Healthy Sleep: Giving Children a Good Start

Carole Kline, MS, CPNP
Senior Instructor, Sleep Medicine
University of Colorado
Children’s Hospital Colorado

Bedtime problems and frequent awakenings occur in about 20-30% infants, toddlers and preschoolers

Sleep is a public health problem
- The financial burden alone of childhood sleep problems is considerable
- Recent study found a 228% increase in health care use in children with obstructive sleep apnea alone (OSA) before treatment compared with normal children

Average high school senior sleeps only 6.5 hours each night

Zombie Kids: Overscheduled, Overtired
- Homework
- Sports
- Social activities
- Electronics
- Lack of bedtime routine
- Working parents
- 80% do not get enough sleep
Insufficient sleep

- Daytime sleepiness/fatigue
- Poor cognitive function, especially math
- Obesity
- Irritability, moodiness
- Behavioral problems, aggression
- Headaches
- Depression

Obesity and insufficient sleep

- Increased production of hunger hormone ghrelin
- Decreased leptin which helps balance food intake by telling the body it’s full
- Decreased production of growth hormone

Causes for insufficient sleep

- Social
- Behavioral
- Lack of parental knowledge regarding importance
- Medical

Social stressors that impact sleep

**Home environment**
- Small living area, shared beds
- Multiple adults staying up late
- Noise
- Hot/cold room temp
- Poor diet

**School**
- Anxiety
- Excessive homework
- Late activities
- Early school start time
- Parental expectations that are either too high or too low

Poor sleep and doing poorly in school

- Children who already have a mood, behavioral, and or academic problem such as ADHD experience more sleep problems
- Most parents feel that their child can get by on less sleep and many do not know how much sleep their child should have
What happens when we sleep?

• Recent research is helping us to understand why we sleep
• More powerful than any drug in ability to restore, rejuvenate brain and body
• Lights out, brain goes to work
• Memories are consolidated
• Hormones secreted

Memories are consolidated

Hormones secreted

• Human growth hormone: For children, most intense period of release is shortly after beginning stage 3 slow wave sleep, which is about 30 minutes after sleep onset. Important for bone and muscle growth
• Leptin helps balance food intake by telling the body it’s full

The body on sleep

• Bone – wear and tear remedied with intensified bone building
• Muscles – repairs muscle tears and injuries
• Pancreas – without sleep less able to break down sugar from our diet
• Skin – growth hormone secreted which repairs damage and maintains elasticity
• Brain – cells “shrink” squeezing out debris
• Immune system - strengthened

Sleep Stages over 1 year of age

• Stage 1 – less than 5%; drowsy, transition from wake to sleep
• Stage 2 – 50%; memory consolidation
• Stage 3 – 25%; growth hormone secretion
• REM – 25%; rapid eye movement
Stage 3 in a normal child over age 1 year

REM sleep

- Percentage decreases to adult levels by late childhood/adolescence (20-25%)
- Newborns spend 50% total sleep time
- As in other age groups, medical problems can be very disruptive to this stage with obstructive sleep apnea worsening in REM

REM, same child

Sleep habits changed

Electronics in the bedroom interfere with sleep

The problem with electronics in the bedroom

- 1 in 3 children under the age of 2 have a TV in his or her bedroom
- 4 out of 5 teens sleep with their cell phone next to them
- 72% of U.S. children age 6 – 17 years have some type of electronic device in their bedroom
National Sleep Foundation

- Children sleep better when parents establish rules, limit technology and set a good example
- Many children are not getting the sleep they need
- Turning off electronics when sleeping makes a difference

Sleep in America Poll, 2014

National Sleep Foundation

- Enforcing rules helps children get more sleep
- Setting a good example encourages children to follow suit


Parents as role models

Light exposure and sleep

Suprachiasmatic nucleus (SCN)

Stimulants
Newborn sleep (0-3 months)

- Sleep is the primary activity of the brain
- Irregular sleep schedules because circadian rhythms take time to develop beginning at about 6 weeks
- By age 3 – 6 months infants have a regular sleep/wake cycle with preference for night time sleep
- Only 2 stages – REM and Non-REM

Newborn sleep tips

- Put to bed drowsy, not asleep
- SAFE sleep
- Encourage night time sleep; exposure to light during the day helps establish circadian rhythms
- In evening, quieter, low light

Newborn sleep

- Sleep-wake cycle interacts with need for feedings, diaper change, nurturing
- Total daytime sleep 10.5 – 18 hours, irregular schedule with periods of 1-3 hours awake
- Express their need to sleep different ways; cry, rub eyes, fuss; learn to read cues

SIDS prevention

Back to Sleep program

- Campaign launch 1994
- Since then SIDS death rate down 50%
- Non SIDS deaths sleep related increased
- Sleep on back
- No soft bedding
- Avoid co-sleeping
- Avoid overheating
- Consider pacifier
- Avoid cigarette smoke

Infant sleep (4-11 months)

- By six months night time feeds not necessary, sleep through night
- 70-80% sleep though night by 9 months
- 9-12 hours night sleep; 30 minute to 2 hour naps, 1-4 times per day
Infant sleep tips
- Put to bed drowsy, not asleep, learn to fall asleep on their own and during the night with normal awakenings, “self soothe”
- Develop regular sleep/nap schedule
- Consistent and enjoyable bedtime routine
- Sleep friendly environment

Toddler sleep (1-3 years)
- 11-14 hours total sleep in 24 hour period
- Naps decrease to 1/day @ 18 months (1-3 hrs)
- Many sleep problems can occur
  - Bedtime resistance
  - Night fears
  - Nightmares/night terrors common
  - Behavior problems, daytime sleepiness signal sleep problem

