Management of childhood sleep disorders

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Sleep disorders are common in childhood and can have significant effects on the health and wellbeing of both children and their families. This article discusses the management of the sleep disorders most commonly encountered in primary care, including insomnia, delayed sleep phase disorder and parasomnias, as well describing the less common but more serious conditions that require referral for specialist investigation.

Childhood sleep disorders are very common, affecting 30–40 per cent of the population at some point. The prevalence of sleep problems has consistently been shown to be higher in children and young people with neurodevelopmental disorders, chronic illness and mental health problems. Normal sleep is vital for homeostasis, growth, learning and memory. When compromised, there can be multiple physical, psychological and behavioural complications with major ramifications on family life.

The International Classification of Sleep Disorders, third edition (ICSD-3), published by the American Academy of Sleep Medicine (AASM), defines six categories of sleep disorders: insomnia, sleep-related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorders, parasomnias and sleep-related movement disorders. This article focuses on the conditions most commonly encountered in primary care, as well as reviewing the less common but more serious conditions that require referral for specialist investigation and management (see Table 1). Although no UK national treatment guidelines exist for childhood sleep disorders, the BMJ produces “best practice” guidelines based on current best evidence, which have formed the basis of the management recommendations in this article.

Sleep-onset insomnia

Behavioural insomnia of childhood is very common in young children, affecting 20–30 per cent of those aged five years and under. In sleep-onset association type insomnia, the child develops an inability to sleep without specific routines or interventions from a carer and cannot self-soothe. This means that if they wake in the night – a brief and normal phenomenon – they are unable to get back to sleep on their own. In limit-setting type insomnia, the child delays bedtime or sleeping and the carer does not enforce appropria-
Management of this challenging condition involves prevention with a consistent bedtime routine and clear boundaries.\textsuperscript{6} Diagnosis relies on a comprehensive history focusing on bedtime routines and behaviours, which can be aided by a weekly or fortnightly sleep diary.\textsuperscript{1,6} Children with insomnia can present differently from adult patients: rather than being sleepy in the daytime, they may be paradoxically hyperactive with reduced concentration and mood disturbance.\textsuperscript{7}

Pharmacological treatment is not usually indicated for sleep-onset insomnia but melatonin may be considered where other measures have failed, with the best evidence for its use in children with neurodevelopmental disorders and attention deficit hyperactivity disorder (ADHD). Here it has been shown to reduce sleep onset latency but not increase total sleep time by a clinically significant amount, nor improve sleep efficiency.\textsuperscript{5,10} The use of melatonin is discussed in greater detail below. Hypnotics are frequently prescribed for primary insomnia in adults, with the newer generation “Z-drugs” preferred because of evidence of reduced adverse “hangover” effects and no evidence of long-term tolerance.\textsuperscript{8} Hypnotics should be prescribed by specialists only and with utmost caution in paediatric populations. The BNF for Children advises that they should only be used for insomnia when “severe, disabling or causing the child extreme distress”.\textsuperscript{11} Other medications may be indicated for co-morbid anxiety or depression.\textsuperscript{5}

### Delayed sleep phase disorder

The human circadian clock regulates the sleep-wake cycle to approximately 24 hours, controlled by release of the hormone melatonin from the pineal gland, which can be affected by light exposure, activity and eating.\textsuperscript{9,10,12} In delayed sleep phase disorder (DSPD), which affects 5–10 per cent of adolescents,\textsuperscript{1} the cycle is delayed by two hours or more, resulting in a later bedtime and difficulty waking up at the usual time.\textsuperscript{6} During the school week, a sleep debt is accrued, which is compensated for by sleeping in very late at the weekend, thereby cementing the delayed pattern.\textsuperscript{1} DSPD is thought to be caused by a combination of physiological

### Table 1. Overview of diagnostic investigations and management options in childhood sleep disorders\textsuperscript{1,4-7}

