

Making Polysomnography More “Child Friendly:” A Family-Centered Care Approach

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Study Objective: With the increasing recognition of pediatric sleep disorders, there is a growing demand for pediatric sleep medicine services, including polysomnography. The procedure of polysomnography can be particularly challenging in young children with limited ability to cooperate, especially when they have developmental disabilities or other medical complications. This article describes a family-centered care approach to polysomnography in children that is appropriate in any type of sleep laboratory setting. This approach emphasizes respect for the family, psychological preparation, adaptation of laboratory routines to the needs of the family, substitution of child-friendly terminology for medical jargon, coping strategies for the child and family during the procedure, positioning for comfort, utilization of distraction and medical play, modeling behavior for the parent,

and continuous praise and reassurance for the child. In our experience with over 1000 studies in children of all ages with a broad range of comorbidities, implementation of this approach has minimized the burden of the polysomnography for the child, boosted the confidence of the sleep technologist, improved study quality for the diagnostician, and increased patient and family satisfaction.

Abbreviations: PSG, Polysomnography; SDB, Sleep-disordered breathing
Key Words: Polysomnography, child, family-centered care, patient satisfaction, sleep disorders, diagnostic testing

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With the increasing recognition of pediatric sleep disorders, there is a growing demand for pediatric sleep medicine services including polysomnography (PSG).^{1,2} From an adult's perspective, the PSG procedure appears relatively painless and noninvasive compared to other common medical procedures that a child might undergo, such as venipuncture, intravenous access, or laceration repair. However, from a child's point of view, sleeping overnight in an unfamiliar environment with multiple physiologic sensors can be an onerous and intrusive procedure. From the sleep technologist's point of view, a PSG in a child is a more labor-intensive procedure and signal integrity is more difficult to maintain. The tearful protests and busy fingers of young children often interfere with sensor placement and lengthen the set-up portion of the PSG past the child's usual bedtime, resulting in an overtired, less-cooperative child. From the accompanying parents' point of view, the “high-tech” wires and sensors may be fear provoking and a physical barrier to comforting their child. In addition, PSG can be even more challenging in children with developmental disabilities who are at greater risk for sleep-disordered breathing (SDB),³ but who have even less ability to cooperate. Each of these problem areas can be minimized and managed by proper child and family preparation with a focus on development of coping skills.

In this special report, we describe PSG-specific strategies based on a family-centered care approach that create a more child-friendly procedure and facilitate the acquisition of high-quality PSG data. These strategies have evolved from the collaborative efforts of child-life specialists in our children's hospital who have helped children (and their families) prepare and cope with the PSG procedure and trained our own PSG technical staff to utilize these techniques. These preparation and coping techniques are most appropriate for toddlers, preschoolers, and younger school-age children and for older children, teens, or young adults with developmental disabilities such as trisomy 21. These children will have the least ability to cooperate but the greatest need for diagnostic services, since SDB peaks from ages 2 to 8 years and children with special needs are at increased risk for SDB.

A FAMILY-CENTERED CARE PHILOSOPHY

Family-centered care is a philosophy and clinical approach that recognizes and supports the vital role of families in their child's health care. Family-centered practitioners recognize that emotional, social, and developmental support are integral components of health care. With this approach, they promote the families' typical patterns of living, support families in their natural roles by building upon their unique strengths, and promote a partnership between parents and professionals in planning and coordinating a child's health care.⁴ This philosophy includes the parent remaining with the child during any procedure and supports them throughout the entire process. A goal for a family-centered care model is creating the least amount of trauma for a child.⁵ Although this statement seems intuitive, this has not always been the case for medical procedures in children who may be placed supine and restrained for a procedure as simple as a clinical electroencephalogram.

Disclosure Statement

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OVERVIEW OF A FAMILY-CENTERED CARE APPROACH TO PSG

A family-centered care approach specific for PSG is summarized in Table 1. This approach recognizes that the parents are the “experts” on their child. They know their child’s likes and dislikes, what comforts them, and what may potentially frighten them. The parents are a constant in their child’s life and health-care professionals should not disrupt this continuity. The sleep technologist must recognize the family’s strengths and individuality, respect different methods of coping, and foster the parent and child’s togetherness throughout the procedure. If a parent speaks up for his or her child and requests something that truly cannot be done, providing a reasonable explanation along with possible alternative suggestions further enables the parent to help the child. Since a desired goal of the PSG staff is to help families support their child emotionally through what may be a difficult procedure, a family-centered care approach includes the staff, parents, and the child all on the same team.

A family-centered care environment is fostered when the sleep laboratory’s culture and routines are adapted to the needs of the family. One practical implication is the need to extend laboratory-staffing hours to accommodate both the longer set-up times for the procedure and the longer sleep periods needed for children. Although recommended staffing for adult studies⁶ is usually 2 to 1, 1 to 1 staffing may be required for young children, at least during the set-up period and sometimes the entire night, depending on the child’s acuity and clinical needs.

