Review and Updates in Parasomnias

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Conflict of Interest

• I have no relevant financial conflicts of interest and nothing to disclose for this educational activity
Goals

- Review various types of parasomnia
- Describe predisposing factors and triggers
- Discuss underlying pathophysiology
- Outline management strategies
Introduction

- Parasomnias represent a collection of undesirable physical events or experiences that occur during *entry into sleep, within sleep, or during arousals from sleep*.

- They can occur in both NREM and REM sleep, and may well represent an "overlap" between states of alertness.

*Mahowald et al, Sleep 1991*

Note, no parasomnias arise from this overlap as there is no wakefulness stage.
Classification of Parasomnias

• Non Rapid Eye Movement (NREM) related parasomnias
• Rapid Eye Movement (REM) related parasomnias
• Other parasomnias

NREM Parasomnias

- Confusional arousals
- Sleepwalking
- Sleep terrors
- Sleep-related eating disorder

Same pathophysiological continuum?
NREM Parasomnias ICSD-3

1. Recurrent episodes of incomplete awakenings
2. Inappropriate or absent responses to others
3. Limited or no associated cognition or dream imagery
4. Partial or complete amnesia
5. The disturbance is not better explained by another disorder or substance use

Common Features of NREM Parasomnias

- Strong familial pattern
- Onset in childhood
- Cessation in adolescence
- Presence of triggering factors (in particular sleep deprivation)
- Episodes in the first third of the night
- Most occur during arousals from N3 sleep

Common Features of NREM Parasomnias

- No same-night episode occurrence
- Long episode duration (minutes)
- Autonomic discharge during the episode
  - Profuse sweating, mydriasis, tachycardia, and tachypnea
- Minimal recall of the event

<table>
<thead>
<tr>
<th></th>
<th>Children</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusional arousals</td>
<td>About 20% in &lt;5 yrs old</td>
<td>4-15% of adults</td>
</tr>
<tr>
<td>Sleep walking</td>
<td>Up to 40%; peak in incidence between ages 4-8 yrs old</td>
<td>4%</td>
</tr>
<tr>
<td>Sleep terrors</td>
<td>1-6% in prepubertal children Males more commonly affected Peak incidence between ages 5-7 yrs old</td>
<td>1-2.6%</td>
</tr>
</tbody>
</table>

Pathogenesis of Non-REM Parasomnias

Predisposing factors
- HLA
- 1st degree relatives

Precipitating Factors
- Sleep disordered breathing
- Periodic limb movements
- External noises

Priming Factors
- Slow wave sleep
- Arousals
- Medications
- Alcohol
- Sleep deprivation
- Fever, Stress

Confusional Arousals ICSD-3

Criteria A-C must be met:

A. Disorder meets the general criteria for NREM disorders of arousal

B. The episodes are characterized by mental confusion or confused behavior that occurs while the patient is in bed

C. There is an absence of terror (autonomic arousal) or ambulation outside of the bed
Confusional Arousals are associated with...

- Sleep disorders
  - Sleep apnea
  - Circadian Rhythm Disorders
  - Hypersomnia
  - Insomnia
- Mental health disorders
  - Depression
  - Bipolar Disorder
  - ETOH/substance abuse
  - PTSD/anxiety
- Medications
  - Antidepressants
  - Anxiolytics/Hypnotics less likely
- Medical conditions
  - Digestive
  - Cerebrovascular
  - Upper respiratory tract

Ohayon et al. Neurology. 2014 Aug 26;83(9):834-41
Confusional Arousals on EEG

- Dissociated state in which sleep patterns in some cortical areas are accompanied by wake patterns in others
- Arousal involving wide cortical network
- Sleep activity persists in few structures
  - Hippocampus
- Altered consciousness may be due to disturbance in inferior frontal gyrus

Flamand et al. Sleep 2018; 41(10)
Sexsomnia

- Associated with confusional arousals and sleepwalking
- Usually confined to bed
- Typically young adults
- Involves masturbation or attempts to achieve sexual intercourse
- Complete amnesia of events
- Can be triggered by sleep deprivation, OSA, PLMs
- Can have legal and social consequences

2. Dubessy et al. Sleep. 2017 Feb 1;40(2).
Sleepwalking ICSD-3

Criteria A and B must be met:
A. The disorder meets the general criteria for NREM disorders of arousal
B. The arousals are associated with ambulation and other complex behaviors out of bed

