Scope of Practice for Electroneurodiagnostic Technology

6501 East Commerce Avenue, Suite 120
Kansas City, MO 64120
816.931.1120 phone; 816.931.1145 fax; www.aset.org

The Electroneurodiagnostic (END) Technologist is a multi-skilled allied health professional who performs diagnostic testing procedures including, but not limited to, electroencephalograms (EEG), evoked potentials (EP), polysomnograms (PSG), nerve conduction studies (NCS) and electronystagmograms (ENG).

The END Technologist works under the supervision of a physician who is responsible for interpretation and clinical correlation of the results. This physician is not usually physically present during the procedures and so the technologist must be able to analyze data during the recording, making certain that the information being obtained is valid and interpretable. A relevant patient history obtained by the technologist guides to some degree how the test will be conducted, therefore, he/she must be knowledgeable in clinical neurology.

The preferred method of entering the field of END technology is through formal training programs, accredited by the Commission on Accreditation of Allied Health Education Programs [CAAHEP]. [Refer to the school listing at www.aset.org.] Any individual entering the END profession must have earned an associate degree or higher and have successfully completed a program reviewed by the Joint Review Committee on Education in Electroneurodiagnostic Technology and accredited by the Commission on Accreditation of Allied Health Education Programs. Within two years of graduation, individuals are strongly encouraged to take and pass a recognized, national examination for professional credentials in an area of electroneurodiagnostic specialty.

Some states require licensure and professional credentials [RPSGT] to perform sleep studies, while other states exempt credentialed technologists. In addition, efforts are underway in several states to require licensure. It is important to understand the legal requirements within each state. For more information, contact ASET or view current legislative activity at www.aset.org.

National board examinations are available in EEG, evoked potentials, intraoperative monitoring, polysomnography, and nerve conduction studies. The board examinations for EEG, evoked potentials and nerve conduction include a clinical performance evaluation. The professional credentials awarded for successful completion of the national examinations are: R. EEG T. for electroencephalography; R. EP T. for evoked potentials; RPSGT for polysomnography; R. NCS T. for nerve conduction; and CNIM for intraoperative monitoring. Successful completion of national board examinations is recommended for all technologists who are not directly supervised by the physical presence of a credentialed technologist or physician.

Professional credentials may be required for some procedures, including intraoperative monitoring, data reduction of long-term monitoring and recordings for electrocerebral silence. As of July 1, 1998, the Centers for Medicare and Medicaid requires professional credentials for technologists who are independent contractors, under the definition of an Independent Diagnostic Testing Facilities (IDTFs), and who seek direct reimbursement from Medicare for performing certain END procedures.

Training of at least one year duration must include classroom and textbook instruction as well as extensive hands-on experience in the clinical laboratory. The curriculum should include general anatomy, physiology and medicine (with special emphasis on neuroanatomy, neurophysiology and clinical neurology), basic electronics, normal and abnormal waveform identification, maturation of the nervous system (structural and electrophysiological), artifact recognition, montage design, characteristics of sleep patterns and cardio-pulmonary crisis recognition.

The clinical laboratory experience should occur under the direct supervision of a registered technologist who

gives the trainee opportunities to become proficient in electrode application, patient handling, trouble-shooting, artifact elimination, and equipment maintenance. Clinical experiences should expose the student to a variety of ages and medical disorders. Record review sessions with the supervising technologist and the interpreting physician are necessary so that the trainee can discuss, evaluate and learn from the tests performed.

The END technologist must also have basic computer skills in that much of the diagnostic equipment in laboratories utilizes menu driven programs and data is stored in digitized form.

The END technologist works in a variety of settings including: hospital neurodiagnostic departments, out-patient clinics, physician offices or research facilities. Studies may be performed in a laboratory, emergency room, operating room, intensive care unit, special monitoring units or at the patient's bedside.