Since the goal of family-centered care is the least amount of distress for a child, accommodating a particular family’s needs is essential. For instance, if a child is usually comforted to sleep by thumb sucking or pacifier use, then the sleep technologist may delay application of the nasal-oral airflow sensor until after the child falls asleep. Although it may be more convenient to systematically apply equipment from “head-to-toe,” the better approach for some children may be to begin with the least noxious sensors (for example, the leg movement sensors), leaving the more bothersome sensors (for example, nasal airflow) for last. The extra time that sleep technologists take to explain their reasons for doing parts of the PSG procedure a certain way

improves family cooperation and satisfaction.

Using a family-centered care approach often means a change in focus from the needs of the staff to the needs of the parent and child. In the past, children undergoing procedures would be placed in the supine position or restrained with the belief that it was better to get things “over with” and done more quickly. A more child-friendly and comfortable approach is to having children sit on the parents’ laps, allowing them to use toys to keep the children’s hands busy. Pediatric care specialists would agree that allowing children to remain sitting up and comforted by the parent is the preferred approach and ideal for sensor application for PSG.^{5,7} For the older child, engaging them in the procedure and giving them choices will encourage cooperation.

Another philosophical change is from the “good guy–bad guy” approach to everyone being valued as a member of the team. In the earlier thinking, technologists were the “bad guys” because they were doing an unpleasant thing to the child. The parents, who should be “good guys,” were now “bad guys” because they were allowing the technologist to do something unpleasant to the child. When the parent, child, and sleep technologist work together, everyone is now on the same “good-guy” team. Verbalizing everyone’s “important job” out loud during the PSG set-up puts emphasis on the team approach for the parent and child. Specifically, the technologist’s job is to place the sensors on the child to get the best possible test results. The child’s job is to sit as still as possible when the sensors are being applied. The parent’s job might be to hug the child to help the child sit still or to use interactive toys and books to keep the child’s hands busy.

IMPORTANCE OF CHILD AND FAMILY PSYCHOLOGICAL PREPARATION

Psychological preparation for diagnostic or surgical procedures is the foundation to minimize distress and contribute to a successful experience for the child, parent, and medical staff. Research indicates that children from 1 to 4 years of age are most vulnerable to upset, both during treatment and in the period following.⁸ The well-known benefits of systematic individualized preparation for hospitalized children and their families include faster recovery with less emotional stress.^{9–13} Preparation is equally beneficial for outpatient procedures such as PSG.

Essential to the preparation process for any procedure, inpatient or outpatient, is education. Parents and children need to know why the procedure is important to the health of the child. For PSG, a typical explanation might be that “this test helps us know how your body works when you are sleeping and will also help your doctor make decisions about how to help you get a better night’s sleep.” Parents and children also need to know what to expect during the procedure, specifically, what they will feel, see, hear, and smell as well as what their individual roles will be. They also need to develop a plan together on how to manage the experience. For children, this information should be developmentally appropriate and timed

Table 1—Principles of the Family-Centered Care Model Applied to Polysomnography

Parents are the experts on their child and a constant in their child’s life. Procedures should be conducted to create the least amount of trauma for the child.

The procedure’s environment should be inviting and child-friendly. Important “mind-set” changes by the polysomnography staff:

From the needs of the staff **TO** the needs of the parent and child
From “Good Guy–Bad Guy” **TO** parent, child, and technologist on the same team.

From a child lying down **TO** performing the procedure with the child in a sitting position.

Psychological preparation of the child and parent are fundamental to the procedure.

Coping-skill development enhances a child’s sense of mastery and control over a potentially stressful experience.

Parents need a clearly defined role as part of the health-care team, and the health-care staff is open to the ideas, suggestions, and requests made by the parents on behalf of their child’s care.

Table 2—Top 5 Recommended Items for Distraction Boxes

- Bubbles (Mini Bubble Tumbler™, Catch-a-Bubble™, wedding bubbles)
- Stickers (small enough to fit on top of the medical sensors)
- Books (“look and find,” musical push button, flap, and pop-up)
- Hand-held water games (made by Tomy™)
- Cause-and-effect toys (musical and light-up)

to meet the individual child's needs and preferences.¹⁴ Studies show that time invested in preparation is easily redeemed in time saved during the procedure.¹⁵ The child is able to cooperate with the procedure, and the parents remain calm.

The preparation process requires constant reassessment of what the child needs and what she or he is experiencing. Preschool-aged children have misconceptions about medical equipment, and readily use their imagination in order to invent uses for the equipment.¹⁶ A child (or parent) who is under stress, anxious, or worried about the PSG procedure is likely to have trouble processing information. Since children often regress during stressful situations, explanations may need to be adapted to a developmental level that is younger than a child's chronologic age. Verbal repetition, rehearsal, and medical play are helpful preparation strategies for children. Demonstrating or practicing on a doll and incorporating coping techniques into play can help to externalize the experience and internalize the information¹⁷—for example, placing a sticker near a doll's eye, stressing that the doll can “still see,” and then encouraging the child to decide which book the doll will choose to look at first. It is also important to keep in mind that children may have misconceptions about what is happening to them and become anxious. They may think they will never go home or that the equipment will stay on their body even after they go home.

