

## Disturbed Sleep

### Definition / Supporting Information

The definitions below relate to the majority of sleep disturbances occurring in childhood and other relevant terms.

- The average duration for sleep varies by age and is shown in Table 1 [Iglowstein et al, 2003]

**Table 1. Average Sleep by Age**

Age (months)	Total Sleep Duration (hours)	2-98 (%)	Mean Daytime Duration (hours)	Daytime Napping Children (%)
1	14.0	9-19	5.5	100
12	13.9	11.4-16.5	2.4	100
24	13.2	10.8-15.6	1.8	87
36	12.5	10.3-14.8	1.7	50
48	11.8	9.7-14.0	1.5	35
60	11.4	9.5-13.3	0	8

- Day-night reversals
  - Usually occurs at approximately 2 weeks old
- Settling
  - 5 hours of continuous sleep after midnight for 4 consecutive weeks
- Sleep-onset associations
  - Conditioned response; child cannot fall asleep unless established conditions associated with sleep-onset are recreated
- Limit-setting disorder
  - Bedtime routines longer than 30 minutes which may reflect parental difficulty in setting limits
- Primary insomnia
  - Must last at least 1 month, interfere significantly with functioning or cause significant distress, and not be part of another medical, sleep or mental disorder

- Dyssomnia
  - Insomnia that does not meet disorder criteria; includes environmental sleep disorder caused commonly by noise, pets, and temperature extremes
- Awakenings from sleep
  - Problematic only when the child cannot return to sleep on his or her own
- Sleep-onset association disorder
  - Trained night feeding: infants > 6 months old who wake up during the night and are immediately fed to encourage return to sleep
  - Trained night waking: waking between 4 and 8 months old without requiring a feed
  - Developmental night waking: infants who slept through the night by 6 months but begin awakening again at around 8 to 10 months old
- Sleep-related breathing disorder
  - Snoring is common; obstructive sleep apnoea is less common
- Circadian rhythm sleep disorder
  - Sleep-phase delay, commonly seen in adolescents
- Parasomnias (disorders of partial arousal from slow wave sleep): unusual behaviours or experiences that occur during sleep or the transition between sleep and waking
  - Confusional arousals
    - Child appears awake but is confused and non-responsive to parental questions
  - Night terrors
    - Characterised by physiological arousal, including:
      - Pallor
      - Sweating
      - Pupillary dilation
      - Piloerection (goose bumps)
      - Tachycardia
  - Sleepwalking disorder (somnambulism)
    - Occurs mainly during first 120 minutes of sleep
  - Nightmare disorder
    - Occurs during rapid eye movement (REM) sleep, usually during the last third of the sleep period
  - Violent behaviour during sleep
    - Normal REM atonia (very deep muscular relaxation almost a paralysis) does not occur
      - The content of dreams can be physically acted out, sometimes violently
  - Bruxism
    - Grinding of teeth during sleep

- Sleep-related movement disorders
  - Restless legs syndrome
    - Uncomfortable sensations in the legs, worse at rest (“like worms crawling under my skin”)
  - Periodic limb movements of sleep
    - Repetitive, brief leg twitches, occurring > 5 times per hour
  - Sleep-wake transition disorder
    - Rhythmic movements while falling asleep, common in infants and toddlers
  - Benign sleep myoclonus of infancy
    - Myoclonic jerks that involve limbs, trunk, or the whole body, occurring in clusters during quiet non-rapid eye movement (NREM) sleep
- Hypersomnia
  - Narcolepsy
    - Potentially disabling syndrome of irresistible daytime sleep attacks
      - Abnormally fast transitions to REM sleep from awake
      - Disrupted night-time sleep
  - Idiopathic hypersomnia
    - Constant and severe excessive daytime sleepiness despite adequate nocturnal sleep without a clear underlying cause.
- Sleep disorders associated with psychiatric or behavioural disorders
  - Most common in mood disorders

**Keywords / also known as:** insomnia, poor sleep, sleep disorder, sleep problems, tiredness

## Essential History

### Ask about:

- Sleep details
  - Excessive daytime sleepiness (rare in young children)
  - Hyperactivity
    - Impaired attention
  - Poor school performance
    - Impaired concentration, reduced vigilance
  - Behaviour problems
    - Bad mood, irritability
  - If children sit up, mumble, and appear awake
  - Confusion, non-responsiveness to parental questions
  - If children thrash about and respond combatively
  - Physiological arousal

