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EVALUATION AND TREATMENT OF PEDIATRIC INSOMNIA

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Disclosure Statement



- No relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.
- I will reference off-label or investigational use of medications in this presentation.

Goals and Objectives



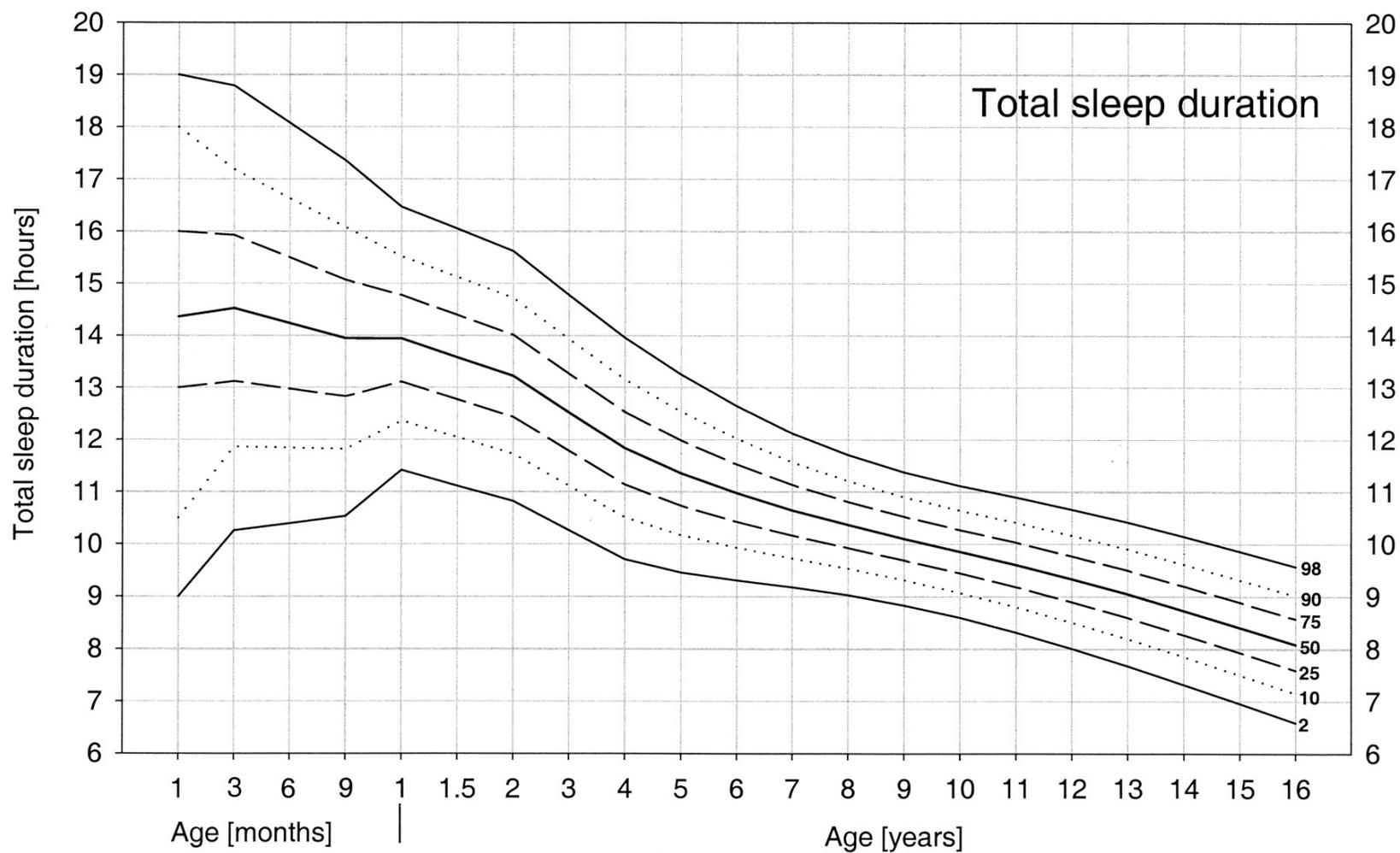
- Learn the how to identify and categorize pediatric insomnia.
- Increase knowledge of common sleep treatments, indications and potential side effects.
- Increase understanding of sleep issues in particular patient populations (Autism, ADHD, depression and anxiety) and appropriate strategies to optimize treatment.

