# PLEASE LET ME SLEEP!

Andrew Darmahkasih, MD PGY-2 UCI-CHOC Pediatric Residency Program

#### Introduction

- Sleep is a highly complex and intricately regulated neurobiologic system that influences and is influenced by all physiologic systems in the body, as well as the environment
- Sleep regulation requires 2 highly-coupled processes:
  - Homeostatic process: regulates length and depth of sleep, thought to be related to the accumulation of cytokines and sleep-promoting chemicals
    - This is thought to be built up more quickly in infants and young children
  - Circadian rhythms: influences organization and timing and duration of daily sleep-wake cycles
- Changes in sleep architecture and sleep patterns reflect physiology, developmental, and environmental changes occurring throughout childhood

# Developmental Changes in Sleep

- Sleep is the primary activity of the brain during early development
   By age 2, the average child has slept 9500 hours vs. 8000 hours awake
- There is a gradual decline in the average 24 hour sleep duration from infancy through adolescence (both diurnal and nocturnal sleep amount)
- Sleep organization:
  - Decline in relative percentage of REM sleep from birth (50% of sleep) through early childhood into adulthood (25-30%)
  - Initial predominance of slow-wave sleep that peaks in early childhood, drops off abruptly after puberty, and then further decreases over the life span
  - This predominance of slow-wave sleep is the cause of high prevalence of partial arousal parasomnias (sleepwalking and sleep terrors) in preschool and early school-age children

# Developmental Changes in Sleep

- The within sleep cycle lengthens from 50 min in infants to 90-110 min in the school-age child
  - Responsible for less frequent night awakenings as the child develops
- Gradual shift in the circadian sleep-wake rhythm to a delayed sleep onset and offset time, linked to pubertal stage rather than chronological age
  - Often coincides to the prevalence of exposure to electronic screens

# Sleeping Through the Ages - Newborns (0-2 mo)

- Total sleep: 10-19 hours per 24 hours, may be higher in premature babies
- Bottle-fed babies generally sleep for longer periods (2-5 hr bouths) than breastfed babies (1-3 hr bouths)
- Sleep periods are separated by 1-2 hour awake
- No established nocturnal-diurnal pattern
- Sleep is evenly distributed throughout the day and night

#### Sleeping Through the Ages - Newborns (0-2 mo)

Please make sure I sleep by myself, in my crib, every time!

- Sleep recommendations:
  - No bedsharing for first year of life
  - Always sleep on the back, in a firm mattress, no pillows or comforters
  - Make sure face and head stay uncovered and clear of blankets and other coverings during sleep



# Sleeping Through the Ages - Infant (2-12 mo)



- There is great variability, but recommended sleep duration is 12-16 hours
- Sleep regulation and self-soothing

   Self-soothing begins in first 12 weeks of life
- Sleep consolidation ("sleep through the night") occurs generally between 6 weeks and 3 months
- Can see sleep-related rhythmic movements (head-banging, body rocking)

# Sleeping Through the Ages - Toddler (1-2 yr)

- Recommended sleep amount is 11-14 hours, including naps
- Naps decrease from 2 to 1 nap at average age of 18 months
- Cognitive, motor, social, language development issues impact sleep
- Nighttime fears develop, transitional objects and bedtime routines become important
- Behavioral insomnia of childhood
  - Sleep-onset association type: will fall asleep only under certain conditions or associations, typically requiring parental presence, such as being rocked or fed - child does not develop the ability to self-soothe
  - Limit-setting type: usually related to inadequate limit setting and managing behavior in general, unwillingness/inability to set consistent bedtime rules and/or regular bedtime

# Sleeping Through the Ages - Preschool (3-5 yr)

- Recommended sleep amount is 10-13 hours (including naps)
- Overall, 26% of 4 yo and just 15% of 5 yo nap
- Persistent cosleeping tends to be highly associated with sleep problems in this age group
- May see sleepwalking, sleep terrors, nighttime fears/nightmares



# Sleeping Through the Ages - Childhood (6-12 yr)

- Recommended sleep is 9-12 hours
- Can start seeing school and behavior problems being related to sleep
- Irregularity of sleep-wake schedule reflects increasing discrepancy between school and non-school night bedtimes and wake times
- Increasingly electronic is competing for sleep time



# Sleeping Through the Ages - Adolescence (13-18 yr)

- Recommended sleep amount is 8-10 hours
- Can see later bedtimes, increased discrepancy between sleep patterns on weekdays and weekends
- Puberty-mediated phase delay (later sleep onset and wake times)
- Earlier required wake times
- Electronics playing a major role in keeping adolescents up at night
- May see delayed sleep-wake phase disorder, narcolepsy, restless legs syndrome

I have trouble sleeping at night, so that's why I play with my phone to help me fall asleep...



# Basic Principles of Healthy Sleep for Children

- Have a set bedtime and bedtime routine.
- Bedtime and wake-up time should be about the same time on school nights and non-school nights.
- Make the hour before bed shared quiet time. Avoid high-energy activities just before bed.
- Don't send your child to bed hungry.
- Avoid products containing caffeine for a few hours before bedtime.
- Make sure your child spends time outside very day.
- Keep your child's bedroom quiet and dark.
- Keep your child's bedroom at a comfortable temperature during the night.
- Don't use your child's bedroom for time-out or punishment.
- Keep the TV out of your child's bedroom.

# Basic Principles of Healthy Sleep in Teenagers

- Wake up and go to bed around the same time every night.
- Avoid sleeping in on weekends to "catch up" on sleep.
- If naps are taken, they should be short (less than 1 hour) in the early to mid-afternoon. But napping during the day can make insomnia worse.
- Spend time outside every day and exercise regularly.
- Use your bed for sleeping only.
- Make the 30-60 minutes before bedtime a quiet or wind-down time.
- Don't go to bed hungry.
- Avoid caffeine for hours before bedtime.
- Do not use alcohol.
- Do not smoke at least 2 hours before bed.
- Do not use sleeping pills, melatonin, or other nonprescription sleep aids.

#### References

• Kliegman RM, St Geme JW, Blum NJ, Shah SS, Tasker RC, Wilson KM. *Nelson Textbook of Pediatrics*. Elsevier Health Sciences. 2020, 21st ed.