STRATEGIES THAT CAN IMPROVE PSG QUALITY AND EXPERIENCE

Preparation Before the PSG Study

Providing preparation prior to a procedure lessens anticipatory anxiety and procedural distress, increases cooperation, improves parental satisfaction, and has a more positive impact for future procedures.¹⁸⁻²⁰ Pre-PSG preparation can be accomplished through a variety of media, including telephone, mail, Internet, or pre-PSG site visits. Sleep centers that offer PSG services to children should consider a designated PSG resource person (or other pediatric care specialist) who interfaces well with families and who can provide additional time to answer questions or to suggest preparation and coping-skill strategies to make the PSG experience more child-friendly.

Scheduling the Study

Typically, the initial contact with the family is made via telephone when the PSG is scheduled. Since many children who are referred for PSG have significant medical comorbidities relevant to either the performance or interpretation of the PSG (for example, trisomy 21), the general sleep and health information gathered by the scheduler should be organized to quickly identify pertinent medical conditions, behaviors, or developmental issues that signal the need for more-detailed follow-up by the designated PSG resource person. In addition, the PSG should be assigned to the evening and night technical staff who are most comfortable with children and families.

Timing of the Study

The testing should be scheduled around the child's usual sleep and wake cycle and allow a sufficient amount of time prior to the PSG set-up for the child and parent to settle into the room. In our

experience, at least 1 hour should be available for the most cooperative children, with longer times anticipated for children with special needs or when application of a full electroencephalographic montage has been requested. Since toddlers and preschool-aged children typically sleep 11 to 12 hours at night and school-aged children sleep 9 to 10 hours, scheduling pediatric patients means using staff for longer or at nontraditional shift times.

Confirmation Letter

Families should receive a letter that confirms their child's appointment and arrival time, describes local logistics (for example, directions to the sleep laboratory, parking availability, registration issues, what to bring, reminders about no caffeine, limited or no naps, no skin or scalp lotions, policies for medications, meals, and snacks), and a brief explanation of what to expect the night of the study. Existing confirmation letters should be reviewed for “child friendliness” and revised as needed. For children, the “what to bring” list may include transitional objects (for example, a special blanket or stuffed animal), items familiar to the child's usual bedtime routine (for example, bedtime stories, a snack, or a bottle) and favorite toys or videos to keep the child occupied during the PSG set-up. The name and contact information for the designated PSG resource person should also be included, along with a brief description of their role and how they might help the family in preparing their child for the procedure.

Preprocedure Telephone Call

At our institution, preprocedure preparation phone calls are routinely made to parents of children higher-acuity disorders (for example, those with trisomy 21, autism, severe behavioral issues, development delays, cerebral palsy, or neuromuscular weakness). In our experience, these calls are important because, typically, these children and their parents are more easily overwhelmed by sensor application. Even though parents hear a preliminary explanation of the procedure from the referring physician or sleep medicine specialist, they often retain only a small portion of it. The goal of this preliminary telephone call is to describe the PSG procedure in greater detail, offer suggestions on how to prepare their child for the test, discuss coping techniques, and answer other questions the parents may have. Preprocedural telephone calls often last from 10 to 45 minutes and are facilitated by “trigger” questions such as:

Tell me what you know about the sleep study?

Has your child had any other tests (prior sleep studies, electroencephalograms) or hospital experiences?

How did your child manage during that experience?

What was and was not helpful?

After explaining the PSG set-up to the parents, the caller should seek information on how the parents think his or her child will do, what she or he thinks might be helpful to elicit cooperation, and what the child's likes and dislikes are. A plan to help the child manage the procedure is then developed with the parent's input. If a prior medical experience had negative or exaggerated memories for the child, those memories will be strong predictors of distress levels during future encounters with the same or other stressful events.²¹ The information gathered during this preprocedure telephone call is conveyed to the night PSG technologist through documentation in the patient's medical record. The med-

ical director also reviews this information so that any additional concerns that may impact study performance are anticipated and managed preemptively.

Optional Pre-PSG Daytime Visit

Sleep laboratories should offer the option of a pre-PSG visit for pediatric patients in the same way that surgical centers offer presurgical preparation visits for children. A recent study²² found that a preparation program for children and families before surgery lowers anxiety and increases comfort level about the upcoming experience. These preprocedure visits can help children and their families familiarize themselves with the environment as well as participate in an individualized preparation session. They can be especially helpful in both building a relationship with the child and creating a positive and nonthreatening experience. Such visits are strongly recommended for autistic children or children who have a difficult time adjusting to new situations.