Sleepwalking

• Series of complex behaviors
  – (ex: Turning, playing with sheets, sitting up)
• Culminates in walking around
• Altered state of consciousness
  – Impaired judgement
• Person often seems calm and passive

Sleepwalking

• Complex, coordinated, semi-purposeful activity
  – Dressing, going to the bathroom, arranging objects, unlocking doors, operating appliances
  – Safety risk

• Inappropriate behaviors
  – Urinating in a corner


The Sleepwalking Lady Macbeth by Johann Heinrich Füssli, late 18th century. (Musée du Louvre)
Sleep Terrors ICSD-3

Criteria A-C must be met:
A. The disorder meets the general criteria for NREM disorders of arousal
B. The arousals are characterized by episodes of abrupt terror, typically beginning with an alarming vocalization such as a frightening scream
C. There is intense fear and signs of autonomic arousal, including mydriasis, tachycardia, tachypnea, and diaphoresis during an episode

Sleep Terror in a Child

• Appears alert with eyes open
• May not recognize parents
• Consolation may not be effective
• Subsequent relaxation and return to sleep
• Feeling of primitive threat/danger if awakening
Behavioral Patterns

Modified from Derry, CP et. al. NREM arousal parasomnias and their distinction from nocturnal frontal lobe epilepsy: a video EEG analysis. Sleep 2009: 32: 1637-44.
Sleep Related Eating Disorder (SRED) ICSD-3

A. Recurrent episodes of dysfunctional eating that occur after an arousal during the main sleep period

B. The presence of at least one of the following in association with the recurrent episodes of involuntary eating:
   1. Consumption of peculiar forms or combinations of food or inedible or toxic substance
   2. Sleep-related injurious or potentially injurious behaviors performed while in pursuit of food or while cooking food
   3. Adverse health consequences from recurrent nocturnal eating

C. There is partial or complete loss of conscious awareness during the eating episode, with subsequent impaired recall.

D. The disturbance is not better explained by another sleep disorder, mental disorder, medical disorder, medication, or substance use.
SRED Key Points

• Variant of sleepwalking
• Compulsive eating behavior
  – Associated with no feelings of hunger
  – Ingestion of often inedible objects
• Adverse outcomes
  – Accidents (burns, lacerations, fires)
  – Obesity, dental decay
• Different from Nocturnal Eating Disorder
  – No altered consciousness

SRED Epidemiology

• True prevalence not known
• Estimated 5% of college age adults\(^1\)
  – 17% in inpatient eating disorder groups
• Majority (60-83%) are female\(^2-^3\)
• Age of onset 22-39 years old
  – Symptoms typically occur for 4-15 years before diagnosis

SRED Associations

• Sleep disorders
  – RLS, PLMD, Circadian Rhythm, OSA, sleepwalking

• Mental health disorders
  – Depression, Bipolar, Anxiety, prior substance abuse

• Medications
  – Zolpidem, triazolam, amitriptyline, olanzapine, risperidone

Auger. Psychiatry (Edgmont). 2006 Nov; 3(11): 64–70
SRED Treatment

• Safety measures
  – Bedroom/refrigerator locks
  – Remover knobs from stove
• Evaluation for underlying etiologies
• Consider pharmacologic treatment
  – SSRIs (1st line)
  – Topiramate
  – Clonazepam

Differential Diagnosis for NREM Parasomnias

- REM Behavior Disorder
- Sleep-Related Epilepsy
- Malingering
- Alcohol intoxication
# NREM Parasomnias vs. Epilepsy

<table>
<thead>
<tr>
<th></th>
<th>NREM Parasomnias</th>
<th>Nocturnal Epilepsy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of Onset</strong></td>
<td>&lt;10 yrs old</td>
<td>Between age 10-20 yrs old</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>Few times month/week</td>
<td>Frequent; can occur multiple times per night</td>
</tr>
<tr>
<td></td>
<td>Rarely &gt;1 episode/night</td>
<td></td>
</tr>
<tr>
<td><strong>Behaviors noted</strong></td>
<td>As noted above</td>
<td>Stereotypic, repetitive behaviors</td>
</tr>
<tr>
<td><strong>Amnesia</strong></td>
<td>Common</td>
<td>Common</td>
</tr>
<tr>
<td><strong>PSG findings</strong></td>
<td>Abrupt arousals from N3 sleep</td>
<td>Epileptiform activity/muscle artifact</td>
</tr>
<tr>
<td></td>
<td>Increased cyclic alternating pattern</td>
<td>May be normal especially if limited montage</td>
</tr>
</tbody>
</table>
Management of NREM Parasomnias

