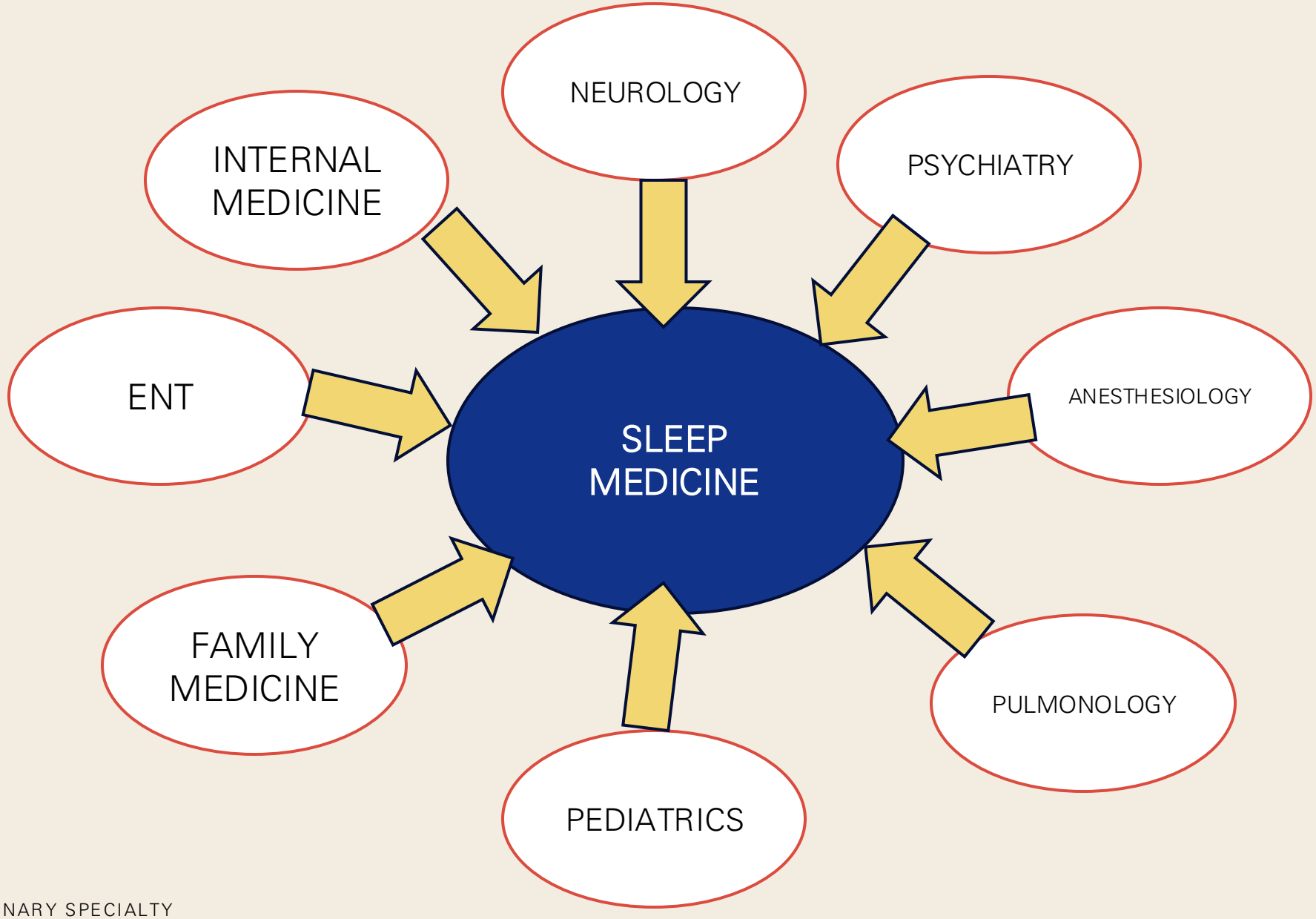
AN INTERNIST'S GUIDE TO SLEEP MEDICINE

A PRESENTATION BY MATT BOLIAUX, DO – SLEEP MEDICINE PGY4


NEUROLOGY
INTERNAL MEDICINE
PSYCHIATRY
ENT
SLEEP MEDICINE
ANESTHESIOLOGY
FAMILY MEDICINE
PULMONOLOGY
PEDIATRICS

SLEEP-DISORDERED BREATHING

SLEEP-DISORDERED BREATHING

What is it?

- Abnormalities of respiration during sleep, including **central** and **obstructive** sleep apnea
    - Central sleep apnea – disruption of sleep due to repetitive respiratory events characterized by **absent** respiratory effort
        - Elevated respiratory drive (hypoxia with **high altitude** breathing)
        - Instability of the respiratory control system (prolonged circulation e.g. **heart failure**)
        - Damage/impairment of neural circuitry which regulates breathing (**stroke**, opiates)
        - Immature development of neural circuitry (prematurity)
        - Structural abnormalities (Chiari Malformation)
    - Obstructive sleep apnea – upper airway narrowing or closure during sleep while respiratory effort continues
        - Presence of daytime impairment (sleepiness, fatigue, reduced QoL), gasping/choking, or observed apneas/snoring
        - Polysomnography/Home Testing identifies **at least 5 episodes** of obstructive events per hour of sleep

IDENTIFICATION AND TESTING

Who is at risk?

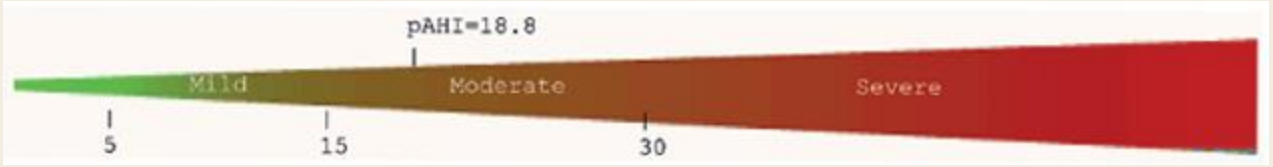
- Estimated to affect nearly 1 billion people globally and **> 80 million people in the US (~23%)**
- Best validated measurement for identifying patients at risk for OSA is the STOP-BANG score
  - Cannot use questionnaires alone to diagnose but can help with identifying needs for HSAT vs. PSG
- Scales such as the Epworth Sleepiness Scale are helpful for identifying daytime impairment

How Do We Diagnose?

