

# **NEURODIAGNOSTIC TECHNOLOGY PROGRAM GRADUATE COMPETENCIES FOR PERFORMING POLYSOMNOGRAPHY STUDIES – ADD-ON PSG**

The following graduate competencies for performing Polysomnography Studies (PSG) are recommended as standards for the education of postsecondary students in neurodiagnostic technology (NDT) programs with add-on PSG. Employers can expect the graduates of CAAHEP-accredited NDT with PSG add-on programs to be competent in the areas defined below under appropriate supervision.

## **I. GENERAL COMPETENCIES FOR POLYSOMNOGRAPHY**

### **A. The graduate prepares for the study by:**

1. assessing the physician's order to assure appropriateness in conjunction with reviewing of the patient's medical records;
2. interviewing the patient to obtain any additional information;
3. determining and accommodating the patient's age-specific needs, disability and/or other special needs;
4. providing appropriate patient and family education including expectations of technical procedures;
5. answering questions related to sleep disorders testing;
6. determining the need for additional physiological monitors; and
7. determining the possible need for emergency intervention.

### **B. The graduate prepares a worksheet that includes:**

1. patient demographic information (name, age, gender, ID number, referring physician, reason for referral, etc.);
2. procedure information (procedure type, procedure number, date of test, technologist name, recording time, etc.);
3. chief complaint, relevant medical history and clinical findings specific to procedure;
4. sleeping medications taken or administered during the study; and
5. any special circumstances necessitating changes in usual protocols.

### **C. The graduate verifies the integrity of the PSG recording equipment by:**

1. performing an all-channel and montage calibration;
2. recognizing and correcting recording equipment malfunction observed during calibration including polysomnography amplifiers, ancillary equipment and audiovisual equipment;
3. performing a post-study calibration procedure to verify the integrity of recorded data; and
4. maintaining documentation of required safety equipment checks.

### **D. The graduate follows a method of electrode and sensor application that includes:**

1. identifying the appropriate method of electrode application;
2. determining setup and recording protocols including montage derivations;
3. using standard precautions during patient preparation;
4. measuring the patient's head according to the International 10/20 system of electrode placement;
5. cleaning patient's scalp and skin prior to electrode application;
6. following established protocols for placement of ECG, EMG, EOG and other recording electrodes and sensors used in polysomnography, i.e. nasal/oral airflow, effort devices and oximeter sensors;
7. utilizing additional electrodes or modified placements based on the patient's history or medical needs;
8. ensuring security and integrity of electrodes and sensors for an extended period of time; and
9. verifying and documenting electrode impedances are balanced and below 5,000 ohms on the face and scalp, 10,000 ohms on the legs.

### **E. The graduate obtains an accurate patient recording by:**

1. acquiring, verifying and documenting biological calibrations prior to "lights out" to document integrity of the physiological monitors;
2. recognizing the effects of recording parameters on waveforms (i.e., filter settings, sensitivity settings);

3. recognizing, troubleshooting and minimizing artifacts so that sleep stages and all monitoring channels are clearly readable throughout the recording;
4. recognizing and documenting relevant data such as body position changes, life-threatening events, EEG and ECG abnormalities, etc.;
5. documenting routine changes periodically throughout the recording to include notes on observed behavior, parasomnias, notations of montage and equipment settings; and
6. recognizing the need for clinical interventions (Oxygen, Positive Airway Pressure titration, CPR, etc.) and performing them according to established guidelines.

**F. At the end of the PSG recording, the graduate:**

1. removes electrodes and sensors from the patient;
2. documents a summary of the polysomnogram and clinical observations in order to assist with the interpretation (i.e. estimated apnea index, apnea-hypopnea index, estimated periodic limb movement index, clinically significant behavior, significant cardiac arrhythmia, lowest oxygen desaturation, etc.);
3. prepares patient data and chart for scorer;
4. performs transfer of data or data backup in accordance with department specific protocols; and
5. cleans and disinfects electrodes and other reusable equipment according to manufacturer's guidelines and/or established department protocols.

**G. The graduate scores the polysomnogram in accordance with The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology, and Technical Specifications which includes:**

1. sleep stages;
2. arousal events;
3. respiratory events;
4. differentiation between potentially lethal and non-lethal ECG patterns; and
5. periodic limb movement events.

**H. The graduate provides a technical report that includes:**

1. sleep scoring data: lights out/on, total sleep time, total recording time, sleep latency, stage R latency, wake after sleep onset, percent sleep efficiency, time in each stage, percent of total sleep time in each stage;
2. arousal events: number of arousals, arousal index;
3. respiratory events: number of obstructive/mixed/central sleep apneas and hypopneas, number of apneas + hypopneas, apnea index, hypopnea index, apnea + hypopnea index, continuous oxygen saturation mean value, minimum oxygen saturation during sleep, occurrence of Cheyne Stokes breathing (yes/no);
4. cardiac events: average heart rate and highest heart rate during sleep, highest heart rate during recording, occurrence of the following arrhythmias (yes/no) listing heart rate or duration of pause:
  - a) bradycardia – report lowest heart rate observed
  - b) asystole – report longest pause observed
  - c) sinus tachycardia during sleep – report highest heart rate observed
  - d) narrow complex tachycardia – report highest heart rate observed
  - e) wide complex tachycardia – report highest heart rate observed
  - f) atrial fibrillation
  - g) occurrence of other arrhythmias (yes/no) list if present;
5. movement events: number of periodic limb movements of sleep (PLMS) with/without arousals, PLM index, PLM arousal index;
6. summary statements: findings related to sleep diagnosis; EEG abnormalities; ECG abnormalities; behavioral observations; and summary of therapeutic intervention.

