

sleep. REM sleep in neonates is termed *active sleep*, and frequent muscle twitches and facial grimaces are common. REM sleep comprises up to 50% of total sleep time in newborns and gradually decreases to 25% to 30% by adolescence. Slow-wave sleep is not seen before 3 to 6 months of age. Beginning from 6 to 12 months and continuing through adulthood, the amount of REM sleep shifts toward the last third of the night, while NREM sleep predominates during the first third of the night.

The timing and duration of sleep also change with age. Sleep patterns become more diurnal and total daily sleep time gradually decreases. Full-term infants sleep on average 16 to 18 hours per day in fragmented intervals throughout the day and night. One-year-old children sleep on average 10 to 11 hours per night and nap for 2 to 3 hours during the day. Naps decrease from two naps to one during the second year of life. In the United States, over 80% of 2-year-olds nap, decreasing to 50% by age 3. By 12 years old, the average child sleeps 9 to 10 hours per day. By adolescence, the average sleep duration has dropped to 7½ hours per day, even though adolescents need an average of 9 hours per day. Adolescents also develop a physiologically based shift toward later sleep-onset and wake times relative to those in middle childhood.

Cultural factors strongly influence multiple sleep practices, including whether children sleep independently (the norm in the United States) or with parents, other siblings, or grandparents (the norm in many other cultures). Awareness of the varying cultural practices regarding sleep is essential to respectful and effective intervention.

SLEEP DISORDERS

Sleep problems are one of the most frequent complaints in pediatric practice. Numerous sleep disorders exist, including behavioral insomnias (bedtime refusal, delayed sleep onset, nighttime awakenings), parasomnias, and circadian rhythm disorders (Table 15-1). Obstructive sleep apnea (OSA) and sleep disorders associated with mental and physical illness should also be considered.

Epidemiology

Sleep problems occur in 20% to 30% of children at some point during childhood. Behavioral sleep disorders are common and found across all age groups but are most prevalent from infancy through preschool age. Bedtime resistance occurs in 10% to 15% of toddlers, and 15% to 30% of preschool-aged children have difficulties achieving and/or maintaining sleep. Although generally benign, parasomnias occur commonly in young children, including sleep walking (15% to 40%) and sleep terrors (1% to 6%). OSA is reported in 1% to 4% of children. Circadian rhythm disorders occur in 7% to 16% of adolescents.

Clinical Manifestations and Evaluation



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Seizures and Other Paroxysmal Disorders
Sleep Disturbances

Sleep disorders may manifest in a variety of ways and often go unrecognized. Some children present with daytime behavioral

problems, including inattentiveness, hyperactivity, or irritability rather than overt sleepiness. Screening for sleep disorders is recommended as part of primary care. Clinicians should inquire about bedtime problems, excessive daytime sleepiness, awakenings during the night, regularity and duration of sleep, and presence of snoring and sleep-disordered breathing.

The assessment of sleep complaints begins with a detailed **history** of sleep habits, including bedtime, sleep-onset, and wake times. A detailed description of the sleep environment can result in a dynamic understanding of the challenges to and resources for achieving normal sleep. The recommended history includes the type of bed, who shares it, the ambient light, noise, temperature, and the bedtime routine. Household structure, routines, and cultural practices may be important and influence the timing and ease of sleep (e.g., parental work patterns, evening activities, number of household members). Dietary practices influence sleep, including timing of meals and caffeine intake. A detailed history assessing for symptoms of OSA (gasps, snorting noises, breathing pauses, and so on) should be obtained in all children who snore regularly. New-onset sleep disorders may be associated with a psychological trauma. When the history does not reveal the cause of the sleep disorder, a sleep diary can be helpful.

A complete **physical examination** is important to rule out medical causes of sleep disturbance, such as conditions that cause pain, neurologic conditions that could be associated with seizure disorder, and other central nervous system disorders. Children with genetic syndromes associated with developmental delay may have sleep disorders. Similarly children with attention-deficit/hyperactivity disorder and fetal alcohol syndrome are at higher risk for sleep disorders than other children. Careful attention to the upper airway and pulmonary examination may reveal enlarged tonsils or adenoids or other signs of obstruction.

A **polysomnogram** is used to detect OSA, excessive limb movements, and seizure disorder. This consists of an all-night observation and recording performed in a sleep laboratory. Polysomnography is not indicated in children with primary insomnia (difficulty initiating or maintaining sleep), circadian rhythm disorders, uncomplicated parasomnias, or behaviorally based sleep problems.

Differential Diagnosis

Behavioral insomnia of childhood is divided into two subtypes: *Sleep-onset association subtype* manifests as frequent or prolonged nighttime awakenings that occur in infants or young children. During periods of normal brief arousal with each sleep cycle, the child awakens under conditions different from those experienced as they fell asleep. Thus they are unable to return to sleep independently. *Limit-setting subtype* is most common in preschool-aged and older children and is characterized by bedtime resistance or refusal that stems from a caregiver's unwillingness or inability to enforce bedtime rules and expectations. Nighttime fears are also common causes of bedtime refusal.

Parasomnias include sleepwalking, sleep terrors, and confusional arousals. These occur during NREM sleep and are more likely during the first third of the night. They are most common in preschool children and are likely to resolve with time and developmental maturation. Sleepwalking is common and often benign but is sometimes associated with agitation or dangerous behaviors. Sleep terrors consist of an abrupt awakening with a loud scream, agitation, and unresponsiveness to caregivers' attempts to console. Sleep terrors are differentiated