- Pallor, sweating, pupillary dilation, piloerection, and tachycardia
  - If child sits up, screams and appears terrified
  - If child thrashes or runs and is not responsive to attempted parental comforting
  - Loss of muscle tone with emotions while awake (cataplexy)
  - Inability to move for a few seconds to several minutes on awakening (sleep paralysis)
  - Visual aura or dream states while falling asleep (hypnagogic hallucinations)
  - Snoring loudly, choking or appearing to stop breathing while sleeping
- Sensory issues
  - Noise, light (eg, prolonged screen time), any stimulating activities, temperature, bedding
- Family situation
  - Any stresses for family or child (eg, bullying), chaotic family, parental mental health
- Behavioural or psychiatric disorders
  - Refer to Table 2
- Medical problems
  - Asthma, cystic fibrosis, Down's syndrome, gastro-oesophageal reflux, brain injury, spinal problems
- Medications, herbal products, drugs, alcohol, caffeine or tobacco use

## 'Red Flag' Symptoms and Signs

### Ask about:

- Symptoms caused by neuromuscular disorders
- Snoring and sleep apnoea
- Apparent life-threatening events (ALTE)
- Waking up with pain at night

### Look for:

- Faltering growth
- Obesity
- Features of chronic airway obstruction
  - Mouth breathing
  - Enlarged tonsils
  - Heart failure
  - Craniofacial anomalies
- Chromosomal syndromes
- Neuromuscular disorders
- Medical conditions including spinal problems

- Hyperactivity, poor concentration
- Undiagnosed psychiatric disorder
  - Abnormal mood or anxiety
- Features suggestive of safeguarding issues
  - Unexplained bruising
  - Faltering growth
  - Emotional problems

## Differential Diagnosis / Conditions

(Please refer to Definition section as well)

- Sleep onset associations
- Limit setting disorder
- Primary insomnia
- Sleep onset association disorder
- Dyssomnias
- Parasomnias
- Circadian rhythm disorder
  - Differentiate from oppositional disorder by the child's behaviour pattern
  - A child with a circadian rhythm disorder may not resist going to bed but is unable to fall asleep
- Violent behaviour during sleep
  - Abnormal behaviour occurs during the last third of the night, unlike NREM motor parasomnias, which typically occur during the first third of the sleep period
- Sleep-related movement disorders
  - Restless legs syndrome
    - Uncomfortable sensations in the legs, worse at rest ("like worms crawling under my skin")
  - Periodic limb movements of sleep
    - Repetitive, brief leg twitches, occurring > 5 times per hour
  - Sleep-wake transition disorder
    - Rhythmic movements while falling asleep, common in infants and toddlers
- Sleep related breathing disorder
- Hypersomnia
  - Differentiate from weakness or fatigue
  - Narcolepsy
  - Idiopathic hypersomnia
  - Other causes of hypersomnia include:

- Neurological disorders (eg, hydrocephalus / CNS tumours, previous trauma)
- Mood disorders
- Chronic fatigue syndrome
- Medical disorders (eg, obstructive sleep apnoea, acute and chronic infections, including mononucleosis, metabolic disorders, or neuromuscular diseases)
- Sleep-related headaches
  - Evaluate for increased intracranial pressure or hypercapnia caused by hypoventilation
    - Duchenne muscular dystrophy
    - Obstructive sleep apnoea (OSA)
- Bedtime fears
  - Most often seen in preschool and early school-aged children
- Developmental disorders
  - Learning disabilities are associated with increased rates of sleep disturbance, including night waking and trouble falling asleep
- Sleep disorders associated with medical problems
  - Neurological disorders
    - CNS disorders that result in dysregulation of the sleep cycle
  - Epilepsies occurring during sleep
    - Approximately 20% of epileptic patients have seizures only during sleep, most often during sleep–wake transitions
  - Sleep-related headaches
    - Usually during REM sleep
  - Degenerative disorders (eg, mucopolysaccharidosis)
  - Sleep disturbance due to asthma
  - Gastro-oesophageal reflux disease
    - Diagnosis is not obvious if the usual signs are not evident
      - Excessive spitting up
      - Reswallowing motions
      - Increased fussiness
      - Refusing to feed
      - Heartburn
      - Failure to thrive

## Investigations

To be undertaken by non-specialist practitioners (eg, General Practitioner (GP) Team):

- Parent or other caregiver usually initiates the diagnostic evaluation
- Family-provided audiotapes and recordings on mobile phone

- Sleep diary

To be undertaken by specialist practitioners (eg, Paediatric and / or Respiratory / Paediatric Neurology Team(s)):

- Questionnaires (see suggested resources for details)
  - **BEARS** (**B**edtime problems, **E**xcessive daytime sleepiness, **A**wakenings at night, **R**egularity and duration of sleep, and **S**norings) can help practitioners to:
    - Determine the level of parental concern
    - Elicit maladaptive patterns if no concern is expressed
    - Help formulate a differential diagnosis