**I. The graduate understands the use of the following electrodes and sensors:**

1. respiratory inductance plethysmography;
2. nasal/oral thermistor;
3. nasal/oral thermocouple;
4. nasal pressure transducer;
5. snore microphone/sensor;

6. pulse oximetry;
7. end-tidal CO<sub>2</sub> monitor;
8. transcutaneous CO<sub>2</sub> monitor;
9. gastroesophageal pH monitor;
10. esophageal pressure monitor; and
11. other respiratory monitoring devices.

## **II. POSITIVE AIRWAY PRESSURE (PAP) TITRATION**

### **A. The graduate will perform a positive airway pressure titration by:**

1. assuring the positive airway pressure device is calibrated appropriately and interfaced properly to the polysomnography recording equipment;
2. explaining the positive airway pressure procedure to the patient during the setup process and answering any questions;
3. sizing the patient with a mask and allowing the patient to adjust to wearing it while awake and sitting up prior to starting the recording;
4. understanding the contraindications and complications of positive airway pressure therapy;
5. identifying when to adjust the pressure to achieve optimal delivery (snoring, arousals, desaturations, etc.) and providing documentation and reasons for changes in positive airway pressure;
6. verifying optimal pressure during Stage R and supine sleep if possible;
7. identifying and correcting factors that may compromise delivery of effective positive airway pressure pressures, i.e. substantial mask leakage or mouth breathing;
8. recognizing the need to change to bi-level positive airway pressure if needed;
9. recognizing when to contact the medical director;
10. maintaining proper cleaning and disinfection and maintenance of the positive airway pressure device; and
11. understanding the different types of positive airway pressure.

## **III. OXYGEN TITRATION**

### **A. The graduate will perform oxygen titration by:**

1. ensuring that a physician's order is obtained prior to administration;
2. determining the need for supplemental oxygen by following established laboratory protocols for oximetry;
3. assuring proper function of equipment providing oxygen delivery;
4. recognizing contraindications for supplemental oxygen;
5. properly fitting and adjusting the nasal cannula for oxygen delivery with or without positive airway pressure and humidification devices;
6. understanding the use of combined positive airway pressure and oxygen supplementation;
7. identifying when to adjust supplemental oxygen to achieve an optimal saturation level;
8. identifying signs that the patient's drive to breathe is reduced and making appropriate adjustments; and
9. documenting changes in oxygen saturation on the PSG and the technologist summary report.

## **IV. MULTIPLE SLEEP LATENCY TEST (MSLT)**

### **A. The graduate performs the MSLT by:**

1. verifying and documenting use and/or discontinuation of all prescription medications, over-the-counter medications, herbal and dietary supplements, other substances and/or activities that would affect sleep or wakefulness;
2. documenting by polysomnography the previous night's sleep to verify the appropriateness of the Multiple Sleep Latency order;
3. removing recording sensors used for the polysomnography, but not needed for the Multiple Sleep Latency Test;
4. allowing the patient to dress in street clothes;

5. obtaining a urine drug screen test if ordered;
6. following established guidelines for the performance of the Multiple Sleep Latency procedure;
7. administering questionnaires as required; and
8. providing documentation and reports as required by lab protocols for interpretation.

## **V. MAINTENANCE OF WAKEFULNESS TEST (MWT)**

### **A. The graduate performs the MWT by:**

1. verifying a drug history was obtained and any medications discontinued for two weeks prior to testing as deemed necessary by the referring physician;
2. removing recording sensors used for the polysomnogram, but not needed for the Maintenance of Wakefulness Test;
3. allowing the patient to dress in street clothes;
4. obtaining a urine drug screen test if needed, as ordered;
5. following established guidelines for the performance of the MWT procedure;
6. administering questionnaires as required; and
7. providing documentation and reports as required by lab protocols for interpretation.

## **VI. KNOWLEDGE STATEMENTS IN POLYSOMNOGRAPHY**

### **A. The graduate understands:**

1. the principles of polysomnography and the clinically relevant questions to be answered for each individual patient;
2. medical terminology and accepted abbreviations in sleep disorders medicine;
3. basic electricity and electrical concepts of analog and digital equipment;
4. anatomy and function, especially cardiopulmonary and neurologic;
5. basic safety issues with multiple equipment interfaces to the patient;
6. polysomnographic patterns correlating with specific disorders;
7. basic breathing mechanisms and airway physiology;
8. current medications and their effects on the recordings;
9. therapeutic modalities (mechanical, pharmacological, surgical, etc.) and;
10. infection control procedures; and
11. ethics and appropriate professional behaviors.

### **B. The graduate can identify basic indications for sleep studies:**

1. using the International Classification of Sleep Disorders and relevant practice parameters;
2. understanding signs and symptoms for adult sleep disorders;
3. understanding signs and symptoms for pediatric sleep disorders;
4. recognizing seizure manifestations and classifications; and
5. understanding psychiatric and psychological disorders.

### **C. The graduate gains knowledge and skills by:**

1. reviewing the recordings with polysomnographers on a regular basis;
2. reading journal articles;
3. studying textbooks related to sleep medicine; and
4. recognizing opportunities to participate in professional organizations.