NATIONAL COMPETENCY SKILL STANDARDS FOR PERFORMING ICU/cEEG MONITORING

ICU/cEEG providers practice in accordance with the facility policy and procedure manual which details every aspect and type of recording.

The American Society of Electroneurodiagnostic Technologists, Inc. presents this document to provide national criteria for evaluating competencies for performing studies associated with continuous EEG monitoring in Intensive Care Units (ICU/cEEG). These national competencies were established following analysis of survey data collected July, 2007 through March, 2008. The tabulation was completed by the ASET executive office and the ICU/cEEG task force, according to the standards set by the Professional Testing Corporation, New York, NY. The ASET Board of Trustees first approved this document in July 2008. The document was revised for consistency in terminology with the new Scope of Practice and approved by the ASET Board of Trustees in April 2011.

In addition to advanced EEG knowledge and technical performance, quality patient care and patient/staff interaction were considered. The technical components include those defined in ASET's published competency criteria documents: *National Competency Skill Standards for Performing an Electroencephalogram* and *National Competency Skill Standards for Long-Term Monitoring in Epilepsy*.

SECTION I: ICU/cEEG MONITORING CORE KNOWLEDGE

The ICU/cEEG Technologist has attained the advanced level of technical knowledge and skills as well as the cognitive ability necessary to interact with the critical care patient and staff to ensure a high quality ICU/cEEG recording that provides reliable information about the continuous electrophysiology of the brain.

Technical Skills and Other Abilities:

The ICU/cEEG technologist:

- Follows American Clinical Neurophysiology Society (ACNS) International 10–20 System guidelines for head measurement and electrode application
- Selects electrode application method appropriate to the patient's clinical condition and monitoring paradigm
- Is highly skilled in EEG pattern recognition and can provide a technical description to the electroencephalographer, physicians, and nursing staff caring for the patient
- Possesses skills and cognitive abilities in videography
- Possesses knowledge and skills in EEG data reformatting and reduction techniques
- Understands computer operations and networking, when applicable, sufficient to do basic troubleshooting/report to information technology support services
- Is able to work quickly and proficiently under stressful conditions
- Is knowledgeable of the criteria for medically induced coma

- Is certified in CPR and follows facility policy and procedures for respiratory or cardiopulmonary crisis
- Follows facility policy and procedures for infection control including sterile techniques relevant to the patient and equipment
- Follows facility policy and procedures for safety procedures, patient isolation, and sedation

The ICU/cEEG technologist comprehends:

- Principles of critical care monitoring and relevant clinical application as reflected in current literature
- Medical terminology and accepted abbreviations in ICU/cEEG
- Electronic concepts relative to ICU/cEEG equipment and patient safety
- Functional neuroanatomy and neurophysiology relevant to critical care monitoring
- Anatomical correlation of EEG waveforms
- Electrophysiologic correlates of clinical conditions found in critical care patients such as: convulsive and nonconvulsive seizures, altered levels of consciousness, coma, sedation titration, vasospasm, intracerebral hemorrhage and encephalopathy
- The utility of current medications used in critical care; their clinical and electrophysiologic effects
- The clinical value and application of additional neurodiagnostic procedures performed on critical care patients, i.e., evoked potential studies, (EPs), transcranial motor evoked potentials (TCMEPs), transcranial Doppler studies (TCDs), and ambulatory EEG (AEEG)

The ICU/cEEG technologist recognizes indications for ICU/cEEG:

- Monitoring the patient's current electrophysiologic status and evolution
- Diagnosis of seizures and status epilepticus, cerebral ischemia, hemorrhage, or encephalopathy
- Levels of coma (burst suppression)
- Quantification of seizures
- Localization of EEG abnormalities

The ICU/cEEG technologist is knowledgeable about ICU/cEEG recording and networking options:

- Additional scalp electrodes
- Options for recording, i.e., live EEG data and trending screens
- Use of remote monitoring networking capabilities within the facility, if relevant
- Use of remote monitoring networking capabilities outside the facility, if relevant