During the visit, the parent and child are given a tour of the “their bedroom” that they will have during “their sleepover.” They will see not only where they will be sleeping, but also the sleeping accommodations for the parent in the same room. During this visit, the PSG resource person reviews the sleep study set up. Using a doll and the PSG sensors, the child can participate along with the technologist in applying the sensors while an explanation is given for each one. Assessment of the child’s and parent’s understanding, as well as their attention span and nonverbal cues, are continually made during the preparation session. Although preparation involves the parent, it should progress at the child’s pace and never be forced. If the child does not seem to be listening or focusing, attempts should be made to redirect. If unsuccessful, demonstration and explanation should continue with the parent. The parent can review the information with her or his child at home, where the child may feel more comfortable. A plan for managing the experience is also developed. The discussion should include what the child and parent will be doing while the technologist applies the sensors, such as whether the child is going to help place the sensors or choose other optional activities that are available (for example, looking at books, blowing, bubbles or watching a movie).

A pre-PSG visit may not be feasible for some families due to work schedules or travel distance or in communities where the sleep laboratory is not in physical proximity to the specialty clinic. In these cases, written information about preparing a child for the experience with a step-by-step guide to what happens during a PSG can be beneficial. The guide should be written so that parents can understand it and should include words that can be used with their child. The parents can then talk with their child and feel confident in their explanations. Preparation time prior to the scheduled PSG helps family members to feel empowered, confident, and relaxed when they know what to expect and have had questions answered prior to their child’s procedure night. A parent can then be emotionally present for and supportive to her or his child during the PSG experience.

Specific Environmental Considerations

Sleep laboratories that accommodate children need to plan for certain safety needs: emergency equipment, medical-alert procedures, staff training for emergencies, and medical back up appro-

priate for children. The unit and sleeping quarters need to be quiet, comfortable, and child-friendly. There must be parent-sleeping accommodations in the child’s sleep area. Laboratories should anticipate requests to accommodate more than 1 parent. Access to refrigeration and cooking appliances are needed for infant formulas or special foods. Common safety considerations include access to cribs with safety tops, availability of beds with protective rails, access to extra linens and padding, safety plugs in wall outlet, and coverings for sharp corners on laboratory furniture. When young babies and young children are tested, anticipate crying that may disturb adult patients and consider other scheduling options. Unfamiliar or ill-appearing adult strangers in the waiting areas may frighten children so that separate locations for meeting and greeting children and their families should be considered.

Preparation on the Night of the PSG Study

Ideally, when the parent and child arrive for the PSG, the parent and child have already been prepared for the study. If a telephone call or visit was not possible, relationship building and preparation begins as soon as the child and parent enter the unit. This includes a short but relaxed time during which the sleep technologist begins to build a rapport with the child and parent, gathering information on the child’s previous procedural experiences and the child’s manner of coping with those prior experiences.

Difficulty with prior medical or procedural experiences is often the greatest predictor of how children will cope with future procedures.^{21,23} An important part of information gathering is listening to the child and parent. Parents know their child and how he or she handles new situations, whether shy or slow to warm up and what is the best approach to use with their child. The sleep technologist can facilitate this discussion by asking “What is helpful to your child?” or “What can we do to make your child’s experience easier?”

Exploring a child’s past experiences and coping strategies^{21,24} can identify the need for additional interventions. A parent may report “It took 6 people to hold him down last time we were in the hospital. You’ll need to get some help.” A supportive response from the sleep technologist might be “We have been very successful in using a more child-friendly approach. I don’t expect we will need anyone to hold him down. This is how we help children here...” Additionally, the sleep technologist can explore what the child thinks will happen during his or her stay by asking, “Tell me what you know about your sleepover tonight.” The sleep technologist is in an ideal position to clarify any misconceptions or confusions that the child may have. For example, children may be fearful that the sensors can read their minds or see their dreams.

Creating an inviting, calm, and relaxing atmosphere sets the tone for the evening. Although it is efficient for sleep technicians to have all of their set-up supplies prepared and laid out ahead of time, the sensors, paste, gauze, and tape may be frightening to the child. These supplies should be covered or discretely placed out of the child’s first view of the room. Consider a 3-year-old child and his or her parents coming to the laboratory for a PSG. What would be the first things that they see as they walk in the bedroom where they would be sleeping? Having a few books and an interactive toy placed on the bed can instantly help a child feel more comfortable, more relaxed, and possibly more willing to participate. Gentle background music may be helpful as well. Conversations should remain primarily focused on the child, keeping her or him at the center of attention. A procedure can get

out of control quickly when several people are talking at once. The environment also must be calm with quiet soothing voices. Voices that escalate in volume and assertiveness can induce a greater level of tension and anxiety that may lead to uncooperativeness. One quiet voice can change the entire atmosphere in a room. Therefore, speaking in a low tone with soothing timbre helps everyone to remain calm.²⁵

Developmentally Appropriate Explanations

As discussed earlier, procedural explanations should be based on the child's developmental level. Appendixes A and B provide examples of child-friendly terminology for various PSG-related activities. A younger child needs short, objective, and concrete explanations and descriptions. An older child can understand a little more-detailed explanation such as, "This is a little metal cup the size of a pencil eraser. It helps the doctor know what your brain is telling your body to do, like move these eye muscles so you can close your eyes." Some older children prefer more information as a learning tool about their body. They may want to know how the body lets the technologist know that they are in rapid eye movement sleep. Inclusion of sensory information in the conversation will help desensitize and engage the child during the PSG experience, such as, "There is a tiny wet spot in the middle of the sticker. Some kids say that the wet part feels cold. Tell me how it feels for you." Time descriptors are also helpful for the child to know how long he or she will experience a certain feeling, for example, "Help me count to 5 while this special glue dries."

