

TECHNOLOGIST PERFORMANCE OF NERVE CONDUCTION STUDIES, SOMATOSENSORY EVOKED POTENTIALS, AND NEUROMUSCULAR ULTRASOUND UNDER DIRECT EDX PHYSICIAN SUPERVISION

The electrodiagnostic (EDX) medicine examination is an extension of the neurologic portion of the physical examination and requires detailed knowledge of the patient and his or her disease. Nerve conduction studies (NCS) and somatosensory evoked potentials (SEP), and neuromuscular ultrasound (NMUS) are types of EDX testing. Unlike many laboratory studies, EDX testing is not standardized and must be individualized for each patient. Testing protocols frequently require modification during the examination based on evolving findings to ensure accurate data collection and diagnostic interpretation.

Collection of the clinical, electrophysiologic, and imaging data should be entirely under the supervision of the EDX physician. The physician may collect all data directly from the patient or may delegate collection of some data to a specifically trained technologist. Data collection may also be delegated to a physician in a residency training program related to neurology or physical medicine and rehabilitation or fellowship related to EDX and/or neuromuscular medicine. In the case of NCS, SEP, and NMUS, the EDX physician may be absent from the room when the procedure is performed but should be immediately available. Once the physician has determined the preliminary differential diagnosis based on the patient's history and examination, a technologist may perform the NCS, SEP, and/or NMUS tests selected by the physician. The physician should be alerted immediately during any testing if the results appear to be unusual or unexpected, so opportunity exists to reassess the differential diagnosis and develop alternative testing strategies. Experienced EDX physicians will on occasion determine that only a NCS is required, but this is a minority of studies performed. To accurately diagnose many neuromuscular disorders, NCS, EMG, and NMUS are often complementary and may all be required. The patient should remain in the room until the supervising EDX physician has reviewed NCS, diagnostic SEP, and NMUS results. SEPs are also frequently performed for preoperative baselines or prognosis after neurologic injury; those results can be reviewed by the physician later.

NMUS is an operator-dependent modality requiring individualization of protocol based on the clinical differential diagnosis, consistent with NCS and SEP testing. Although NMUS image data is stored digitally and may be reviewed asynchronously, image acquisition itself remains highly operator dependent and therefore requires the same level of physician oversight applied to other EDX studies. Given the highly operator-dependent nature of NMUS image acquisition, storage of cine/video image clips, when feasible, is recommended to improve characterization and communication of ultrasound findings for physician interpretation. Unlike static still images, dynamic cine clips better capture changes in probe orientation, anisotropy, surrounding anatomic context, and accurate identification and measurement of nerve size, all of which may substantially influence diagnostic interpretation and are often difficult to fully appreciate from isolated static images alone. The complexity of NMUS image acquisition varies substantially by anatomic target and clinical indication. Ultrasound evaluation of commonly assessed superficial nerves, such as the median or ulnar nerves, may be more readily performed by appropriately trained technologists, whereas imaging of deeper, smaller, less accessible, or anatomically variable structures, including the brachial plexus, may require a greater degree of direct physician involvement and supervision depending on the technologist's demonstrated competency and experience. The interpreting physician must review all acquired images and provide a written interpretation integrated with the clinical and electrophysiologic findings. Technologist performance of NMUS is limited to diagnostic image acquisition under direct physician supervision; procedural applications of ultrasound, including nerve blocks and other interventional uses, are outside the scope of this statement.

Medicare defines appropriate supervision levels for diagnostic tests rendered by nonphysicians. General supervision means "the procedure is furnished under the physician's overall direction and control, but the

physician's presence is not required during the performance of the procedure. Under general supervision, the training of the nonphysician personnel who actually performs the diagnostic procedure and the maintenance of the necessary equipment and supplies are the continuing responsibility of the physician." Direct supervision in the office setting means "the physician must be present in the office suite and immediately available to furnish assistance and direction throughout the performance of the procedure. It does not mean that the physician must be present in the room when the procedure is performed" unless otherwise required by state law.

Medicare regulations mandate that a physician must provide a minimum of general supervision over certified technologists throughout the performance of NCS, SEP, and/or NMUS testing. A physician must provide a minimum of direct supervision over uncertified technologists throughout the performance of NCS, SEP, and/or NMUS testing. While Medicare allows for general supervision in some situations, it is the position of the AANEM that direct supervision, as defined by Medicare, is recommended for all NCS, SEP, and/or NMUS testing performed by technologists.

For SEP testing performed intraoperatively for monitoring purposes, a physician may provide general or direct supervision as appropriate or supervise a technologist who is continuously present in the operating room from a remote site with online, real-time contact.

It is the position of the AANEM that technologists should be certified by one of the following:

- (1) American Board of Electrodiagnostic Medicine; or
- (2) American Board of Registration of Electroencephalographic and Evoked Potential Technologists, Inc.; or
- (3) American Board of Neurophysiologic Monitoring.

Prior to performing NMUS under direct physician supervision, a technologist must undergo structured hands-on training under the direct instruction of a physician with appropriate training and expertise in neuromuscular ultrasound. The supervising physician must evaluate the technologist's image acquisition skills across the relevant anatomic targets and formally deem the technologist competent prior to allowing independent image acquisition under direct supervision. Documentation of training and attestation of competency by the supervising physician is recommended. It is the position of the AANEM that formal competency assessment, rather than a specific credentialing examination, is currently the appropriate standard for technologist qualification in NMUS, given the evolving nature of training pathways in this area.

The AANEM encourages the development of formalized NMUS training pathways for EDX technologists and supports the establishment of standardized competency benchmarks appropriate to the neuromuscular context.

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