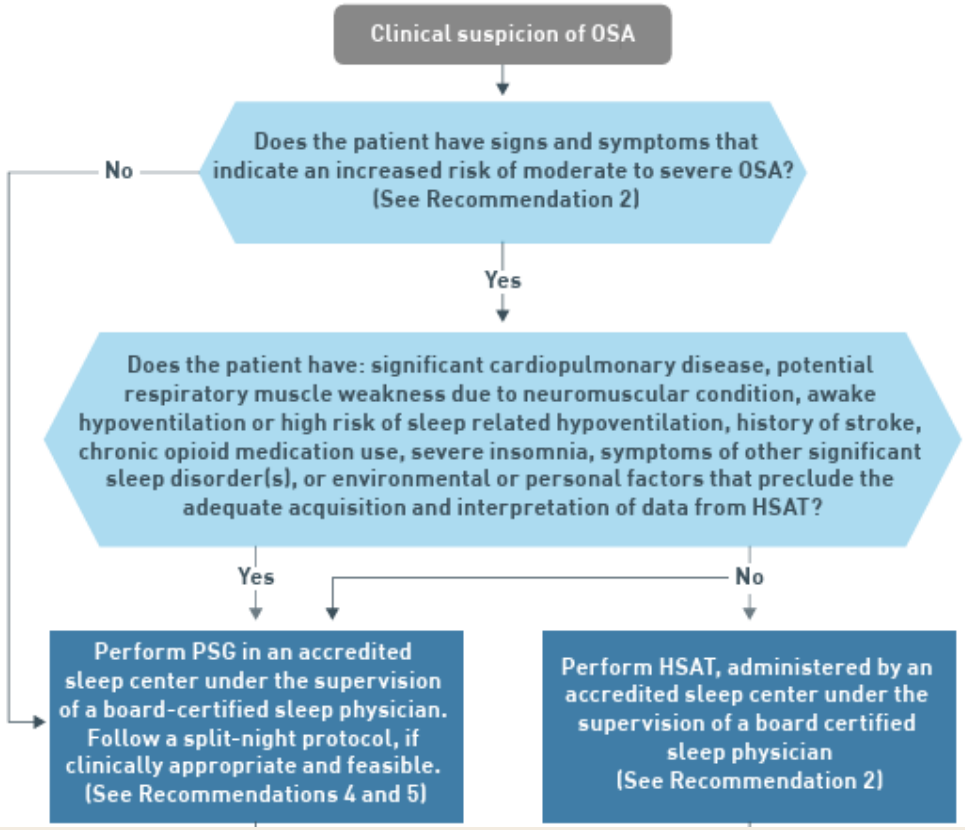
- **Diagnostic PSG (in-lab testing) is the gold standard** (often the choice on board exams)
  - **Patients with CHF, Seizures, Neuromuscular conditions, CVA, hypoventilation (COPD/OHS), or opiate use should be in-lab**
  - Patients with symptoms but **low-risk** STOP-BANG should be considered for in-lab study
- Home sleep apnea testing (HSAT) are accurate and cost effective in those considered high risk **without** significant medical comorbidity
  - If HSAT returns negative/inadequate, diagnostic PSG should be considered if high suspicion for OSA

Stratifying Severity

- **Mild** = AHI 5 – 14.9 events/hour of sleep
- **Moderate** = AHI 15 – 29.9 events/hour of sleep
- **Severe** = AHI 30+ events/hour of sleep



Clinical Practice Guideline for Diagnostic Testing for Adult Obstructive Sleep Apnea: An American Academy of Sleep Medicine Clinical Practice Guideline



RECOMMENDATIONS FOR THE DIAGNOSIS OF OSA IN ADULTS

1. We recommend that clinical tools, questionnaires or prediction algorithms not be used to diagnose OSA in adults, in the absence of PSG or HSAT. [STRONG]
   ⊕⊕⊕⊖ H>b

2. We recommend that PSG, or HSAT with a technically adequate device, be used for the diagnosis of OSA in uncomplicated adult patients presenting with signs and symptoms that indicate an increased risk of moderate to severe OSA. [STRONG]
   ⊕⊕⊕⊖ B>H

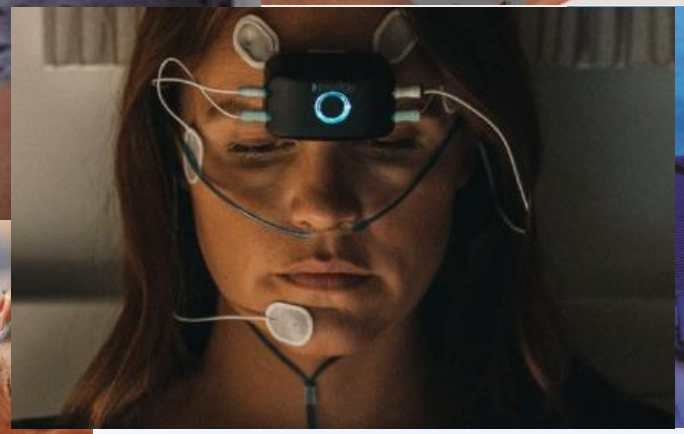
3. We recommend that if a single HSAT is negative, inconclusive or technically inadequate, PSG be performed for the diagnosis of OSA. [STRONG]
   ⊕⊕⊖⊖ B>H

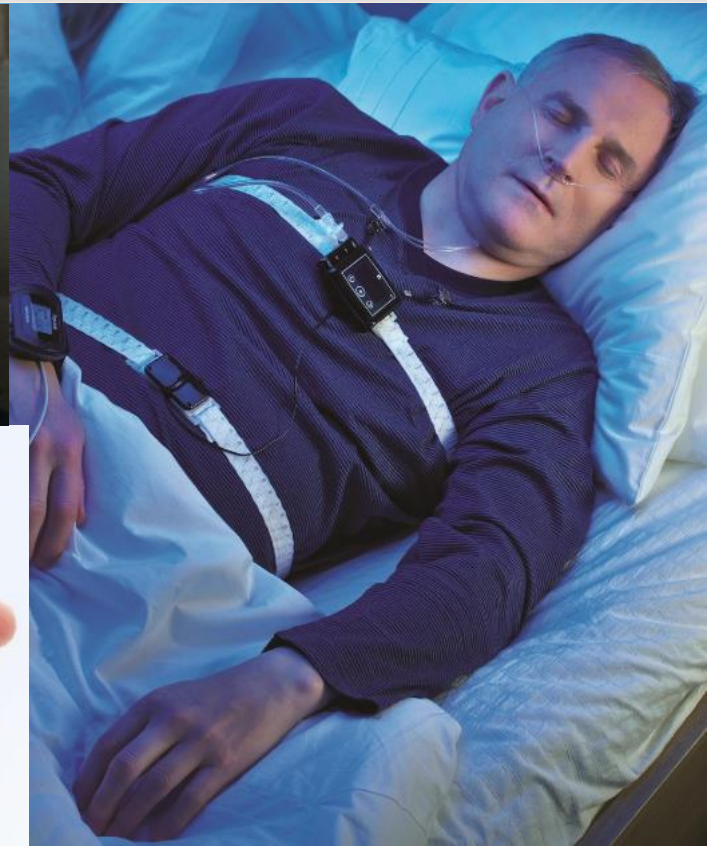
4. We recommend that PSG, rather than HSAT, be used for the diagnosis of OSA in patients with significant cardiorespiratory disease, potential respiratory muscle weakness due to neuromuscular condition, awake hypoventilation or suspicion of sleep related hypoventilation, chronic opioid medication use, history of stroke or severe insomnia. [STRONG]
   ⊕⊖⊖⊖ B>H