In addition to developmentally appropriate explanations, word choice and honesty are equally as important. The staff should avoid giving overly detailed descriptions that may cause fears or misunderstandings or encourage fantasies. Explanations need to include sequential information specific to what the child will directly experience on a sensory level before, during, and after the study. A helpful comment might be, "I'm going to use a cotton applicator and a special cleaning lotion to clean a little spot on your skin where the sticker will go. Some kids say the lotion feels like it has a bit of sand in it. I'll put some on your finger so you can feel. You tell me how it feels for you." Another sample comment could be, "In the morning, the stickers just slide right off when we use this special pink liquid. Would you like me to show you now?" The sleep technologist should continually reassess the child's verbal and nonverbal cues and how the child is managing, then adjust their approach accordingly.

Procedures are very serious experience for children. Words and phrases that may be helpful for one child may be overwhelming to another. Children take comments literally and may not understand teasing, sarcasm, tickling, or humor. Such techniques may build rapport for an older child but may be perceived as confusing to another child and, even worse, be considered as lacking understanding, empathy, and compassion by the parent.²⁶ Some words and phrases can also have a way of predisposing people's thoughts about upcoming events and discourage interaction.¹⁷ For example, instead of saying "That was hard for you," the sleep technologist may want to say, "How was that for you? Was it the way you thought it would be?"

In addition to choosing appropriate words, focusing on the child's desired behavior and giving positive reinforcement encourages interaction and cooperation. Sample comments include, "You are sitting so still while you are blowing bubbles.

That is so helpful to me!" Words such as "super," "incredible," "fantastic," and "awesome" should be used frequently. Children feel proud when they are praised for being such wonderful helpers and holding so still.⁵

Positioning for Comfort

Since the PSG set up may take up to 1 hour, comfortable positioning is important for the child, parent, and the technologist. Typically, the most comfortable position for the child is the sitting position, either on the bed or in a parent's lap, especially after the child has achieved the milestone of sitting. The sleep technologist should help the parent and child settle into a comfortable position that accommodates the technologist's needs as well. This may mean raising the bed to limit the amount of bending required or having a taller chair for the parent to sit in while holding their child.

There should be no need to lay a child down or restrain him or her to apply sensors, even if a child is upset or squirmy. Parents can hold their child in familiar positions of comfort, in a chest-to-chest hugging position or sitting sideways on a parent's lap or sitting forward for specific activities (see Figure 1). In these positions, children feel less vulnerable, can maintain a sense of control, and can cooperate. They still may cry, but they do not flail to get free.⁵

Coping Techniques

An important goal of family-centered care is the development of individual coping plans for children and parents that will support them throughout the procedure, thereby increasing their ability to cooperate and master the experience. Sleep technologists begin the process of developing a plan for coping with the child and parent by asking them, "What do you think would helpful to you (or your child) to get through this procedure?" So much is done to a child in the medical setting. The sleep technologist can turn this experience around by encouraging child's and parents' participation so that the child is an active participant rather than passive one. Participation gives the child and family an element of control, where previously they had very little.

One helpful approach is to give the child and parent choices. For example, would the child like to help the technologist or would he or she like to play with some of the toys that are available? If a child chooses to help, give jobs that are appropriate for his or her age, such as holding the gauze squares or taking the backing off the stickers. Other choices may include, "Which finger would you like to use for your finger nightlight?" or "Would you like to hold this mirror and watch as I put the stickers on your chin?" Coping effectively does not mean the child does not cry. If a child cried during the set-up but tried to hold still or was held in a comforting position by the parent, then the child did his or her job.



Figure 1—Positioning for Comfort During a Child's Polysomnography Set-up

Most parents intuitively use distraction techniques to help their child manage a difficult experience. Distraction is effective in reducing a child and parent's anxiety during procedures.²⁷ It can be as simple as talking with the child or singing or stroking him or her. Visual and interactive distractions are effective with children who are 3 to 6 years old; such distractions include hand-held water game toys, musical and light-up toys, bubbles, and "look and find" books.²⁸ Toys are a child's familiar domain and promote interaction and offer a bridge to establish rapport, trust, and cooperation with the child. Television with a videocassette recorder or digital video recorder and video games are also helpful distracters for older children and teens and are routinely available in most laboratories.

