Pediatric Parasomnias

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Conflict of Interest Disclosure

• I have no conflicts of interest.
Learning Objectives

• Introduction to parasomnias
• Understand parasomnias and stages of sleep
• Presentation of specific parasomnias
• Diagnosis and essential features
• Management and treatment of parasomnias
What are parasomnias?

• Undesirable physical events or experiences that occur during entry into sleep, within sleep, or during arousal from sleep
• Occur during different stages of sleep
  • NREM
  • REM
  • During transitions to and from sleep
• Encompass abnormal sleep related complex movements, behaviors, emotions, perceptions, dreams and autonomic nervous activity
Why do we care about parasomnias?

• They are clinical disorders which can result in:
  • Injuries
  • Sleep disruption
  • Adverse health effects
  • Untoward psychosocial effects

• These clinical consequences can affect the patient, the bed partner or both.
Human Consciousness and Parasomnias

• Wake, NREM sleep and REM sleep
• These are modulated by
  • Neurochemical bias
  • Central nervous system activation
  • Endogenous and exogenous input
• Sleep wake cycle oscillations
  • During transitions, dissociations can occur between fully awake and sleep
  • Lead to states of altered consciousness manifesting as parasomnias.
Parasomnias

• **NREM**
  • Disorders of arousal
  • Confusional arousal
  • Sleepwalking
  • Sleep terrors
  • Sleep related eating disorder

• **REM**
  • REM sleep behavior disorder
  • Recurrent isolated sleep paralysis
  • Nightmare disorder

• **Other parasomnias**
  • Exploding head syndrome
  • Sleep related hallucinations
  • Sleep enuresis
  • Parasomnia due to medical disorders

• **Normal variants**
  • Sleep talking
Prevalence of sleep disorders in children

• Higher in children than in teens/young adults

NREM:
• Sleep terrors 5% → 1%
• Sleepwalking and confusional arousals 15% → 4%

REM Behavior sleep disorder:
• Linked with medications such as SSRI SNRIs

Rhythmic Movement disorders:
• Bruxism 14%
• Body Rocking/Head banging 3-15%
• RLS 0.5% severe and 2% mild-moderate
Peds sleep problems by age

Infants: <1 year
SIDS, sleep/wake usually self limited

Toddlers: 1-2 year
Rhythmic movement

Pre-school 3-5 year
Nightmares, sleep terrors, rhythmic movements
Peds sleep problems by age

School Age 6-12 year
Sleep walking, confusional arousals, bruxism, enuresis,

Teenagers 13-18 year
Sleepwalking
Where do pediatric sleep disorders show up at night?
NREM-Arousal Disorders

- Confusional Arousals
- Sleepwalking
- Sleep Terrors
General Diagnostic Criteria for Disorders of Arousal

- Recurrent episodes of incomplete awakening from sleep
- Absent responsiveness to efforts of others to intervene or redirect the person during the episode
- Limited or no associated cognition or dream imagery
- Partial or complete amnesia for the episode
- Key Features
  - Events usually occur during the first 3rd of the major sleep episode
  - Continual appearance of confusion and disorientation for several minutes or longer after the episode
NREM-Arousal Essential Features

- Complex behaviors usually initiated during partial arousals from slow wave N3 sleep
- Episodes are brief, can last 30-40 minutes
- Sleep talking and shouting can occur
- Eyes are usually open, “glassy stare”
- Difficult to awaken and often confused
- Amnesia of these events
- Emerge predominantly in the 1st 3rd of the night or during recovery sleep following sleep deprivation
- Rarely occur from naps
Confusional Arousals

• Occurs with the patient in bed
• If patient leaves the bed, sleep walking has been initiated
• Usually starts with the individual sitting up in bed and looking about in a confused manner.
Confusional Arousal

• Onset
  • Early childhood around age 2 years
• Typically benign
  • Usually more concerning for parents
• Usually diminish by age of 5 years old
Sleepwalking

• Can start as soon as child can walk
• Usually disappears spontaneously around puberty but may persist into adolescence
• Occurs sporadically or frequently
• Can occur more than one time in the night
• Can occur for the first time in adulthood
• Recurs in adulthood during sleep deprivation or stress (high school or college student)
Sleepwalking

- Typically start as confusional arousals
- Patient may leave the bed or even “bolt” out
- Belligerent, agitated, or violent behavior
- Simple/non-goal directed or complex behavior
- Ambulation can terminate spontaneously
- Either in random places or back to bed
- Amnesia
- Decreased sensory input leads to diminished external perception
Sleepwalking