5. We suggest that, if clinically appropriate, a split-night diagnostic protocol, rather than a full-night diagnostic protocol for PSG be used for the diagnosis of OSA. [WEAK]
   ⊕⊕⊖⊖ B>H

6. We suggest that when the initial PSG is negative, and there is still clinical suspicion for OSA, a second PSG be considered for the diagnosis of OSA. [WEAK]
   ⊕⊖⊖⊖ B>H


WatchPAT
ONE






97%

DEFINITIONS AND SCORING

Apneas and Hypopneas

- Apneas are defined as a drops in respiratory signal by at least 90% of pre-event baseline for at least 10 seconds
- Hypopneas are defined as drops in respiratory signal by at least 30% of pre-event baseline for at least 10 seconds
    - This must be associated with a 3% (or 4%) drop in oxygen saturation OR an associated arousal
- AHI = [(# apneas + # hypopneas) / # minutes of sleep] x 60

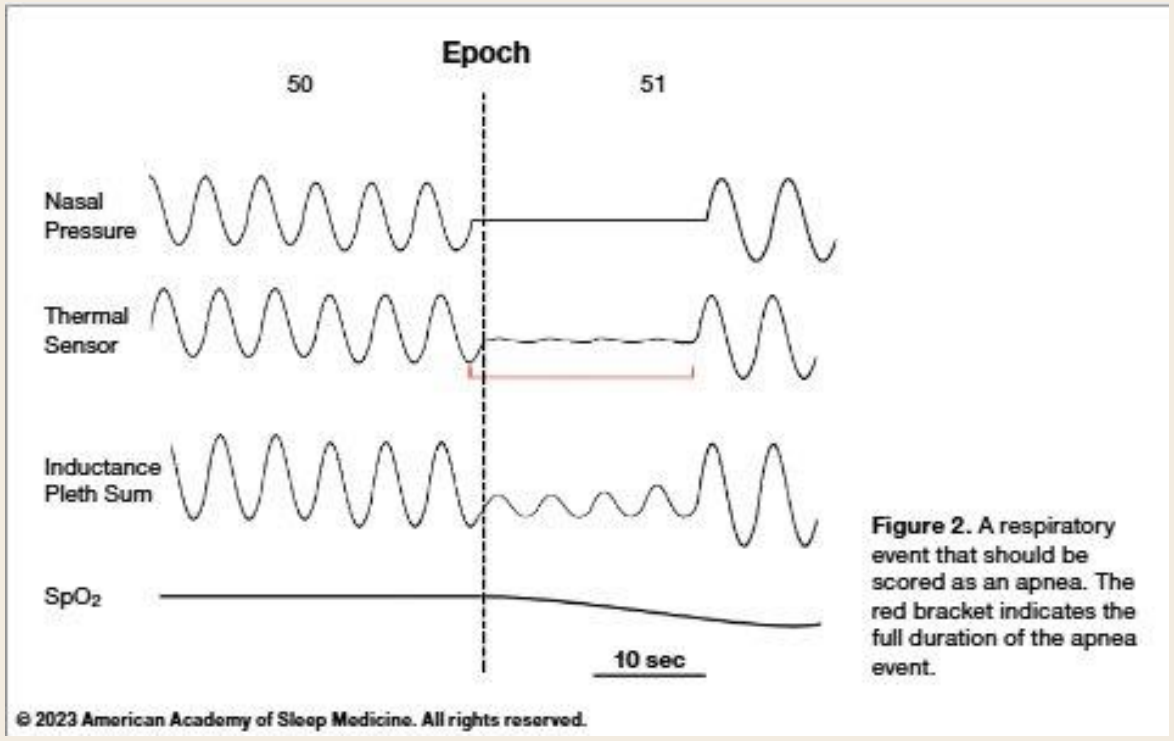


Figure 2. A respiratory event that should be scored as an apnea. The red bracket indicates the full duration of the apnea event.

