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Kids that go bump in the night

Background

Incomplete arousal from deep sleep in children causes night time disruption and can present as confusional arousals, sleep walking or night terrors. These nocturnal events are common in childhood but can be extremely concerning to parents and disruptive to families.

Objective

This article provides a framework for the initial assessment of children's nocturnal events.

Discussion

Occasionally night time disturbances are seizures. A framework discussing the clinical features of typical benign childhood events and how to differentiate them from seizure disorders is presented. Generally, sleep walking and night terrors are self limiting and children grow out of them. However, in some cases there are ongoing precipitants that are important to identify and treat.

■ **The night is broken by a spine chilling scream and a child starts running frantically around the house looking terrified as if someone is chasing them. In another house, a child quietly gets up when other family members are sleeping, and starts to dress in their school clothes and rearrange their school bag before wandering off to settle down to sleep on the living room couch. Down the street a mother holds her toddler who is screaming and yelling, and she worries he is in pain because she cannot soothe him. These are examples of the sometimes weird and disturbing night time events that parents describe to their doctor, terrified that there is something wrong with their child.**

Sleep is made up of two distinct states: nonrapid eye movement (NREM) sleep and rapid eye movement (REM) sleep. Rapid eye movement sleep is often referred to as 'dream sleep'. Nonrapid eye movement sleep is further divided up into four stages depending on electroencephalogram (EEG) characteristics:

- stages one and two (NREM 1&2) are described as light sleep
- stages three and four (NREM 3&4) are known as deep sleep.

In children, the majority of deep sleep occurs in the first third of the night, whereas most dream sleep occurs in the second half of the night (*Figure 1*).

Parasomnias are defined as 'undesirable events that accompany sleep' in the international classification of sleep disorders.¹ Parasomnias are further classified as those associated with NREM or REM sleep.

Nightmares are parasomnias associated with REM sleep and are therefore more common in the second half of the night. They are vivid dreams accompanied by feelings of fear that wake the child from sleep. The child is scared, yet interacts appropriately with caregivers, and can often relay what they are scared about. Nightmares are most common in children aged 3–6 years, with boys and girls equally affected.



The most common NREM parasomnias in children are those associated with incomplete arousal from NREM 3&4 sleep or deep sleep, and include confusional arousals, sleep walking and night terrors. As most deep sleep in children occurs in the first third of the night, the NREM parasomnias tend to take place within 2–4 hours after the child has fallen asleep. It is thought that as the child transitions from deep sleep to another sleep state they become 'stuck' and manifest features of being awake and asleep at the same time. Although the clinical manifestations of these NREM parasomnias can vary greatly, they share the following common characteristics:

- the child is confused and unresponsive to the environment
- the child has no memory of the event the next morning (retrograde amnesia), and
- the event is accompanied by varying degrees of autonomic activation (dilated pupils, sweating, tachycardia).

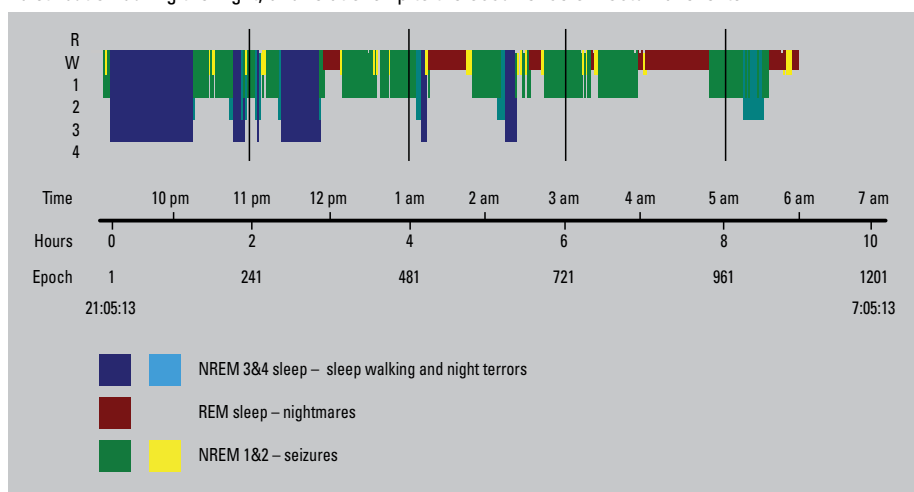
Nonrapid eye movement parasomnias occur in children of all ages but are most common between the ages of 2–10 years. More than one type can occur within the one patient. These events occur equally between boys and girls.