The END technologist is responsible for: explaining the test procedure to the patient, applying all recording, monitoring and stimulating electrodes, recognizing and eliminating artifact, calibrating all equipment used and troubleshooting and correcting malfunctions, selecting appropriate amplifier settings and obtaining quality data. The technologist is capable of providing technical descriptions of studies. He/she must be able to work independently and make on-line decisions regarding data collection.

The END technologist must be trained in CPR techniques, knowledgeable of END best practices, current infection control and patient safety guidelines.

END technologists can be cross trained to perform other medical diagnostic studies included but not limited to transcranial and carotid doppler, electrocardiograms (ECGs) stress tests and thermography. Because of their extensive experience in electrode application and bioelectric recording techniques, they are easily trained in biofeedback evaluations and therapy.

Electroencephalograms [EEGs]

EEGs are conducted following the clinical practice guidelines written by the American Clinical Neurophysiology Society (formerly the American EEG Society) and included in their publication, "Guidelines in Electroencephalography, Evoked Potentials and Polysomnography: Revised 2004."

The EEG Technologist is able to insert nasopharyngeal electrodes and assist in the placement of sphenoidal leads.

EEG activity may be monitored and correlated with behavioral activity over prolonged periods of time for the evaluation of complicated seizure disorders (LTME--Long Term Monitoring for Epilepsy). Technologists who work in these LTME units must be highly skilled in pattern recognition and artifact detection and must have additional abilities in videography, data re-formatting, and computer networking. They are responsible for identifying critical segments out of many hours of data and providing a condensed and organized version of significant events to the interpreting physician.

When EEG is collected in an ambulatory setting with data recorded onto tape cassettes, a technologist scans the one to several days of data both visually and aurally. The technologist selects portions of the data based on what is seen and heard and also on subjective reports by the patient or caregiver. This condensed data is then passed on to the electroencephalographer for clinical interpretation.

EEG may be recorded digitally and displayed in a topographical mapping format. Electrodes must be precisely applied and extra attention paid to artifact recognition and elimination. The technologist not only controls the recording session, but is usually responsible for extracting artifact free samples for detailed analysis after the data is collected.

When EEG is performed intraoperatively, the technologist provides the physician/interpreter descriptive

information regarding changes that occur in relation to surgical or anesthetic manipulations. When EEG is recorded from an exposed brain, the technologist must work directly with a physician who interprets data

on-line for the surgeon.

Intraoperative recording of EEG is conducted in accordance with the American Society of Electroneurodiagnostic Technologists', "Guidelines for Intraoperative Recording of EEG, 1998.

Evoked Potentials [EPs]

Evoked potentials examine auditory, visual, somatosensory, and motor pathways. Auditory testing includes brainstem evoked potentials (BAEP), brainstem audiometry (including infant hearing screening), and intra-canalicular electrocochleography (E.Coch.G.). Visual testing includes flash and patterned evoked potentials and electroretinography (ERG). Somatosensory evoked potentials involves testing of cranial and peripheral nerves and dermatomes. Motor evoked potentials (MEP) are obtained by magnetic, electrical or mechanical stimulation and recording neural-motor potentials (NMEP) or evoked electromyographic potentials (EMG) using established recording techniques.

Evoked potential recordings are conducted in accordance with practice guidelines written by the American Clinical Neurophysiology Society (formerly the American EEG Society), and included in their publication, "Guidelines in Electroencephalography, Evoked Potentials, and Polysomnography:" Revised 2004.

EPs are actually derived data and, therefore, are very dependent on the skill level and on-line judgement of the recording technologist. The data presented for interpretation is a product of how it was derived, requiring the technologist to pay extra attention to electrode application, patient cooperation, amplifier settings, and the reduction of artifact.

When EPs are performed during surgical procedures the END technologist works as part of a monitoring team under the supervision of a physician/neurophysiologist who is responsible for interpreting the data.. The technologist is responsible for applying electrodes, operating the equipment, trouble shooting artifacts, documenting anesthetic, blood pressure and temperature changes, and at regular intervals providing descriptive reports to the surgeon and/or interpreting physician. When the physician/interpreter is not physically present during the surgical procedure, the technologist must be credentialed through ABRET.

