ASET Position Statement

24/7 Staffing for Neurodiagnostic Long-Term EEG Monitoring Services

The field of Neurodiagnostics continues to transform to meet the demands and needs of high-quality patient care and patient/caregiver satisfaction, thus the need for twenty-four hour, seven days/week (24/7) staffing availability.

Medical institutions are demanding 24/7 neurodiagnostic services as the standard of care, partly due to medical situations in which after-hours diagnostic care (i.e., testing, monitoring, rounding, maintenance, communication, and other work in support of testing) directly correlates with patient outcomes. Therefore, it is ASET’s position that 24/7 staffing models be utilized to support patient and employee safety and patient outcome in Level III and IV epilepsy monitoring units (EMUs); Level I and II neurocritical care units; and Level III and IV neonatal ICUs (NICUs) as described and outlined below:

I. PATIENT SAFETY SUPPORTS THE NEED FOR 24/7 STAFFING

Trends in Neurodiagnostic Event Reporting for EMU and ICU cEEG services reveal patient safety concerns attributable to a lack of 24/7 technologist staffing include provision of care, which encompasses a broad range of issues:

A. Provision of Care
   1. Lack of 24/7 staffing may result in gaps in communication and throughput, diagnostic availability, quality, patient safety and care, and order completion (i.e., fulfilling new orders, triage of care in the event of a seizure or critical, time sensitive event, etc.) (Lawton et al. 2012).
   2. Delays or gaps in reporting and documentation of critical values and events to patient care teams (TJC 2021; Payne et al. 2014; Sanchez Fernandez 2017)
   3. In institutions with 24/7 in-house staff, areas of vulnerability include shift-to-shift handoff (Capek et al 2013; Starmer et al. 2014; Patel & Landrigan 2019; I-PASS Study Group 2014). By extension, an even greater risk is present when there is no overnight staff and delays may extend until the next day shift arrives.

B. Skin/Tissue Alteration
   1. Insufficient staffing may result in delays or gaps in performing electrode maintenance, skin checks (Drees et al. 2016), and reporting of skin alteration and assessment to appropriate personnel (ACNS 2015).
      • Disconnecting discontinued studies that could subsequently contribute to skin alteration due to unnecessary prolongation of long-term monitoring.
   2. Insufficient staffing to perform frequent quality assurance inspections to validate practice standards, such as:
      • Ensuring that prepping solution is cleaned/removed prior to electrode application (ASET 2016; ASET 2017)
• Checking electrode impedances (i.e., < 10k Ohm and balanced) for LTM studies (ACNS 2016)
• Ensuring head wrap is in place and not excessively tight (require two finder widths) (ASET 2016; ASET 2017)

C. Equipment/Medical Device
1. Equipment failures or device malfunctions may go undetected in LTM studies in the absence of 24/7 in-house staffing.
2. Technical staff must be physically present to troubleshoot and remediate technical issues in-house (ACNS 2015).

II. EMPLOYEE SAFETY CONSIDERATIONS SUPPORT A 24/7 STAFFING MODEL
A. State Labor Laws
1. The Federal Labor Standards Act (FLSA) does not limit the number of hours an employee can work per week if 16 years or older (US Department of Labor n.d.), although some states have limitations on how many days an employee can work consecutively.
2. Furthermore, OSHA does not regulate extended and unusual shifts if they exist in the workplace, and employees in the healthcare industry are exempt from FLSA (OSHA n.d.).
3. 24/7 staffing models must ensure compliance with state labor and wage laws that define best practices for employee safety and the penalties involved for noncompliance [e.g., predictability pay, etc., (BACP 2020)].

B. Burnout
1. Technologist burnout (LaRoche & Haider 2018) occurs from working overtime or unusual shifts/hours, frequently changing shifts to cover workload, and providing on-call services during scheduled days off, nights/weekends, and during holidays.
2. Exhaustion can impact both patient and employee safety, leading to an inability to focus, mistakes and errors that affect the quality of patient care and outcomes, and can be acutely dangerous in situations where technologists drive to and from the hospital at night or at unusual hours to provide on-call services.
3. Poor technologist retention can lead to delays in patient care, contribute to additional workload for other staff and decreased quality of services and patient care.

C. Scope of Practice for the Neurodiagnostic Technologist – 24/7 environment will require physician oversight and availability to align with technologist availability to ensure that technologists are not working outside of their Scope of Practice (i.e., interpretation) (ASET 2020a; ASET 2001).
1. Alignment of technologist and physician availability ensures proper support and reduces delays in care/treatment.
2. Refer to section IV.A.4 below for staffing types and responsibilities.

