1.) Evidence-based Interventions for Sleep Problems in Children with Autism Spectrum Disorder (ASD) and Other Disabilities

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2.) Objectives for Presentation
   • A.) Discuss the need for interventions for sleep problems in children with ASD and other disabilities
   • B.) Present evidence for tx for sleep problems including melatonin and educational & behavioral treatments
   • C.) Discuss adaptations for interventions considering characteristics and preferences

3.) What are sleep problems?
   Variations in sleep, but considered a problem when it impacts daytime functioning

4.) Insomnia
   • Definition—Difficulty in getting to sleep, staying asleep or early morning waking
   • Difficulty settling and night waking 5X more prevalent in ASD population
   • Younger children more frequent night waking
   • Older children difficulty settling for sleep
   • Children with Developmental Disabilities more frequent night wakenings

5.) Parasomnias
   • Problems that interrupt the normal course of sleep
   • Some parasomnias such as night terrors more common in children with ASD
   • Enuresis or bedwetting
   • Night Terrors
   • Sleep Walking or Eating
   • Better sleep quality helps parasomnias

6.) Other Sleep disorders
   • Restless leg syndrome
     o Relationship to lack of iron and hereditary factors
     o Medications
   • Sleep Disordered Breathing
     May be sleep apnea-obstructive or central
     Relationship to obesity
     Standard tx for obstructive is removal of tonsils and adenoid
     CPAP—Continuous Positive Airway Pressure
7.) Importance of Sleep to Children
   - Consolidates learning experiences
   - Restore brain energy
   - Aid both physical and mental growth and development

Physical Health
   - Adolescents with symptoms of insomnia have more fatigue, less energy, symptoms of headache, stomachache, backache and worse perceived health
   - Safety- Children ages 3 to 7 with short sleep duration may be a risk factor for increased child injury.

Mental Health
   - Adolescents with insomnia report more behavioral and emotional problems including depression, anxiety, irritability, and anger. Also more drug use and alcohol use.
   - A large cohort study of 6-11 year olds associated sleep disordered breathing with somatic complaints, oppositional and aggressive behaviors and social problems

Growth & Development
   - Short sleep duration in the first 3 years of life associated with hyper activity/impulsivity and lower cognitive performance on neurodevelopmental tests at age 6. Children followed from ages 2.5 to age 6. Average sleep duration was recorded. Children that had short sleep duration between 2.5 and 3 years of age (even if resolved by school age) had a 3.2 time higher risk of hyperactivity at school age
   - Critical period in early childhood where the lack of sleep is particularly detrimental to various aspects of development. Suggests that there may be long standing consequences to insufficient sleep.

Learning and Cognition
   - Inattention and hyperactivity may be worsened by the presence of sleep disorders such as sleep disordered breathing.
   - Prefrontal cortex damage as a result of SDB is associated with impaired verbal fluency and retrieval

8.) Importance of Sleep to Parenting
   - Daytime parenting can be compromised by a child’s sleeping behaviors
   - Quality of children’s sleep can predict the quality of maternal sleep
   - Predict maternal mood, stress & fatigue
   - Safety concerns- more difficulty monitoring child activity
   - Parents of children with ASD report poorer sleep quality
     - Caregivers of children with disabilities described one or more chronic physical ailments and almost all had experienced chronic fatigue and sleep deprivation

9.) Parental Factors that Contribute to Sleep Problems
   - Genetic predisposition- Parent has sleep problems, child more likely to also
   - “Family clocks”- Shift workers may readjust the clock for other family members
   - Parenting styles
     - Inconsistent parenting/within one parent or between parents
     - Parents who are too attentive can limit a child’s ability to learn to self-sooth

10.) Culture & Sleep
    - Influence beliefs and practices

Evidence-based Interventions for Sleep Problems in Children with ASD & Other Disabilities
• Culture can influence attitudes concerning lack of sleep, time to sleep
• Poor sleep habits are reinforced in some parts of our culture
• Adolescents may feel pressured to stay up late at night
• Sleep problems in school may be incorrectly attributed to poor parenting

11. Socioeconomic Factors and Sleep Problems
• Socioeconomic risk factors place children at risk for developmental delays and correspondingly are at an increased risk for sleep disorders.
• Almost half of children in foster care under the age of 3 have developmental delays and qualify for Early Intervention
• Children in foster care may have had greater difficulties initiating sleep. Problems may reflect stress-related hypervigilance at bedtime and or earlier difficulties with state regulation.