A "distraction box" can be created and kept in the PSG unit containing easy-to-clean plastic toys and books. Cleaning and disinfecting items between patient use should follow the infection-control cleaning policies at the individual institution. These child-friendly "tools" are used to enhance a child's cooperation, coping, and control, as well as to encourage a child's active participation. Examples of useful distracters are listed in Table 2. They help to reduce anxiety and encourage relaxation by helping a child focus his or her attention, thoughts, and actions away from the stressful experience.²⁹

The use of coping "tools" may involve objects, but ultimately what makes them successful is how the people involved use them. One of the most popular, successful, and inexpensive distraction tools is soap bubbles that can be used in a multitude of ways. For example, if an air hose is being used to dry paste or collodion, the child may be allowed to blow the bubbles with the air hose; the air hose may be used to blow the floating bubbles toward the parent; the child may pop the bubbles with his or her toes; or the child, parents, or technologist may make up a silly song about popping bubbles. Also, blowing bubbles toward the ceiling so the child will look up can help the technologist gain access to the neck for the chin and snore sensors.

The use of distraction toys does not negate the importance of preparing children for procedures. Preparing a child for what is about to happen is essential even if it is a simple as, "While you are blowing bubbles, I am going to place these blue stickers on your chest." Distraction techniques alone without providing developmentally appropriate preparation and explanation, positioning for comfort, and engaging the parent in the procedure will not adequately address the emotional needs of younger children.

Beginning the PSG Set-Up and Use of Medical Play

Ongoing verbal explanation during the PSG set-up is enhanced by the use of medical play experiences. Medical play reduces a child's anxiety and increases parental satisfaction with the course of the procedure.³⁰ Demonstrating what will be happening is fundamental to facilitating a child's cooperation. One of the best ways to achieve cooperation is to demonstrate what will be happening on a doll and allow the child opportunities to handle the doll and equipment. Broken electroencephalogram leads and other sensors can be saved to create a reusable "preparation kit." Verbal comments such as, "We first need to clean a little spot on the baby doll's 'skin' so her skin is clean and the sticker will stick" will help the child (and parent) to internalize important information. For example, giving the child a cotton applicator with some special lotion to "clean a little area on the baby doll while I clean a few

small spots on your skin" helps the child use medical play as a coping technique. If a child brings a favorite stuffed animal with her or him (for example, a transitional object for sleep), do not assume that it can be used as the model. Sometimes those items are too special and very protected. The sleep technologist will need to ask permission from the children to show them on their stuffed animal what will be happening. Furthermore, a child's permission must also be gained before demonstrating on the parent, since a child may not like anything happening to his or her parent either. Therefore, it may be safer to use something that the child has no attachment to for medical play.

Even with the best preparation and coping techniques, children still may become overwhelmed by the experience. They may not want to touch the equipment. The sleep technologist must recognize the need to change approaches and adjust to the sensitivity of the child when needed. Using the equipment in fun and non-threatening ways may lessen the child's apprehension. For example, let the children paint with a cotton applicator and water on colored paper while a cotton applicator is being used to clean their skin; put "fun stickers" (for example, cars, rainbows, etc.) on top of the medical stickers; or use the air hose to blow bubbles. After this desensitization time, the sleep technologist can proceed with the preparation, demonstration, and application. One technologist in our institution was successful with a very scared, autistic, 2-year-old, whose favorite toys were trains, by incorporating all aspects of train terminology into the PSG set-up. The elastic bands became the "railroad tracks," the electrocardiogram sensors became the "control buttons for the whistle," and so on. Using these objects in play helps the child gain some control where there are few choices. The experience will become less threatening because the child will be more actively involved in the set-up.

Patience, flexibility, and a positive attitude are a prerequisite for staff working with children. When the sleep technologist approaches the night with confidence and assumes the child will cooperate, even when the medical history and preadmission telephone call data would predict the opposite, they are portraying themselves to the child and parent as relaxed, confident, and professional. Even when limits and redirection are needed, the technologist's attitude must remain calm and patient. Positive suggestions can go a long way toward helping a parent and child reframe their expectations of the experience such as, "I think this may be easier than expected."

Role for Parents

Parents need a clearly defined role as part of the team. The job for the parents in the PSG unit is to be involved with their child and to support and comfort their child during the set-up using techniques that are familiar and helpful at home, such as a pacifier, cuddling, stroking, etc. The parents' role may need to be spelled out for them. For example, "Your job, mom, is to help (child's name) hands stay busy with the toys and also to comfort him or her. (Child's name) job is to stay as still as she or he can and in one place. (Child's name), which toy are you going to play with while I am putting the stickers on your chest?" Parents may also need guidance, support, and encouragement to keep their focus on their child. If the parents are watching the technologist, their attention should be directed back to their child by saying, "Mom, can you guess what is under that flap in the book that (child's name) has?" If the parent is chatting too much and

neglecting the needs of their child, again, refocus the parents back to their child. For example, the technologist may say, “(Child’s name), mom is going to give you a big hug (this will keep the child still) and let’s see...what song would you like mom to sing (this is the distracter)?” Parents may arrive nervous or anxious, wanting their child to cooperate and embarrassed when the child does not. The parent may need extra guidance, support, and redirection at this time as well. The sleep technologist should model appropriate behavior for the parent. Use a calm voice with positive directions to the child. If a parents order their child to sit still, the technologist may say, “Mom, let’s see if (child’s name) can find who is hiding under the flaps in the book while he or she hold his or her head still.”