- Behaviors can be urinating in a wastebasket
- Moving furniture around
- Climbing out of a window
- Prone to bumping into objects or falling down
- Children may walk quietly toward a light or to the parents bedroom.
- Can walk to a window or door and may even go outside
Sleep Terrors

- Usually emerge in children aged four to 12 years
- Can emerge in adulthood
- Resolves spontaneously by early adolescence
- Serious or even lethal injuries
Sleep Terrors

• Often accompanied by a cry or piercing scream
• Increased autonomic system and behavioral manifestation of intense fear
• Increased HR, RR, flushing of skin, diaphoresis, mydriasis, and increased muscle tone
• Found sitting up in bed, unresponsive to external stimuli
• If awakened, confused and disoriented
• Prolonged inconsolability
Sleep Terror
Sleep Terror

pavor nocturnus
Sleep Talking

- Talking with varying degrees of comprehensibility
- Can occur in REM or NREM sleep
- Idiopathic or associated with RBD, confusional arousals etc
- Complications arise when talking is loud and disrupts others sleep
- Talker is rarely aware of his or her sleep talking
- Lifetime prevalence is 66%, no apparent sex difference.
Demographics Disorders of Arousals

- No sex difference
- Prevalence of confusional arousals in children 3-13 yo is 17.3%.
- Lifetime prevalence of sleepwalking is as high as 18.3%.
- Prevalence of sleep terrors are 1% to 6.5% in children and 2.2% in adults have been reported.
Disorder of Arousals

- Evaluated in terms of:
  - Predisposing
  - Priming
  - Precipitating factors
Predisposition

- Genetic predisposition
  - Sleepwalking has a familial pattern
  - 22% when neither parent has the disorder
  - 45% if one parent is affected
  - 60% when both are affected
- Expected and normal development in childhood
- Persistence beyond adolescence or new in adulthood is abnormal, requiring further evaluation
Priming Factors

• Sleep deprivation
• Situational stress (most potent factors)
• Rare etiologies
  • Hypothyroidism
  • Migraines
  • Head injury
  • Encephalitis
  • Stroke
Precipitation Factors

- OSA – etiology of arousals in adults and children
  - Treatment of the SRBD may reduce or eliminate arousals
- Environmental Triggers:
  - Telephone calls
  - Pagers
  - Messaging from electronic devices
  - Sleeping in unfamiliar environments, traveling
Precipitating Factors

- Physical triggers:
  - Febrile states
  - Physical or emotional stress
  - Premenstrual period in women
- Medications
  - Lithium
  - Phenothiazines
  - Anticholinergeric agents
  - Sedative/hypnotics (Ambien)
- Alcohol (potential trigger?)
Objective Findings for Arousal Disorders

- PSG not typically required to diagnose problem
- Out-of-bed behaviors are rare in the sleep lab
- Normal PSG does not rule out the diagnosis
- PSG can be used to differentiate other possible diagnosis such as epilepsy or RBD
Sleep Related Eating Disorder

• Recurrent involuntary or “out of control” eating
• Consumption of peculiar forms or combinations of food or toxic foods
• Frozen pizzas, raw bacon, cat food, coffee grounds, cleaning solutions
• Sleep related injuries:
  • Lacerations with kitchen utensils
  • Burns
• Health problems
  • Dental caries
  • Weight gain, fasting for next day procedures
Sleep Related Eating Disorder

- Occurs any time in the sleep cycle
- High caloric foods preferred
- Association with sleepwalking
- High association with narcolepsy-cataplexy
Recurrent Sleep Paralysis

- Inability to perform voluntary movements at sleep onset or on waking from sleep in the absence of a diagnosis or narcolepsy.
- Cannot speak or move limbs, trunk or head.
- Respiration is unaffected.
- Consciousness is preserved with full recall.
- Lasts seconds to minutes.
- Mean age onset 14-17.
- Usually has spontaneous resolution.
- Triggers are sleep deprivation and irregular sleep wake times.
Nightmare Disorder

- Recurrent, highly dysphoric dreams
- Disturbing mental experiences generally occur during REM sleep
- Result in awakening
- Occur during second half of the night
- Seems vivid and real, becoming more disturbing
- Emotions are negative, involving anxiety, fear, terror, rage or disgust
- Key: ability to remember dream upon awakening
Nightmare Disorder

- Common in children
- Usually starts between 3 and 6 years old
- Child will give a good description of the frightening scenario
- Will wake up anxious and difficult to fall back asleep
- Can lead to sleep avoidance and deprivation
- High risk in sexually or physically abused and PTSD
Treatment of Nightmare Disorder

- Generally diminish in frequency and intensity over the course of decades
- PSG is not indicated to diagnose
- Pharmacologic agents aim at neurotransmitters norepinephrine, serotonin, and dopamine
- Usually antidepressants, antihypertensives and dopamine receptor antagonists.
Sleep Related Hallucinations