Normal Sleep Requirements

Age	Total Sleep	Average Total Sleep (h)
Newborn (0–2 mo)	10–19 h	13.0–14.5
Infants (2–12 mo)	9–10 h at night + 3–4 h of nap	12–13
Toddlers (1–3 y)	9.5–10.5 h at night + 2–3 h of nap	11–13
Preschool (3–5 y)	9–10 h	9–10
School age (6–12 y)	9–10 h	9–10
Adolescents (13–18 y)	9–9.5 h needed (most get 7.0–7.5 h)	9.25 needed

Data from Mindell JA, Owens J. Sleep in infancy, childhood, and adolescence. In: A clinical guide to pediatric sleep: diagnosis and management of sleep problems, 2nd edition. Philadelphia: Lippincott Williams & Wilkins; 2009. p. 12–29.

Percentiles for total sleep duration per 24 hours from infancy to adolescence.



Iglowstein I et al. *Pediatrics* 2003;111:302-307

Insomnia



- “significant difficulty initiating or *maintaining** sleep and/or non-restorative sleep, with identifiable daytime consequences.”
- Sleep problems exist despite *adequate opportunity** and circumstances for sleep.

Consequences of Inadequate Sleep

- ❑ Fatigue/Daytime sleepiness
- ❑ Somatic complaints
- ❑ Behavioral problems - overactivity, impulsivity, noncompliance, risk taking
- ❑ Mood Disturbance - moodiness, irritability, lability, depression
- ❑ Cognitive Impairment – memory, attention, concentration, decision making, problem-solving
- ❑ School problems – tardiness, poor performance
- ❑ Overuse of stimulant medications - caffeine, nicotine, energy drinks, someone else's Ritalin)

Consequences of Inadequate Sleep

- Correlational/case-control studies suggest:
 - ▣ Quantity & quality of sleep correlates with daytime sleepiness and performance at school
 - ▣ Inadequate sleep linked to problems with attention, impulse control and behavior regulation
 - Car crashes, accidents in young children, risk taking in adolescents
 - ▣ Possible reciprocal association with psychiatric disorders
- Experimental studies of sleep deprived children suggest:
 - ▣ More sleepy
 - ▣ Less attentive
 - ▣ Possible effect on higher-level cognitive skills
 - ▣ *No clear effect on externalizing behaviors yet demonstrated*
- Effect on long-term development unknown

The Assessment of Sleep Problems in the Primary Care Setting

- A thorough clinical evaluation includes:
 - Developmental considerations
 - Medical problems
 - Psychiatric problems
 - Functional impairment at school and home
 - Caregiver burden
 - Comprehensive sleep history
- Screen for underlying primary sleep disorder
 - E.g. OSA, restless leg syndrome
 - BEARS

Box 1
Screening questions

Infants/babies

- What are the sleeping arrangements? Where? Cosleeping?
- What is the sleep routine? Is there a schedule?
- How do the parents handle nighttime awakenings?
- Are there medical problems? (colic, otitis, reflux, congestion, eczema, and so forth)
- How are the parents sleeping?

Toddlers

- What time does the child go to bed and get up in the morning?
- What is the bedtime routine? (who helps, what does it include, where does it happen)
- Where does the child sleep? Is he/she alone? With a sibling or a parent?
- What happens at separation, when the parent leaves? Is there a transitional object?
- Are there nighttime arousals? What happens then?
- Does the child nap? When? Where?
- How does the child function during the day?
- How are the parents sleeping? How are they doing during the day?

