

## **PEDIATRIC POLYSOMNOGRAPHY PROTOCOL**

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### **PURPOSE**

Provide adequate information to perform quality polysomnograms on pediatric patients per physician order with confidence and competence. Pediatric patients age-specific ranges of *Adolescent* (13–17 years). Polysomnography is essential to diagnose certain sleep-related conditions. Below is a list of common indications:

- Snoring
- Excessive daytime somnolence
- Insomnia, unexplained, resistant to therapy
- Neuromuscular disease
- Disorders of arousal include but are not limited to: confusional arousals, sleepwalking and sleep terrors. Other parasomnias include hypnagogic hallucinations, sleep paralysis, nocturnal seizures, bruxism and rhythmic movement disorder.
- Sleep-associated seizures

### **POLICY**

#### **Adolescent (13–17 years)**

- Schedule for nighttime testing with one parent or caretaker available throughout the procedure.
- Follow adult protocol for polysomnography testing.
- Unless otherwise specified, parents do not stay in the patient suite.
- Maximum patient-to-technologist ratio is 2:1. In cases that involve significant anxiety or developmental disabilities, a 1:1 patient-to-technologist ratio may be necessary.
- **Unless otherwise specified, parents must stay in the patient suite.**

### **PROCEDURE**

#### **Prior to patient arrival at the sleep facility**

- 1.0** Confirm physician order for polysomnogram and any other procedures such as supplemental nocturnal oxygen and/or nasal CPAP.
- 2.0** Confirm that a history and physical examination are in the patient's chart. Determine the child's usual sleep/wake schedule and make effort to schedule the polysomnogram start time within 30 minutes of the child's usual bed time.
- 3.0** Confirm physician order or facility protocol for appropriate montages to be utilized.
- 4.0** Confirm that age-specific resuscitation equipment is available in the sleep facility.
- 5.0** Patient suite and sensors should be inspected and prepared prior to patient's arrival.
- 6.0** Calibrate polygraph and/or computer and related monitors and confirm proper operation.
- 7.0** Confirm proper operation of video camera.

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### **Patient/parent preparation for testing**

- 1.0 After escorting the parent and the patient to the patient suite, explain procedure to the patient and parent in terms the child can understand.
- 2.0 Consent-to-treat form should be signed.

### **Electrode placement/application**

#### **1.0 Wash Hands Thoroughly**

#### **2.0 EEG**

##### 2.1 Preparation of scalp electrodes:

- 2.1.1 The head must be measured according to the International 10-20 System to assure accurate electrode application. Electrode sites generally used for the polysomnogram are ground, C3, C4, O1, O2, M1 and M2. Additional electrodes will depend on system or montages to be utilized. A system reference electrode is also used for computerized systems.
- 2.1.2 Prepare the electrode sites using skin abrasive specifically designated for skin preparation. Apply abrasive to marked electrode sites with cotton swab using care to avoid over-abrading the scalp. Allow to dry.
- 2.1.3 Application of electrodes can be accomplished by a variety of techniques, either by use of TEN-20 conductive paste and/or EC-2 cream or collodion glue. The uncooperative younger patient may require the head wrapping technique using Kling or Coban gauze. Utilizing the paste application method is preferred.
- 2.1.4 Place TEN-20 conductive paste in electrode cups and apply them to the prepared areas on the scalp. Secure the electrode cups by applying 1" × 2" gauze pieces with a small amount of EC-2 cream over each of the electrode cups and securing them with a few hairs crossed over the gauze patches.

#### **3.0 EOG**

- 3.1 Properly identify each location of electrode placement, prepare sites with skin abrasive gel, and allow to dry.
- 3.2 Fill electrode cups with conductive cream and apply one electrode one cm above and one cm away from outer canthus of one eye and the other electrode cup one cm below and one cm away from outer canthus of the other eye.
- 3.3 Tape the electrodes in place. Guide wires toward back of patient's neck.

#### **4.0 EMG**

##### 4.1 Submental/mentalis

- 4.1.1 After properly preparing electrode sites and filling electrode cups with conductive paste, apply two electrodes at the center of the chin and one electrode beneath the chin. One of the three electrodes is used as a backup for possible use during the recording.

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4.1.2 Secure electrodes with paper tape and drape over patient's ears toward back of his or her neck.

### 4.2 Left/right anterior tibialis

4.2.1 Prepare each electrode site with skin abrasive gel. Allow to dry.

4.2.2 Identify muscle by flexing patient's ankle and observing muscle movement at the site.

4.2.3 Fill electrode cups with conductive cream and apply two electrodes five cm apart on that portion of patient's legs. Secure with paper tape.

