

Pediatric Sleep Disturbance

Identification of Problems & Strategies
for Management in Primary Care

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Objectives

- Establish the impact of sleep problems, describe normal sleep, & define sleep physiology
- Establish familiarity with a sleep screener that can be used in primary care (PC) with goals of:
 - Outlining common sleep presentations
 - Describing corresponding practical recommendations for the PC setting
 - Determining when to consider sub-specialty referral
- Medication management options in PC

Relevance of Pediatric Sleep Problems

How Common Are They? Why Be Concerned?

Occurrence of Sleep Disorders

- Insomnia – 20% or more in young children (Mindell et al., 2006)
- Insufficient sleep – 62% in teens (NSF, 2006)
- DSPD – 7% teens
- OSA – 1% to 4% (Lumeng & Chervin, 2008)
- Narcolepsy – 0.05% (Longstreth et al., 2007)
- Parasomnias
 - Recurrent nightmares – 1% to 5% (Li et al., 2011)
 - Recurrent sleep terrors ages 4 to 12 – 1% to 7% (AASM, 2014)
 - Sleep walking 5%
- RLS 2% - 6%, which is associated with PLMD and ADHD (Picchietti et al., 2013)

Parents' and Teens' Perceptions

- 25% to 33% of parents think their toddler, pre-, or school-age child doesn't get enough sleep.
 - Few children “outgrow” sleep problems; e.g., 84% of infants 3 years later (Owens et al., 2000)
- 9% of parents think their teen has a sleep prob
- 24% of teens think they have a sleep prob
 - Depending on age, 29% to 56% getting < 7 hrs!
 - 51% report EDS at least once per week

Impact of Sleep Problems

- Emotional lability & ADHD-like symptoms in 7 – 11 yo's (Gruber, Casoff et al., 2012; Gruber, Michaelsen et al., 2012)
- Memory and Executive Function problems (Beebe et al., 2010; Sadeh et al., 2003)
 - Poor Grades (Asarnow et al., 2014; deCarvalho et al., 2013)
- 5% of teens have fallen asleep while driving (NSF, 2006)
- Among 62% of teens with insufficient sleep; 17% report Sxs of depression (NSF, 2006)
- Increased risk for HTN, HCl, obesity, compromised immune fxn (too many citations, 2018)

Sleep in Children & Teens

What's Normal?

Average Sleep Duration

AGE	AVG. SLEEP NEED
4 – 12 months	12 – 16 hours
1 – 2 years	11 – 14 hours
3 – 5 years	10 – 13 hours
6 – 12 years	9 – 12 hours
13 – 18 years	8 – 10 hours

AASM Consensus Statement (2016)