### Laboratory findings

- For diagnosing genetic conditions: (eg, in those with dysmorphic features) haplotyping, karyotyping, or fluorescent in situ hybridisation studies or Array testing:
  - Congenital central hypoventilation syndrome
  - Rett syndrome
  - Smith-Magenis syndrome
  - Prader-Willi syndrome
- Approximately 90% of patients with narcolepsy with cataplexy are positive for HLA-DQB1\*0602
  - Absence of the gene does not exclude the diagnosis of narcolepsy, especially without cataplexy
- Investigations for underlying medical conditions if suspected clinically

### Imaging

- Violent behaviour during sleep
  - Diagnosis requires a sleep study (including electroencephalogram (EEG)) and neuroimaging

### Diagnostic procedures

Sleep-related breathing disorder

- Whether all children should participate in sleep studies before adenotonsillectomy is controversial
- Certain groups are at higher risk for perioperative complications and may warrant polysomnography as part of a preoperative evaluation, especially if outpatient surgery is being contemplated:
  - Age < 3 years old
  - Morbid obesity
  - Chromosomal or craniofacial anomalies

- Underlying neuromuscular disorders
- Other underlying medical conditions that increase surgical risk

#### Sleep study

- Overnight study
- Extended-montage video electromyography may be combined with polysomnography to diagnose nocturnal seizures

#### Actigraph

- Actigraph is a small portable device similar to a large wristwatch, worn for several weeks
  - Can be a useful, non-invasive method for assessing specific sleep disorders:
    - Insomnia
    - Excessive daytime sleepiness
    - Circadian rhythm disorders

## Treatment Approach

To be undertaken by specialist practitioners (eg. Paediatric and / or Paediatric Respiratory / Paediatric Neurology / Ear Nose and Throat (ENT), and / Psychology Team(s)):

### **Maturational or behavioural issues**

- Day-night reversals
  - Establish a general bedtime
  - Keep lights off or low
  - Keep interaction to a minimum during night-time feedings
  - In the morning, keep lights bright and encourage social interaction
- Sleep-onset associations
  - Advise parents to place the infant into the crib while infant is still awake for both night-time sleep and daytime naps starting by 48 weeks post-gestational age (correct for prematurity if needed)
  - If a problematic sleep-onset association has already developed, parents may need to institute a graduated programme
    - Warn parents what to expect and address fears regarding harming or creating a sense of abandonment
    - Success requires consistency and collaboration of all night-time caregivers
- Limit-setting disorder
  - Reasonable daily schedules
  - Assurance of adequate special individual time with each parent every day
  - Careful limit-setting

- Limit bedtime routine to a defined set of activities or length of time
- Notify the child that parents will not respond to further requests, or say “only one more” and adhere to this declaration
- Set bedtime for when the child is tired to enhance the child’s tendency to fall asleep
- Avoid naps close to bedtime
- Use positive reinforcement
- Bedtime fears
  - Acknowledge child’s fears
  - Reassure child that the parents will be able to keep the child safe
  - Consider ritual of the adult spraying the bedroom to discourage / scare away monsters
  - Have the child help the parent buy a special flashlight to use to check out the room at night
  - Relaxation exercises and empowerment stories for older children
  - Night light
- Primary insomnia
  - Eliminate distraction or correct environmental conditions
  - Sedating antihistamines, clonidine and melatonin have been used (unlicensed - to be used by specialists)
    - Indiscriminate medication can mislead about the causes of insomnia or prevent behavioural management
- Sleep-onset association disorder
  - Trained night feeding
    - Formula-fed infants who have learnt to sleep through the night and subsequently begin waking hungry are probably ready for solids (if older than 6 months) or need increased feeding during day or evening
    - Breastfed infants may respond to more frequent evening feedings (cluster feeding)
  - Trained night waking
    - Management of the precipitant stress with help from spouse/partner and asking neighbours to tolerate some crying during the treatment phase
    - Establish bedtime routines
      - Consider giving the infant clothing with a parental scent
    - Place infant into bed awake
    - Limit daytime naps to 2 hours to consolidate longest sleep period at night
    - Allow 1 to 2 minutes of crying before being checked, but not fed, then check every 2 to 5 minutes
    - Do not pick up, rock, or cuddle infant; touching is okay

