Sleep Disturbances (ages 0-12)

Background

1. Definitions
   - Dyssomnias
     - Sleep disorders affecting normal sleep or wakefulness
     - Behavioral etiology
   - Parasomnias
     - Sleep disorders characterized by abnormal physiologic events which occur
       - During sleep
       - During sleep-wake transitions
   - Sleep disorders associated w/medical or psychiatric conditions:
     - Obstructive sleep apnea
     - Epilepsy
     - Asthma
     - GERD
2. General info
   - Sleep problems occur in 20-30% of children
   - Sleep problems represent one of top three concerns among parents
   - Paucity of data concerning normal sleep patterns in children
     - Cultural perspectives influence definition of "normal"
   - Most infants younger than 12 mos wake an average of three times per night
     - Half the time they may not signal parents

Pathophysiology

1. Pathology of dz
   - Normal sleep patterns
     - Sleeping through night defined as sleeping midnight to 5 am
       - 44% of 2 month old infants
       - 78% of 9 month old infants
     - Sleep architecture evolves from fetal to adolescent ages
       - Decr amounts REM sleep
       - Incr periods wakefulness
       - Incr sleep consolidation into fewer and longer periods of sleep
       - Change in distribution w/incr sleep time occurring during night
     - Average daily sleep requirements by age (range of "normal" is wide)
       - 1 wk old: 16.5 hrs
       - 6 mos old: 14.5 hrs
       - 12 mos old: 13.8 hrs
       - 2 yrs old: 13 hrs
       - 3 yrs old: 12 hrs
       - 5 yrs old: 11 hrs
       - 9 yrs old: 10 hrs
       - 12 to 15 yrs old: 9 hrs
       - Adolescents have later onset sleep and later awakenings
     - Average nap patterns by age
       - 0-6 mos: 3 to 4 naps in daytime
       - 7-18 mos: morning and afternoon nap

            - 18-24 mos: one long afternoon nap
            - 2 to 3 yrs: single afternoon nap x 1 ½ hrs
            - 3 to 5 yrs: daytime nap may cease, but this is culturally dependent
    - Abnormal sleep patterns
        - **Dyssomnias**
            - Settling problems
                - Sleep-onset association disorder occurs when a child learns to fall asleep under a prescribed set of conditions that often involve presence of parent
                    - Being rocked or fed
                - Limit-setting sleep disorder occurs w/inconsistent rule setting or discipline
            - Freq night wakings
                - Hypothesized as related to inappropriate sleep-onset associations
                    - Where young children awaken and expect bedtime soothing from parents to help them go back to sleep
        - **Parasomnias**
            - Sleepwalking
            - Night terrors
                - Partial awakening which occurs 1-3 hrs after sleep onset
                - Child can appear fully awake or in a trance w/
                    - Screaming
                    - Agitation
                    - Confusion
                    - May be inconsolable
                - Child usually doesn't remember events in morning
                - Not associated w/daytime sleepiness
                - Very alarming to parents/ caregivers
            - Nightmares
                - Occur in second half of night or early morning
                - Full awakening and child often wants parental reassurance
                - Child usually remembers in morning
                - May result in daytime sleepiness
            - Sleep paralysis
                - Occurs in second half of night
                - Results in daytime sleepiness
            - Rhythmic movement disorders
                - Body rocking or head banging
                - Generally benign, safe environment modifications recommended
            - Nocturnal enuresis
        - Sleep disorders associated w/medical or psychiatric conditions
            - Obstructive sleep apnea
            - Psychiatric disorders including ADHD
            - Sleep-related epilepsy
            - Asthma
            - Gastroesophageal reflux disease

            - Narcolepsy
                - Onset as early as 6-8 yrs
                - Severe daytime sleepiness or sleep attacks
                - Hypnagogic hallucinations and sleep paralysis
            - Periodic leg movements of sleep
                - May be associated w/ADHD

2. Incidence/ prevalence
    - Dyssomnias:
        - Going to sleep or staying asleep
        - 20-42% of 1-5 yr olds
    - Obstructive sleep apnea
        - 2% of all children
    - Age-related sleep disorders
        - Infancy
            - SIDS
                - 4 wks to 12 mos, peak incidence 2-3 mos
            - Night wakenings needing resettling help, incidence 25%
        - 1 to 5 yrs old
            - Behavioral, incidence 20-42%
                - Wake to sleep transition difficulties
                - Sleep-stalling
                - Night awakenings
        - 3 to 8 yrs old
            - Parasomnias
                - Night terrors: 3-4% of 4-8 yr olds
                - Nightmares: 6% of 4-8 yr olds
                - Sleepwalking: 2% of 4-8 yr olds
                - Sleeptalking: 14-15% of 4-8 yr olds
3. Risk factors
    - Physical
        - Physical or learning disabilities
            - 86% <6 yrs old will have sleep disorders
        - Hx of colic
        - Family hx of parasomnias
        - Sleep deprivation
        - Medications, incl antiepileptics
        - Anxiety and frightening experiences/ PTSD
        - Medical illness
    - Behavioral
        - First born child
        - Difficult temperament
            - Research shows an association between intense temperament and behavioral sleep problems
        - Irregular sleep-wake schedules

