Pediatric Sleep Problems and ASD: Types, Assessment, & Intervention

Presented by:
Kathleen Armstrong, Ph.D., NCSP
Department of Pediatrics
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Objectives
- Review prevalence of pediatric sleep problems
- Describe relationship between sleep problems, age, and ASD
- Differentiate types of sleep-wake disorders
- Compare interventions for pediatric sleep problems in ASD population

Function of Normal Sleep
- Sleep Theories
  - Restorative Theory
  - Conservation of Energy Theory
  - Adaptive Theory
  - Memory Consolidation Theory
What makes us sleep

- Adenosine and other neurotransmitters
- Environmental cues alter biological clock

Stages of Sleep

- 4 stages of sleep
- Cyclic (go through them in same order)
- First 3 are non-rapid eye movement (Non-Rem)
- Fifth is rapid eye movement (REM)
- Amount of REM changes with development

Sleep and Lifespan
Optimum Sleep and Development

- Sleep optimizes cognition, memory, behavior regulation, and learning
- Slow wave (stage N3 sleep) plays role in memory consolidation
- REM sleep essential for processing memories within emotional component

Prevalence of Pediatric Sleep Problems

- Common complaint, exact prevalence is unknown
  - 53-78% of children with ASD
  - 20-65% of children with ADHD
  - 46% of children with developmental delay
  - 32% of typical children
  - 27% of children presenting to community screening for developmental concerns
  - 18% of children in the bottom 10% of their class have a sleep disorder
  - Only 2% of children with sleep disorders diagnosed and treated

Consequences related to Pediatric Sleep Disorders

- Health Problems
  - Car crashes
  - Obesity
  - Growth hormone deficiency
  - Immune system compromised
- School Performance
  - Poor Attention
  - Lower Grades
  - Impaired Social Skills
- Emotional & Behavioral Problems
  - Disruptive Behavior, Mood, Inattention, Aggression, Anxiety
Sleep problems and ASD

- Sleep problems major health concern for ASD
- Sleep problems probably not related to subtype of ASD, or IQ
- Sleep problems change as children grow older
- Sleep problems in ASD may increase aggressive behavior, developmental regression, mood, stereotypies, and anxiety
- Sleep problems related to medical problems

Sleep Problems and Development

- Children
  - Under 5: sleep anxiety, bedtime resistance, parasomnias, night wakenings
- Adolescents
  - Long-standing poor sleep hygiene
  - Anxiety related to sleep difficulties
  - Circadian rhythm difficulties
  - Daytime sleepiness

Medical Risks and Sleep Problems

- Allergies, ear infections, & asthma
- Cranial-facial Syndromes
- Diabetes
- GI problems
- Large tonsils or mouth malformations
- Neuromuscular disorders
- Obesity
- Seizures
- Vision problems
ASD and Sleep Dysregulation

- Theories
  - Genetic mutations in the neuroligin-3 and neuroligin-4 genes resulting in epilepsy or sleep-wake disturbance in ASD
  - Decrease in GABAB receptors in occipital and cingulate cortices
  - Abnormally low levels of Melatonin
  - Decreased interhemispheric synchronization between right and left temporal gyrus during sleep

Sleep-Wake Disorders in ASD

- Circadian rhythm sleep disturbances
- Behavioral insomnia
- Rapid eye movement sleep disorder
- Daytime sleepiness
- Restless leg syndrome
- Periodic limb movement disorder
- Obstructive sleep apnea
- Narcolepsy

Assessment of Sleep Problems

- Clinical history
  - Sleep initiation, maintenance, duration; refreshed and alert in AM; bedtime routine; anxiety/depression; unusual nighttime behaviors
- Sleep log
  - 2-3 weeks to document sleep-wake patterns
- Wrist actigraphy
  - Can combine with sleep log
- Polysomnography
  - Needed for OSAS, RLS, or nocturnal seizures
Child’s Sleep Diary

<table>
<thead>
<tr>
<th></th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
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<tbody>
<tr>
<td>Bedtime</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Time fell asleep</td>
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<td>Times awake during night</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Time awake in morning</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Child refreshed?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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Actigraphy

- Promising technique to measure sleep patterns and response to intervention, especially for those with neurodevelopmental disorders
- Parent still needs to maintain accurate sleep diary, so actigraph can be interpreted in context of when child went to bed.
- Documents sleep onset delay.