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Diagnosis</th>
<th>Nonpharmacological management</th>
<th>Pharmacological management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep-onset insomnia</td>
<td>History Sleep diary</td>
<td>Education Good sleep hygiene Behavioural modification Psychological therapy</td>
<td>Melatonin Hypnotics</td>
</tr>
<tr>
<td>Delayed sleep phase disorder</td>
<td>History Sleep diary Consider wrist actigraphy</td>
<td>Education Good sleep hygiene Light exposure regulation Chronotherapy</td>
<td>Melatonin</td>
</tr>
<tr>
<td>Parasomnias</td>
<td>History Polysomnography where history inconclusive</td>
<td>Education and reassurance Good sleep hygiene Relaxation techniques Environmental protective measures (sleepwalking) Scheduled awakening (NREM parasomnias) Psychological therapy (severe nightmares)</td>
<td>Benzodiazepines (NREM-related parasomnias) Antidepressants</td>
</tr>
<tr>
<td>Obstructive sleep apnoea</td>
<td>History Polysomnography</td>
<td>Adenotonsillectomy Continuous positive airway pressure (CPAP) Treat underlying disorders and precipitants</td>
<td>Oral montelukast or intranasal budesonide</td>
</tr>
<tr>
<td>Narcolepsy</td>
<td>History Multiple sleep latency test (polysomnography should be done first)</td>
<td>Regular naps</td>
<td>For daytime somnolence: stimulants eg methylphenidate, modafinil, dexamphetamine For cataplexy: clomipramine, imipramine, venlafaxine, fluoxetine, sodium oxybate</td>
</tr>
<tr>
<td>Restless legs syndrome and periodic limb movement disorder</td>
<td>History Polysomnography with anterior tibialis recording</td>
<td>Avoid triggers</td>
<td>Ferritin supplementation Dopamine agonists Benzodiazepines Anticonvulsants (gabapentin)</td>
</tr>
</tbody>
</table>

"PRESCRIBING IN CHILDREN"
changes during puberty and behavioural changes, with social pressure to stay up late and extended use of electronic devices. It is usually possible to diagnose DSPD based on the history alone, supplemented by a sleep diary. In unclear cases, a delay in the sleep phase can be confirmed with actigraphy, a motion-sensitive device worn on the wrist to determine whether the patient is asleep or awake.\textsuperscript{5,6}

When treating DSPD, good sleep hygiene measures are key with a regular bedtime routine, a quiet and dark sleeping environment, and avoidance of stimulation prior to bedtime. During the daytime, regular exercise should be encouraged, and caffeine, smoking and alcohol avoided.\textsuperscript{1,13} Bright light exposure should be avoided prior to bedtime and encouraged in the morning either via artificial devices or by going outside.\textsuperscript{1} In resistant cases, chronotherapy can be tried: bedtime is progressively delayed by three hours at a time, through the 24-hour cycle until the desired bedtime is reached.\textsuperscript{1} This is clearly very disruptive to family life and best attempted during the school holidays.

When non-pharmacological approaches have been exhausted, oral melatonin before bedtime can be tried, to advance the circadian cycle and reduce sleep onset latency.\textsuperscript{1,12} The modified-release 2mg tablet is licensed for primary insomnia in older adults (aged 55 years and over) but can be used off-label in a paediatric population. There are also a number of unlicensed immediate-release formulations available and the dose may vary between manufacturers. The BNF for Children recommends an initial dose of 2-3mg before bed; however, some trials have found a dose of as little as 0.5mg per night to be effective.\textsuperscript{10,11} Oral melatonin has been shown to be well tolerated for up to 12 weeks of administration, with similar rates of adverse effects to placebo;\textsuperscript{10} as longer term effects are unknown, six monthly review is recommended.\textsuperscript{11} Initial prescription should be by a specialist but ongoing care can be shared with the child’s GP.\textsuperscript{11}

Parasomnias
Parasomnias are unpleasant, involuntary motor or experienced phenomena that can be divided into the non-rapid eye movement (NREM)-related parasomnias of confusional arousals, night terrors and sleepwalking, and the REM-related parasomnias, the most common of which are nightmares, with 75 per cent of the population recalling a childhood nightmare.\textsuperscript{4} They can be associated with a family history of parasomnias and may be triggered or exacerbated by a lack of sleep or an underlying sleep disorder. Although parasomnias are often distressing for both the child and the parent/carer, they are harmless in nature and almost always resolve before adolescence. A collateral history from a carer or a sibling who shares the bedroom can help with diagnosis. Where the history is inconclusive or there is a suspicion of a serious underlying condition such as obstructive sleep apnoea or nocturnal seizures, specialist referral and further investigation is warranted.\textsuperscript{4}

Parental education and reassurance are paramount for successful management of parasomnias. Good sleep hygiene should be encouraged and relaxation techniques may be tried.\textsuperscript{2} For sleepwalking, the environment should be made safe, for example by removing potentially dangerous objects and putting safety gates at the top of stairs. In the NREM parasomnias, scheduled awakening can be tried if the above measures alone are unsuccessful, although there is only anecdotal evidence in support of its efficacy.\textsuperscript{4} With severe nightmares thought to be caused by psychological factors, cognitive behavioural therapy can be tried.\textsuperscript{4}