- Social
    - Bed sharing studies demonstrate correlation between co-sleeping and perceived sleep problems in societies in which routine bed sharing is not the norm
        - No long-term positive or negative correlates at 6 yrs and at 18 yrs of age
    - Witnessing and/or experiencing domestic violence or abuse

4. Morbidity/ mortality
    - Daytime sleepiness
    - Impaired daytime functioning incl cognitive impairments
    - Mood problems w/
        - Exacerbation of negative mood
        - Decr in positive mood and affect
    - Behavioral consequences w/impaired attention and poor impulse control and hyperactivity (can mimic ADHD)
    - Incr parental stress
    - School failure
    - Accidents

Diagnostics

1. History
    - Sleep/ wake pattern, may recommend filling out sleep diary
    - Social setting incl bed sharing, room sharing
    - Behavioral elements
        - Bedtime routine, parental responses
        - Daytime manifestations of sleepiness incl
            - Daydreaming
            - Listlessness
            - Moodiness
            - Hyperactivity
            - Aggression
    - Behaviors during sleep:
        - Snoring
        - Diaphoresis (consider OSA)
        - Restlessness (consider Periodic Limb Movement Disorder)
    - PMH
    - Medications
        - Antiepileptics
        - Methylphenidate
    - FHx of sleep problems
    - SHx
        - Family conflict, home situation
    - Review of systems
        - Nocturnal enuresis
        - Night cough or wheezing (consider asthma)
        - Stridor, chronic cough, recurrent wheezing, failure to thrive (consider GERD)
        - Emotional disturbances, signs of psychiatric disorder like depression
        - Learning disabilities

2. Physical exam
    - General
        - Obesity (consider OSA)
    - HEENT
        - Consider OSA if:
            - Enlarged tonsils/adenoids
            - Deviated septum
            - Cleft lip or palate repair
            - Micrognathia
    - Pulmonary
        - Wheezing, consider asthma, GERD
    - Neurologic: associated w/sleep disordered breathing
        - Spinal scoliosis
        - Findings of post-traumatic brain injury
        - Spina bifida
        - Chiari type 2 malformation
        - Muscular dystrophy
    - Psychiatric:
        - Consider anxiety, depression, ADHD if:
            - Mood
            - Interaction
            - Behavior
3. Diagnostic testing
    - Dx based on H&P
        - Upper airway obstruction suspected
            - Consider Polysomnography and Otolaryngology referral for surgical eval
        - Periodic Limb Movement Disorder suspected
            - Polysomnography and/or sleep disorders clinic referral, may benefit from meds
        - Asthma suspected
            - Eval and tx appropriate for asthma
        - Neurologic related sleep disordered breathing
            - Polysomnography and sleep disorders clinic referral
            - May benefit from nighttime ventilatory support
        - Psychiatric disorder suspected
            - Referral to Psychiatrist, meds may be needed
        - Parasomnias like sleepwalking, night terrors, rhythmic movement disorders suspected
            - Videotaping of an event can be helpful to the clinician

Differential Diagnosis

1. Key DDx
    - Dyssomnias
        - Settling problems
            - Sleep-onset association disorder
            - Limit-setting sleep disorder
        - Frequent night wakings

- Parasomnias
  - Sleepwalking
  - Night terrors
  - Nightmares
  - Sleep paralysis
  - Rhythmic movement disorders
  - Nocturnal enuresis
- Sleep apnea

2. Extensive DDx
   - Social/ emotional stressors
   - Underlying medical conditions
     - Epilepsy
     - Narcolepsy
     - Periodic leg movements of sleep
     - Asthma
     - Gastroesophageal reflux dz
     - Depression
     - Medications
     - Other organic illness/ condition

Acute Management

1. Reassurance
2. Education on sleep behavior and behavioral therapy
   - Provide education about common conditions:
     - Sleep stalling
     - Frequent awakening
     - Nightmares
     - Night terrors
   - Discuss common strategies:
     - Sleep hygiene
     - Reassurance to child w/nightmares
3. Follow up within 6 mos or sooner if needed

Further Management: Dyssomnias

1. Behavioral therapy
   - Primary tx for dyssomnias
     - Evidence-based review recommends sleep hygiene as a front-line option
   - **Extinction**
     - Could be considered at approx 6 mos of age
     - Child is put to bed after pre-bedtime routines
       - If cries after parent leaves room, parents do not respond ("cry it out")
     - Research shows improved settling and reduced night wakes in healthy children
       - Results in 3-5 days
     - Potential drawbacks incl
       - Parental intolerance