Parents who are paid little attention by staff and who have less input, remain more anxious, focus on the mechanics of the procedure, and tend to ignore their child, while parents who interact with their child during a procedure are calmer.^{24,31} When the sleep technologist incorporates the ideas, suggestions, and requests of the parent and the child into the procedure, the family will feel respected. When a child and parent are more timid about ideas for play or distraction, it is helpful to suggest choices. For example, the technologist might say, “Let’s keep your hands busy (child’s name)? Would you like to look through this flap book or push the buttons on this toy?”

It is important to reassure the child frequently that he or she is doing a good job or trying hard even if the set-up has been difficult. For example, “I see that you are trying really hard to hold your head still (child’s name). Let’s see you give mom an even bigger hug. It is so helpful to me when you hold so still.” Alternatively, the technologist can say “I noticed when you were looking at the noisy book that you concentrated so hard on the sounds and guess what? You were holding your head so still! That was so helpful!” Also, pay attention to the nonverbal cues; try to recognize and validate the child’s feelings. For example, “I notice your face looking different than when we were playing before. Tell me what you are thinking, so I can be helpful to you.” In addition, praising the parents and telling them how helpful they are encourages them to continue the good work that makes the PSG procedure a team approach.

Even after trying to create a child-friendly environment and setting the stage to provide a positive experience for children and their families, there will still be challenging situations. Sleep technologists should recognize when their own stress levels are rising. They should take a time out for themselves and try some of these suggestions: take a deep breath and let it out slowly (this relaxes one’s muscles and gives a few second reprieve); smile (even if they doesn’t feel like it); play with the child for a few minutes to connect on more neutral ground; count to 10; or enlist the help of the parents to see what suggestions they may have. After all, the sleep technologist, the parent, and the child are on the same team.

What If the “Team” Has Done Everything Optimally and Sensors Still Cannot Be Applied?

Even under the most ideal preparation circumstances, it may be impossible to successfully apply some or all of the sensors. One option is to consider waiting until the child falls asleep to place the remaining sensors. For children, the nasal airflow sensors are often the least well tolerated but may be successfully applied after sleep onset. Another option is the use of limited-channel

montages (pulse oximetry, a few cardiorespiratory sensors, and video supplemented with behavioral observation of sleep, wake, arousals, and snoring), especially if the clinical question was SDB. Specifically for SDB, the more severe the SDB, the fewer sensors needed for detection. In any event, sedation should not be used to facilitate sensor application when the indication for PSG is SDB, since these drugs can worsen upper airway obstruction and precipitate respiratory arrest.³²

AFTER THE PSG STUDY

The child and the family will remember the positive efforts of the child-friendly sleep technologist even when the child has cried during the PSG set-up or when all the desired signals have not been perfectly acquired. The success of one’s pediatric PSG services should be monitored with patient-satisfaction questionnaires and periodic reassessment of policies, procedures, and performance. We have used the family-centered care model in our approach to pediatric PSG for several years. At our outpatient pediatric sleep laboratory, almost half of the PSG referrals are for children under age 6 years and almost one-fifth have major medical or developmental comorbidities. One measure of success has been the positive feedback from our parent “morning after” questionnaire that asks whether the study night was typical of the child’s sleep and breathing, whether anything bothered the child, and how could we have made this testing easier for you or your child? In 83 consecutive studies in the past 3 months, 32 parents (39%) responded to the last question by spontaneously writing in “thank you-type” compliments directed to the technical staff. Even in the 12 “technically challenging” (ie, worst) studies in which there was either persistent patient-related sensor loss or need to default to a limited-channel montage, 7 (66%) of the parents specifically wrote in praises for our technical staff. Based on our local experience, we encourage all sleep laboratories that offer sleep services for children to consider incorporating a family-centered care approach to pediatric PSGs. Sleep centers will then have the opportunity to use process measures to independently assess changes in study quality and patient satisfaction before and after implementation of this approach.

SUMMARY

The PSG-specific preparation and coping techniques for children undergoing this procedure described in this manuscript are the direct result of the involvement of the child-life specialists assigned to assist with procedures on our epilepsy and sleep-monitoring unit. In our experience, their observations, interventions, and work with our sleep technical staff to develop a more “child-friendly” approach to the PSG procedure have been invaluable in improving study quality, child and family satisfaction, and technologist confidence. The family-centered care approach is a basic tenet of patient care in a children’s hospital but is also appropriate for any setting in which children are exposed to medical procedures, including outpatient offices and laboratories. Although its application to the PSG procedure seems intuitive, this has not been tested. Using a family-centered care approach to the PSG procedure in children may be an ideal quality-improvement initiative that can be evaluated by formal satisfaction survey methods.