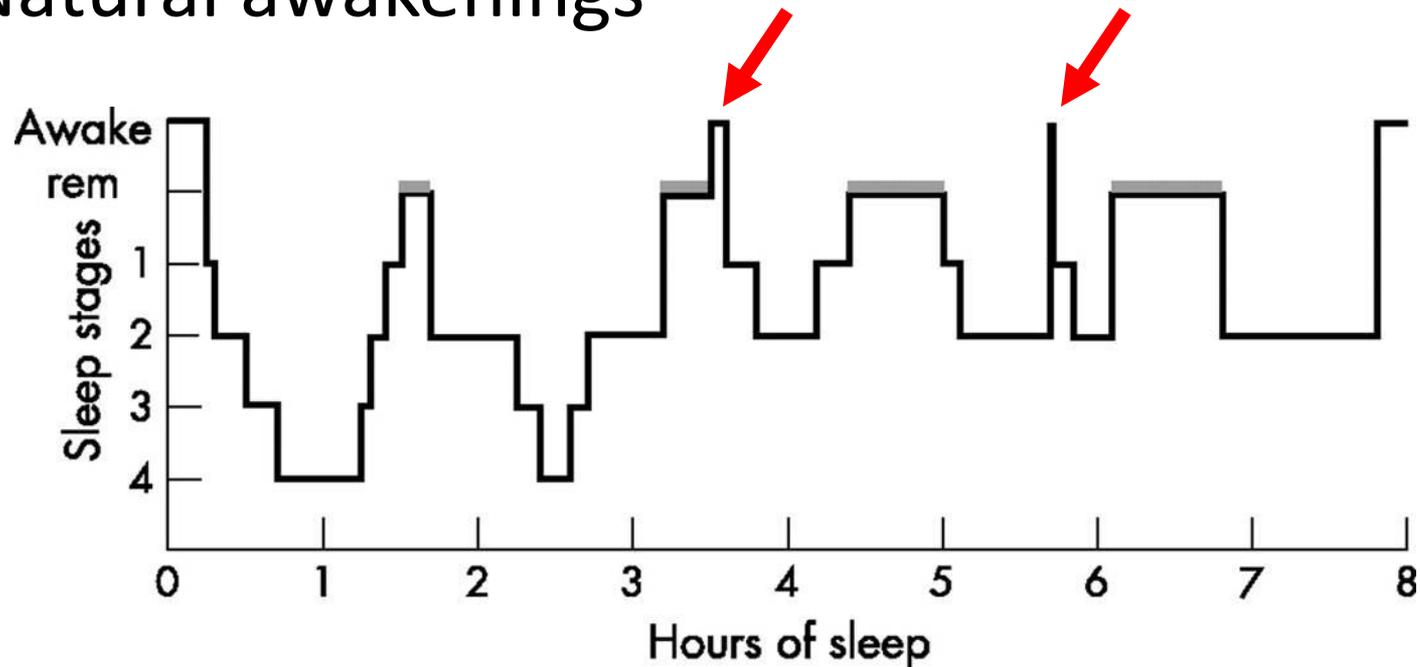
**Every Olympic event should include
one average person competing
for reference.**

Noteworthy Milestones

- **Sleep consolidation** expected by 6 – 9 mos = 10 to 12 hours nighttime sleep
- **Night feedings** (usually) not needed after 6 mos
- **Two naps** per day at 12 – 18 mos
- **One nap** per day after 18 mos
- **Only 25% of 4 yo's nap**; 80% or more need naps
- **10 yrs, 10 hrs**
- **Circadian preference** emerges in school-age children
- **Circadian phase delay** is natural for teens: ~2 hrs
- Recommended teen sleep = **9.25 hrs**; Avg TST = 7.5 . . . Yikes!

Sleep Architecture

- Stages/cycles
- Natural awakenings



What Controls Sleep?

- **Sleep Pressure:** Accumulation of sleep-promoting brain chemicals; e.g., adenosine.



Borbély (1982, 2009)

What Controls Sleep?

- **Circadian Rhythm:** Timing & organization of the sleep-wake schedule
 - Zeitgeber
 - Light – dark
 - Routines
 - Genetics
 - Owls & larks



Borbély (1982, 2009)

Assessment of Sleep complaints

In the Pediatric Primary Care Setting

B-E-A-R-S Assessment

5-item pediatric sleep-screening instrument developed for the PC setting

- **B**edtime Problems
- **E**xcessive Daytime Sleepiness
- **A**wakenings During the Night
- **R**egularity and Duration of Sleep
- **S**leep-disordered Breathing



Bedtime Problems & Nighttime Awakenings

Bedtime Problems

PCP: Does your child have any problems going to bed / falling asleep?

PARENT: [*Audible laugh followed by real tears*]. I put Sam down at eight. Then I leave. Then he comes out—like 30 times! We give hugs, drinks, snacks, cuddles, one more story. He says, “I have to pee.” (He never does.) Nothing works! Eventually, one of us has to lie down with him until he falls asleep. I used to drink wine, watch Netflix . . . [*crying*].

