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 verity 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 <u>The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology, and Technical Specifications</u> 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_2 monitor;
8. transcutaneous CO_2 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. MULTPLE 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.