Children

- What time does the child go to bed and get up in the morning?
- What is the bedtime routine?
- What is in the sleep environment? Electronics?
- Are there nighttime arousals? What happens then?
- Does the child snore?
- Is there sleep refusal, separation anxiety, fear of the dark, or fear of strangers?
- Is the child enuretic?
- How does the child function during the day? How does he/she feel?

Teenagers

- Is there a regular bedtime? Wake time? When?
- Is there a presleep routine?
- What is the cause of delay in going to sleep? Homework or socializing?
- Does the teenager nap?
- Are there electronics in the bedroom?
- How does the teenager feel during the day? How is he/she functioning?
- Are there after school activities or commitments?
- Does the teenager complain of fatigue?

Fatigue

Ask about these issues:

- Medical:** acute illness, thyroid dysfunction, anemia, Epstein-Barr virus disease, muscle disease, medications, snoring, diabetes, poor nutrition, medications
- Psychological:** depression, anxiety, school refusal, drug use, stress
- Sleep related:** phase delay, overscheduling, late bedtime, caffeine use, naps, electronics, cataplexy

Comprehensive Sleep History

- Sleep habits
- Sleep hygiene
- Bedtime routine
- Sleep schedules
- Sleeping environment/arrangements
- Severity, frequency and duration of problem
- Parental responses to problem behavior
- Previous attempts at treatment
- Consider a 2 week sleep diary

Owens and Moturi, Child Adolesc Psychiatric Clin N Am 18 (2009) 1001–1016; Owens and Mindell, Pediatr Clin N Am 58 (2011) 555-569

BEARS



- Bedtime resistance/sleep onset delay
- Excessive daytime sleepiness
- Awakenings at night
- Regularity, patterns and duration of sleep
- Snoring and other symptoms

Additional Considerations

- Children rarely present with complaint of sleepiness
- Parents ability to recognize sleep problems varies
 - ▣ Parents of infants and toddler more likely to be aware of sleep concerns than parents of older children
- Culturally-based differences in sleep patterns and definitions of sleep problems
- Most noticeable consequence may be caregiver stress/sleepiness

General Principles in the Treatment of Pediatric Insomnia

- Treatment should be diagnostically driven
 - ▣ Insomnia is a symptom, not a diagnosis
- There can be multiple precipitating and perpetuating factors
- Behavioral interventions work, especially in young children
 - ▣ Should be the mainstay of treatment and offered as initial treatment

Categorizing Pediatric Insomnia

- Behavioral insomnia of childhood
 - 3 types
 - Sleep-onset association type
 - Limit-setting type
 - Combined Type
- Psychophysiological Insomnia

BIC-Sleep-Onset Association Type

- Unable to self-soothe, signal caregiver for help
- Diagnostic criteria:
 - ▣ Prolonged sleep onset that requires particular conditions
 - ▣ Demanding sleep-onset conditions
 - ▣ Significant delay of sleep onset in absence of those conditions
 - ▣ Caregiver intervention required to return child to sleep
- Diagnosis before age 6 months not typical
- Affected by internal and external factors, such as:
 - ▣ Parental presence while falling asleep
 - ▣ Feeding to sleep
 - ▣ Medical conditions
 - ▣ Attachment
 - ▣ Maternal depression

“Sleep-onset Associations”



- Sleep associations are conditions habitually present at time of sleep and serve as cues to go to sleep
- Can be
 - ▣ *appropriate* (thumb sucking)
 - ▣ *inappropriate* (rocking, nursing) require caregiver presence and are primary cause of prolonged night awakenings

BIC-Limit-Setting Type

- Noncompliant behaviors at bedtime
- Diagnostic criteria:
 - ▣ Trouble initiating or maintaining sleep
 - ▣ Stalling or refusal to go to sleep at bedtime or after night awakenings
 - ▣ Insufficient limits set by caregiver regarding bedtime/sleep behaviors
- Most common in children preschool aged and older
- Affected by developmental and external factors, such as:
 - ▣ Developmental appropriate fears (separation, dark)
 - ▣ Increased need for autonomy
 - ▣ Medical issues or medications
 - ▣ Mismatch between child's circadian rhythm and parent expectations
 - ▣ Parenting style
 - ▣ Child temperament and/or behavioral problems