Toddler sleep tips
- Maintain daily sleep schedule with consistent bedtime routine
- Bedroom environment same every night/day
- Set limits that are consistent, communicated and enforced.
- Use of security object
- Low light, quiet, no electronics 1 hour before bedtime. Bath may be too much fun at bedtime so for some may not be a good idea

Sleep in preschoolers
- Sleep 11-13 hours per night
- Usually no naps needed by 5 years
- Sleep problems:
  - Difficulty falling asleep
  - Night awakenings
  - Sleepwalking, night terrors peak in this age group
  - Snoring abnormal (obstructive sleep apnea)
  - Frequent kicking can be abnormal

Sleep tips preschoolers
- Regular, consistent bedtime routine that is relaxing
- Bedroom quiet, cool (around 68 degrees), dark and without electronics. Same sleep environment every night. Night light OK
- Low lights, no electronics, quiet time 1 hour before bedtime
- Sleep walking and night terrors more likely to occur when sleep deprived

Steps to a good sleep
- Make sleep a family priority
- Consistent sleep schedule, same on weekends
- Bedroom for sleep, not for timeout or playroom
- Media free zone. TV out not just off
- Bedtime routine lasts 20-30 minutes, 1 hour before bed quiet time
- Cut caffeine (sodas, chocolate, etc.)
- Avoid too many naps
- Exercise, light exposure during the day
What’s wrong with this sleep environment?

Helping parents find solutions

- Discuss their sleep concerns
- Assess sleep environment
  - Where does the child sleep, co-sleep, shared room
  - Noise levels, adults/other children up late
  - Parent work schedule, who puts the child to sleep
  - What is family routine in evening; dinner time, evening activities
  - Joint custody, more than one bedroom
  - Other barriers

Case study

- Child with autism, behavioral issues, poor sleep since toddler, irregular sleep/wake cycle
- 5 adults and 3 children; 3 bedroom house
- All 5 adults use cell phone as alarm
- Child shares bedroom with parents, mom works until midnight
- Up wandering house at night, watching ESPN, playing with cell phones

Discussion

- Autism and early awakenings, role of melatonin
- Locking up the cell phones, remotes, $10 alarm clocks for all
- Screening for medical problems (low ferritin, OSA)
- Establishing a routine; family priority
- Safe environment
- Daily exercise, community resources
- Dietary assessment (sugar, caffeine, iron rich foods, bedtime snack)

Common pediatric sleep disorders

- Obstructive sleep apnea
- Periodic limb movements
- Restless legs syndrome
- Sleep behavioral problems
- Nightmares, night terrors

American Academy of Pediatrics Technical Report
Diagnosis and Management of Childhood Obstructive Sleep Apnea

- Prevalence 1% - 5%
- Polysomnography is the gold standard for diagnosing OSA
- Overnight pulse oximetry may miss sleep disordered breathing
- Adenotonsillectomy, first line management, 50% curative
  - Less likely to be curative in obese patients and those with craniofacial abnormalities with residual OSA as high as 75-80% in obese patients
  - Obese children may still require CPAP or BiPap therapy

Common causes of OSA

• Large tonsils, adenoids
• Sinus, allergy problems
• Congenital syndromes such as Down syndrome, Pierre Robin, any craniofacial malformation
• Obesity

Treatment of OSA in Young Children

• Nasal obstruction therapy (medical and surgical)
• Adenotonsillectomy
• Weight loss
• Craniofacial surgery
• CPAP, BiPAP
• Tracheotomy: severe OSA

Obstructive sleep apnea
Nighttime Symptoms

• Snoring (snoring is not normal for children)
• Apnea
• Restless sleep, kicking
• Neck hyperextension
• Mouth breathing

Obstructive sleep apnea
Daytime symptoms

• Sleepiness
• Difficulty focusing
• Poor school performance, cognitive deficits
• Morning headaches
• Hyperactivity
• Behavior problems, general
• Aggression, ODD, social problems

Obesity and OSA
Obesity

- Often identified in school age group
- Association with use of electronics (decreased activity, poor sleep)
- Associated health problems that can disrupt sleep
  - OSA and asthma
  - GERD
  - Joint and positional discomfort

Obesity and OSA

- Large neck circumference, puts pressure on the posterior oropharynx, narrowing the airway
- Abdominal adiposity puts pressure on the diaphragm and restricts lung capacity, restricting lung function (obesity hypoventilation, decreased O2 and increased CO2)

Periodic leg movements

Restless legs syndrome

- PLM’s frequent kicking while asleep, diagnosed by polysomnography
- RLS leg discomfort in the evening
- Often associated with low ferritin (less than 50)
- Hereditary
- Link ADHD

Parasomnias

- Nightmares (REM)
- Sleep walking (stage 3)
- Night terrors (stage 3)
- Often worsened by insufficient or interrupted sleep (OSA, other sleep disorders, meds)
- Should decrease and disappear by puberty, if not could be sign of more serious disorder

Down syndrome and OSA risk

Why do a sleep study?

Sleep disordered breathing
- Snoring, pauses in breathing, neck hyperextension, mouth breathing observed by parents
- Periodic limb movements
- Narcolepsy
- Nocturnal seizures
Sleep study

Periodic breathing

Severe OSA

CHCO Sleep Center

• Sleep RN’s Karen Meyer and Amy Stein, 720-777-6181, also use this number for both NP’s Carole Kline and Susan Hines
• Sleep lab, 720-777-5618 (to schedule a study)
• Sleep clinic, 720-777-6181 (for a clinic visit)