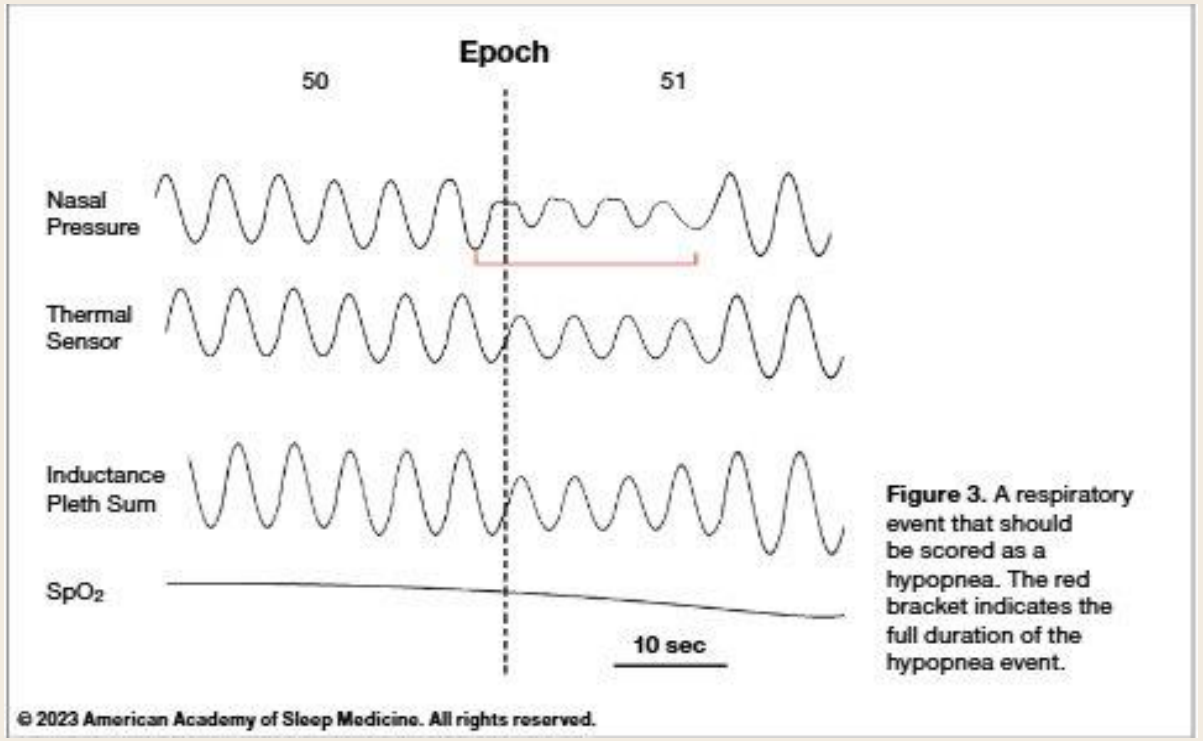
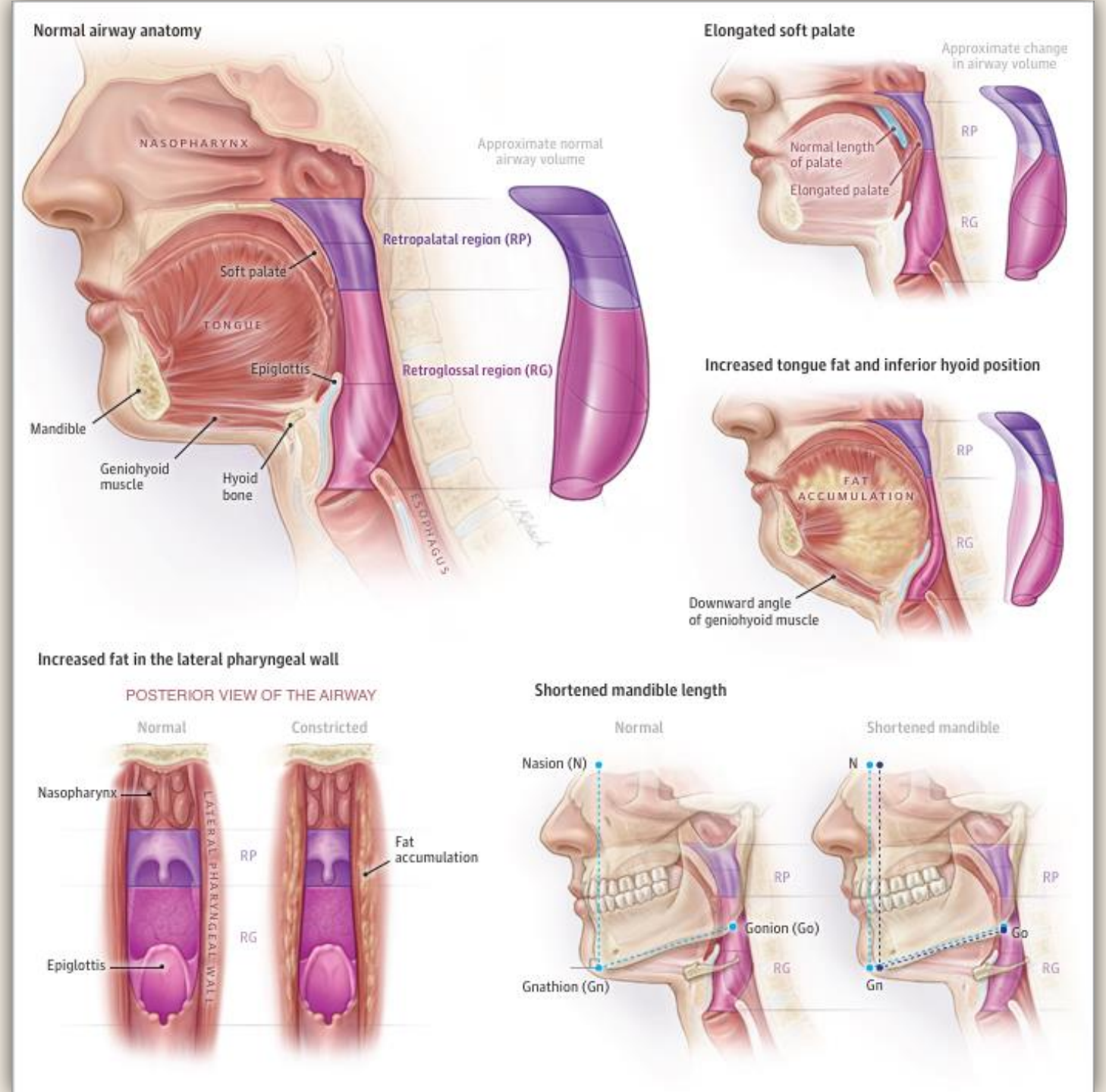


Figure 3. A respiratory event that should be scored as a hypopnea. The red bracket indicates the full duration of the hypopnea event.



Credit: https://jamanetwork.com/journals/jama/article-abstract/2764461?utm

OXYGEN AND THE SYMPATHETIC RESPONSE

Oxygen is what we typically associate, but the sympathetic response is a key player

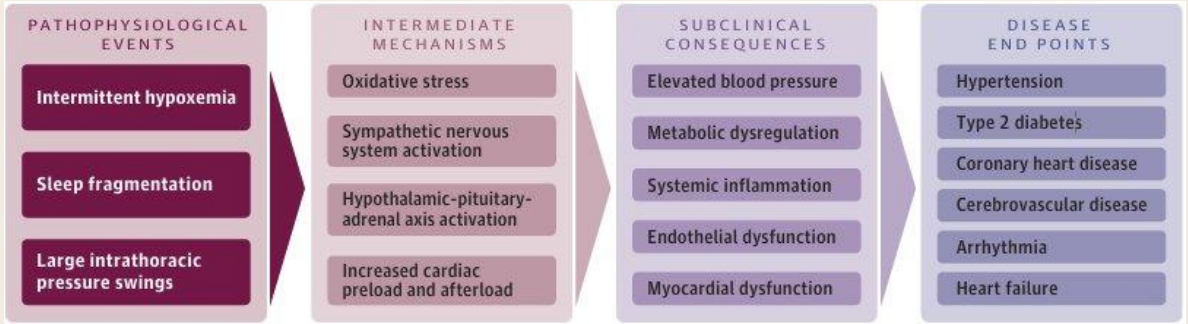
- Oxygen drops ----> shift from vagal to sympathetic tone ---> compensatory increase in BP + HR ---> microarousal

Chronicity leads to worsening of overall disease burden

- Increased risk of motor vehicle crashes (2-3x increase), inattention, cognitive impairment, HTN, CAD, AFIB, HFrEF, CVA, metabolism issues (T2DM), MASLD (2-3x increase)
- Highest risk of CVA, MI, arrhythmias are during the morning (shortly after highest burden of REM sleep)
- "Night Owls" have higher CV and metabolic risk compared to earlier chronotypes