Pharmacological treatment for the parasomnias should only be considered for very severe, refractory cases under specialist supervision. As a first-line pharmacological therapy in the NREM parasomnias, long-acting benzodiazepines such as diazepam and clonazepam can be considered\textsuperscript{4} with close monitoring for ‘hangover’ symptoms of daytime drowsiness, behavioural changes and amnesia, and an understanding of the risk of withdrawal syndrome when suddenly stopped.\textsuperscript{7} There is some evidence from case reports for the efficacy of antidepressants both for NREM and REM-related parasomnias.\textsuperscript{4} Prescribers should be aware that in 2004, the US Food and Drug Administration (FDA) issued a “black box” warning relating to a slightly increased risk of suicidal thoughts and behaviour with the use of antidepressants in children and adolescents. However, with careful monitoring, these drugs can be safely prescribed in a paediatric population.\textsuperscript{4,11,14}

Obstructive sleep apnoea
Obstructive sleep apnoea (OSA) occurs when the soft tissues of the upper airway collapse and obstruct breathing during sleep. It has a prevalence of 1-4 per cent\textsuperscript{15} and peaks in preschool age due to the relatively large size of the adenoids and tonsils within a relatively small airway.\textsuperscript{1} There are a number of risk factors including hypertrophy of the adenoids/tonsils, obesity, Down syndrome, craniofacial abnormalities, gastro-oesophageal reflux and environmental tobacco smoke.\textsuperscript{1,6} The clinical presentation can be varied. Overnight, the patient may be witnessed to snore, gasp, choke and have apnoeic episodes. During the daytime, there can be excessive sleepiness and morning headaches.\textsuperscript{6,16}

Expedient diagnosis and treatment is vital as there can be serious physical complications including metabolic and cardiovascular disease, as well as cognitive, developmental and behavioural disturbance.\textsuperscript{1,14,16} The gold standard for the diagnosis of OSA is overnight polysomnography, which includes electroencephalography, electrocardiography, pulse oximetry, recording of eye movement and skeletal muscle contraction, and infrared video recording.\textsuperscript{1,2} The first-line treatment is surgical adenotonsillectomy, which is curative in approximately 80–90 per cent of cases.\textsuperscript{2} As an adjunct or a second-line treatment, there is a role for overnight continuous positive airway pressure (CPAP) to prevent airway collapse.\textsuperscript{1} There is also evidence for the efficacy of oral montelukast or intranasal budesonide as an adjunct to surgery or CPAP.\textsuperscript{1} Underlying disorders such as obesity should also be targeted.\textsuperscript{1}

Narcolepsy
Narcolepsy is relatively rare neurological disorder which affects between 1 in 2000 and 1 in 4000 with a peak onset at 14
years of age. There is thought to be an underlying autoimmune pathology leading to low or absent CSF hypocretin, a hypothalamic peptide hormone linked to the sleep-wake cycle. Patients have extreme daytime somnolence, causing them to fall asleep several times during the day. This may occur with or without cataplexy, the paroxysmal loss of muscle tone that usually occurs with strong emotion. Narcolepsy is diagnosed using the multiple sleep latency test, which should be preceded by polysomnography to exclude other causes. As with other sleep disorders, conservative measures are important with regular scheduled daytime naps to combat the somnolence. A full discussion of the specialist pharmacological management is beyond the scope of this article but it can involve use of stimulants during the daytime such as methylphenidate, modafinil and dexamfetamine, and a number of treatments for cataplexy including clomipramine, imipramine, venlafaxine, fluoxetine and sodium oxybate.

Restless legs syndrome and periodic limb movement disorder

Restless legs syndrome (RLS), in which patients experience an unpleasant sensation in the legs with a desire to move them, has an estimated prevalence of two per cent. RLS can occur with or without periodic limb movement disorder (PLMD) where the legs move rhythmically during sleep. RLS has been shown to be associated with iron deficiency, a lack of exercise, caffeine, smoking and certain medications such as antidepressants and antihistamines. For diagnosis, a thorough history is needed and where PLMD is suspected, polysomnography with recording of anterior tibialis movement should be carried out. Potential triggers should be identified and avoided and if the serum ferritin is below 50µg per litre, oral iron supplementation can be started. There are a number of pharmacological options in resistant cases including dopamine agonists, benzodiazepines and anticonvulsants such as gabapentin.

Conclusion

Childhood sleeping disorders are common but not always asked about, despite their manifold effects on the health and wellbeing of children and their families. Most cases of insomnia, DSPD and parasomnia can be diagnosed by a comprehensive history and effective nonpharmacological management initiated by the GP. Where the diagnosis is unclear, a serious sleep disorder is suspected or medication required, specialist referral is indicated.

References


Declaration of interests

None to declare.

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