ruled out in that particular situation.

Multiple diagnoses will be established by EDX testing in about 25% of patients. When multiple diagnoses are identified, the recommendations listed in Table 1 for a single diagnostic category do not apply.

It should be noted that in some situations it is necessary to test an asymptomatic contralateral limb to establish normative values for an individual patient. Normal values based on the general population alone are less sensitive than this approach; therefore restrictions on contralateral asymptomatic limb testing will reduce the sensitivity of electrodiagnostic tests.

	<b>Limbs Studied by Needle Electromyography (95860-95864, 95867-95870, 95885-95887)</b>	<b>Nerve Conduction Studies (Total nerve studied, 95907-95913)</b>	<b>Neuromuscular Junction Testing (Repetitive Stimulation)</b>
<b>Indication</b>	<b>Number of Services (Tests)</b>	<b>Number of Services (Tests)</b>	<b>Number of Services (Tests)</b>
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	--

### Timing of Testing After an Injury

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 payors, 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:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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:

1. Two tests for carpal tunnel-unilateral, carpal tunnel-bilateral, radiculopathy, mononeuropathy, polyneuropathy, myopathy, and NMJ disorders.
2. Three tests for motor neuronopathy, plexopathy, acute inflammatory demyelinating polyneuropathy/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.

### **Minimum Standards**

1. EDX testing should be medically indicated and guided by a documented neuromuscular history and physical.
2. 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 under this policy.
3. The number of tests performed should be the minimum needed to establish an accurate diagnosis.
4. 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.
5. The needle EMG examination must be performed by a physician specially trained in electrodiagnostic medicine, as these tests are simultaneously performed and interpreted. The EDX laboratory must have the ability to perform needle EMG. NCS should not be performed without an EMG except in unique circumstances. Needle EMG and NCS should be performed together in the same EDX evaluation when possible.
6. 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.
7. 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.
8. All EDX laboratories must adhere to quality standards as laid out in the AANEM’s laboratory accreditation program. The only accreditation program that currently adheres to these guidelines is the AANEM.

### **References**

American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM). Recommended Policy for Electrodiagnostic Medicine

AANEM Position Statement. Proper Performance and Interpretation of Electrodiagnostic Studies

AANEM Position Statement. Who is Qualified to Practice Electrodiagnostic Medicine

AANEM Education Report. Reporting the Results of Needle EMG and Nerve Conduction Studies

AANEM Evidence-Based Review. Use of Surface Electromyography in the Diagnosis and Study of Neuromuscular Disorders. *Muscle & Nerve*. 38: 1219-24, 2008.

Brown, Elizabeth. An Evidence Based Technology Assessment of the NC-stat® Device. March 19, 2007

Hayes brief. Nc-stat System (NeuroMetrix Inc.) for Noninvasive Nerve Conduction Testing of Upper Extremity Neuropathy. February 27, 2007.

Lefevre, Frank. An evidence review of the diagnostic accuracy of automated nerve conduction studies compared to traditional nerve conduction studies. May 22, 2008.

Morse, Josh. NC-stat® System, NeuroMetrix® Inc. (Nerve Conduction Testing System) Technology Assessment. June 8, 2006.

<http://www.lni.wa.gov/ClaimsIns/Providers/Treatment/CovMedDev/SpecCovDec/NCstat.asp>

National Government Services. Nerve Conduction Studies (NCS)/Electromyography (EMG). L26869.

Other Medicare Contractor Local Coverage Determinations

Other Private Insurance Medical Coverage Policies

Approved by the American Association of Neuromuscular & Electrodiagnostic Medicine: February 2010.

Updated December 2011. Updated and re-approved January 2016.