Behavioral Insomnia of Childhood, Prevalence

- Most common behavioral sleep disorder in young children (0-5)
 - ▣ 25-50% of infants (>6mo) and toddlers have night waking
 - ▣ 10-15% of toddlers have bedtime resistance
 - ▣ 15-30% of preschoolers have difficulty falling asleep and night waking
- Can persist into middle childhood and adolescence

Behavioral Insomnia of Childhood, Treatment



- Goals
 - Eliminate inappropriate sleep-onset associations
 - Reduce undesirable nighttime behaviors
 - Encourage parental limit setting

Behavioral Insomnia of Childhood, Treatment

- Specific recommendations to parents:
 - ▣ Establish consistent bedtime routine that does not involve TV or other stimulating activities
 - ▣ Introduce new sleep associations (e.g. transitional object)
 - ▣ Encourage self-soothing skills (falling asleep without parent present)
 - ▣ Bedtime fading (gradually change to desired bedtime)
 - ▣ Decrease parental attention for problematic behaviors
 - ▣ Positively reinforce appropriate behaviors
 - ▣ Teach self-relaxation techniques and cognitive behavioral strategies (older children)
- And remember:
 - ▣ BE CONSISTENT
 - ▣ Expect an extinction burst

Psychophysiological Insomnia

- Characteristics:
 - Difficulty falling asleep and/or staying asleep
 - Learned or habituated sleep-preventing associations
 - Heightened physiologic arousal
 - *Excessive worry about sleep and concern about potential consequences*
- Associated factors:
 - Genetic vulnerability
 - Medical or psychiatric conditions
 - Stress
 - Poor sleep habits, caffeine, maladaptive cognitions
- Prevalence
 - Primarily in older children and adolescents
 - Up to 11% lifetime prevalence of insomnia in 13-16 year olds
 - Up to 35% of adolescents experience insomnia at least several times a month

Psychophysiological Insomnia, Treatment

- Specific recommendations to patient/family
 - **Educate** about principles of sleep hygiene
 - Appropriate bedtime for age
 - Consistent sleep schedule on weekends and weekdays
 - Avoidance of naps
 - Limiting caffeine
 - Sleep-conducive environment
 - Removal of electronics from bedroom, screens
 - Use bed only for sleep, get out of bed if unable to sleep (stimulus control)
 - Use relaxation skills
 - References: PAL guide “Relaxation Therapy Tip Sheet”,
http://www.dartmouthcoopproject.org/TeenMental/using_relaxation_TN.html
 - Cognitive restructuring of problematic thoughts
 1. Identify inappropriate sleep cognition
 2. Challenge the validity of the cognition
 3. Replace thought with more productive one

Sleep Hygiene for Children

- Keep consistent bedtimes and wake times every day of the week. Late weekend nights or sleeping-in can throw off a sleep schedule for days.
- Avoid spending lots of non-sleep time in bed—spending hours lying on a bed doing other activities before bedtime keeps our brains from associating the bed with sleep time.
- Child's bedroom should be cool, quiet and comfortable. Children who stare at clocks should have their clocks turned away from them.
- Bedtime should follow a predictable sequence of events, such as brushing teeth and reading a story.
- Avoid high stimulation activities just before bed, such as watching television, playing videogames, communication with friends, or exercise. Do not do these things during a nighttime awakening either. It is best not to have videogames, televisions, computers or phones in the child's bedroom.
- Having physical exercise as a part of the day often helps with sleep time many hours later.
- Relaxation techniques such as performing deep, slow abdominal breaths or imagining positive scenes like being on a beach can help a child relax.
- Avoid caffeine (sodas, chocolate, tea, coffee) in the afternoons/evenings. Even if caffeine doesn't prevent falling asleep it can still lead to shallow sleep or frequent awakenings.
- If child is awake in bed tossing and turning, it is better for them to get out of bed to do a low stimulation activity, (i.e. reading) then return to bed later. This keeps the bed from becoming associated with sleeplessness. If still awake after 20-30 minutes, spend another 20 minutes out of bed before lying down again.
- Worry time should not be at bedtime. Children with this problem can try having a "worry time" scheduled earlier when they are encouraged to think about and discuss their worries with a parent.
- Children should be put to bed drowsy, but still awake. Letting them fall asleep other places forms habits that are difficult to break.
- Security objects at bedtime are often helpful for children who need a transition to feel safe and secure when their parent is not present. Try to include a doll, toy or blanket when you cuddle or comfort your child, which may help them adopt the object.
- When checking on a child at night, checks should be "brief and boring." The purpose is to reassure the child you are present and that they are okay.
- If your child is never drowsy at the planned bedtime, you can try a temporary delay of bedtime by 30 minute increments until the child appears sleepy, so that they experience falling asleep more quickly once they get into bed. The bedtime should then be gradually advanced earlier until the desired bed time is reached.
- Keep a sleep diary to keep track of naps, sleep times and activities to find patterns and target problem areas when things are not working.