## **5.0 EKG**

5.1 Identify and prepare sites with skin abrasive gel and allow to dry.

5.2 Apply EKG electrodes or patches and attach snap electrodes. Placement of electrodes should be below the clavicles and equidistant from the sternum.

## **Respiration**

### **1.0** Airflow devices

1.1 A single, double or triple bead nasal and/or oral thermocouple or thermistor is secured directly below the nostrils to record air temperature changes at patient's nose and/or mouth. A number of different devices are available. Nasal pressure transducers should be used, in accordance with the most current version of the *AASM Scoring Manual*. Choice of device is at the technologist's discretion.

### **2.0** CO<sub>2</sub> monitoring (end-tidal or transcutaneous)

2.1 When evaluating sleep-disordered breathing in children, it is recommended that both airflow and CO<sub>2</sub> be recorded.

### **3.0** Respiratory effort

3.1 For monitoring respiratory effort, use one of the following:

3.2 Esophageal manometry

3.3 Dual thoracoabdominal RIP belts (calibrated or uncalibrated)

### **4.0** Oximetry

4.1 An oximeter probe is attached to patient's finger, toe, nose or ear; choice of site depends on technologist discretion and available sensors.

## **Final preparation**

**1.0** Group sensor wires together and secure. Arrange wires out of reach of the child.

**2.0** Confirm patient's comfort in bed.

**3.0** If applicable, raise side rails to the up-and-locked position. Document in technologist's notes.

**4.0** Confirm impedances.

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**5.0** Confirm data at polygraph or computer.

### **Collection**

- 1.0** Begin recording at this time and perform patient calibrations.
- 2.0** After completing patient calibrations document “Lights Out.”
- 3.0** Document all observed actions and reactions.
- 4.0** Correct any artifact and document it as it occurs during the recording.
- 5.0** Sleep study data should generally be collected for a minimum of eight hours, if indicated.
- 6.0** Throughout the study the technologist puts comments in the tracing every 20 minutes or when a pertinent event occurs, the following information is documented:
  - a. SaO<sub>2</sub> (low value)
  - b. Body Position
  - c. CO<sub>2</sub> (high value)
  - d. Behavioral changes
  - e. “A” for appears awake
  - f. “S” for appears asleep
  - g. *Snoring, yes or no*
- 7.0** During the recording the technologist’s attention is kept on the physiological functions of the child (i.e. RR, HR, CO<sub>2</sub> and SaO<sub>2</sub>), the child’s comfort and the quality of the recording. The technologist makes adjustments whenever the recording is of low quality. Corrections are documented on the recording within 2 – 3 minutes of their occurrence.

### **End of sleep study**

- 1.0** At the end of the polysomnogram, gently awaken patient and document “Lights On.”
- 2.0** End recording and if necessary exit from computer program.
- 3.0** Gently remove all sensors from patient. Take care to avoid irritation of patient’s sensitive skin.
- 4.0** Carefully and diligently soak each electrode site with warm water until the electrode gently lifts away from the patient’s skin.
- 5.0** Assure that all paste residue has been removed by using a fine-toothed comb through the hair after all electrodes have been removed.
- 6.0** When parent (caretaker) and patient are ready to leave, escort family to sleep facility exit and document all observations and actions.

### **After the polysomnogram**

- 1.0** Carefully sort wires and group them together by lengths and application sites.

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- 2.0** Remove any remaining tape, wash electrodes with soap and water, rinse and allow to soak in sodium hypochlorite solution for a minimum of 10 minutes. Rinse well and allow to dry.
- 3.0** Inspect wires at this time to insure their integrity.
- 4.0** Return any equipment and all cleaned and disinfected wires to their storage area for future use.

### **General cleanup checklist**

- 1.0** Discard all used tape, collars, gauze, etc.
- 2.0** Clean and disinfect thermocouples/thermistors, if not disposable.
- 3.0** Return patient-preparation kit to appropriate area.
- 4.0** Stock
- 5.0** If CPAP and/or oxygen equipment was used, remove and empty humidifier, connecting tubing, nasal cannula, patient bore tubing and any other equipment and place in designated “dirty equipment area” for cleaning and disinfecting.
- 6.0** Discard disposable equipment such as the nasal cannula or disposable oximeter probe.
- 7.0** Remove any lint from CPAP equipment filter.
- 8.0** Remove used linen and place in appropriate dirty linen container.
- 9.0** Leave patient suites in clean and orderly condition.

### **Scoring the polysomnogram**

- 1.0** Sleep-stage scoring is based on the most current version of the *AASM Scoring Manual*, if age appropriate.