Pediatric Polysomnography

Audience: All personnel in the Sleep Disorder Center.

Purpose: Provide adequate information to perform quality polysomnograms on pediatric patients per physician order with confidence and competence. Pediatric patients include age-specific ranges of *Pre-school child* (3-5 years), *School-age child* (6-12 years), and *Adolescent* (14-17 years). Polysomnography is essential to diagnose certain sleep-related conditions. Common indications include:

- Snoring
- Excessive daytime somnolence
- Insomnia, unexplained, resistant to therapy
- Neuromuscular disease
- Parasomnias
- Disorders of arousal, which 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: Pre-school (3-5 years), and School-age children (6-12 years)

- Schedule for nighttime testing with one parent or caretaker available throughout the procedure. A visit to the sleep center prior to the scheduled procedure is encouraged to help parent and child become familiar with the surroundings and to answer any questions they might have.
- Encourage parent to bring patient's comfort items such as snacks, bottles, diapers, and a favorite bedtime toy or blanket.
- Patient-testing suite with be "child proofed" (outlet covers, no sharp corners or objects).
- Bed style will be determined based on size and age of patient. Bedside safety rails will be used when appropriate.
- Parent will stay in the patient suite at the discretion of the medical director. Parent should not sleep in the same bed with the child, unless necessary to complete study. A recliner may be provided for parent's comfort.
- Feedings depend on patient's schedule. The fussy patient may do better if fed prior to electrode application. Feeding times may vary, depending on the indication for and timing of the study.
- Additional toys and children's videos will be available to keep patient occupied during electrode application.
- Due to some children's apprehensions to normal hospital uniforms, technologist may wear street clothes.
- Maximum technologist-to-patient ratio is 1:2.

- Electrodes will be applied in accordance with this procedure to obtain consistency and maintain high quality during polysomnography recordings. Three methods of application are acceptable. The past-application method is preferred. The use of collodion is acceptable. For the patient with a history of reactive airway disease, history of allergy to collodion, an immediate reaction to collodion, or sensitivity to the EC-2 paste, the headwrap method with Kling gauze or Coban may be used.

Adolescent (13-17 years)

- Schedule for nighttime testing with on patent or caretaker available throughout the procedure
- Follow and adult protocol for polysomnography testing.
- Unless otherwise specified, parents do not stay in the patient suite.
- Maximum technologist-to-patient ratio 1:2.

Procedure: **Prior to Patient Arrival at the Sleep Center**

- Confirm physician order for polysomnograms and any other procedures such as supplemental nocturnal oxygen and/or nasal CPAP.
- Confirm that a history and physical examination are in the patient's chart.
- Confirm physician order or center protocol for appropriate montages to be utilized.
- Confirm that age-specific resuscitation equipment is available in the sleep facility.
- Patient suite and sensors should be inspected and prepared prior to patient's arrival.
- Calibrate polygraph and/or computer and related monitors and confirm proper operation.
- Confirm proper operation of video camera.

Patient/ Parent Preparation for Testing

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

Electrode Placement/ Application

Wash Hands Thoroughly

<u>EEG</u>

Preparation of the scalp electrodes:

- The head must be measured according to the International 10-20 System to assure accurate electrode application. Electrode sites generally used for the polysomnograms are ground, C3, C4, O1, O2,

A1, and A2. Additional electrodes will depend on system or montages to be utilized. A system reference electrode is also used for computerized systems.

- 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.
- 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.
- 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” x 2” gauze pieces with a small amount of EC-2 cream over the each of the electrode cups and securing them with few hairs crossed over the gauze patches.

<u>EOG</u>

- Properly identify each location of electrode placement, prepare sites with skin abrasive gel and allow to dry.
- Fill electrode cups with conductive cream and apply one electrode 1cm above and 1cm away from outer canthus of one eye and the other electrode cup 1cm below and 1cm away from outer canthus of the other eye.
- Tape the electrodes in place. Guide wires toward back of patient’s neck.

<u>EMG</u>

Submental/Mentalis

- After properly preparing electrode sites and filling electrode cups with conductive past, 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.
- Secure electrodes with paper tape and drape over patient’s ears toward the back of his or her neck.

<u>Left/Right Anterior Tibialis</u>

- Prepare each electrode site with skin abrasive gel. Allow to dry.
- Identify muscle by flexing patient’s ankle and observing muscle movement at the site.
- Fill electrode cups with conductive cream and apply two electrodes 5cm apart on that portion of the patients’ legs. Secure with paper tape.

<u>EKG</u>

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

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

Respiration

Airflow Devices

- 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 that patient's nose and/or mouth. A number of different devices are available. Choice of device is at the technologist's discretion.

CO2 Monitoring

- When evaluating sleep-disordered breathing in children, it is recommended that both airflow and CO2 be recorded.

Respiratory Effort

- Respiratory inductance plethysmography for chest and abdomen or other modification may be utilized to determine respiratory effort.

Oximetry

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

Final Preparation

- Group sensor wires together and secure. Arrange wires out of reach of the child.
- Confirm patient's comfort in bed.
- If applicable, raise side rails to the up and locked position. Document in technologist's notes.
- Confirm impedances.
- Confirm data at polygraph or computer.

Collection

- Begin recording at this time and perform patient calibrations.
- After completing patient calibrations document "Lights Out".
- Document all observed actions and reactions.
- Correct any artifact and document it as it occurs during the recording.
- Sleep-study data should be collected for a minimum of 8 hours, if indicated.

End of Sleep Study

- At the end of the polysomnography, gently awaken the patient and document "Lights ON".
- End recording
- Gently remove all sensors from patient. Take care to avoid irritation of patient's sensitive skin.
- Carefully and diligently soak each electrode site with warm water until the electrode gently lifts away from the patient's skin.
- Assure that all paste residue has been removed by using a fine-toothed comb through the hair after all electrodes have been removed.
- When parent (or caretaker) and patient are ready to leave, escort the family to the sleep center exit and document all observations and actions.

After the Polysomnogram

- Carefully sort the wires and group them together by lengths and application sites.
- Remove any remaining tape, wash electrodes with soap and water, rinse and allow them to soak in sodium hypochlorite solution for a minimum of 10 minutes. Rinse well and allow to dry.
- Inspect wires at this time to insure their integrity.
- Return any equipment and all cleaned and disinfected wires to their storage area for future use.

General Cleanup Checklist

- Discard all used tape, collars, gauze, etc.
- Clean and disinfect thermocouples/ thermistors, if not disposable.
- Return patient-preparation kit to appropriate ares.
- Stock patient-preparation kit as needed.
- If CPAP was used, remove any equipment and place in designated area for cleaning and disinfecting.
- Discard any disposable equipment (i.e. oxygen nasal cannula, disposable oximeter probe).
- Remove used linen and place in appropriate container.
- Leave patient suite in a clean and orderly condition.

References:

American Academy of Sleep Medicine (AASM). Accreditation Reference Manual For Policies and Procedures, Documentation and Reporting. May 2007. Web. June 2012.

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