Insomnia

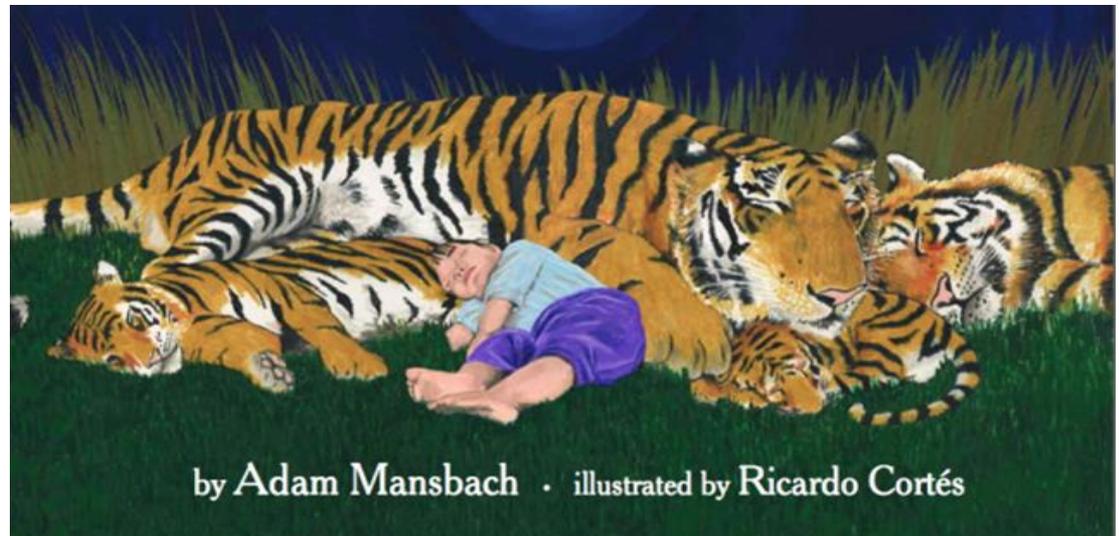
- Symptoms
 - Difficulty initiating sleep
 - Difficulty maintaining sleep
 - Resistance
 - Association problems
- Produces some form of daytime impairment:
 - Fatigue
 - Cognitive problems
 - Behavioral problems
 - Mood disturbance & irritability
- Chronic versus Acute



ICSD-3 (2014)

Limit-Setting Insomnia

- Bedtime resistance
 - Noncompliance
 - Other rigidity & inflexibility
 - Curtain calls
 - Anxiety



Awakenings at Night

PCP: Do you wake up in the night?

TEEN: Yeah, I guess. Doesn't everyone?

PCP: Maybe. How long are you awake?

TEEN: Like 30 minutes or so. I think about stupid stuff like what I'm gonna wear or if I put my homework in my bag. Or if maybe I had a test I forgot about. If I can't go back to sleep I check my phone and maybe just get up early.