Robert Hilt, MD

Primary Reference: [A Clinical Guide to Pediatric Sleep](#), by Jodi Mindell and Judith Owens

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PHARMACOLOGIC TREATMENT OF PEDIATRIC INSOMNIA



Guidelines for using medications

- ❑ Should not be first treatment choice
- ❑ Should not be used alone
- ❑ Clearly define treatment goals
- ❑ Use for short-term only
- ❑ Match problem and patient with medication
- ❑ Screen for illicit substances, OTC and CAM treatments
- ❑ Monitor closely for side effects
- ❑ Avoid in presence of untreated, underlying primary sleep disorder

Melatonin*

- T $\frac{1}{2}$ is 40 minutes; plasma levels peak at 1 hr
- Studies supporting its use in ADHD and ASDs
- Side effects
 - ▣ Effects of long term use unknown
 - ▣ Possible suppression of hypothalamic-gonadal axis
 - ▣ Potential for lower seizure threshold and pro-inflammatory properties
- Not FDA regulated, commercial preparations vary in strength, purity and efficacy
- Typical doses 0.5 to 10 mg
 - ▣ Typically 30-60 minutes before desired sleep time
 - ▣ For sleep onset delay/circadian phase delay, may try 0.5 mg 5-7 h before current sleep onset

Antihistamines*

- Most commonly used sedatives in children
- Tolerance can develop
- Common SEs include – dry mouth, urinary retention, hypotension, tinnitus, dizziness, weight gain, headache, “hangover”.
- Risk of paradoxical excitation
- Be careful of other antihistamines (e.g. cold medicines) to avoid accidental OD

Antihistamines*

- diphenhydramine*:
 - typical doses 0.5-1 mg/kg, or 12.5-50 mg HS
 - ↑ QTc
- hydroxyzine*
 - typical doses 25-100 mg HS
- cyproheptadine
 - typical dose 2 mg
 - increase appetite, rare bronchospasm

trazodone*

- 5-HT₂ receptor antagonist
- Possible SEs include - GI, dry mouth, blurry vision, headache, dizziness, hypotension, morning “hang over”, ↑ QTc
- Risk of priapism, rare (1 / 1 000-1 / 1 0000) but potentially very serious
- Sedative doses typically 25-1 00 mg
- Can have antidepressant effects at higher doses
- Commonly used w/ SSRIs with unclear benefit