12. Cosleeping
• Reflect preferences
• In most cultures throughout the world, infants sleep with their mothers
• Can be influenced by economic status
• More children with ASD sleep with their parents than typical children
• May be a contributor or result of sleep problem

13. Sleep Problems in ASD
• 53% to 86% of children with ASD have sleep problems
• Sleep problems in ASD are multifactorial
• Most common - difficulty falling asleep or frequent night waking
• Symptoms of ASD may contribute to sleep problems
• Biochemical Differences
  • REM-Take longer to enter REM
  • Disruption of melatonin secretion
  • Clock gene abnormalities

14. Sleep Problems and Children with Other Disabilities
• Developmental Disabilities-High prevalence of sleep problems,
  • More night wakeings than ASD
  • 50% of the Children with Down syndrome have sleep apnea.
• Cerebral Palsy-Prevalence of sleep problems in children with CP is approximately 33%.
  • Sleep related breathing disturbances due to increased muscle tone
  • Disturbed sleep due to difficulty changing body position, chronic pain.
  • Some evidence of Decreased REM
• Visually Impaired
  • Circadian rhythm disturbances
  • Rate of sleep problems in blind individuals is high in those with no light perception or in conditions where the eyes fail to develop
• Speech Language Impairments
  • Cleft Palate. At risk for sleep disordered breathing
  • Articulation difficulties may be affected by adenotonsillar hypertrophy & can be a primary cause of sleep disordered breathing.
• Early Intervention
  • Prematurity and low birthweight increase the risk of sleep disordered breathing by 2-3 fold.
• ADHD-
  • May have some of same issues as ASD in settling for sleep
  • Restless leg syndrome- More common in children with ADHD
  • 15% to 25% of the children w/ hyperactivity could experience improved behavior if Sleep disordered breathing were diagnosed and treated

15.) Comorbidities that affect sleep
• Poor appetite- as many children with ASD have nutritional deficiencies include food restrictions due to allergies, picky eaters.
• Gastrointestinal problems such as reflux- GERD Gastro-esophageal disease (gastric acid from the stomach is brought up into the throat when someone is lying down or exercising vigorously). GERD is common in ASD and associated with a high incidence of sleep disorders
• Asthma, upper respiratory problems and ear infections, a suspected cause of sleep disorders in ASD. Recurrent ear infections are almost twice as common in snorers than non-snorers
• Dental issues- May have pain from caries or wisdom teeth
• Epilepsy-High rate of sleep problems in people who have epilepsy. Sometimes difficult to differentiate night terrors from epilepsy. Treatment of seizure disorders can result in improvement in comorbid sleep problems
• Psychiatric disorders (anxiety/depression) were associated with sleep problems in children with ASD.
• Medications for attention deficit, seizures may need adjustment. Some meds should be avoided if they cause insomnia
• CNS trauma- Rates of sleep disorders are higher in people who have experienced CNS trauma, Rates of traumatic injury particularly to the head are higher than expected in the ASD population
• Obesity- Relationship with sleep disordered breathing

16.) Separating sleep problems from disability
• A significant number of children with Developmental Disabilities do not receive treatment for their sleep problems
• Medical practitioners may not inquire and parents may fail to raise this issue. Pediatricians may not have knowledge about sleep problems or treatments in children and adolescents.
• Parents may see sleep problems as part of the disability and may not perceive the sleep problem as something that is treatable.
• Parents tended to see the child’s sleep problem as more severe if it disrupted the parent’s own sleep.
• What is considered a sleep problem is variable and may depend on culture and seeking treatment may depend upon awareness of community resources
• Need for screening and for improvement in clinician education about sleep.