Intraoperative recording of evoked potentials is conducted in accordance with guidelines written by the American Clinical Neurophysiology Society (formerly the American EEG Society) and included in their publication, "Guidelines in Electroencephalography, Evoked Potentials, and Polysomnography: Revised 2004".

Nerve Conduction Studies [NCSs]

An END technologist performs nerve conduction studies under the supervision of a physician trained in electrodiagnostic medicine (usually a neurologist or physiatrist).

The technologist measures limb temperature and warms the limb if necessary, applies recording and stimulating electrodes, stimulates the nerve at appropriate sites, records the waveforms, calculates nerve conduction velocities and amplitudes, and prepares the data for interpretation by the physician.

The technologist may assist the physician with needle EMG studies.

Nerve conduction studies may be performed intraoperatively during procedures where there is risk of peripheral nerve damage. The END technologist at these times works under the supervision of a physician/neurophysiologist who interprets the data.

Testing protocols are established by the laboratory's medical and technical directors. The END technologist may deviate from standard protocols during the study if warranted by the patient's clinical history or by peculiarities of the testing procedure.

Polysomnograms [PSGs]

END technologists perform diagnostic sleep tests according to practice guidelines established by the American

Clinical Neurophysiology Society (formerly the American EEG Society) and included in their publication, "Guidelines for Electroencephalography, Evoked Potentials, and Polysomnography"; 1994.

The PSG technologist customizes the recording session to the patient's clinical history. The technologist must be able to recognize and evaluate changes in EEG, heart rhythms, submental EMG, eye movements, limb myoclonus, oxygen and carbon dioxide levels, air flow, respiratory effort, intrathoracic pressure values, esophageal pH, and, in some cases, penile tumescence.

The PSG technologist performs therapeutic titration of nasal continuous positive airway pressure (NCPAP). NCPAP is required to maintain a patent airway in individuals with sleep apnea. Additionally, the PSG technologist is responsible for determining if SaO2 levels are below minimally accepted standards, initiating NCPAP, and titrating O2 for improvement of SaO2. The technologist is knowledgeable of the problems associated with NCPAP and O2 in patients with chronic obstructive pulmonary disease (COPD), making appropriate changes to prevent alveolar hypoventilation.

The PSG technologist must possess cardiac monitoring skills to assess ECG patterns for the presence of potentially life threatening heart rhythms and must be certified in basic life support.

In addition to preparing the patient for recording and monitoring the entire procedure, the technologist is also responsible for presenting a detailed technical description of the data to the interpreting physician. This report includes identification of EEG and ECG patterns, limb movements, blood oxygen levels, respiratory activity, artifacts and quantification of time spent in each stage of sleep.

Because the PSG technologist often works through the night, there is usually not supervisory staff available for consultation if problems arise. Therefore, this technologist must be extremely knowledgeable in pulmonary, cardiac and neurological aspects of their patients' diseases, capable of troubleshooting any technical problems that arise, and able to handle medical emergencies.

Electronystagmograms [ENG[

The ENG technologist performs a battery of tests which include saccade, gaze, tracking, optokinetic, dix hallpike maneuver, positional, and bithermal caloric tests.

A thorough history must be obtained from the patient to determine which tests in the battery are appropriate for a particular patient. In addition, the order the tests are performed and how many of the tests are performed may also be dependent on results obtained as the testing proceeds. For this reason, the technologist must be able to analyze the results on line in order to proceed appropriately.

The technologist examines the external auditory canals of both ears with an otoscope to be sure that the tympanic membranes are intact and not perforated or infected and that there is no excess cerumen.

The technologist either applies surface electrodes around the patient's eyes or fits the patient with infrared recording goggles to measure vertical and horizontal eye movements. The technologist measures nystagmus and calculates caloric responses.

Since training standards for ENG currently do not exist, the technologist works under close supervision of the interpreting physician.