The ICU/cEEG technologist understands details of ICU/cEEG instrumentation:

- Types of recording and storage media
- Concepts of digital recording including appropriate sampling rates, aliasing, Nyquist frequency, sampling skew, amplitude resolution and horizontal resolution (analysis time), digital video specifications
- Effects of recording parameters (filters, gain/sensitivity) on EEG waveforms
- Electrical safety issues of equipment

The ICU/cEEG technologist is skilled in overseeing the operation of ICU/cEEG monitoring daily tasks including:

Procedure assessment confirmation

- Correct patient identification, room, and equipment used
- Skin integrity at electrode site
- Electrode attachment security
- Appropriate electrode impedance measurements
- Appropriate recording parameters and bedside waveform display, including trending

Documentation

- Electrode placement, including additional electrodes placed
- Diagram update of skull defects, surgical sites, edema , intracranial pressure, monitor location, etc
- Any skin breakdown, according to facility policy and procedure
- System malfunction and corrective measures taken
- Medication/dosage changes
- Most recent neuroassessment and clinical changes
- Convulsive or nonconvulsive seizure/event, time, and date
- Monitoring (shift) report summarizing number of events, types of events, precautions necessary, additional procedures ordered and any other relevant information which is available for review by staff caring for the patient
- cEEG analysis and technical description

Data Review/analysis

- Reviews patient's daily chart notes
- Periodic trending analysis and/or data review per facility policy and procedures
- Selects cEEG data for physician review, interpretation and clinical correlation
- Identifies and accurately describes the chronology of clinical correlates during an event
- Selects 2 to 3 minutes of baseline recording before and after an event
- Transfers data between local and network drives from acquisition to review station for data review and permanent storage

Communication

- Periodic update to attending physicians and nursing staff per facility policy and procedures
- Periodic data analysis update to the electroencephalographer regarding cEEG and patient clinical condition per facility policy and procedures
- Obtains updates from patient, family and/or nursing staff regarding changes in patient's level of consciousness and clinical behavior per facility policy and procedures
- Alerts ICU team to the occurrence of nonconvulsive and/or convulsive seizure activity recorded during the monitoring period reviewed per facility policy and procedures
- Reports critical test results* to the interpreting physician, nursing staff, and/or supervisor and documents this communication according to facility policy and procedures.

RECOMMENDATIONS:

- Successful completion of national board examinations (ABRET) in electroencephalography (R. EEG T.) and certification in long term monitoring (CLTM)
- Knowledge of procedures unique to critical care monitoring
- Specific training on equipment for critical care EEG recording

The ICU/cEEG technologist maintains and improves knowledge and skills by:

- Reviewing cEEG monitoring recordings with the electroencephalographer
- Reading journal articles
- Attending didactic continuing education courses in clinical neurophysiology and electroencephalography
- Studying textbooks related to the specialty of ICU/cEEG monitoring
- Participating in ICU "rounds," in-services and department conferences on ICU/cEEG monitoring
- Completing online courses
- Participating in quality assurance/improvement activities and reviews
- Achieving LTM certification and meeting recertification requirements

SECTION II- ICU/cEEG MONITORING PROCEDURE

The ICU/cEEG technologist ensures the integrity of cEEG equipment and supplies:

- Electrodes and other supplies and equipment that have direct patient contact are cleaned and disinfected according to facility policy and procedures
- Calibration of EEG and all ancillary recording instruments according to ACNS guidelines, per facility policy and procedures
- Equipment safety evaluation according to facility policy and procedures
- Audio/video equipment are functioning properly
- Maintains individual logs on equipment malfunctions, per facility policy and procedure
- Confirms adequate storage space on recording instruments, servers, or other data storage devices to record a minimum of 24 hours of continuous data
- Confirms computer connectivity

The ICU/cEEG technologist acquires information and evaluates the patient prior to the procedure by:

- Reviewing patient's medical records
- Interviewing patient and family as appropriate
- Communicating with physicians and nursing staff caring for the patient
- Collaborating with the electroencephalographer
- Viewing previously recorded neurodiagnostic data
- Determining and accommodating the patient's age-specific needs
- Determining and accommodating the patient's needs specific to level of alertness and physical limitations
- Providing appropriate patient/family/staff education regarding the procedure and expectations of the monitoring process