17.) Evidence for Interventions
• Single case studies
• Randomized controlled trials
• Evidence is generally evaluated as “promising” rather than “proven”

18.) Problems with the Evidence
• Heterogeneous samples
• Samples generally Caucasian
• Subjective parent measures are generally used
• Objective measures like polysomnography are difficult to use
• Parental expectancy can affect results
• Methodological errors- both in using actigraphy, carrying out the plan
• Lack of replication- no treatment manual, program may be very tailored
• Lack of separation of interventions

19.) Intervention – Melatonin
• Melatonin is a biologically active compound with serotonin converted to melatonin. Melatonin has a circadian pattern with high circulating levels in the period before sleep. Gradually reduced through the night with waking occurring when it has returned to daytime levels
• Melatonin is a sleep-promoting substance that is inhibited by light and released by the pineal gland
• Abnormalities in melatonin production and metabolism with people with ASD.
• RCTs using melatonin and a placebo

20.) Summary of Evidence Table-Melatonin (see table)
• General dosage of 3-5 mg. 30 minutes prior to desired bedtime
• Shorter sleep latency (time between going to bed and falling asleep
• Some changes in total sleep duration
• Other considerations
  • No differences in night wakings-except in controlled release study( Ross, et al. 2002)
  • Unless time released, short lasting
  • Return to baseline levels when melatonin discontinued
  • Advantage is inexpensive & available without prescription
  • No harmful side effects
  • Quality of melatonin may be variable
  • Low dosages OK for children who have seizures

21.) Daytime Behavior & Melatonin
• Improvement in behavior in 71% of sample and 61% in mood in 105 ADHD medication free children ages 6-12 (Van det Heijden, et al, 2007)
• No differences in daytime behavior difficulties of 20 children with ASD ages 4-16. No differences in general health of the parents (Wright, et al. 2010).

22.) Behavior & Sleep
“Common sleep problems are often behaviorally maintained or have a behavioral component even when there is an underlying medical or developmental condition” (p. 183). Richdale, A.& Wiggs, L. (2005). Behavioral approaches to the treatment of sleep problems in children with developmental disorders: What is the state of the art? International Journal of Behavioral and Consultation Therapy, 1(3), 165-190.
• Bidirectional relationships-Sleep problems may be induced by and be responsible for problem behaviors
• Poor sleep quality both a contributor and result of daytime behavioral issues.

23.) Behavioral and Educational Treatments of Insomnia in ASD
• Considered first line of treatment (ATN) (Autism Treatment Network)
• Good sleep hygiene –
• Attention to the sleep environment
• Establishment of a bedtime routine
• Other educational and behavioral interventions-

24.) Setting the Stage –
• Sleep hygiene–Intent- Consider biological needs
• Attention to the sleep environment= props& scenery- Consider sensory needs
• Establishment of a bedtime routine= script-Consider the behavioral needs
• The behavioral strategies - Tie together hygiene, sleep environment, and bedtime routine, tools to allow family to direct “the production”

25.) Sleep Hygiene Begins in the Morning
Daytime Habits
• Adequate exercise
• Exposure to light- affects Melatonin
• Limited caffeine
• Limited naps
• Consistent schedules-(waking time should not vary more than 1 hr.)
Evening Habits
• Attention to the sleep environment
• Bedtime routines

26.) Attention to Sleep Environment
• Decreasing exposure to electronics
• Minimal sound & light
• Cool temperature
• Textures- soft
• Deep pressure
• Minimal distractions
• Bedroom not used for “time-out

27.) Sensory Considerations
• Sensitivities to textures, light, sound can affect sleep
• Timing of toothbrushing and bathing may affect alertness
• Sensory gating & heightened sensory processing before sleep
• Low threshold (overly sensitive) vs high threshold (sensory seekers) may need different strategies. Low threshold may be more likely to have sleep problems

28.) Bedtime routine
• Activities that occur at the same time and place every night
• Bedtime routine alone not proven effective but important for the success of behavioral strategies

29.) Helpers for Bedtime Routines
• Visual schedules which include each step of the bedtime routine
• Stories that convey parental expectations
• Social stories show effectiveness in single/small sample studies w/ gradual extinction (Moore, 2004)

30.) What time should your child go to bed
• Parent may be putting the child to bed when the child is not sleepy
• Child may become hyperaroused and have more difficulty falling asleep
• Very frustrating!!!