Alpha agonists (clonidine, guanfacine)*

- Clonidine second most commonly used sleep medication
- No randomized controlled trials for pediatric insomnia
- Sedation diminishes over time
- Guanfacine less sedating than clonidine
- Clonidine more concerning for children with seizure disorder

clonidine*

- Onset 1 hour; peak effect 2-4hr; T_{1/2} 6-24 hrs
- Start low (0.025-0.05 mg), increase gradually
- Risk of clinically significant hypotension; rebound hypertension; bradycardia or tachycardia
- Can cause irritability, dysphoria, dizziness, headache, GI effects, dry mouth
- Narrow therapeutic index
 - ▣ Can be cardiotoxic and risk of death in overdose

prazosin*

- Alpha *antagonist*
- Primarily used in context of nightmares or HS hyper arousal related to trauma
- Limited data in youth
- Dosing
 - ▣ Strawn et al: Extrapolated from adult data, start at 1 mg at bedtime and increase by 1 mg/wk up to 4 mg/day (J Clin Psychiatry 71:7, July 2010)
- Notable SEs include: palpitations, hypotension, dizziness, nausea, syncope, HA, edema, priapism (rare), pancreatitis (rare)

mirtazapine*

- H1 receptor antagonist
- Typical doses 7.5-45 mg
- More sedation at lower dose
- Some notable SEs – increased appetite, weight gain, daytime sedation, dry mouth, GI, dizziness, weakness, abnormal dreams, increased triglycerides, low white count (rare), serious liver problems (rare)
- Small, open label trial showed efficacy for adolescent depression (anxiety scores improved as well)

SSRIs*

- No controlled trials for pediatric insomnia
- Useful when treating underlying depression/anxiety
- Citalopram* and fluvoxamine* are thought of as most sedating
 - ▣ But not necessarily reason to use these first line
- Effects on sleep (Owens and Moturi 2009)
 - ▣ Can exacerbate RLS and PLMs
 - ▣ Suppress REM sleep, increase REM latency and REM density

Tricyclic antidepressants*

- Trimipramine, amitriptyline and doxepin are most sedating (3⁰ amines)
- Suppress REM and slow-wave (restorative) sleep
- SEs include anti-cholinergic effects; treatment emergent anxiety and agitation; cardiac effects such as ↑ QTc and arrhythmia
- Drug-drug interactions with SSRIs
- Can exacerbate RLS
- Serious cardiotoxicity in overdose

Benzodiazepines*

- ❑ Tolerance, dependence, behavioral disinhibition and safety issues limit use
- ❑ Can cause anterograde amnesia and impair memory and learning
- ❑ Longer acting (e.g. clonazepam) preferable to short acting (e.g. alprazolam)
- ❑ Avoid in obstructive sleep apnea (Owens and Moturi 2009)

Atypical Antipsychotics*



- ❑ Not recommended for treatment of insomnia
- ❑ Major side effects
- ❑ Expensive

Herbal Supplements*

- Some supplements used for insomnia:
 - Valerian root
 - Lavender (aroma therapy)
 - Kava-kava – risk of necrotizing hepatitis
 - Tryptophan – risk of eosinophilic myalgia syndrome
 - Lemon balm, chamomile, passion flower
- Untested in pediatric populations

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SLEEP ISSUES IS SPECIAL PEDIATRIC POPULATIONS

Insomnia in Depression

- Most children & adolescents with MDD report insomnia
- Depression tends to be more severe, higher rates of comorbid anxiety
- Objective measures inconsistent w/ teen reports
 - ▣ Based on 3 night stay in sleep lab, despite depressed youth reporting significantly worse sleep, EEG showed no difference compared to controls. (Bertocci M et al, JAACAP 2005)

Approach to Insomnia in Teen Depression

- Treat depression and insomnia simultaneously
- Use sleep hygiene and CBT first when possible
 - ▣ Correction of misperception of sleep problems may have therapeutic benefit
- If medication used – temporary intervention combined with behavioral intervention
- Base choice of medication on individual
 - ▣ Type of sleep problem
 - ▣ Comorbidities
 - ▣ Patient/family characteristics

Trazodone and SSRIs (Kallepalli et al. JACP. Jan 2009)

	Days to Resolution
trazodone	2
fluoxetine	4
trazodone + fluoxetine	5

- Difference was statistically significant but not clinically significant.
- Resolution not faster w/ combined treatment versus fluoxetine monotherapy