- Avoidance of sleep deprivation, alcohol, associated medication (ex: Zolpidem)
- Treatment of underlying disorder (ex: OSA)
- Consistent sleep-wake cycle
- Safety proofing bedroom environment
  - Padding, mattress on floor
  - Locks on doors/windows, barriers on stairs, locked firearms
- Patient and family education
Management of NREM Parasomnias

- Consider pharmacologic options
  - Clonazepam\textsuperscript{1}
  - Melatonin\textsuperscript{2}
  - Limited data on
    - SSRIs for sexesomnia\textsuperscript{2}
    - Topiramate or dopamine agonists for SRED\textsuperscript{3-4}

REM Related Parasomnias

- REM sleep behavior disorder
- Recurrent isolated sleep paralysis
- Nightmare disorder
REM Behavior Disorder (RBD)  
ICSD-3

Criteria A-D MUST be met:
A. Repeated episodes of sleep related vocalization and/or complex motor motor behaviors
B. These behaviors are documented by polysomnography to occur during REM sleep or, based on clinical history of dream enactment, are presumed to occur during REM sleep
C. Polysomnography demonstrates REM sleep without atonia
D. The disturbance is not better explained by another sleep disorder, mental disorder, medication, or substance abuse

International classification of sleep disorders, 3rd ed. Darien, IL: American Academy of Sleep Medicine, 2014
“In the right hand he held a sword, with which he was cutting and thrusting at everything about him, uttering cries all the while, as if in truth he were engaged in deadly combat with a giant. Yet his eyes were tight shut, and it was clear to all that he was fast asleep; but in his dream he had slashed at so many of the wine skins that the whole room was full of wine.”

—Miguel de Cervantes
Don Quixote de La Mancha (1605)
RBD Prevalence

• 0.5-1% of the general population
• ~2% of older adults
• Male predominance
• Estimated 35 million worldwide
  – Most unrecognized
• Can be seen in younger pts (<40 yo)
  – Antidepressant medications
  – Narcolepsy

Normal REM Sleep

Red Nucleus RN (Excitatory)

Sublaterodorsal Nucleus and α Part of Subcoeruleus Nucleus - SLDN-SCLN (Inhibitory)

Ventromedial Medulla VMM (Inhibitory)

Glutamate

Motor Neuron MN (Excitatory)

Muscle Activity

GABA or Glycine

RBD
REM Without Atonia on PSG

Alpha-Synucleopathy

• Most common cause of RBD
• Idiopathic RBD prodrome for…
  – Parkinson’s Disease (PD)
  – Lewy Body Dementia (LBD)
  – Multiple System Atrophy (MSA)
• 80-90% convert to neurologic disorder
• Neurologic symptoms can occur decades later

## Prodromal Value of Idiopathic RBD

<table>
<thead>
<tr>
<th>Alpha Synucleinopathy</th>
<th>Prevalence of RBD</th>
<th>RBD preceding the onset of neurodegenerative disorder (% of patients)</th>
<th>Time interval between RBD onset and onset of neurodegenerative disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple system atrophy</td>
<td>80-100%</td>
<td>16-54%</td>
<td>4-7 years</td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>30-41%</td>
<td>18-25%</td>
<td>3-4 years</td>
</tr>
<tr>
<td>Dementia with Lewy bodies</td>
<td>40-72%</td>
<td>71-100%</td>
<td>6-10 years</td>
</tr>
</tbody>
</table>

Other Etiologies on RBD

- Other neurologic disorders\(^1\)
  - Alzheimer’s, ALS, Huntington’s, Cerebellar Ataxia, Myotonic Dystrophy, etc.
- Narcolepsy (especially Type 1)\(^2\)
  - Orexin deficiency \(\rightarrow\) unstable REM
- Pontine lesions\(^3\)
- Medications\(^4\)

Medications Associated with RBD

### Acute or chronic administration – Common

<table>
<thead>
<tr>
<th>Medication</th>
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<tbody>
<tr>
<td>Serotonin-specific reuptake inhibitors</td>
</tr>
<tr>
<td>Serotonin-norepinephrine reuptake inhibitors</td>
</tr>
<tr>
<td>Noradrenergic and specific serotonergic antidepressants (eg, mirtazapine)</td>
</tr>
<tr>
<td>Tricyclic and tetracyclic antidepressants</td>
</tr>
<tr>
<td>Monoamine oxidase inhibitors</td>
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</tbody>
</table>