III. SERVICE DELIVERY ENVIRONMENTS THAT REQUIRE 24/7 TECHNOLOGIST SUPPORT
Service delivery environments that require 24/7 neurodiagnostic technologist support include Level III and IV epilepsy monitoring units (EMUs) (Labiner et al. 2010; ACNS 2008); Level I and II
neurocritical care units (Moheet et al., 2018; Herman et al. 2015a & 2015b); and Level III and IV neonatal ICUs (NICUs) (AAP 2012).

A. Epilepsy Monitoring Units (EMUs)
   1. **American Epilepsy Society (AES) and National Association of Epilepsy Centers (NAEC)** guidelines for accredited epilepsy centers that provide Levels 3 and 4 care.
      - According to the NAEC Guidelines (Labiner et al. 2010), common components of level 3 and 4 epilepsy centers include an interdisciplinary care team approach and long-term EEG services, both of which include the need for neurodiagnostic technologist personnel (as defined by ASET 2020b and AMA v2021). The guidelines specify that “all electrodiagnostic facilities should have... the presence and availability of qualified EEG technologists... at all times.” Furthermore, some of the distinguishing elements of level 4 centers include the availability of advanced neurodiagnostic services, such as functional cortical mapping, evoked potentials, electrocorticography, and SPECT, all of which require the need for qualified neurodiagnostic staff

   2. **ACNS** guideline for long-term monitoring for epilepsy (LTME).
      - According to the ACNS guideline, the minimum practice standard recommends that an EEG technologist and/or Neurodiagnostic Assistant ["monitoring technician" (sic.)] must be available to “observe the patient, record events, and maintain recording integrity during inpatient LTME” (ACNS 2008).

B. Critical Care LTM/cEEG
   1. **Neurocritical Care Society (NCS)** standards for neurologic critical care units.
      - As recognized by the NCS, common neurocritical care diagnoses include ischemic stroke, intracerebral hemorrhage, subarachnoid hemorrhage, traumatic brain and spine injury, encephalitis, anoxic brain injury, coma, spinal cord compression, and status epilepticus, all of which require continuous EEG monitoring (Moheet et al. 2018).

   2. **ACNS’ Consensus Statement on Continuous EEG in Critically Ill Adults and Children Part II: Personnel, Technical Specifications and Clinical Practice** specifically states, “Critical care continuous EEG should be performed by appropriately trained, certified, and supervised neurodiagnostic technologists [NDTs (sic.)]” (Herman et al. 2015b).
      - Therefore, it is recommended that Level 1 and 2 hospitals provide staffing and services for continuous EEG (cEEG) and STAT EEG, for which EEG equipment availability is “crucial” (Moheet et al. 2018) and 24/7/365 availability of qualified neurodiagnostic personnel is essential.

C. Neonatal ICU (NICU)
   1. The **American Academy of Pediatrics (AAP)** defines Level III and IV neonatal ICUs (NICUs) as those which have the capability to provide “prompt and readily available access” to comprehensive care for infants with critical illnesses (AAP 2012).

   2. **As recognized by** ACNS **guideline 13**, conventional video-EEG monitoring in critically ill neonates is the gold standard for “the surveillance and prompt treatment of electrographic seizures,” (Shellhass et al. 2011).
Guideline 13 also states that “appropriate neonatal EEG monitoring requires a team of trained caretakers, including... EEG technologists” (Shellhass et al. 2011), thus supporting the need for 24/7 staffing of qualified neurodiagnostic personnel in hospitals with Level III and IV NICUs.

IV. STAFFING
ASET, NAEC, and ACNS recognize the unique risks associated with seizures and support well-trained interdisciplinary team members who rely on best practices for responding to emergencies, especially for inpatients whose medications have been reduced. Additionally, NAEC’s accreditation criteria require inpatients receiving video EEG to be continuously observed by trained staff. To meet the needs of 24-7 (in compliance with labor law, based on state):

A. Staffing types and duties (Herman et al. 2015b; LaRoche & Haider 2018) as defined below.

1. **Neurodiagnostic Laboratory Assistants**: Performs limited tasks related to EEG, such as initiating a study by applying a limited electrode array (temporarily utilized until EEG staff are available to apply full montage) and initiating an EEG study, regularly checking and maintaining electrode integrity, and performing skin safety checks.
   - Often used in hybrid staffing models (i.e., intermittent monitoring)

2. **Neurodiagnostic Assistant (NDA) (remote or onsite)**: Formerly known as Patient Observer or Monitor Watcher, i.e., “Critical Care CEEG Observer” in Herman et al. 2015b).
   - Observes patient(s) on video, maintains video integrity, alerts appropriate personnel of problems with EEG recording, and provides an additional level of patient safety as first responders, alerting appropriate personnel of seizure activity or questionable events. Must work in tandem with credentialed Neurodiagnostic Technologists (R. EEG T.® or CLTM®) or a NeuroAnalyst (NA-CLTM®) (ABRET 2022).