Sleep and Bipolar Disorder

- 40 % of children diagnosed with manic episode presented w/ decreased need for sleep (Geller et al. 2002)
- “decreased need for sleep” is often not considered a *problem* – be specific in how you ask the question
- Sleep problems are more commonly reported during a depressive episodes than a manic episode (Lofthouse et al. 2007)

Approach to Insomnia in Pediatric Bipolar

- Ask about sleep at each visit – distinguish between sleep *problems* and *decreased need for sleep*.
- Shift in sleep schedule can precipitate mood episodes (jet-lag, all-nighters, weekend sleep-overs)
- Treat insomnia aggressively to as part of relapse prevention
- Social Rhythm Therapy (CBT for Bipolar; looks at circadian, social and seasonal patterns)

Anxiety and Sleep

- Nighttime fear common between 4y and 12y (up to 75%)
- Children with anxious temperaments may present with sleep problems at a very young age
- Anxiety can cause transient (85%) and chronic (50%) sleep issues
- Older children/adolescents - sleep initiation, frequent nocturnal awakenings
- Younger children – bedtime refusal, co-sleeping, nightmares, fear of dark, need for security object, fear of being alone, and inflexibility around nighttime routine
- PTSD – nightmares, feeling unsafe at bedtime, parasomnias, enuresis

Insomnia in Adolescent Anxiety (Forbes E et al, JAACAP. 2008)

- Teens with anxiety *over report* good sleep
- Reported better sleep than actually demonstrated on sleep study.
- May benefit from help with a problem they are unaware of.

Approach to Insomnia in Pediatric Anxiety

- Nighttime fears
 - Avoid frightening media
 - Safe, soothing and consistent bedtime routine
 - Avoid reinforcing fears
 - More formal intervention – systemic desensitization
- Anxiety disorders
 - Treating underlying anxiety will help sleep for many
 - Sleep medications may be warranted for more severe anxiety disorders, unresponsive to other interventions

Autism Spectrum Disorders (ASDs) and Sleep

- 44-83% have problems with sleep
- Problems with sleep initiation, sleep maintenance, irregular sleep-wake patterns, EMA and poor routines
- Prone to behavioral insomnia of childhood (sleep onset association subtype and limit-setting type)
- Circadian rhythm dysfunction
 - ▣ Abnormal melatonin regulation

Approach to Insomnia in ASD

- All children with ASD should be screened for sleep problems
- Refer for sleep study or sleep specialist if clinically indicated
- Behavioral therapies – sleep hygiene, chronotherapy, massage
- Most consistently improve sleep onset and decrease family distress around bedtime

ADHD



- Sleep complaints in 25-50% of children with ADHD (vs 7% in controls)
- Most consistent complaints are delayed onset, night waking and sleepiness on awakening.
- Studies using actigraphy identified more night-to-night variability (SOL, TST, awake time) compared to controls

Approach to Insomnia in ADHD

- With identification and treatment of comorbidities, sleep disturbance in ADHD is far less significant
- Consider PSG for some youth
- Optimize control of daytime ADHD symptoms
- Use sleep hygiene first
- CBT for nocturnal anxiety
- Consider adjustment to stimulant
- Consider medication for sleep when:
 - ▣ Chronic sleep onset insomnia
 - ▣ Failure to respond to above

When should I think about a sleep study?

- History of persistent snoring
- Witnessed apnea
- Gasping for air during sleep
- Excessive movement during sleep
- Symptoms of RLS
- Excessive daytime sleepiness despite adequate TST

Coaching Parents



- Acknowledge stress, strain and impact on their lives
- Select solutions that fit their lifestyle
- Implement changes when time, energy and patience to assess
- Makes small changes and allow sufficient time to evaluate before moving on
- Be patient – change takes time

Key Points



- Thorough clinical evaluation including screen for primary sleep disorders
- Treatment approach should be diagnostically driven, taking into account patient and family characteristics
- Optimize control of daytime symptoms for underlying psychiatric disorders
- Behavioral treatments should be used first whenever possible, and should always accompany pharmacologic interventions
- If necessary, aim to use medications for sleep as a temporary measure only

Questions?