Cardiovascular Hemodynamic Changes During Sleep

- NREM sleep – BP lowers, RR becomes rhythmic with shallow breaths, HR decreases, cardiac workload reduced, metabolism slows
- REM sleep – hypothalamic signaling changes and the above become more dynamic and variable (abrupt BP and HR changes)
    - Increased myocardial oxygen consumption and increased afterload when BP elevates
    - Augmented vagal cardiac drive (sometimes tachy, sometimes brady, or even asystole)
- Insomnia predisposes to elevated sympathetic tone and increased brain metabolic activity during sleep



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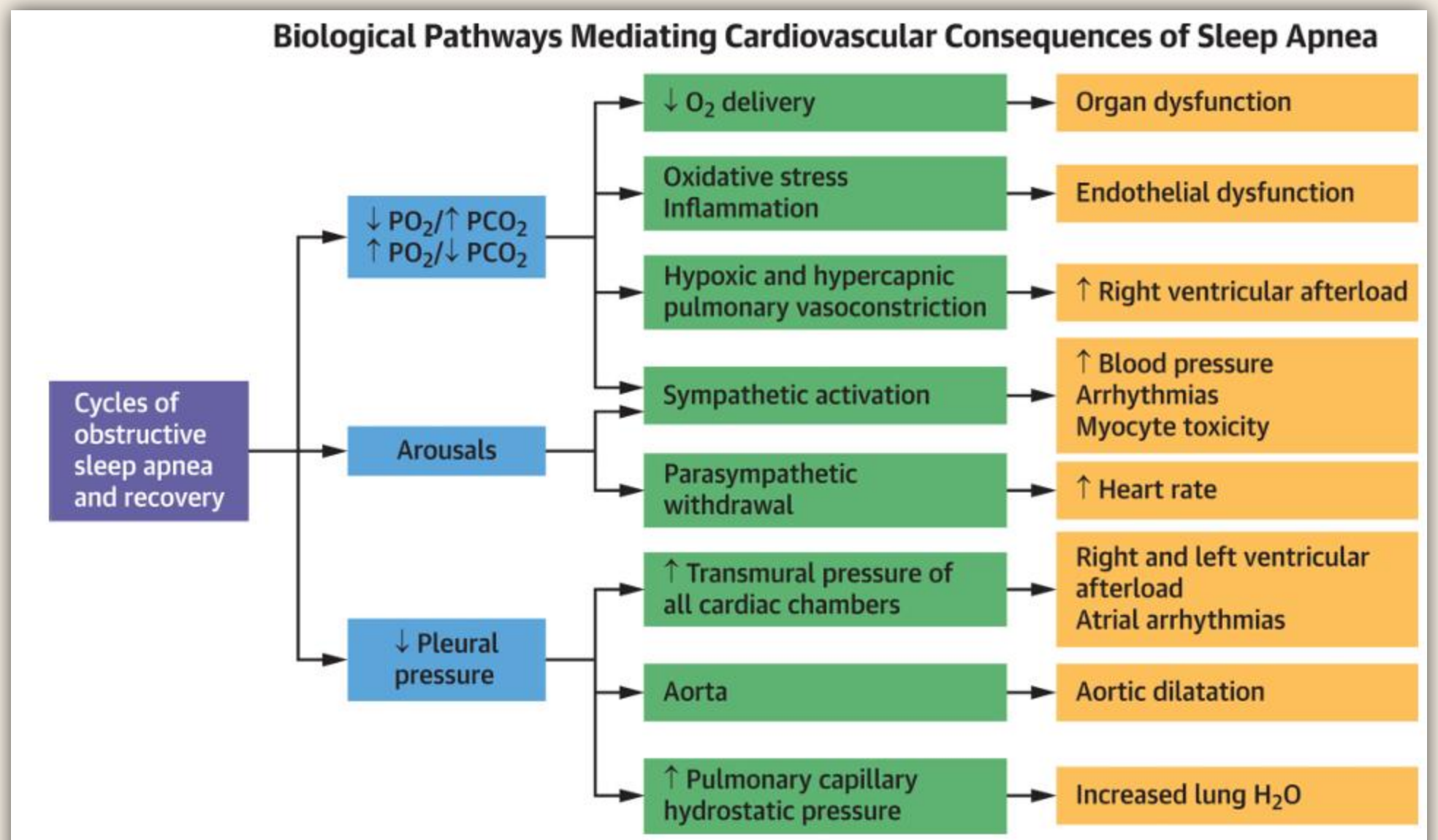
COMMON SYMPTOMS AND OUTCOMES OF OSA EXPLAINED

Typical associated symptoms that patients recognize and report:

- Nocturia – release of atrial natriuretic peptide (ANP) during elevated negative intrathoracic pressure swings
- Morning Headaches – cerebral hypoxia and hypercapnia with vasospasms during BP swings
- Daytime sleepiness – microarousals prevent deep/restorative sleep, somnogenic inflammatory cytokine upregulation
- Snoring – turbulent airflow through a narrowed upper airway (note that primary snoring exists)

Associated outcomes:

- Weight gain – ghrelin/leptin signaling regulation, poor sleep leads to sugar cravings, adiposity leads to inflammation
- Chronic inflammatory state – downstream expression of cytokines lead to release of IL-8 which leads to vascular inflammation
- HLD/CAD – recurrent hypoxemia leads to oxidative stress which leads to increased lipid peroxidation and endovascular injury
- Gut microbiota changes – intermittent hypoxia/hypercapnia and recurrent arousals stress the gut, leading to lower diversity of bacteria
- HTN – intermittent hypoxia leads to increase in TNF-a and neuroinflammatory responses (~90% of patients with resistant HTN had OSA)
- Stroke – INTERSTROKE study showed OSA symptoms were associated with statistically-significant increased OR for CVA and TIA
- Arrhythmia – sympathovagal activity imbalances and cardiac stretch
    - Treatment of OSA restored sinus rhythm in 30% of patients with AF post-ablation in one study



CENTRAL ILLUSTRATION. Pathophysiological Consequences of Sleep Apnea and Hypopnea
Pleural pressure (Ppl) is a surrogate of the pressure surrounding the heart and other vascular structures. Reproduced from Javaheri et al.[1]

INPATIENT MANAGEMENT STRATEGIES

Evaluation and management of obstructive sleep apnea in adults hospitalized for medical care: an American Academy of Sleep Medicine clinical practice guideline

Reena Mehra, MD, MS, FAASM[1]; Dennis H. Auckley, MD, FAASM[2]; Karin G. Johnson, MD, FAAN, FAASM[3]; Martha E. Billings, MD[1]; Gerard Carandang, MS[4]; Yngve Falck-Ytter, MD[5,6]; Rami N. Khayat, MD, FAASM[7,8]; Reem A. Mustafa, MD, MPH, PhD[9,10]; Cinthya Pena-Orbea, MD[11]; Ashima S. Sahni, MD, FAASM[12]; Sunil Sharma, MD, FAASM[13]; Susheel P. Patil, MD, PhD, FAASM[14,15]