After reading this article, some sleep laboratories without access to these specialized pediatric support services may be con-

cerned that performing PSGs in children will be too labor intensive, too time intensive, or beyond their local expertise. There is no doubt that the decision to accommodate children (and families) in the sleep laboratory will be resource intensive because of the longer set-up times and longer sleep periods. However, the use of a family-centered care approach is more of a “mind-set” change that can be easily learned and practiced. Sleep technologists who are more successful with pediatric PSGs are likely to have already incorporated many of these techniques into their technical repertoire. Sleep centers looking for more direction may want to identify local or regional expertise such as certified child-life specialists³³ who can assist and support staff development to upgrade their pediatric PSG services and improve both study quality and patient and family satisfaction.

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Appendix A

Examples of Child-Friendly Terminology for Polysomnography Sensors

INSTEAD OF ...

TRY THIS EXPLANATION ...

Leg-movement sensors

A “movement sticker.” A rectangle sticker with a skinny string attached that shows how much your legs move while you sleep.

Sensor or monitor electrodes, leads
(eg, electrocardiogram, eyes and chin sensors)

Oval stickers the size of a quarter for your chest, near your eyes, and under your chin. The sticker has a small wet spot in the center and a snap with a skinny string attached. This will show your heartbeat, eye movement, and muscle tone while you sleep.

Belts

“Soft, stretchy bands.” One for around your tummy, and one for around your chest. This will show how you are breathing while you sleep.

Pulse oximeter

A “finger nightlight.” It looks similar to a Band-Aid™ with a tiny red light on it. It will be on 1 finger or toe and will show how well you are breathing (or how much oxygen you have in your body) while you sleep.

Electroencephalogram electrodes

“Tiny gold cups” or “hair jewelry” the size of a pencil eraser with a skinny string attached. It is put on your head and shows what your brain is telling your body to do while you sleep.

Air hose

A “mini hairdryer.” It looks like a small silver pencil, and it blows cool air. It also makes a “shooo” sound as the air comes out.

Snore sensor

A “movie star microphone.” A small sticker the size of a penny with a skinny string attached. It is placed on your neck and shows if you make any noises while you sleep.

Thermistor

A “sticker moustache.” A small sticker that rests under your nose and above your lip. It shows if you are breathing through your nose or your mouth while you sleep.

Cannula

A “clear plastic moustache.” A soft plastic tube that rest under your nose to show how hard you are breathing out of your nose while you sleep.

Video camera

You are a “movie star” tonight. Your doctor can see a movie of you while you sleep. Both the movie and the stickers will help the doctor know how you sleep and then she or he can figure out how to help you to get a better night’s sleep so you won’t be so tired during the day (or will learn better in school, etc).

Appendix B

Examples of Child-Friendly Phrasing for Explanations of Polysomnography-Related Procedures

INSTEAD OF ...

Welcome to our sleep laboratory

Let's get this over with so you can go to sleep.

Your mom is allowed to stay if she wants.

I'm going to start with these stickers.

This part may hurt.

That doesn't hurt!

I know ... I'm the bad guy.

You're going to be mad at me for doing this.

Will you still be my friend after this is all done?

Don't look at what I'm doing.

If you don't stop moving, Dad will have to leave.

I can't get the sticker on because you are moving too much.

I don't want to have to do this again.

If you don't hold still, it will take longer ... we'll have to do it again.

Don't be sad ... scared ... angry.

Hurt

You will feel ... It feels ...

TRY THIS EXPLANATION ...

Hi! You must be (child's name). I see you and mom/dad are here for your sleepover.

I'd like to talk with you and your and mom/dad about what will be happening tonight. We don't want any surprises for you. You can help yourself by asking any questions you might have.

Mom, your job is to comfort your child while we put the various stickers on. Come with me, and I'll help you get settled and explain further.

Tell me what you know about this test. Has (child's name) had a sleep study before? ... How did it go? ... What was helpful?

Some kids say this feels scratchy, uncomfortable, etc. You tell me how it feels for you.

Tell me how it feels. Some kids say it feels cold, a bit scratchy, etc. Let's think of a way together that we can make it feel warmer, less scratchy, etc.

I'm sorry you need this test, but it will help your doctor know how to help you sleep better at night.

I am so proud of you for holding still while I put the stickers on you. You have been so helpful to me!

Do you want to help me put the stickers on your chest? Some kids choose to help, and some choose to look at our books or play with our toys. What would you like to do?

You and dad are such a good team. Dad, could you and (child's name) sing a favorite song?

Your job is to hold your head (or other body part) as still as you can. Mom's hand is on your cheek (or whatever body part) to help remind you to hold still.

Can you hug your Daddy a little tighter? ... Let's see you push all the green buttons on this toy.

How was that for you? ... Was it the way you thought it would be? ... Harder or easier? ... Is there something else we should tell children and their mommies or daddies about this test? (Avoid telling a child what they feel or experience with out first asking them)

Uncomfortable ... bother ... bothersome ... more comfortable. Some kids say it feels ... You may notice or discover ...