



NATIONAL COMPETENCY SKILL STANDARDS FOR ICU/cEEG MONITORING

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 approved this document on July 9, 2008.

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 national competency criteria documents for performing an Electroencephalogram and Long Term Monitoring.

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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 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 hospital protocol for respiratory or cardiopulmonary crisis
- Follows hospital infection control procedures, including sterile techniques relevant to the patient and equipment
- Follows hospital protocol for safety procedures, patient isolation and sedation

The 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 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

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The 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 hospital, if relevant
- Use of remote monitoring networking capabilities outside the hospital, if relevant

The 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 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 hospital protocol
- 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 lab protocol
- Selects cEEG data for physician review, interpretation and clinical correlation
- Identifies and accurately describes the chronology of clinical correlates during an event
- Selects 2-3 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 lab protocol
- Periodic data analysis update to the electroencephalographer regarding cEEG and patient clinical condition per lab protocol
- Obtains updates from patient, family and/or nursing staff regarding changes in patient's level of consciousness and clinical behavior per lab protocol
- Alerts ICU team to the occurrence of nonconvulsive and/or convulsive seizure activity recorded during the monitoring period reviewed per lab protocol

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
- Participating in quality assurance/improvement activities and reviews

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SECTION II - ICU/CEEG MONITORING PROCEDURE

The 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 hospital protocol and/or ASET infection control guidelines
- Calibration of EEG and all ancillary recording instruments according to ACNS guidelines, per hospital protocol
- Equipment safety evaluation according to hospital protocol
- Audio/video equipment are functioning properly
- Maintains individual logs on equipment malfunctions, per hospital protocol
- 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 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 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 technologist ensures a method of electrode application that includes:

- Applying full or modified 10/20 placement according to lab protocol
- Following hospital protocol 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 lab protocol.
- Placement of appropriate recording reference and ground electrodes in digital recording systems
- Securing headbox/transmitter system to protect against disconnection during patient movement

The 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 lab protocol 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 lab protocol

The 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

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The 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 bioimed troubleshooting

The 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, according to hospital protocol
- Proper disposal of disposable electrodes and procedure products
- Proper cleaning/disinfecting/sterilizing of reusable application products per hospital protocol
- Proper cleaning/disinfecting of cEEG equipment per hospital protocol
- Restocking cEEG supplies per lab protocol
- Relocation of equipment to assigned storage area
- Completes and maintains patient documentation for charges, statistics and medical records.