    - Bursts of worsening behavior w/in 5-10 nights after implementation
    - Mild incr in problem behaviors 2-4 wks after initiation
- **Graduated extinction**
  - Could be considered at between 4-7 mos of age (expert opinion)
  - Child is put to bed after pre-bedtime routines
    - If cries after parent leaves room, parents return briefly in 5, then 10, then 15 minute intervals that lengthen each night
  - Research shows improved settling and reduced night wakes in healthy children
  - Better tolerated by parents
  - Can be targeted to individual areas
    - Amount of physical contact
    - Proximity of parent to child
    - Duration of intervals between check-ins
  - Drawback is that it requires consistent parental responses
- **Positive routines**
  - Set a bedtime routine of calm activities that a child enjoys
    - Child is put to bed immediately if throws a tantrum
  - Research has shown effective, particularly because prevents
    - Crying
    - Bedtime struggles
    - Parental anxiety
  - Drawback is that it requires consistent parental responses
- **Sleep hygiene**
  - Well-validated, effective treatment for chronic insomnia
  - Ideal bedtime chosen w/positive routine lasting less than 20 min, for example
    - Teeth brushing
    - Using toilet
    - Reading story
    - Gentle massage
    - Then child told it is bedtime
  - If tantrums after bedtime, firmly say:
    - "The routine is over; it is time for bed!"
  - Research shows reduced bedtime tantrums in healthy children
  - Drawback is that it requires consistent parental responses
- **Scheduled awakenings**
  - Goal of preventing full arousal w/problematic spontaneous awakenings
  - Briefly awaken child approximately 15 mins before a typical nighttime awakening for at least 10 days, then fade out over time
  - Research shows moderately effective, particularly for children resistant to extinction or who engage in undesirable behaviors on full arousal
  - Drawbacks include
    - Difficult to carry out
    - May take several weeks
    - Doesn't teach independent sleep initiation

- **Sleep restriction**
  - Curtailing amount of time spent in bed to actual or estimated amount of sleep time
    - Then gradually incr until optimal sleep duration is achieved
  - Studies in adults show improvement; no studies to date in children

2. Medications
   - Meds for pediatric sleep disorders are mostly "off label"
   - Behavioral modifications are mainstay of tx
   - Diphenhydramine
     - Use for sleep is off label
     - Peds dose: 0.5 mg/kg, max 25 mg
     - Overdose is a concern; fatal intoxications reported in infants
     - SE: residual daytime sleepiness, paradoxical excitement, hypertension
   - Chloral hydrate
     - Use for nighttime sedation
     - Peds dose: 25-50 mg/kg at bedtime
     - Overdose is a concern; may cause respiratory suppression
     - Contraindicated in children using
       - Stimulants
       - Diuretics
       - Fluoxetine
     - Caution in pts w/sleep-disordered breathing
     - Other SE
       - Gastric distress
       - Vomiting
       - Drowsiness
       - Dizziness
       - Malaise
       - Idiosyncratic reaction of confusion
       - Is habit forming w/chronic use
   - Melatonin
     - Dosing guidelines have not yet been established in pediatrics
       - Adult doses between 0.3 and 1 mg may be used and incr to effect
     - 2 small RCTs in 6-12 yr olds using melatonin 5 mg showed improved sleep onset and sleep time in healthy children
     - Works better in adults when given 2 hrs before bedtime
     - SE: HA, dizziness, decr appetite
     - Little is known about long term effects of melatonin

Further Management: Parasomnias

1. Behavioral therapy
   - No studies identified, therefore, recommended without supporting evidence
   - Extinction and graded approaches, scheduled waking, sleep hygiene, or sleep restriction
2. Medications
   - Clonazepam
     - Off label use
       - Can be used to prevent parasomnias associated w/partial arousals like sleep terrors or sleepwalking that disturb family

        - Pediatric dose 0.25-0.5 mg, suspension can be prepared by pharmacist
        - SE: residual daytime sedation, rebound insomnia
    - Melatonin
        - No studies identified in healthy children therefore recommended w/o supporting evidence for parasomnias
            - Used w/success in children w/epilepsy
            - 6 mg in children 3-9 yrs old
            - 9 mg in children 10-12 yrs old
    - Antihistamines
        - No studies support their use in parasomnias
3. Sleep disorders associated w/medical or psychiatric conditions
    - Tx underlying condition

Long-Term Care

1. Review if sleep problems are improving
2. If not improving, re-eval for underlying medical condition and consider referral to sleep disorders clinic

Follow-Up

1. Return to office
    - No recommendations found
    - Given length of behavioral modifications and possible intervening issues, 3-4 wks seems reasonable
2. Refer to specialist
    - Sleep disorders clinic referral for polysomnography in cases where sleep-disordered breathing or periodic limb movement disorder are suspected as non urgent referral
    - Other specialists as indicated if medical or psychiatric conditions suspected or dx
3. Admit to hospital
    - Only if underlying medical or psychiatric issue warrants this

Prognosis

1. Dyssomnias
    - Improved sleep behaviors w/behavioral interventions in short term
        - No long term studies available
2. Parasomnias:
    - Most children outgrow them
3. Sleep disorders associated w/medical or psychiatric conditions
    - Depends upon underlying condition

Prevention

1. Parental education of age-appropriate sleep hygiene
    - Effective in preventing sleep problems in children
    - Recommend education sessions during well child checks covering
        - Normal sleep patterns
        - Importance of consistency in routines
        - Sleep environment

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Evidence-Based Inquiry

1. Which nondrug alternatives can help with insomnia?

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