- Recommendations for screening with high-resolution pulse oximetry
  - This is **not sufficient for diagnosis** but can provide evidence for nocturnal PAP therapy

- Patients with history of OSA should be placed on PAP therapy
  - Ask patient or search chart for documented settings
  - If no settings available, consulting with RT can be helpful

- Those with increased risk or high suspicion for OSA, Sleep Medicine consultation should be part of discharge planning for outpatient evaluation
  - Place the outpatient consult while discharging the patient and tag PCP/forward to their office

QUESTION #1

A 48-year-old man comes to the office for evaluation of palpitations. The patient awakens frequently at night with a pounding sensation in his chest. He also experiences "missing beats" and palpitations during the day, several days of the week. He has had no chest pain, dyspnea, syncope, or dizziness. He lives alone after a recent divorce and shares that he is afraid he may "die in my sleep." When asking about social factors, he states he has been very "stressed out" and has had symptoms of daily headaches and feels "tired all the time." He smokes 1 PPD of cigarettes for the last 20 years, and often drinks excessively on the weekends.

Temp: 99.0*F, BP: 152/89 mmHg, HR: 77 bpm with regular rhythm, RR: 15 bpm on room air, SpO2 93%, BMI 33.4 kg/m2

Physical examination is benign. 12-lead EKG is performed which shows sinus rhythm with nonspecific T-wave changes.

Labwork was recently obtained 1 week ago and reflects normal cell counts, serum chemistry and thyroid results.

Echocardiography obtained 1 month ago shows normal ejection fraction with mild left atrial enlargement, but is otherwise normal.

You provide a Holter monitor which he returns 24 hours later, revealing frequent PVCs, several episodes of bradycardia (down to 30 bpm between 2-5 AM), and a 5-second pause followed by a spontaneously-terminating 18 second run of atrial fibrillation (at 4 AM).

Which of the following is the most appropriate next step in management of this patient?

A. Evaluate ETOH abuse and dependence
B. Cardiac Stress Testing
C. Diagnostic PSG with EKG
D. Cardiology referral to discuss pacemaker implantation
E. Anxiety and Depression Counseling followed by SSRI initiation

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Which of the following is the most appropriate next step in management of this patient?

A. Evaluate ETOH abuse and dependence (12%)
B. Cardiac Stress Testing (2%)
C. Diagnostic PSG with EKG (56%)
D. Cardiology referral to discuss pacemaker implantation (30%)
E. Anxiety and Depression Counseling followed by SSRI initiation (0%)

INSOMNIA

INSOMNIA

What is it?

- Persistent difficulty with sleep initiation or maintenance that is **associated with concern, dissatisfaction, or perceived daytime impairment**
  - Impairment = labile mood, fatigue, general malaise, cognitive impairment, daytime sleepiness
  - Chronicity – at least 3 nights/week for more than 3 months qualifies a chronic condition

Epidemiology

- Estimated that 10% of people have chronic insomnia issues, whereas 30-35% of the population suffer from acute/transient insomnia
  - ~30% of people with chronic insomnia have comorbid OSA, and ~40% of patients with OSA have insomnia symptoms
- Strong familial predisposition, with an **estimated 40% genetic influence from first-degree relative**

What are the typical causes? It is most often a secondary process:

- **Psychophysiological** – learned sleep-preventing associations, often with excessive focus/worrying about sleep
- **Idiopathic** – longstanding with insidious onset during early childhood without identifiable cause
- **Paradoxical** – "sleep-state misperception"; normal sleep initiation, maintenance, and duration despite complaints otherwise
- **Inadequate sleep hygiene** – poor habits lead to poor sleep (e.g. daytime napping, use of afternoon caffeine, alcohol, etc.)
- **Medical/mental comorbidity** – conditions such as chronic pain, severe anxiety, bipolar disorder, COPD, etc.
- **Medication effect/substance use** – discontinuation of stimulants, certain prescription medications