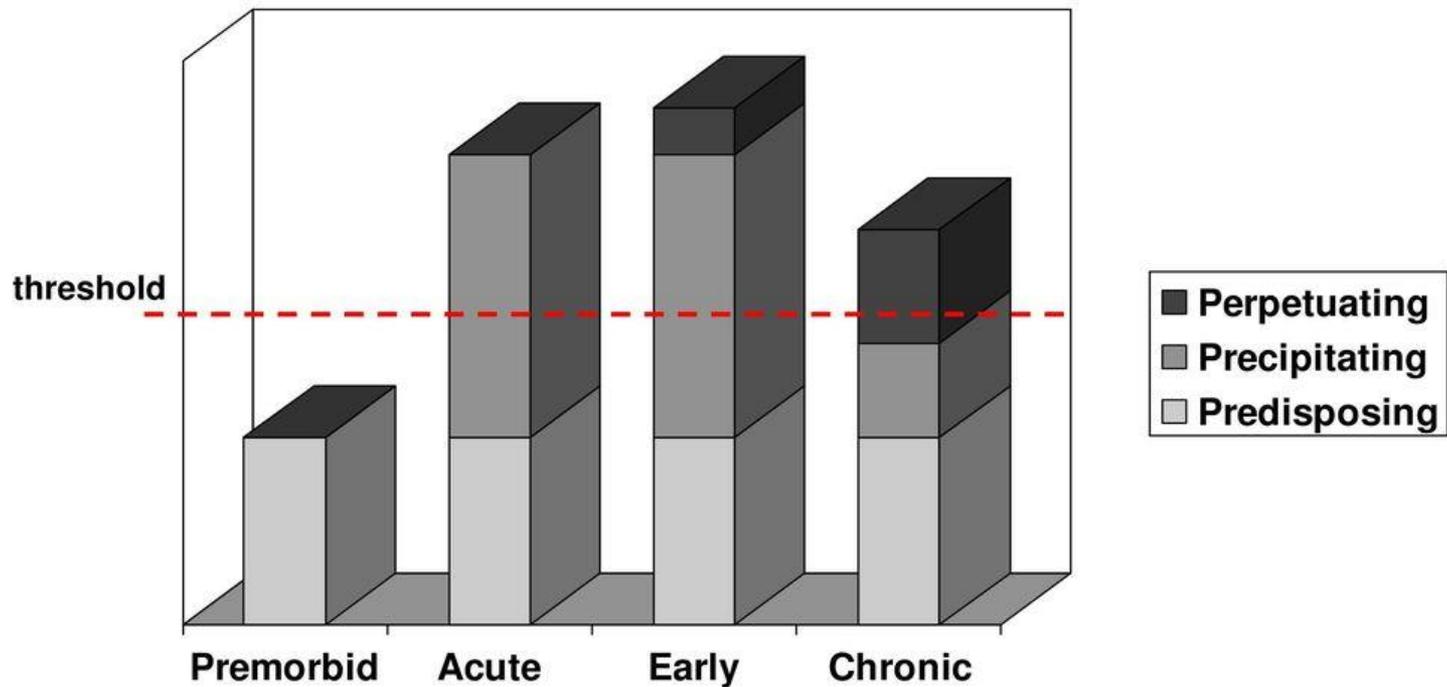
Sleep-Onset Association Insomnia

- Extended process, requiring special conditions
 - Parental presence
- Bedtime & nighttime awakenings
 - All children awaken at night, but . . .
- Conceptualized as a Skill deficit



Persistent Insomnia

Nature of Insomnia over time Three-factor model from Spielman



Sleep Hygiene

- Get up same time 7 days
- Avoid daytime sleep (school-age +)
- Same, positive bedtime routine
- Bedroom free of distraction
- Low light / low noise
- Comfortable temperature
- Don't take problems to bed
- Don't *try* to fall asleep
- Daytime activity/exercise
- Eat regular meals & don't go to bed hungry
- Reduce/eliminate caffeine
- Avoid excessive liquids in evening



Stimulus Control

Active Ingredients of Insomnia Treatment

- Stimulus Control
 - Sleep only in the bedroom
 - Use the bedroom only for sleep
- Sleep Restriction
 - $SE = TST/TIB$



Excessive Daytime Sleepiness

Excessive Daytime Sleepiness (EDS)

PCP: Does your child seem overly tired or sleepy during the day?

PARENT: Its not even funny how much he sleeps during the day. His teachers think he's lazy. He used to get all A's. Now he can't even get up to go to school. It seems like he sleeps enough at night, like 10 pm to 7 am.

Epworth Sleepiness Scale

ACTIVITIES	CHANCE OF FALLING ASLEEP			
Sitting and reading	0	1	2	3
Sitting and watching TV or video	0	1	2	3
Sitting in a classroom at school during the morning	0	1	2	3
Sitting & riding in a car or bus for about half an hour	0	1	2	3
Lying down to rest or nap in the afternoon	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly by yourself after lunch	0	1	2	3
Sitting and eating a meal	0	1	2	3

Johns (2015); Janssen et al. (2017)

Patient or Parent Reports EDS

CLARIFY

TST age-appropriate?

No

Insufficient Sleep

Morning wake time fits with next-day obligations?

No

Circadian DSPD

No

Trouble sleeping on preferred schedule?

Yes

Insomnia

Yes

Irresistible daytime sleep?
Sudden loss muscle tone?
Unusual sensations on awakening?

Yes

Hyper-somnolence
Problem

Often co-occur in teens

≤ 15%
EDS

Refer to Sleep
Medicine



Regularity / Duration of the Sleep Period

Regularity / Duration of the Sleep Period

PCP: What time do you usually go to bed on school nights?