### Withdrawal

<table>
<thead>
<tr>
<th>Substance</th>
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<tbody>
<tr>
<td>Alcohol</td>
</tr>
<tr>
<td>Benzodiazepines</td>
</tr>
<tr>
<td>Barbiturates</td>
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</table>

### Acute or chronic administration – Rare

<table>
<thead>
<tr>
<th>Medication</th>
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</thead>
<tbody>
<tr>
<td>Beta blockers</td>
</tr>
<tr>
<td>Cholinesterase inhibitors</td>
</tr>
<tr>
<td>Orexin receptor antagonists (eg, suvorexant)</td>
</tr>
</tbody>
</table>
Treatment of RBD

• Safety!
  – Sleeping alone, soft surroundings

• Pharmacotherapy
  – Clonazepam
  – Melatonin

• Discussion of future risk

Isolated Dream Enactment

- Rare and intermittent episodes
- Not confirmed on polysomnography
- College students and post-partum women
- Mostly benign

Nielsen et al. Sleep. 2009 Dec;32(12):1629-36
Recurrent Isolated Sleep Paralysis

- REM atonia persists in wakefulness
  - Hypnogogic (at sleep onset)
  - Hypnopompic (on awakening)
- Can be associated with hallucinations
- 7.6% of the general population experienced at least one episode
  - Higher rates in students (28.3%) and psychiatric patients (31.9%)\(^1\)

Recurrent Isolated Sleep Paralysis

• Associated conditions
  – Hypertension
  – Idiopathic hypersomnia
  – Insufficient sleep syndrome
  – Narcolepsy
  – Obstructive sleep apnea
  – Alcohol use
  – Wilson’s disease

• Treatment
  – Reassurance
  – Treatment of underlying condition
Nightmare Disorder ICSD-3

Criteria A-C must be met:
A. Repeated occurrences of extended, extremely dysphoric, and well-remembered dreams that usually involve threats to survival, security or physical integrity
B. On awakening from the dysphoric dreams, the person rapidly becomes oriented and alert
C. The dream experience, or sleep disturbance produced by awakening from it, causes clinically significant distress or impairment in social, occupational, or other important areas of functioning

International classification of sleep disorders, 3rd ed. Darien, IL: American Academy of Sleep Medicine, 2014
Nightmare Disorder

- 2-6% of adults with frequent nightmares\(^1\)
  - Higher rates in children
- Associated with:
  - Mental Health Disorders\(^2\)
    - PTSD, Depression, Anxiety, Schizophrenia
  - Medications\(^3\)
    - Antihypertensives, dopamine agonists, antidepressants, antimicrobials

1. Levin R, Nielsen TA. Psychol Bull. 2007 May;133(3):482-528
Treatment of Nightmare Disorder

• Good sleep hygiene
• Cognitive behavioral therapy
  – Imagery rehearsal therapy\(^1\)
• Medications
  – Prazosin\(^2\)
  – Others (ex: Clonidine)

Other Parasomnias

- Exploding head syndrome
- Sleep-related hallucinations
- Sleep enuresis
- Parasomnia due to a medical disorder
- Parasomnia due to a medication or substance
- Parasomnia, unspecified
Exploding Head Syndrome

- Perception of abrupt, loud noise at sleep-wake transition
- Usually painless
- Sensory variant of hypnic jerk
- Treatment
  - Reassurance, relaxation techniques
  - Anecdotal use of medications
    - Benzos, TCAs, Nifedipine

Summary

Parasomnias are undesirable physical events or experiences during and around sleep.

- Classified as REM and NREM related.
- Occur due to overlap of sleep stages.
- They are often due to underlying medical and psychiatric disorders, medication use and withdrawal, as well as sleep deprivation.
Summary

• Evaluation:
  – Thorough history and physical exam
  – Consideration of polysomnography

• Treatment:
  – Management of underlying medical or psychiatric disorder
  – Removal of contributing medication/substance
  – Reassurance, lifestyle modification
  – Pharmacotherapy
Doctor, can you prescribe something to stop me from sleepwalking?

No, you need the exercise!

Thank you