The ICU/cEEG technologist prepares an initial patient data sheet that includes:

- Patient demographic information (name, age, ID number, referring MD, etc.)
- Procedure information: number, recording time, date, technologist's initials
- Significant relevant medical history and clinical findings specific to procedure

- Patient's neuroassessment baseline state and level of consciousness
- All patient medications
- Baseline ICU monitoring values: ICP, blood pressure, heart rate, ventilation
- Results of studies relevant to cEEG (MRI, CT, SPECT, angiogram, other neurodiagnostic studies)

The ICU/cEEG technologist ensures a method of electrode application that includes:

- Applying full or modified 10–20 System electrode placement according to facility policy and procedures
- Following facility policy and procedures regarding infection control during patient preparation that includes maintaining sterility of head wounds, incisions and intracranial monitor areas
- Selecting appropriate method of electrode application
- Using disposable products when possible
- Assessing the risk for skin breakdown at the electrode application site and using appropriate electrode application technique for patients at risk (edema, cardiac patients, hypoperfusion) according to facility policy and procedures
- Placement of appropriate recording reference and ground electrodes in digital recording systems
- Securing headbox/transmitter system to protect against disconnection during patient movement

The ICU/cEEG technologist obtains a baseline cEEG recording from all electrodes used during the cEEG procedure

- Verifies electrode recording integrity
- Assesses adequacy of scalp site used for recording reference location
- Determine set-up and recording protocol including montage derivations appropriate for the patient
- Uses recording and stimulus parameters appropriate for cEEG
- Is able to reformat data, adding electrode derivations and montages or other techniques that enhance or clarify the EEG abnormality
- Uses sequential montages according to facility policy and procedures or ACNS guidelines
- Displays most appropriate montage on bedside monitor for staff reference, i.e., anterior/posterior chain
- Prints EEG waveforms and reviews baseline with ICU staff as appropriate per facility policy and procedure

The ICU/cEEG technologist communicates with ICU staff regarding:

- Type of electrodes used and related precautions (i.e., subdermal needle electrodes)
- How to move patient without jeopardizing electrode security
- Disconnecting electrodes appropriately, i.e., to transport patient for imaging studies
- Documenting events and comments into the computer
- The need for sedatives, muscle relaxants and/or anesthetics
- Type of networking connections used and how to correct loss of connectivity
- Who to contact regarding equipment issues
- Who to contact regarding clinical issues

The ICU/cEEG technologist identifies and eliminates or reduces artifacts contaminating the recording of cEEG and video by:

- Analyzing the quality of the recording
- Recognizing artifact as physiologic or non-physiologic
- Ensuring proper grounding of patient and equipment
- Correcting, eliminating, or monitoring artifact as appropriate
- Documenting artifacts that cannot be avoided, i.e., chest percussions, sternal rub, oscillating bed, etc.
- Performing established protocol to confirm stimulus induced electrographic changes
- Optimizing equipment amplifier parameters
- Articulating instrumentation adequately for bio-med troubleshooting

The ICU/cEEG technologist ensures the following after completion of the cEEG procedure:

- Disconnection of patient from monitoring equipment and removal of electrodes
- Documentation of any skin breakdown per facility policy and procedures
- Proper disposal of disposable electrodes and procedure products
- Proper cleaning/disinfecting/sterilizing of reusable application products per facility policy and procedures
- Proper cleaning/disinfecting of cEEG equipment per facility policy and procedures
- Restocking cEEG supplies per facility policy and procedures
- Relocation of equipment to assigned storage area
- Completes and maintains patient documentation for charges, statistics and medical records

* Critical test results – any values/interpretations where delays in reporting may result in serious adverse outcomes for patients. MA Coalition for Prevention of Medical Errors; www.macoalition.org/document/CTRPractices.pdf

-- Approved by ASET Board of Trustees April 2011