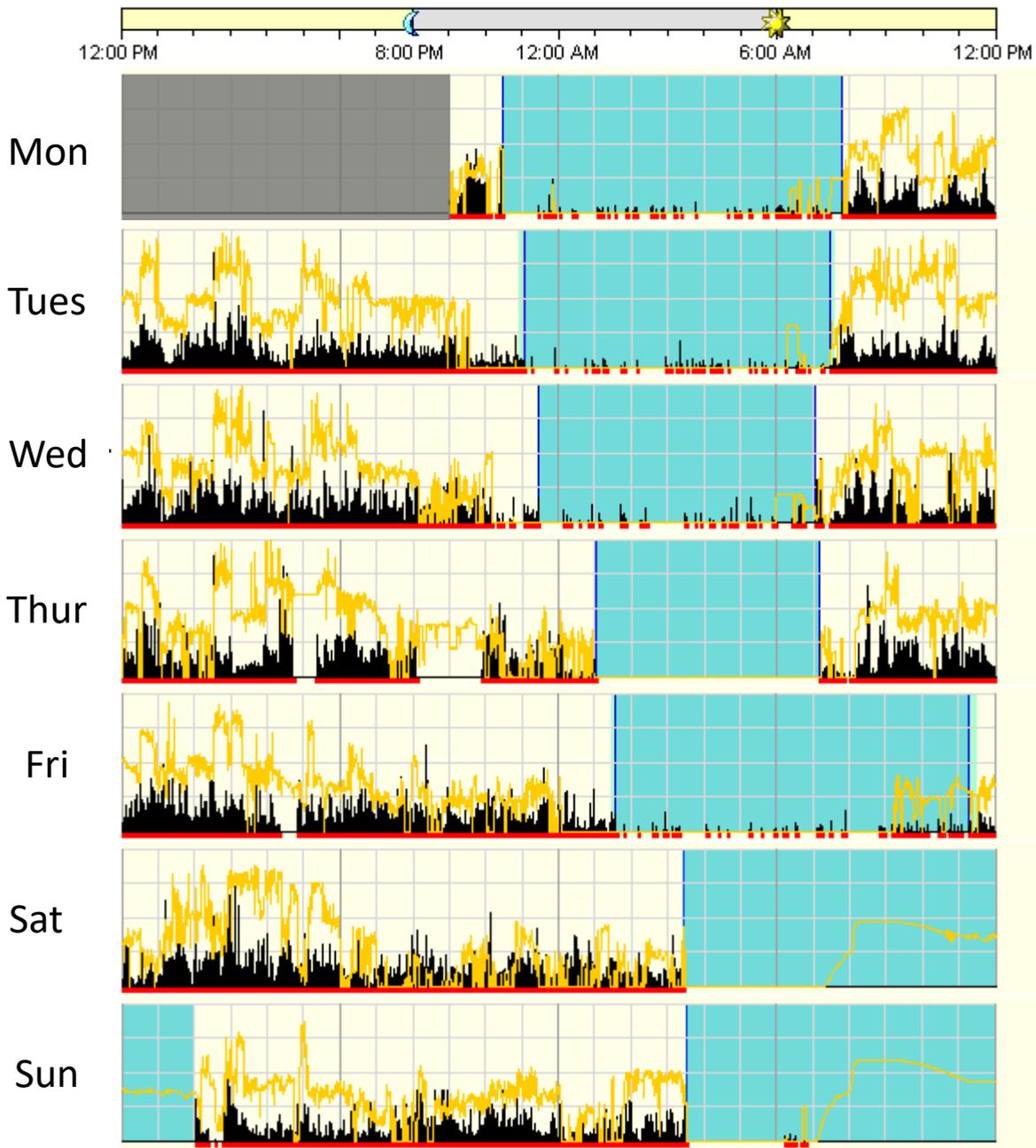
TEEN: [*Arms crossed, poor EC.*]. Late.

PCP: How late?