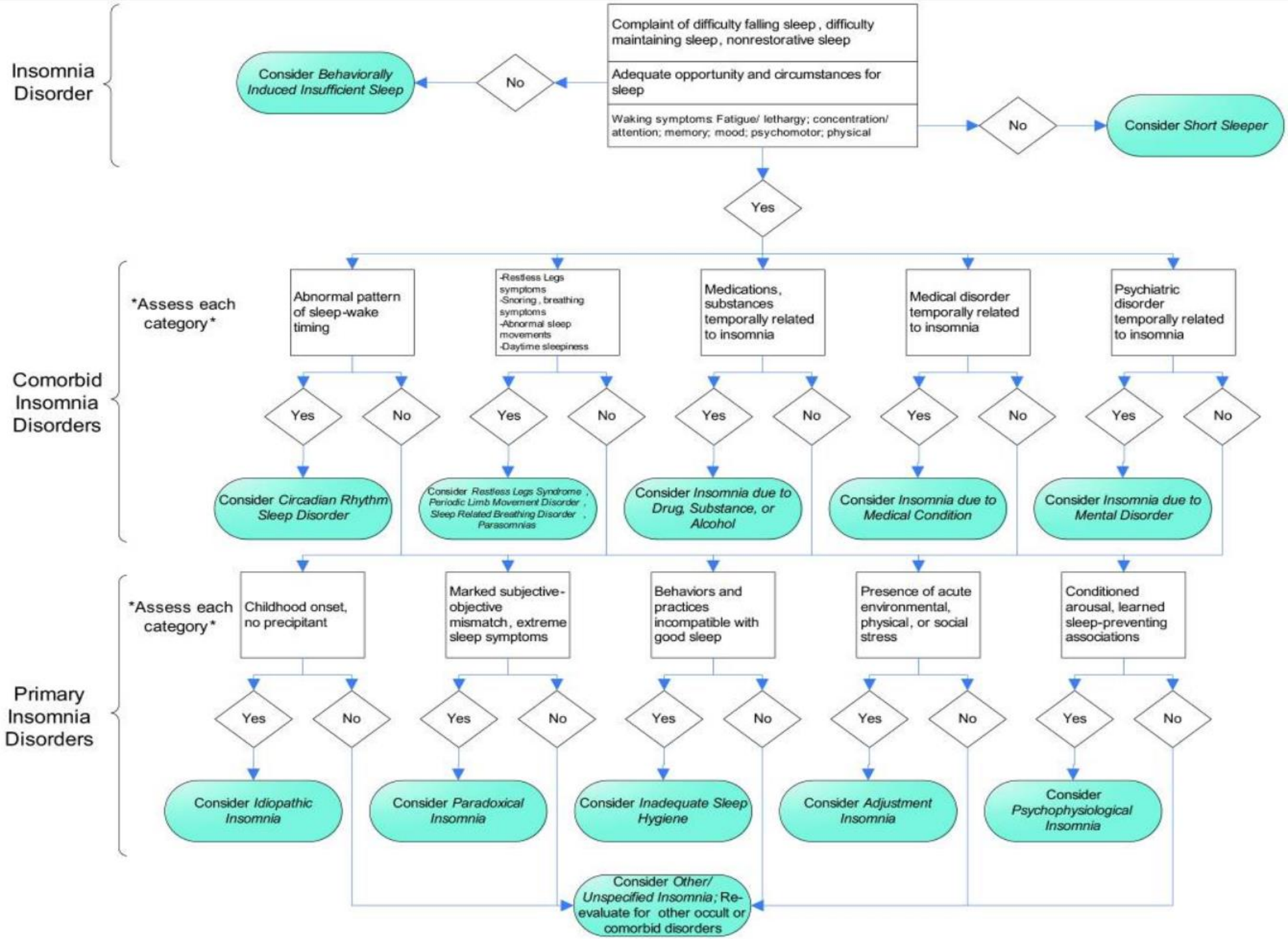
INSOMNIA MANAGEMENT

Diagnosis

- Clinical diagnosis via thorough sleep, medical, substance, and psychiatric history
- Use of questionnaires to identify daytime impairment (e.g. the Epworth Sleepiness Scale)
- Use of sleep logs (and, rarely, actigraphy) along with sleep diaries for 2 weeks to identify habits/problem areas
    - Very important for identifying if this is a circadian rhythm disorder vs. insufficient sleep vs. true insomnia
- Polysomnography +/- MSLT are not indicated unless there is reasonable suspicion for sleep apnea, PLMD, or when diagnosis is unclear

Management

- First-line therapy – psychological and behavioral interventions via cognitive behavioral therapy for insomnia (CBT-I)
    - Stimulus control, relaxation training, sleep restriction, paradoxical intention, biofeedback, sleep hygiene
    - 2025 Updated Beers Criteria has adopted these recommendations
- Adjunctive treatments include pharmacotherapy with short-term doses of hypnotics (patient specific)
    - Benzodiazepines/BZRAs may be helpful but these come with significant risks
        - Melatonin is NOT indicated for insomnia and not recommended as effective management by the AASM
    - Drug choice depends on type of insomnia: onset, maintenance, or mixed


Insomnia Disorder
Complaint of difficulty falling sleep, difficulty maintaining sleep, nonrestorative sleep
Adequate opportunity and circumstances for sleep
Waking symptoms: Fatigue/ lethargy; concentration/ attention; memory; mood; psychomotor; physical
No
Consider Behaviorally Induced Insufficient Sleep
No
Consider Short Sleeper
Yes
Comorbid Insomnia Disorders
Assess each category
Abnormal pattern of sleep-wake timing
-Restless Legs symptoms
-Snoring, breathing symptoms
-Abnormal sleep movements
-Daytime sleepiness
Medications, substances temporally related to insomnia
Medical disorder temporally related to insomnia
Psychiatric disorder temporally related to insomnia
Yes
No
Consider Circadian Rhythm Sleep Disorder
Consider Restless Legs Syndrome, Periodic Limb Movement Disorder, Sleep Related Breathing Disorder, Parasomnias
Consider Insomnia due to Drug, Substance, or Alcohol
Consider Insomnia due to Medical Condition
Consider Insomnia due to Mental Disorder
Primary Insomnia Disorders
Assess each category
Childhood onset, no precipitant
Marked subjective-objective mismatch, extreme sleep symptoms
Behaviors and practices incompatible with good sleep
Presence of acute environmental, physical, or social stress
Conditioned arousal, learned sleep-preventing associations
Consider Idiopathic Insomnia
Consider Paradoxical Insomnia
Consider Inadequate Sleep Hygiene
Consider Adjustment Insomnia
Consider Psychophysiological Insomnia
Consider Other/ Unspecified Insomnia; Re-evaluate for other occult or comorbid disorders

Benzodiazepines

- Triazolam (onset)
- Clonazepam (onset)
- Temazepam (maintenance)

Benzodiazepine-like Receptor Agonists (BZRAs aka "Z-drugs")

- Eszopiclone (Lunesta; both)
- Zolpidem (Ambien; both)
- Zaleplon (Sonata; onset)

Mood Stabilizers / Psychotropics

- Doxepin (maintenance)

Melatonin Receptor Agonists

- Ramelteon (onset)

Orexin Antagonists

- Suvorexant (maintenance)

NOT RECOMMENDED FOR TREATING INSOMNIA

We suggest that clinicians not use the following drugs for the treatment of sleep onset or sleep maintenance insomnia (versus no treatment) in adults: Diphenhydramine, Melatonin, Tiagabine, Trazodone, L-tryptophan, Valerian. (Weak)

INPATIENT MANAGEMENT STRATEGIES

Causes, Consequences, and Treatments of Sleep and Circadian Disruption in the ICU

An Official American Thoracic Society Research Statement

Melissa P. Knauert, Najib T. Ayas, Karen J. Bosma, Xavier Drouot, Mojdeh S. Heavner, Robert L. Owens, Paula L. Watson, M. Elizabeth Wilcox, Brian J. Anderson, Makayla L. Cordoza, John W. Devlin, Rosalind Elliott, Brian K. Gehlbach, Timothy D. Girard, Biren B. Kamdar, Amy S. Korwin, Elizabeth R. Lusczek, Sairam Parthasarathy, Claudia Spies, Jag Sunderram, Irene Telias, Gerald L. Weinhouse, and Phyllis C. Zee; on behalf of the American Thoracic Society Assembly on Sleep and Respiratory Neurobiology

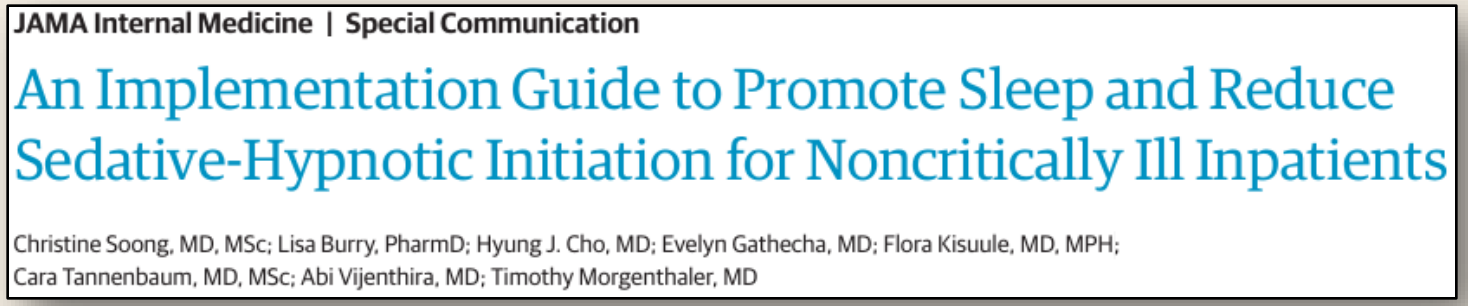
- Recommendations from experts come with limitations
  - No good way to objectively measure sleep inpatient
  - Circadian rhythm shifts from critical illness
  - Heterogenous subgroups with paucity of data