3. **Neurodiagnostic Technologist**: Initiates cEEG acquisition, maintains recording integrity, daily/frequent patient assessment (skin safety, reactivity, etc.), i.e., “boots on the ground” services. May hold registry in EEG (R. EEG T. ®).

4. **Neurodiagnostic Specialist**: All responsibilities of technologists, plus reviews QEEG trends (i.e., in critical care) and selection of EEG segments for later analysis (in critical care and LTME), under the supervision of a physician. Notifies physician of any changes in EEG activity that may reflect seizure or deterioration in brain function. Must hold R. EEG T. ® and CLTM®.

5. **NeuroAnalyst (NA) (remote or onsite)**: Analytical review of EEG data
   - The NA responsibilities include but are not limited to providing technical descriptions and critical care EEG summaries of LTM studies, including reviewing raw and QEEG obtained during continuous digital video-EEG monitoring, alerting responding clinicians to abnormal findings, preparing/completing a non-billable/preliminary technical report, etc.
   - Must hold CLTM® and may hold NA-CLTM®.

6. **Interpreting Physician**: A 24/7 environment will require physician oversight and availability to align with technologist availability to ensure that technologists are not...
working outside of their Scope of Practice (i.e., no interpretation) (ASET 2020a). Must hold licensure in the state/country in which the EEG service is being performed.

- Alignment of technologist and physician schedules ensures proper support and reduces delays in patient care and treatment.

B. Tech-to-Patient EEG Monitoring Ratios per CMS (i.e., based on CPT codes, see AMA v2021). Best practice recommends monitoring performed by Neurodiagnostic Specialists and NeuroAnalysts (must hold at minimum R. EEG T.®, with CLTM® and NA-CLTM® preferrable).

1. Real-time monitoring for Continuous EEG = 4 patients : 1 technologist
2. Intermittent EEG monitoring = 12 patients : 1 technologist
3. Unmonitored EEG: Greater than 12 patients to 1 technologist is considered unmonitored EEG

C. Staffing Model per LaRoche & Haider 2018:

1. cEEG monitoring and real-time interpretation:
   - The most ideal staffing model for optimal patient care in ICUs and LTME
   - Requires tremendous investment in staffing and equipment resources.
   - Most often only found in large academic centers and healthcare systems.
   - For critical care EEG and/or LTME with volume of more than 6 patients per day, staffing model recommends 5 or more Neurodiagnostic Technologists and 3 or more Neurodiagnostic Specialists and/or NeuroAnalysts.

2. Intermittent EEG monitoring and interpretation (aka “hybrid staffing model”):
   - Utilizes on-call staffing and is an ideal and cost-effective model if call-ins are uncommon. If call-ins frequently occur, it is recommended that the cEEG staffing model be used to “minimize staff burnout” and avoid “expensive overtime labor.”
   - Utilizes Neurodiagnostic Laboratory Assistants during off-hours, weekends, and holidays (see Section IV.A.1. for responsibilities).
   - Most often used by small academic centers and midsized hospitals.
   - For intermittent EEG monitoring with volume of 3-6 patients per day, staffing model recommends 3-4 Neurodiagnostic Technologists and 1-2 Neurodiagnostic Specialists and/or NeuroAnalysts.

RECOMMENDATIONS FOR FACILITIES THAT CANNOT IMPLEMENT A 24/7 MODEL (i.e., other service providers)

A. cEEG monitoring is underutilized and has been proven to lead to better patient outcomes (Hill et al 2019; Kreimer 2018).

1. Utilization of qualified remote vendors could be used to outsource long term/continuous EEG monitoring when monitoring ratios cannot be properly met (ASET 2022).

REFERENCES:


Hill CE, Blank LJ, Thibault D, Davis KA, Dahodwala N, Litt B, Willis AW. Continuous EEG is associated with favorable hospitalization outcomes for critically ill patients. Neurology. Jan 2019, 92 (1) e9-e18; DOI: 10.1212/WNL.0000000000006689


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