- May require the more involved parent to take a shower, turn up music, go out of the house, or find some other distraction
- Brief sedation with sedating antihistamines for the infant are no longer recommended to help modify this habit
  - Any use must be balanced with the risk of CNS depression
- Developmental night waking
  - Advise parents at the 6-month health supervision visit to expect a recurrence of night waking
  - Advise parents to wait a few minutes before checking the infant but to avoid feeding or other reinforcement
  - If waking is already established
  - Explain contributing factors
  - Advise parents to create a bedtime routine
    - Including a transitional object and a dim nightlight
  - When the infant awakens, allow at least 2 minutes to self-soothe, with some fussing tolerated as part of the process
  - If fussing continues, then one parent can go to reassure the child briefly, without touching or feeding, and settle down within sight to sleep the rest of the night without talking to the child
  - The child often becomes enraged instead of fearful, which is more tolerable to the parent, who can see that the child is safe
  - For children who are no longer constrained to a crib, the parent must prevent body contact with the child by giving the child the alternative that the parent will leave the room to avoid establishing a sleep association
  - Further interactions should be brief and minimally interactive
  - Eventually, the child will no longer require the parent's presence to return to sleep after nocturnal awakenings
  - Some children will respond well to the use of a blanket or soft toy to support self-soothing behaviour

### **Sleep-related breathing disorder**

- Many children improve after adenotonsillectomy
  - Those with obesity or asthma are less likely to experience complete resolution
- Nasal continuous positive airway pressure or even tracheostomy may be required
  - To be initiated and monitored by a specialist

### **Circadian rhythm disorder**

- Changing adolescent sleep-phase delay requires intense commitment and active participation of the adolescent and parents
- Use bright light exposure in the morning and consistent wake times all 7 days of the week

- Adjust different types of circadian shift by simultaneously shifting naps, bedtime, waking time, and meals to a desired schedule
- Screen time and any stimulating activities should be reduced in the evening / before bed time.

### **Parasomnias (partial arousal disorders)**

- Confusional arousals
  - Reassure parents that episodes are generally benign
  - Provide minimal intervention during episodes
  - Remove potential safety hazards from the child's bedroom
  - Treat disorders that may fragment sleep, such as OSA and restless leg syndrome
  - In severe cases, a few weeks of a benzodiazepine, such as lorazepam, at bedtime may interrupt the sequence by reducing slow-wave sleep
    - Rebound occurs with discontinuation of the medication, often with an increasing number of events
- Sleep terrors
  - Empty bladder routinely before bedtime
  - Keep environment dark and quiet
  - Bouts may be interrupted by waking the child 15 minutes before expected episode, generally 1 hour into sleep each night for approximately 1 week
  - A 30- to 60-minute afternoon nap can reduce stage IV NREM deep sleep and may decrease the number of episodes
  - Treatment with benzodiazepines can reduce the frequency of these events by altering slow wave sleep, but episodes may recur with weaning or tolerance
- Sleep-walking disorder (somnambulism)
  - Safeguard chronic sleepwalkers to prevent injury
  - Door and window alarms and locks may be necessary
- Nightmare disorder
  - Comfort a child who wakes from a frightening dream
  - Keep intervention brief
  - Follow recommendations for bedtime fears
  - Chronic nightmares improve with targeted relaxation exercises and stories in which the child masters a situation
  - Prepare for good dreams through rehearsal and imaging at bedtime
  - Severe nightmares may respond to bedtime medications, although counselling is mandatory
- Violent behaviour during sleep
  - Treatment with clonazepam has been beneficial in children with autism spectrum disorder (ASD).

- Bruxism
  - Tooth guards can protect the teeth and reduce potential damage to the temporomandibular joint
  - Relaxation exercises at bedtime if stress or anxiety is a trigger

### **Sleep-related movement disorders**

- Restless legs syndrome and periodic limb movements of sleep
  - Iron supplements, clonidine, gabapentin, or dopaminergic agents, depending on child's age
- Sleep-wake transition disorder
  - Reduce condition by kinaesthetic stimulation during the evening and holding the child as part of the bedtime routine
  - Sleep restriction (limiting the time the child lies in bed before falling asleep) and mild sedation are helpful in difficult cases
  - Parents often need reassurance of the generally benign nature of these behaviours

### **Hypersomnia**

- Narcolepsy
  - Stimulants such as methylphenidate (to be initiated and monitored by a specialist), to address excessive daytime sleepiness
  - Antidepressants, such as venlafaxine, to control cataplexy (to be initiated and monitored by a specialist)
  - Regular adequate sleep
  - Two to three planned 30-minute daytime naps
  - Timed activities at optimal hours of alertness
  - Educate patient, family members, and school personnel
- Idiopathic hypersomnia
  - Attention to sleep hygiene
  - Stimulant medications
  - Review of safety issues, such as driving or operating machinery