TEEN: [*Response is somewhere between oppositional and apathetic*]. Does it matter? . . .
Like after midnight, I guess.

PCP: Weekends?

TEENS: Later.



Actogram



Sleep Hygiene for Teens

- Get up same time 7 days
- Avoid daytime sleep
- Establish a positive bedtime routine carried out at the same time each night
- Commit to keeping your bedroom free of distraction
- Reduce/eliminate caffeine
- Get daytime bright light exposure
- Decrease light exposure in the two hours before bedtime

Sleep-Disordered Breathing

Sleep-Disordered Breathing

PCP: Does your daughter snore ?

PARENT: Every night. Louder than her dad.

PCP: Is she sleepy during the day

PARENT: Are you kidding? Just the opposite. I feel like she never runs out of gas. She's literally bouncing off the walls!

Obstructive Sleep Apnea

All children should be screened for snoring

History

Snoring

Labored breathing

Enuresis

Odd postures

Morning headaches

Daytime sleepiness

ADHD-like symptoms

Learning problems

Physical Exam

Underweight

Overweight

Tonsillar hypertrophy

Adenoidal facies

Micrognathia / retrognathia

High-arched palate

Failure to thrive

Behavioral Treatment

Why Treat Sleep Problems?

- Research shows that behavioral treatments **work** (Mindell et al., 2006; Morganthaler et al., 2006; Vriend & Corkum, 2011)
- AAP practice parameter for sleep treatments in autism (Malow et al., 2012)
- Impact on daytime behavior (as noted in the intro)
- Family stress

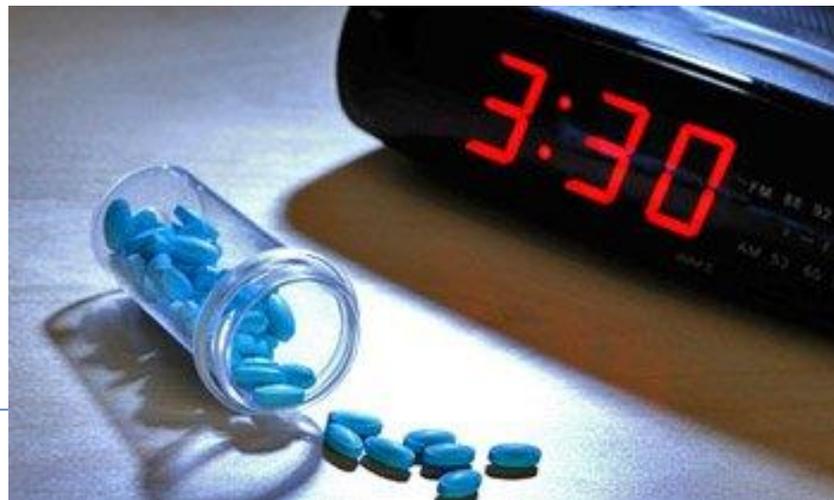
Evidence-Based Behavioral Treatment

- **Insomnia:** Extinction procedures, Excuse-Me Drill, Bedtime Pass, CBT-I
- **DSPD:** Chronotherapy, Light therapy
- **NREM parasomnia:** Scheduled awakenings
- **Nightmares:** IRT
- **Sleep-Related Rhythmic Movements:** Schedule, TST, positive bedtime routines, HRT
- **Narcolepsy:** Supportive interventions, scheduled napping
- **OSA:** PAP adherence

Medication Management

Medication Management

- **Which medications do you use for your patients?**
- **What has worked??**
- **What hasn't worked??**



Medication Management- Case 1

Tim is a 10 y/o who you have been following since he was a baby. He was recently diagnosed with ADHD-CT and had been started on Concerta. It seems to be working well but mom says that he is still having a lot of trouble with sleep. They have taken multiple steps to improve sleep hygiene, including taking the tv out of the room, no screens before bed, no food or drink before bed and coming up with a consistent schedule. It is still taking him two hours to calm and get to sleep, but once he is asleep he stays asleep.

What questions do you have?

What would you recommend?



