

PedsCases Podcast Scripts

This is a text version of a podcast from PedsCases.com on “**Sleep Disorders.**” These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Sleep Disorders

Developed by Nikytha Antony and Dr. Joanna MacLean for PedsCases.com.
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Introduction:

Hi, my name is Nikytha Antony and I am a University of Alberta medical student. This podcast was done in collaboration with Dr. Joanna MacLean, a pediatric respirologist and a sleep medicine specialist at the University of Alberta.

This podcast is going to be all about the thing that we all wish we could have more of: sleep!

The objectives for this podcast are:

- Describe sleep physiology and stages
- List the sleep needs for different age groups
- Describe the best practices for sleep hygiene
- Understand common sleep disorders

Let's start with a case study:

You are a third year medical student rotating through a pediatric community clinic. The first patient of the day is an 8 year old boy whose mom has noticed that he screams during the night. He usually screams around 11pm in the night about 2 or three nights a week. There have been no sleepwalking episodes and he is able to go back to sleep right after the event and has no recollection of it the next day. He is not sleepy during the day. You are unsure about what to ask next. Are these nightmares or night terrors or something more sinister such as frontal lobe seizures? How can you tell?

We will revisit the answer to this case at the end of the podcast.

What is the physiology of sleep and its stages?

Sleep is a reversible physiological state during which there is reduced metabolic and motor activity and responsiveness (1). There are two main categories of sleep stages: rapid eye movement (REM) and nonrapid eye movement (NREM) sleep (1, 6). REM sleep is associated with a decrease in muscle tone and bursts of eye movements and dreaming occurs during this stage (1). NREM sleep is divided into stage 1, 2 and 3 (denoted as N1, N2 and N3). N1 is the light sleep while N3 is the deep sleep in which it is the hardest to wake someone up (1, 6). Each stage has a unique electrical pattern of the brain that can be distinguished using electroencephalography (EEG) (6). Typically, adults cycle through N1, N2, N3 and REM sleep stages about 4 to 6 times a night. NREM sleep tends to be longer at the beginning of the night and REM sleep increases during the latter sleep cycles (6).

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The polysomnogram is a tool for assessing sleep in both children and adults. It is a nightlong test and it consists of various sensors being used to measure the sleep stage as well as the cardiac and respiratory function during sleep. The sleep stage is determined through a combination of muscle tone, eye movements and EEG recordings. The electrocardiogram (ECG) assesses the heart function. The respiratory function is analyzed using sound and video monitors, air flow through nose and mouth, nasal airflow pressure, chest and abdominal movement and oximetry (2).

A detailed history is very important to evaluate the cause of the child's sleeping pattern. A good acronym to use is BEARS. B stands for bedtime issues and bedtime hygiene and bedtime environment, E stands for excessive daytime sleepiness, A stands for nighttime awakenings, R is the regularity and duration of the child's sleep as well the time it takes to fall asleep and S stands for snoring or sleep apnea. It is also important to take a thorough medical history since medical illnesses and medications may affect the child's sleep as well (2). A good history and physical exam can distinguish between behavioral causes versus more organic causes of sleep disorders.

Different age groups have differing sleep-wake patterns and requirements (1,6). Infants need to sleep the longest (16 to 18 hours in a day) and they sleep without a clear circadian pattern early on (1, 6). They also tend to enter sleep through REM instead of NREM and have a higher proportion of REM sleep. At around 3 months of age, they start to develop a circadian sleep pattern and enter sleep through NREM sleep (1). Adolescents have a decreased sleep duration requirement compared to infants and children. It is about 10 to 12 hours in children and an average of 9 hours in adolescents and this decreases as we age (1,6). Also, as we age, the amount of time spent in deep sleep (N3) decreases (6).

Bedtime hygiene is really important for obtaining an adequate and restful sleep. It is important to have a consistent bedtime routine that is non-stimulating (i.e. no screen time). Screen time should end at least an hour before bedtime. The bedtime routine should be about 20 to 45 minutes and include soothing activities such as taking a bath, or reading bedtime stories. A consistent bedtime and sleep schedule will also help reinforce the child's circadian rhythm. Positive reinforcement with rewards for good bedtime behavior can help children stick with the bedtime routines (3)

Sleep deprivation can have deleterious effects on both the child's mental and physical growth and development (7). Thus, it is very important to figure out the cause of the sleep disorder and address it quickly.

The most common sleep disorder is insomnia, which describes a problem with getting to sleep or staying asleep. A parasomnia is an abnormality of arousal, partial arousal and sleep-wake transitions. Other common sleep disorders are sleep disordered breathing and restless leg syndrome (5).

Sleep disorders in children could occur in either the NREM or REM sleep. Some common NREM sleep disorders include sleepwalking and sleep terrors that occur due to impaired arousal from NREM sleep and usually occur early in the night (4). REM sleep disorders include nightmares and sleep paralysis and usually occur later in the night. Some sleep disorders also occur during the transition from sleep to wakefulness and these include restless legs syndrome and sleep talking (4).