### **Sleep disorders associated with psychiatric behavioural disorders**

- Depression
  - Cognitive-behavioural therapy
  - Antidepressants

### **Developmental disorders**

- Children with autism frequently have insomnia that may benefit from behavioural interventions, melatonin, or other medications. These medications should be initiated and monitored by specialists

- See Autism spectrum disorder in under 19s [[NICE clinical guideline CG170](#)]
- For information on melatonin use in children with ADHD and sleep problems please refer to Evidence Summary by NICE [[NICE evidence summary ESUOM2](#)]

### **Sleep disorders associated with medical problems**

- Neurological disorders
  - Establish a bedtime routine and put the child to bed when sleep onset is likely to occur quickly
  - If the child has persistent difficulty, establish a new pattern by delaying the usual bedtime for 30 minutes and then removing the child from bed if sleep does not occur in 15 to 20 minutes
    - After removing the child from bed, keep him or her awake for 30 minutes
    - Repeat until the child falls asleep within 15 minutes
  - Keep wake-up time constant
  - Do not allow daytime naps for children > 4 years old
  - Melatonin at bedtime
    - Use cautiously in children with seizure disorders
- Gastro-oesophageal reflux disease
  - Holding the child upright reduces the amount of acid in the oesophagus and may comfort a child
  - Consider treating acid reflux with:
    - Milk thickeners
    - Alginic acid (Gaviscon Infant® sachets)
    - H2 antagonists
    - Proton pump inhibitors (PPIs)

### **When to Refer**

Escalate care to specialist practitioners (eg, Paediatric / Paediatric ENT, Respiratory or Psychologist Team(s)) if:

- 'Red flag' signs are present
- If the clinician is unable to relieve a sleep disturbance after working with the family over the course of 6 weeks
  - Assistance may then be needed from a sleep specialist, family therapist, or psychologist
- Children with chronic, physically-based sleep disorders, such as narcolepsy and sleep-disordered breathing requiring continuous positive airway pressure
- Refer children with adenotonsillar hypertrophy, persistent snoring and any features of obstructive sleep apnoea to a paediatric ENT specialist

## When to Admit

- Primary sleep disturbances rarely require hospitalisation, other than the overnight stay for a sleep study
- Exceptions may include:
  - Severe sleep-disordered breathing with life-threatening oxygen desaturations
  - Obstructive sleep apnoea with arrhythmias or cor pulmonale
  - CNS tumours
  - Serious depression

## ‘Safety Netting’ Advice

If there are ‘red flag’ signs and symptoms, sudden or unexpected exacerbation of symptoms, parents should contact the medical team.

## Patient / Carer Information

***\*Please note: whilst these resources have been developed to a high standard they may not be specific to children.***

- [Children’s Sleep](#) (Web page), the NHS website
- [Healthy sleep tips for children](#) (Web page), the NHS website

## Resources

### National Clinical Guidance

[Sleep disorders in children and young people with attention deficit hyperactivity disorder: melatonin](#) (Web page), NICE evidence summary ESUOM2, National Institute for Health and Care Excellence

[Autism spectrum disorder in under 19s: support and management](#) (Web page), NICE clinical guideline CG170, National Institute for Health and Care Excellence

[Standards for Services for Children with Disorders of Sleep Physiology](#) (PDF), Royal College of Paediatrics and Child Health

[Assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders](#) (Web page), SIGN guideline 98, Scottish Intercollegiate Guidelines Network

[Obstructive sleep apnoea syndrome](#) (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence

[Insomnia](#) (for adults) (Web page), NICE clinical knowledge summary, National Institute for Health and Care Excellence

## Suggested Resources

***\*Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.***

[Melatonin for sleep disorders](#) (Web page), Medicines for Children

Iglowstein I, Jenni OG, Molinari L, et al. [Sleep duration from infancy to adolescence: reference values and generational trends](#). Pediatrics 2003;111(2):302–307

Meltzer LJ, Johnson C, Crosette J, et al. [Prevalence of diagnosed sleep disorders in pediatric primary care practices](#). Pediatrics 2010;125(6):e1410–e1418

Sheldon SH, Ferber R, Kryger MH. Principles and Practice of Pediatric Sleep Medicine. Philadelphia, PA: WB Saunders; 2005

Bandla H, Splaingard M. Sleep medicine in children with common medical disorders. Pediatr Clin North Am 2004;51(1):203–227

[BEARS Questionnaire](#) is available in Mindell JA, Owens JA. Clinical Guide to Pediatric Sleep: Diagnosis and Management of Sleep Problems. Lippincott Williams and Wilkins, 2015.

## Acknowledgements

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### Update information

Created: 2017

Date last updated: -

Next review due: 2020