

## WHO IS QUALIFIED TO PRACTICE ELECTRODIAGNOSTIC MEDICINE?

### Introduction

Electrodiagnostic (EDX) medicine is the medical subspecialty that applies neurophysiologic techniques to diagnose, evaluate, and treat patients with impairments of the nervous, neuromuscular, and/or muscular systems. The term EMG often has been used to mean the entire spectrum of electrodiagnostic tools to evaluate nerve and muscle diseases. Strictly speaking, however, EMG refers only to the needle or surface electrode examination of the bioelectric activity of muscles. The AANEM has developed this statement regarding who is qualified to practice EDX medicine to assist physicians and nonphysicians who are working with their local institution's credentialing committees, practice boards, or insurance companies on issues related to qualifications.

### Executive Summary

It is the position of the AANEM that EDX evaluations must be performed by physicians<sup>1-4</sup> who have comprehensive knowledge of neurological and musculoskeletal disorders to ensure accurate interpretation and diagnosis, and provide patients with quality care. The typical EDX evaluation involves: (1) a focused neuromuscular history and physical examination; (2) the development of a differential diagnosis; (3) the examination of muscles and nerves utilizing nerve conduction studies (NCSs) and needle electromyography (EMG); (4) the determination of a diagnosis; and (5) generation of a complete report. The standard of care in clinical practice dictates that each of these components cannot be predetermined or standardized.

The focused physical examination is directed by the individual patient's particular symptoms and clinical history. Based on the history and physical examination, the physician determines the differential diagnosis, identifies the nerves and muscles to be studied, and whether specialized studies such as repetitive nerve stimulation are required. Once a physician has determined the preliminary differential diagnosis, a technician may perform the NCS tests selected by the physician. It is the position of the AANEM that direct supervision by a physician, meaning that the physician is on site and immediately available, as defined by Medicare,<sup>4</sup> is the minimum standard recommended for all NCS testing.

The results of the initial NCSs are reviewed by the physician on site to ascertain whether additional NCSs are needed. NCSs

should be reviewed in real time as they are obtained, and the patient should remain in the examination room until the supervising physician has reviewed the NCS results. Following the performance of NCSs, the needle EMG examination is formulated and conducted based on the history, physical examination, and NCS data.

The EDX physician's performance of needle EMG requires ongoing assessment during the study of each muscle to ascertain what type of abnormalities exist (if any); the significance of the abnormalities; and, based on the results, which other muscles, if any, must be examined. The physician's decision to perform additional or special EDX studies is directly guided by the individual results obtained as the physician seeks to establish evidence of a particular medical diagnosis through the studies performed. Much of the data used to make a final diagnosis is obtained through observations made during performance of the needle EMG examination. Except in unique circumstances, all EDX testing of a single patient should be performed on the same day by the same EDX physician to ensure continuity, consistency, and to provide the best patient care.<sup>7</sup>

It is the opinion of the AANEM that state laws and regulations should define needle EMG as the practice of medicine to ensure patients undergoing these evaluations receive quality care.

### Recommended Qualifications to Practice Electrodiagnostic Medicine

Proficiency in EDX medicine requires adequate knowledge in anatomy of the peripheral, cranial, and trunk musculature, and of the peripheral and central nervous systems; the physiology of muscle and the peripheral and central nervous systems; the pathology and pathophysiology in neuromuscular disorders; the clinical aspects of neurologic, neuromuscular, autonomic, and musculoskeletal disorders, including their diagnosis and treatment; electrophysiology, i.e., applied electronics, instrumentation, NCS, EMG, neuromuscular junction testing, autonomic testing; and the epidemiology of infectious disease. It is, therefore, the AANEM's position that EDX evaluations should be performed by a physician (specifically a neurologist or physiatrist) who has had special training in the diagnosis and treatment of neuromuscular diseases and in the application of particular neurophysiologic techniques to the study of these disorders. This type of training is included in the residency or fellowship programs of physicians who specialize in physical medicine and rehabilitation (physiatrists) or neurology

(neurologists).

The knowledge and expertise gained from such specialized medical training maximizes the ability of the physician to consider appropriate differential medical diagnoses dependent upon the initial definition of the particular patient's clinical problem. This training also allows the physician to use preliminary data collected from the patient's history and physical examination in planning the course of the EDX examination. Additionally, this knowledge and expertise enables the physician to assist referring physicians in particularly complex diagnostic situations.