• Hallucinatory experiences that occur at sleep onset or awakening from sleep.
• Predominantly visual but may include auditory or tactile hallucinations
• Usually occur following a sudden awakening
• May remain present for many minutes but usually disappears if illumination is increased
• Common in adolescence and decreases with age
Sleep Enuresis

- Primary sleep enuresis
- Secondary sleep enuresis
- Both lead to recurrent involuntary voiding that occurs during sleep
- Both associated with difficulty to arouse from sleep in response to an urge to urinate
- Can occur in any sleep stage
- Both must be present for a period of 3 months
Sleep Enuresis Demographics

- Occurs in 15-20% of 5 year olds
- 3x more common in boys than girls
- “deep sleepers”
- Objectively high arousal threshold
Familial Patterns

• Hereditary factors are suspected in children with primary enuresis.
• Usually with history in parents, siblings, other relatives
• Prevalence is 77% when both parents were enuretics as children
• 44% when one parent has history of enuresis
• Linked to region on chromosome 22q, 13q and 12q
Predisposing and Precipitating Factors for SE

• Three interrelated factors:
  • Large nocturnal urine volume production
  • Nocturnal bladder overactivity
    • Most important in secondary enuresis.
  • Difficulty arousing from sleep
    • Most important in primary enuresis.
Sleep Enuresis

- Primary sleep enuresis:
  - >5 years old
  - Exhibits recurrent involuntary voiding during sleep, occurs at least 2x week
  - Never been consistently dry during sleep
- Secondary sleep enuresis:
  - >5 years old
  - Exhibits recurrent involuntary voiding during sleep, occurs at least 2x week
  - Previously consistently dry during sleep for at least 6 months
Sleep Enuresis

- **Primary SE:**
  - Rarely related to psychosocial etiologies
  - Usually a failure to arouse from sleep in response to bladder sensations or fails to inhibit bladder contraction
  - Acquired skill thus leads to varying ages of their acquisition.

- Some children last normal increase in vasopressin release during sleep leading to high urine volume that exceeds bladder capacity

- High arousal threshold makes arousal difficult
Sleep Enuresis

• Secondary SE associated with any of below:
  • Inability to concentrate urine due to diabetes mellitus, diabetes insipidus, nephrogenic diabetes, or sickle cell
  • Increased urine production secondary to ingestion of caffeine, diuretics
  • Urinary pathology ie UTI, malformations
  • Chronic constipation
  • Neurologic pathology ie seizures or neurogenic bladder
  • Psychosocial stressors ie parental divorce, neglect, physical or sexual abuse or institutionalization
OSA and PLMS

• High correlation with sleep fragmentation with untreated OSA can lead to SE
  • Studies have shown the presence of OSA in 40% of patient’s with SE

• Periodic leg movements syndrome can also cause SE

• Successful treatment of OSA has led to reduction or elimination of SE
  • Studies have shown improvement of SE in 60% of patients with T&A surgeries.
Sleep Enuresis Course

- Between 18 months and 3 years of age, child is able to delay voiding with a full bladder during wakefulness and at a later age during sleep.
- Spontaneous cure rate is 15% per year.
- Complication is child’s self esteem.
- Secondary SE is can occur at any age, treatment is based upon what led to the event.
REM Behavior Sleep Disorder

- Abnormal behaviors emerging during REM sleep that can cause injury or sleep disruption
- EMG abnormalities can be seen on PSG during REM sleep
- Excess muscle tone during REM sleep and excess phasic EMG twitch activity
- Dream action corresponds closely to the observed sleep behaviors
- Walking and leaving the bedroom is uncommon
REM Behavior Sleep Disorder

- Behaviors can lead to self injuries or injury to bed partners
- RBD in children virtually never idiopathic, think:
  - Narcolepsy
  - Brainstem tumors or neurodevelopmental d/o
  - Anti-depressant medications
- If narcolepsy is present, will occur earlier on in sleep ie sleep onset
- If found in adults this is associated with neurodegenerative diseases.
Sleep Related Rhythmic Movement Disorder

- Repetitive, stereotyped and rhythmic movements disorder that involve large muscle groups, such as head banging and rocking or rolling of the head or body, with a rate of 0.5 to 2 per second.
- Movements occur during bedtime or near naptime, when the patient is drowsy or asleep, and may occur during any stage of sleep, including REM sleep.
- Usually occur in infants and young children, but can also be found in adults, and the prevalence decreases with increased age.
- Children don’t typically need medical treatment and it usually resolves on its own.