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
  o Abnormal sleep patterns
  • Dyssomnias
    • Settling problems
      o 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
      o Limit-setting sleep disorder occurs w/inconsistent rule setting or discipline
    • Freq night wakings
      o 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
      o Partial awakening which occurs 1-3 hrs after sleep onset
      o Child can appear fully awake or in a trance w/
        ▪ Screaming
        ▪ Agitation
        ▪ Confusion
        ▪ May be inconsolable
      o Child usually doesn't remember events in morning
      o Not associated w/daytime sleepiness
      o Very alarming to parents/ caregivers
    • Nightmares
      o Occur in second half of night or early morning
      o Full awakening and child often wants parental reassurance
      o Child usually remembers in morning
      o May result in daytime sleepiness
    • Sleep paralysis
      o Occurs in second half of night
      o Results in daytime sleepiness
    • Rhythmic movement disorders
      o Body rocking or head banging
      o 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
  o Onset as early as 6-8 yrs
  o Severe daytime sleepiness or sleep attacks
  o Hypnagogic hallucinations and sleep paralysis
• Periodic leg movements of sleep
  o May be associated w/ADHD

2. Incidence/ prevalence
  o Dyssomnias:
    ▪ Going to sleep or staying asleep
    ▪ 20-42% of 1-5 yr olds
  o Obstructive sleep apnea
    ▪ 2% of all children
  o Age-related sleep disorders
    ▪ Infancy
      ▪ SIDS
        o 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%
        o Wake to sleep transition difficulties
        o Sleep-stalling
        o Night awakenings
    ▪ 3 to 8 yrs old
      ▪ Parasomnias
        o Night terrors: 3-4% of 4-8 yr olds
        o Nightmares: 6% of 4-8 yr olds
        o Sleepwalking: 2% of 4-8 yr olds
        o Sleepwalking: 14-15% of 4-8 yr olds

3. Risk factors
  o 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
  o 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
   o General
     ▪ Obesity (consider OSA)
   o HEENT
     ▪ Consider OSA if:
       • Enlarged tonsils/adenoids
       • Deviated septum
       • Cleft lip or palate repair
       • Micrognathia
   o Pulmonary
     ▪ Wheezing, consider asthma, GERD
   o Neurologic: associated w/sleep disordered breathing
     ▪ Spinal scoliosis
     ▪ Findings of post-traumatic brain injury
     ▪ Spina bifida
     ▪ Chiari type 2 malformation
     ▪ Muscular dystrophy
   o Psychiatric:
     ▪ Consider anxiety, depression, ADHD if:
       • Mood
       • Interaction
       • Behavior

3. Diagnostic testing
   o 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
   o Dyssomnias
     ▪ Settling problems
       • Sleep-onset association disorder
       • Limit-setting sleep disorder
     ▪ Frequent night wakings
o Parasomnias
  ▪ Sleepwalking
  ▪ Night terrors
  ▪ Nightmares
  ▪ Sleep paralysis
  ▪ Rhythmic movement disorders
  ▪ Nocturnal enuresis

  o Sleep apnea

2. Extensive DDx
  o Social/emotional stressors
  o 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
   o Provide education about common conditions:
     ▪ Sleep stalling
     ▪ Frequent awakening
     ▪ Nightmares
     ▪ Night terrors
   o 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
   o Primary tx for dyssomnias
     ▪ Evidence-based review recommends sleep hygiene as a front-line option
   o 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

 o 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

 o 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

 o 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

 o 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
4.4.08

PEDs Sleep Disturbances

- 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
References


Evidence-Based Inquiry

1. Which nondrug alternatives can help with insomnia?

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