The EDX evaluation is a physician's assessment of a patient to establish an accurate diagnosis of a presenting clinical problem that suggests a neuromuscular disorder. Except in unique circumstances, interpretation of any portion of the EDX data alone, absent face-to-face patient interaction and control over the process, is substandard care. The physician establishes the diagnosis after performing a focused history, review of the symptoms and physical examination, and electrophysiologic evaluation of selected functions of the central nervous system, nerve roots, peripheral nerves, neuromuscular junction, and muscles. When an accurate diagnosis has been made and shared with the referring physician, the referring physician is able to develop the best treatment plan possible.

The EDX evaluation is an extension of the neurologic portion of the physical examination and requires detailed knowledge of the patient and their disease. Unlike many laboratory tests, EDX testing is not performed in a standard fashion, but must be specifically designed for each individual patient. In addition, it is often necessary to modify or add to the procedure during the examination, depending on the findings, which results in appropriate data being collected and proper conclusions being drawn.

Collection of the clinical and electrophysiologic data should be entirely under the supervision of the EDX physician. The physician may collect all of the data directly from the patient or may delegate collection of some data to a specifically trained nonphysician or physician in a residency or fellowship training program. Training of nonphysician personnel who perform NCSs is the ongoing responsibility of the supervising physician. Physicians in a residency or fellowship program require close supervision during the actual testing and careful review of the report of the findings before it is sent to the referring healthcare professional. Data collection is achieved by a variety of procedures, including motor and sensory nerve conduction latency and velocity studies, invasive needle or surface electrode EMG, repetitive nerve stimulation studies, reflex latency measurements, measurements utilizing electronic averaging of evoked potentials, exercise tests, and evaluation of autonomic nervous system functions. Many of these tests also are used to monitor nerve and muscle function during surgical procedures.

Determining appropriate delegation of any portion of these EDX studies should be at the discretion of the EDX physician,

but only physicians should perform any portion of the examination which requires needle insertion (needle electromyography or EMG). This AANEM position regarding needle EMG is similar to that of the American Medical Association,<sup>1</sup> American Academy of Neurology, American Academy of Physical Medicine and Rehabilitation, American Neurological Association, Department of Veterans Affairs (Veterans Administration),<sup>3</sup> and many state medical examining boards. A court decision also has upheld this principle.<sup>4</sup> In addition to the determination of further EDX studies that are necessary, the physician may also determine other studies needed such as ultrasound, biopsy, or genetic testing.

Needle electrode insertion requires a detailed knowledge of anatomy and carries a small but finite risk of injury to anatomic structures (nerves, arteries) that can only be reliably identified by a physician. Appropriate precautions also must be taken to avoid transmitting infectious diseases, such as hepatitis, Creutzfeldt-Jakob disease, or human immunodeficiency virus (HIV) disease. Furthermore, some patients have additional risk factors that require testing by a physician knowledgeable in the recognition and management of those problems. Such patients include those who require examination near major blood vessels or the abdomen or lung, are on anticoagulants, have undergone recent cardiac surgery for valve replacement, or have pacemakers, bleeding disorders, or indwelling central venous or arterial lines.

Interpretation of electrophysiologic data and integration with other clinical data in making a diagnosis are carried out by the EDX physician based on their training, knowledge, and experience. Problems are more likely to be misdiagnosed or missed completely if NCSs are performed without EMG and/or if a physician without the proper skill and training is interpreting the data, making a diagnosis, and/or establishing a treatment plan. Research supports that physiatrists and neurologists are much more likely to identify several neuromuscular conditions, such as polyneuropathy, lumbosacral radiculopathy, and carpal tunnel syndrome, than other providers.<sup>6</sup> Significant concordance exists in neurologists and physiatrists rates of identification of such disorders, and the extent of testing, whereas other providers such as chiropractors, physical therapists, and podiatrist had striking variation in both the scope of testing and rates of identification.<sup>5</sup>

Improper performance or interpretation of the EDX examination may be detrimental to patient care and misleading to the referring physician.<sup>7</sup> For example, the exact site and type of a surgical operation performed on a patient may be determined in part by findings of disease discovered during the course of the EDX examination. Therefore, the EDX physician's knowledge of diseases and their clinical electrophysiologic manifestations is needed to interpret such results properly.