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Medical Intervention for OSAS

- Tonsillectomy & Adenoidectomy (T&A)
- Continuous Positive Airway Pressure (CPAP)
- Weight Loss
- Dental Appliances
Evidence-Based Behavioral Interventions

- Problems with initiating and maintaining sleep
  - Sleep hygiene*
  - Standard extinction
- Problems with night terrors
  - Scheduled awakenings
- Problems with co-sleeping
  - Standard extinction

Sleep Hygiene*

- Consistent bedtime routine*
  - Avoid stimulating bedtime activities
  - Turn off media
  - Provide relaxing activities
  - Keep bedroom dark and cool
  - Restrict caffeine before bedtime
  - Offer protein snack
  - Encourage sun exposure and exercise during day

Standard Extinction

1. Parents ignore all bedtime disruptions
   - Ferber Method (1985)-ignore all disruptive behaviors for a preset time
   - At the end of time, parent settles child back in bed, with minimal interaction
2. Often results in extinction burst
   - Parents need support to stay the course
   - May not be suitable for children with self injurious behavior or physical disabilities
### Sleep Disorders and Medications

- Circadian rhythm disorder - Melatonin 5-6 hours prior to bedtime
- Parasomnias of NREM or REM sleep - Clonazepam at bedtime, or melatonin at bedtime
- Epilepsy - Antiepileptic agents depending upon seizure type
- RLS - Oral iron; gabapentin (Neurontin)
- PLMD - Oral iron

### Melatonin

- Pineal hormone that regulates sleep-wake cycle and promotes sleep
- Prolonged sleep latency and decreased sleep time in ASD consistent with circadian rhythm disorder, potentially related to melatonin
- Deficiencies in melatonin in blood and urine samples documented in ASD

### Melatonin and Cognitive Behavioral Therapy

- 160 children with ASD, with sleep onset insomnia and sleep maintenance
- Randomly assigned to (1) Combination of melatonin and CBT, (2) Melatonin, (3) CBT, (4) Placebo
- Combination group showed fewer dropouts, achieved normal sleep efficiency, and sleep onset latency.
**Off-Label Medications**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Indications</th>
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<tr>
<td>Clonidine</td>
<td>RLS, ADHD</td>
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<tr>
<td>Non-benzodiazepines</td>
<td>Sleep onset/mainten.</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>Insomnia</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Sleep onset/mainten.</td>
</tr>
</tbody>
</table>

* Not FDA approved for use with children. Limit usage at lowest possible dose. Use in caution in patients with respiratory, renal, hepatic impairment. No Alcohol.

**Other Agents—with caution***

- Non-prescription agents
  - Valerian
  - Kava
  - Antihistamines*

**Autism Speaks/ Sleep Tool Kit**

- ATN/AIR-P Sleep Tool Kit-Parent Booklet and Quick Tips
  - Using visual schedule to teach bedtime routines
  - Using a bedtime pass
  - Sleep tips for children with autism who have limited verbal skills
### Case Study: Savanna
- Girl, age 36 months diagnosed with ASD
- Presenting problems: Inconsistent sleep schedule, difficulties falling asleep at night, night-time awakenings/unable to console self, restless sleeper, snores loudly, and usually ends up in parent’s bed
- Medical: Allergies, ear infections, poor eater, height/weight < 5th percentile
- Delayed social communication skills
- Difficulty with transitions

### Savanna’s Intervention
- Referred to pediatric sleep specialist by her pediatrician
- Polysomnogram confirms OSA
- Tonsils and adenoids removed
- Parent education
  - Establish healthy sleep routine
  - Implement standard extinction
  - Use social story to reinforce sleep routine

### 6-month Follow-up
- Sleep problems resolved
- Improved ability to follow directions
- Seems happy in morning
- Less emotionally reactive
- Improved social skills
Case Study: Sam

- Boy, age 15, diagnosed with ASD
- Presenting problems: Difficulties falling and staying asleep, difficult to wake in AM and late for bus, sleeps during AM classes
- Medical: Long history for sleep problems, anxious mood, picky eater, constipation, average height and weight
- Limited interest in social activities with peers, but has on-line “friends”
- Propensity for routines and motivation for sameness

Sam’s Intervention

- Referred to pediatric sleep specialist & psychologist:
  - Maintain sleep diary for 3 weeks
  - Prescribed extended release Melatonin 3-6 mg
  - Parent education regarding sleep hygiene
    - Maintain consistent sleep schedule
    - Increase outdoor daily activity
    - Shut off electronic media by 8 PM
  - Sam-CBT
    - Practice CBT prior to bedtime
    - Chart and graph progress

6-month Follow-up

- Sleep problems are resolving with new routine
- Continues to graph progress
- Less difficulty getting up and ready for school
- Less anxiety reported by Sam
- Improved performance at school
Take-home message

- Increased prevalence of sleep problems for children and adolescents with ASD
- Consequences of poor sleep include problems with behavior, learning and memory, growth, and higher parental stress
- More research needed to establish efficacy of sleep interventions for those with ASD
- Improving sleep habits always first line of treatment

References