Clinical characteristics

Confusional arousals

Confusional arousals are more common in babies and toddlers and usually start with groaning and moaning which can escalate to the child becoming distressed and crying. Parents often describe it as a 'temper tantrum', except the child is unresponsive to the parents and their efforts to console them. Unlike sleep walking and night terrors, which tend to have an abrupt and sudden onset, confusional arousals tend to slowly build up and are frequently longer in duration.

Figure 1. Sleep hypnogram from sleep study in a normal boy, aged 7 years, showing sleep state distribution during the night, and relationship to the occurrence of nocturnal events



Confusional arousals can last up to 45 minutes and can occur several times during the night.

Sleep walking

Sleep walking occurs at least once in 15–45% of healthy children, with about 3–5% of children experiencing regular monthly episodes. It can occur as soon as a child can crawl or walk, but is most common between the ages of 8–12 years.² Sleep walking can range from quiet walking, performance of simple tasks such as rearranging furniture or setting tables, to more frenetic and agitated behaviour. Younger children tend to gravitate toward a light source or a parent. Sleep walking children are capable of opening doors and walking outside the house, and this is often a precipitant for bringing them to medical attention.

Night terrors

Night terrors are the most dramatic of the arousal disorders. They are most common in children aged 4–8 years and most studies report

Table 1. BEARS sleep screening algorithm⁴

	Toddler/preschool 2–5 years	School age 6–12 years
Bed time problems (B)	Does your child have any problems going to bed or falling asleep?	Are there any problems at bedtime?*
Excessive day time sleepiness (E)	Does your child seem overtired or sleepy a lot during the day? Do they still nap?	Does your child have difficulty waking in the morning, seem sleepy during the day or take naps?*
Awakenings during the night (A)	Does your child wake up a lot at night?	Does your child seem to wake up a lot at night? Any sleep walking or nightmares? Is there trouble getting back to sleep?*
Regularity and duration of sleep (R)	Does your child have a regular bed time and wake time? What are they?	What time does your child go to bed and get up on school days? Weekends?*
Snoring (S)	Does your child snore a lot or have difficulty breathing?	Does your child have loud or nightly snoring or breathing difficulties at night?*

* Questions can be directed to the patient when old enough



a prevalence of 3–5%, although a recently reported longitudinal study of children up to 6 years of age reported a prevalence of nearly 40%.³ Night terrors usually begin with the child suddenly screaming, and they may either thrash about in bed or get up and run around the house as if they are being chased by someone. There is marked autonomic involvement and the child is often sweating and appears scared. Efforts to calm the child often make the episode worse. Parents find these events extremely distressing to watch and become frightened if they have never heard of them before.

Evaluation

To diagnose night time disturbances, a detailed sleep history over 24 hours looking at the child's sleep patterns, is required. For those unfamiliar with incorporating a sleep history into the regular paediatric history, the use of the 'BEARS' questionnaire may help (*Table 1*).⁴ A sleep diary (*Table 2*) is also useful to help clarify the frequency and timing of events, as well as providing valuable details regarding a child's overall sleep patterns and amount of sleep.

Helpful questions include:

- time the child initially falls asleep
- time of night the event usually occurs
- frequency and duration of the event
- characteristics and motor behaviour during the event
- responsiveness of the child during the event
- recall of the event the next morning by the child.

Additional medical history to exclude medical conditions contributing to disrupted sleep patterns should be sought. Obstructive sleep apnoea (OSA) is occasionally identified as a precipitant of frequent recurrent events.⁵ To consider whether the child may have unrecognised OSA, ask if the child snores, stops breathing or has laboured breathing when asleep.

Other medical conditions that may disrupt sleep include asthma, eczema, nocturnal seizures, and gastroesophageal reflux.

Examination

Examination should include a comprehensive neurological exam and identifying predisposing conditions to development of OSA such as:

- growth – either failure to thrive or obesity
- craniofacial structure (retro/micrognathia, midface hypoplasia)
- mouth breathing suggesting nasal obstruction
- nasal patency, evidence of septal deviation

- presence of swollen turbinates and signs of allergic rhinitis
- tongue size and shape of pharynx, palate and uvula
- adenotonsillar hypertrophy.

A home video may also aid diagnosis.