Melatonin

- Supplement the natural production of melatonin from the pineal gland
- Lower dosing for circadian rhythm disturbances (e.g., jet lag) 0.5mg to 3mg (younger children and 5mg (adolescents) v. higher doses for sleep onset insomnia of 1mg (infants) or 3mg (children and adolescents to max 10mg)

- **Positives:**

- Over the counter
- Cheap
- Multiple formulations
- No clear adverse reactions
- Especially for those with ADHD or ASD or blindness

- **Negatives:**

- Limited evidence of benefit for sleep onset insomnia in children without ADHD or ASD
- Limited evidence of ER form for sleep continuity
- Not FDA regulated
- Vivid dream

Anti-histamines (Benadryl and Vistaril)

- Binds to H1 receptor of the brain
- Rapid acting, intended for sleep initiation and not continuity
- Intended for short term use

• **Positives:**

- Can be over the counter
- Cheap
- Multiple formulations
- Vistaril- studied for anxiety (racing thoughts)

• **Negatives:**

- Limited evidence of efficacy
- Often can develop tolerance
- Toxicity (anti-cholinergic)
- Sedating
- Paradoxical reaction

Alpha agonists (eg. clonidine)

- Clonidine is a central alpha 2 agonist
- Short half life of about 2 - 4 hours and quick initiation of about 30 min - 1 hour
- Guanfacine (Tenex) is alpha 2-A specific and less sedating so less effective
- Start low (0.05mg) and slowly increase (0.05mg per increase)
- Check back for blood pressure check, especially with any increases

• **Positives:**

- Most of evidence of benefit with children with ADHD for good efficacy
- High usage beyond clinical trials with efficacy seen
- Often well tolerated

• **Negatives:**

- Short acting (not good for sleep continuity)
- Can develop tolerance
- Side effects: hypotension, bradycardia, pre-syncope
- Rebound HTN from discontinuation

Trazodone

- At lower doses thought to have some sedative effect by affecting serotonin and histamine binding
- Start low (25mg) and slowly increase, would maximize at 100mg

- **Positives:**

- Often used more with co-morbid depression
- Longest acting for sleep continuity

- **Negatives:**

- Limited empirical evidence of benefit
- Priapism
- May suppress REM

Ambien (Zolpidem)

- Works on GABA type A receptors
- Short half life (about 3 hours) but still can work some for maintenance

- **Positives (all from adult trials):**

- Helps with sleep initiation and maintenance
- Doesn't cause tolerance
- Data for middle of the night waking

- **Negatives:**

- Very limited studies in children/adolescent (including a study with no benefit)
- Possible rebound insomnia
- Concern for side effects:
 - Odd sleep-wake behaviors
 - Hallucinations
 - Headaches

Medications

- Others:
 - Benzodiazepines: Not recommended except for significant panic/anxiety, can disrupt sleep-wake cycles
 - Lunesta (Eszopiclone): No trials showing benefit for children/adolescents

Medication Pearls

- Melatonin is a safe option to start with, even if less effective
- Consider psychiatric co-morbidities
 - Vistaril and benzodiazepines - anxiety
 - Clonidine - ADHD
- Consider half life if difficulty staying asleep
 - Trazodone, Zolpidem and Melatonin ER - longer half life
 - Clonidine and Vistaril - shorter half life
- Medications are often with limited effect, too many side effects or not as well studied, so focus on sleep hygiene first!

Medication Management- Case 2

Jane is a 13 y/o who you are seeing for a well child check for the first time. She follows with one of your other providers and has a history of anxiety. She reports trouble falling asleep that seems to be getting worse and is hoping you can help as she is now falling asleep in class?

What questions do you have?

What recommendations do you have?



Medication Management- Case 3

Sarah is a 15 y/o with a history of Autism Spectrum Disorder who presents for a follow-up of sleep problems with her family. You had referred to Merck for medication management and it is going to be a 6-month wait. They are hoping you can help out sooner.

What questions do you have?

What do medications do you recommend?

What Next?

Pediatric Sleep Program

Referrals & Contact Information

Pediatric Sleep Program at the Children's Hospital of Pittsburgh

(412) 692-5630, option 2