Training should include the basic sciences pertinent to the understanding of these diseases, as well as additional special knowledge of electrophysiologic techniques. The AANEM has established recommended educational guidelines for EDX

training programs. The detailed guidelines can be obtained at [www.aanem.org/Education.aspx](http://www.aanem.org/Education.aspx). The recommended educational requirements for the EDX physician include:

1. A residency in neurology or physical medicine and rehabilitation, accredited by the Accreditation Council for Graduate Medical Education or Royal College of Physicians and Surgeons of Canada.
2. A period of preceptorship in EDX medicine under direct supervision of an experienced EDX physician.
3. The preceptorship should be at least 6 months full-time or equivalent. The first 3 months should be rigidly structured and supervised. At least 200 complete EDX evaluations should be performed on separate occasions during the 6 months; these studies should be of different complexity levels (straightforward, moderate and high complexity), documented and interpreted, and include exposure to neuromuscular disorders in adults and children, such as neuropathies, myopathies, radiculopathies, neuromuscular junction disorders, spinal cord, and brain disorders. It is recommended that the laboratory be in an institution that has an approved residency training program in neurology and/or physical medicine and rehabilitation. The EDX training should include adequate educational experience in:

- anatomy,
- pathology of muscle and nerve,
- neuromuscular physiology,
- electrophysiology – including instrumentation, quantification, and statistical analysis, and
- clinical aspects of neurological and musculoskeletal conditions with particular emphasis on diagnosis and treatment of neuromuscular diseases as they pertain to clinical EDX medicine.

Full competency in EDX medicine can be achieved only with at least 1 more year of experience following training, during which the physician must perform an additional 200 complete EDX evaluations on separate occasions. This period of independent experience must begin after completion of both the approved graduate medical education program and the preceptorship. The year of independent experience may be part of a post-residency program when the candidate is given primary responsibility for the EDX evaluation, interpretation of the results, and preparation of the reports.

An annual examination is given by the American Board of Electrodiagnostic Medicine (ABEM), through which candidates may assess their level of competence. The ABEM is an independent credentialing body established by the AANEM. Certification in electrodiagnostic medicine by an examining board, such as the ABEM, is recommended by AANEM to establish competency in EDX medicine. More information about ABEM can be found at [www.abemexam.org](http://www.abemexam.org).

The AANEM has an EDX Laboratory Accreditation Program. It is a voluntary, peer review process that reviews the laboratory's personnel, facility, and reports to assure quality standards are met or exceeded. Accreditation provides laboratories specializing in EDX medicine with a structured mechanism to assess, evaluate, and improve the quality of care provided to their patients. A list of accredited laboratories can be found at [www.aanem.org/Accreditation.aspx](http://www.aanem.org/Accreditation.aspx).

Additional information about EDX medicine can be found on the AANEM's website at [www.aanem.org](http://www.aanem.org).

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**Endorsed by the American Academy of Physical Medicine & Rehabilitation: December 2019.**

## References

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2. Veterans' Administration. Professional Services Letter: Professional Qualifications for Performing Electromyographic Examinations IL-11-80-1, January 4, 1980.
3. Selective Insurance Co. v. Rothman 414 N.J. Super. 331 (App. Div 2010); affirmed by Supreme Court of New Jersey – January 18, 2012; Caniglia v. New Jersey State Board of Medical Examiners No. A-3435-74 (Superior Court of New Jersey, Appellate Division - June 17, 1976, Unpublished Opinion).
4. CMS Manual Pub 100-02 Medicare Benefit Policy. Dec. 31, 2020. <https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R169BP.pdf>. Accessed 12/14/23.
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6. AANEM. Quality Electrodiagnostic Medicine Controls Costs.
7. AANEM. Common Indicators Suggesting Fraud & Abuse in Electrodiagnostic Medicine.

### Disclaimer:

Institutions should define their own criteria for granting clinical privileges; these criteria may include completion of a residency program, specialized course work, or specialty subcertification. Current policies of the American Medical Association and the Joint Commission on Accreditation of Healthcare Organizations state that delineation of clinical privileges be determined based on the individual's competence.

To determine what official legal, governmental, or private criteria govern the practice of EDX medicine in specific circumstances, individuals should contact their own state's Attorney General, practice board(s), or other appropriate authorities.