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Insomnia can be frustrating for both the child and the parent. There could be several factors that contribute to insomnia in a child. Children with low sensory thresholds and sleep pattern regularity are reported to have nighttime awakenings more often (5). These kids present with difficulty falling asleep or staying asleep, they might have several awakenings each night for which they need parental comfort to fall back asleep. Also, the pattern of sleep might be very variable, with no awakenings or trouble falling asleep one night and the opposite another night (9). Most infants past 6 months of age can sleep the whole night without being fed (5). The child should learn to sleep through the whole night without parental engagement. Parents should be taught to reassure the child but not engage them so that the child learns to fall back asleep independently. This will reduce the number and length of future awakenings. It is also important to have good bedtime hygiene and a regular bedtime (5).

Night terrors usually occur in the first 3rd of the night during NREM deep sleep stage or N3 (4,6). These typically present in children between the ages of 4 and 12 (4). These children present with the parents complaining about their activity during sleep but are otherwise healthy. During the event, children may sit up in bed scared, move around and experience metabolic changes such as an increase in heart and respiratory rate, after which the child may go back to sleep (4). The child has no recollection of the episode the next day (4). Parents should be reassured that the child is not in pain and they should just let the night terrors run its course since the child cannot be comforted during the night terror. It is important for the child to have a regular bedtime so that they can get adequate sleep each night since sleep deprivation prolongs the deep sleep and can result in more frequent episodes (5). Anything that disrupts sleep, such as a fever, illness, or change in the daytime or nighttime routine can precipitate night terror. Nightmares on the other hand occur during REM sleep, in the latter part of the night. They are disturbing to the child and often cause them to wake from sleep. After awakening from a nightmare, they are usually alert and are able to remember and tell the parent about the dream. They usually have trouble going back to sleep but respond well to parents consoling them. Nightmares are also associated with stress, trauma and sleep deprivation. They can also be caused by anxiety and medication that increase REM sleep. They are usually self-limited; however if they are recurrent and problematic, a thorough evaluation should be done to look into the underlying causes or contributing factor (4,5)

Sleepwalking is often associated with night terrors. It also occurs in the NREM deep sleep stage and is common among the ages of 8 to 12 (4, 5). About 15% of all children have had atleast one sleepwalking episode (6). It is usually harmless but parents must be aware of safety concerns and try to keep the environment free of objects that could potentially harm the child while sleepwalking and ensure that outside doors are safely locked. If the sleepwalking is excessive, a bell could be put on the child or the bedroom door so that parents could be alerted to the child walking out of bed. As with night terrors and nightmares, sleep deprivation should be avoided as much as possible (5). A small dose of clonazepam before bed can also decrease the incidence of sleepwalking (6).

Sleep disordered breathing describes any breathing concern that happens during sleep or is worsened by sleep including snoring, obstructive sleep apnea and central sleep apnea. Obstructive sleep apnea is a lot more common than central sleep apnea (6). Obstructive sleep apnea may present with symptoms such as snoring, morning headaches, and excessive daytime sleepiness and irritability during the day (5). During an obstructive sleep apnea episode, the airway of the child becomes blocked and thus the child struggles to open up the airways again. By contrast, in central apnea, apnea comes from a pause in breathing and there

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is no effort to breathe(6). Obstructive sleep apnea tends to be worse during REM sleep due to lower muscle tone in this stage. It is often associated with adenotonsillar hypertrophy, obesity and facial malformations and thus it is important to perform a detailed physical examination (6). It typically occurs between the ages of 2 and 6 years and it exists in about 1 to 5% of otherwise healthy children (6, 7). It is diagnosed using both the clinical and physical examination as well as findings on the polysomnograph (7). In regards to therapy, the family physician or the pediatrician could try intranasal corticosteroids, increasing the height of the bed so that the child is not sleeping supine as well as recommending weight loss if obese before referral for more invasive measures such as adenotonsillectomy or continuous positive pressure airway (CPAP) treatment (8).

Restless Legs syndrome is an uncomfortable sensation in the legs that is relieved by movement. It is a disorder that occurs during the transitions between sleep and wakefulness but can also occur during the day. Children usually describe it as a “creepy-crawly” feeling in their legs right before going to bed or at periods of rest throughout the day. The exact cause of this disorder is unknown but it has been associated with a deficiency in iron. Thus, it is important to order a serum ferritin if this disorder is suspected (2, 6).

If there are red flags on the history and physical examination on the above mentioned sleep disorders, it is appropriate to order additional studies such as a polysomnograph or iron studies. Regardless of red flags, we need to address good sleep hygiene and how it can improve sleep in the child and consequently the parents as well.

Let's summarize the main points:

- REM and NREM are the two sleep stages. NREM sleep consists of N1, N2 and N3 sleep stages with N1 being the lightest stage and N3 being the deep sleep.
- The duration and quality of sleep differs among the different age groups. Infants need the most sleep while adolescents need about 9 hours of sleep each night.
- It is important to maintain good bedtime hygiene to obtain adequate and restful sleep. This includes maintaining a proper bedtime and a bedtime routine that is soothing and non-stimulating.
- There are sleep disorders that occur during REM sleep such as nightmares while others occur during NREM sleep such as night terrors and sleepwalking.

Back to our case, the boy had no previous history of seizures and thus the most likely diagnosis was night terrors since it occurs at the beginning of the night. The mom was told that it is not a danger to his health and he should work on having good sleep hygiene. She could also try waking him right before 11 pm so that it disrupts his current deep sleep stage and he would need to start a new sleep cycle.

Thanks for listening!

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