31.) Faded Bedtime
• Sleep restriction- For settling difficulties.
• Initial bedtime was moved to a later time closer to the time that the child usually fell asleep, and a fixed wake time is used

32.) When do you comfort the baby?
• Tolerance for crying is variable
• Typical children allowed to cry are offered opportunities to develop self-soothing behaviors
• Relationships between maternal confidence, paternal involvement and child’s sleep

33.) Extinction-Cry it out
• Ignoring or not rewarding undesirable behavior
• Used for settling and night waking
• Advantage is that problems can be resolved quickly often in a few days or a week,

34.) Evidence for extinction (table behavioral strategies)
Positive Evidence
• Three studies in which extinction used improved sleep in a methodological sound study without conflicting evidence (Weiskop et al, 2005; Weiskop, Matthews, & Richdale, 2001; Wolf, Risley, & Mees, 1964).
• Weiskopp et al, 2005 Extinction followed a short period of only sleep hygiene intervention with improvements not occurring until extinction introduced.
• Samples well described and intervention replicable
• Extinction is thought to be one of the efficacious treatments for settling and night waking in children with ASD.
• Improvements maintained at 6-12 months
• Decrease in parent stress

Negative Evidence
• Many studies use multiple interventions w/ extinction
• Limited information on improvements in daytime behaviors
35.) Barriers to Implementing Extinction

- Extinction burst - the behavior becomes worse before it is better.
- Concerns of other family members
- Safety - due to other health concerns or impulsivity
- Bonding and attachment

36.) Graduated Approaches

- Often less stressful for the parent and child.
- Interval before checking the child is gradually increased
- Ignoring with checking at fixed intervals
- Stimulus fading

37.) Evidence for Graduated Extinction

- Case studies
    - Reduction of sleep onset latency and bedtime disturbances in two children with ASD, no control for expectancy or attention.
    - Reduced cosleeping and sleep onset latency, no control for expectancy or attention
    - Bedtime routine put in place, mother provided attention for 20 seconds every 5 minutes until girl was asleep. Routine did not work by itself. Fixed interval attention improved settling for sleep and reduced times child left bedroom

38.) Waking up at night

- Tools may help for setting the stage
- “Go back to bed” reminders communicate parent expectations
- Stop/go nightlight
- Bedtime Pass (Moore, et al., 2007) One opportunity to check in Unused pass can be turned in for a reinforce

39.) Stimulus Fading

- Single case series – stimulus fading, bedtime routine and relaxation, mostly Down syndrome

40.) Scheduled Awakenings

- Wakening at night can be due to parasomnia (night terror, bedwetting)
    - Determine average time of night terror
• Wake child – child opens their eyes
• Allow child to fall asleep
• Continue scheduled waking for 7 nights, skip 1, 6 nights, skip 2....

41.) Efficacy of Parent Interventions
- Behavioral and educational interventions to develop sleep hygiene or healthy sleep practices
  • Montgomery et al. 2004 mixed sample teaching graduated extinction and reinforcement with one tx group having face to face instruction other group with a booklet containing same information. Similar effects in both groups compared to control
  • Reed et al. 2009, with ASD sample three 2 hr sessions over 3 weeks. Addressed both general and specific sleep concerns. Improvement in sleep and daytime behaviors, less parent stress.
  • Stores & Stores 2004, Down Syndrome Sample, 90 minute instructional group with booklet. Improvement in sleep behaviors, sleep breathing problems persisted, mothers more knowledgeable about sleep techniques.

42.) Family Process & Sleep Problems
• Resistance by families to change dynamics
• Coersive family process- Situation where the individuals involved do not enjoy what is happening but are rewarded for their behavior and feel as if they are dealing with it the best that they can.

43.) Where to start...
• Ask parent to fill out sleep diary for at least a week. Assists in developing parent awareness of patterns & sleep duration
• Set 1 realistic goal for family. May focus on developing daytime habits or a bedtime routine in order to set the stage for using extinction
• Be aware of comorbidities & medical concerns. SDB need PSG to diagnose, will not get better w/out medical intervention.

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