Investigations

The majority of nocturnal events can be diagnosed by a thorough sleep history, in addition to a routine paediatric history and physical examination, and do not require investigations (*Table 3*).

A sleep study may be used to diagnose OSA disrupting sleep quality. If nocturnal events are very frequent, violent or are atypical, or seizure activity suspected, then a sleep study with an expanded EEG montage or specific EEG monitoring may be required. The type of investigation ordered often depends on the availability of local resources.

Differential diagnosis

Epilepsy

The occurrence of nocturnal seizures is influenced by sleep state, with seizure activity most common in NREM 2, then NREM 1, and less commonly in NREM 3&4. Seizures occurring during REM sleep are rare⁶ (*Figure 1*). Therefore seizures can occur any time during the night, but particularly during the second half of the night, before waking in the morning, or shortly after falling asleep at the start of the night.

A particular type of epilepsy, known as nocturnal frontal lobe epilepsy (NFLE), has a predilection for sleep. There are two distinct types of seizures seen in NFLE:

- brief repetitive stereotypical movements usually lasting less than 30 seconds, and
- seizures that present with bizarre complex asymmetric dystonic posturing and movements which typically last less than 2 minutes.

Both these seizure types can be accompanied by vocalisations and some degree of awareness by the patient. The timing (frequent events throughout the night), patient awareness, and day time tiredness point toward a diagnosis of epilepsy rather than NREM parasomnias.

In NFLE, ictal and interictal EEGs can be normal, along with the sleep study, so prolonged video EEG should be pursued if the history is suggestive of NFLE.⁷ Magnetic resonance imaging (MRI) of the brain needs to be performed in all children with NFLE to exclude structural pathology. Treatment is with carbamazepine.

Table 3. Clinical characteristics to differentiate night terrors, seizures and nightmares

Characteristic	Night terrors	Nightmares	Epilepsy
Sleep stage	NREM 3&4	REM	NREM 2 but can occur all stages
Time of night	First third	Last half	Any time
Wakefulness	Unrousable	Easily aroused	Usually unrousable
Amnesia	Yes	No	Yes or may have some recall
Return to sleep	Easy	Difficult	Easy
Family history	Yes	No	Possibly



Management

The NREM parasomnias are often self limiting and generally require no treatment other than explanation and reassurance (*Table 4*). One of the most useful strategies is to ensure that the child is having enough sleep for their age. Examine sleep schedules and routines to ensure that sleep duration is appropriate for age (*Table 5*).^{8,9} There is evidence that anxiety can increase the frequency of nocturnal events, however it can be difficult to separate the contribution of sleep deprivation related to anxiety, compared to the effect of anxiety alone. Some children benefit from counselling to address anxiety if it is interfering significantly with sleep patterns.

If events are very frequent and occur at a consistent time, then scheduled awakening has been reported to be useful. This entails waking the child 15–30 minutes before the time an event usually occurs. (I have not found this technique to be particularly useful clinically, and there is risk that efforts to wake the child may precipitate an event.)

Medication is rarely needed. In situations where episodes are violent and there is a risk of injury, or where there is extreme night time disruption, then further assessment by a sleep specialist may be necessary. Occasionally low dose clonazepam before bed time may be useful for a period of 4–6 weeks.

Table 4. Tips for the worried parent

- Stay calm and don't touch your child unless they are going to hurt themselves
- Keep the house safe – lock windows and doors, and clear the bedroom of objects they can step on or trip over
- Don't discuss the event the next day unless your child asks. Children and siblings often become upset by parental reactions and older children may become anxious about going to bed
- Maintain a regular sleep schedule and adequate sleep, as overtiredness and changes in routine can precipitate events
- Episodes may become worse with illness and fevers, or if your child becomes very worried about something
- Night time disturbances do not have any long term effects and in the majority of cases the child will outgrow them

Table 5. Average sleep requirements

Age	Requirement
Newborn	16–18 hours
6 months	14.5 hours
12 months	13.5 hours
2 years	13 hours
4 years	11.5 hours
7 years	10.5 hours
10–12 years	9 hours
Teenagers	8–9 hours

Conclusion

Night time disturbances are common in children. The most common are confusional arousals, sleep walking and night terrors. They can usually be diagnosed clinically with the aid of a sleep diary. They are generally self limiting and require only explanation and reassurance (of the parent). Important differential diagnoses to consider are epilepsy and OSA.

Conflict of interest: none declared.

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