- Lack of objective measurements means questionnaires are important
  - Richards Campbell Sleep Questionnaire (RCSQ) is most reliable in ICU

- Interventions:
  - **Mitigate arousals** (anxiety, pain, light) and focus on circadian cues (light/dark)
  - Implement coping/behavioral strategies (relaxation techniques)
  - **Earplugs and eye masks** have been shown to be effective (increased TST)
    - **Melatonin not proven to be effective**, but is in high demand

- Poor sleep has been shown to lead to increased air hunger/dyspnea, changes in chemoreflex control, and failure to extubate
  - Best association is delirium (meta-analysis showed statistically significant reduction in delirium in patients with sleep interventions)
  - **Up to 61% of ICU survivors have persistently poor sleep at 6mo f/u**

INPATIENT MANAGEMENT STRATEGIES


JAMA Internal Medicine | Special Communication

An Implementation Guide to Promote Sleep and Reduce Sedative-Hypnotic Initiation for Noncritically Ill Inpatients

Christine Soong, MD, MSc; Lisa Burry, PharmD; Hyung J. Cho, MD; Evelyn Gathecha, MD; Flora Kisuule, MD, MPH; Cara Tannenbaum, MD, MSc; Abi Vijenthira, MD; Timothy Morgenthaler, MD

- Sedative initiation associated with increased risk of falls (OR 2.3) and increased length of stay (up to 75% longer compared to controls)

- Initiation of sedative-hypnotic medication had **OR of 4.65 for continued post-discharge use at 3 month follow up**

- One meta-analysis of 2417 hospitalized patients on sedatives noted improved sleep-time of 25.2 minutes with decreased arousals
  - Cognitive disturbances 4.78x more common than controls
  - NNT = 13, NNH = 6

- **Behavioral bundles** addressing modifiable factors were most helpful
  - Reduction in noise/light, modifying clinical monitoring (less frequent vitals), relaxation techniques, music therapy, and **eye masks/earplugs**
  - Providing education and **setting realistic expectations**

QUESTION #2

A 61-year-old woman comes to the office due to insomnia. She describes difficulty both falling and staying asleep over the past 6 months. Her insomnia varies and is much worse some days than others. In the mornings, she wakes up 30 minutes earlier than she would like and rarely feels well-rested. She has tried several over-the-counter sleep medications, but they make her feel groggy the next day. She is not aware if she snores. The patient drinks a glass of wine several times a week and doesn't use illicit drugs. She has a history of osteoarthritis and major depression with anxiety for which she takes ibuprofen and venlafaxine, respectively. She has lived alone since her divorce 2 years ago and maintains close relationships with her adult children and grandchildren. The patient is worried about one son who recently lost his job, but she has had no change in mood or appetite.

Physical examination is normal, as are vitals.

Which of the following is the most appropriate management of this patient?

A. Ask her to keep a 2-week sleep diary
B. Cognitive behavioral therapy for insomnia
C. Diagnostic Polysomnography
D. Psychiatry referral
E. Trial of low-dose Eszopiclone (Lunesta)

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Physical examination is normal, as are vitals.

Which of the following is the most appropriate management of this patient?

A. Ask her to keep a 2-week sleep diary (76%)
B. Cognitive behavioral therapy for insomnia (15%)
C. Diagnostic Polysomnography (3%)
D. Psychiatry referral (2%)
E. Trial of low-dose Eszopiclone (Lunesta) (1%)

QUESTION #3

A 40-year-old man comes to the office due to difficulties sleeping over the past 2 years. He regularly goes to bed at 11 PM but is unable to fall asleep until after midnight. As bedtime approaches, he typically becomes tense, watches the clock, and worries about the prospect of another sleepless night. The patient eventually falls asleep and awakens to his alarm by 6 AM so that he may arrive to his office by 8 AM to start work. During the day he feels fatigued and is concerned that his insomnia is negatively affecting his work performance. The patient doesn't take naps during the day. His wife has not noticed snoring or unusual limb movements during sleep. His general health has been good and he takes no medication. He would like to exercise but feels too tired to do so during the day.

Physical examination reveals a tired-appearing male with dark bags under his eyes, large tonsils, and bilateral nasal turbinate hypertrophy.

Vitals are unremarkable outside of a mildly elevated BP of 128/81 mmHg.

Which of the following is the most appropriate next step in the management of this patient?

A. Advise taking strategic naps to replenish sleep debt when able

B. Advise remaining in bed doing a relaxing activity to aid with sleep onset

C. Recommend aerobic exercise before bed to tire himself out

D. Recommend going to bed only when he is feeling as though he is very sleepy

E. Recommend restricting time in bed to 5-6 hours nightly

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Physical examination reveals a tired-appearing male with dark bags under his eyes, large tonsils, and bilateral nasal turbinate hypertrophy.

Vitals are unremarkable outside of a mildly elevated BP of 128/86 mmHg.

Which of the following is the most appropriate next step in the management of this patient?

A. Advise taking strategic naps to replenish sleep debt when able (1%)

B. Advise remaining in bed doing a relaxing activity to aid with sleep onset (12%)

C. Recommend aerobic exercise before bed to tire himself out (7%)

D. Recommend going to bed only when he is feeling as though he is very sleepy (67%)

E. Recommend restricting time in bed to 5-6 hours nightly (9%)

RESTLESS LEG SYNDROME

RESTLESS LEG SYNDROME (RLS)

What is it?

- A sensorimotor disorder characterized by a complaint of strong, irresistible urges to move the limbs. Typically accompanied by irresistible sensations in the limbs which may be difficult or impossible to describe
    - Often, patients will describe tingling sensations, difficulties with getting into a comfortable position, and sometimes itchiness/heat

Diagnosis and Management

- Diagnosis is clinical, with most patients describing restlessness (88%), discomfort (78%), twitching (63%), or generalized "unpleasantness" (59%)

Treatment of restless legs syndrome and periodic limb movement disorder: an American Academy of Sleep Medicine clinical practice guideline

John W. Winkelman, MD, PhD, FAASM[1,2]; J. Andrew Berkowski, MD[3]; Lourdes M. DelRosso, MD, PhD, FAASM[4]; Brian B. Koo, MD[5,6]; Matthew T. Scharf, MD, PhD[7]; Denise Sharon, MD, PhD, FAASM[8,9]; Rochelle S. Zak, MD, FAASM[10]; Uzma Kazmi, MPH[11]; Yngve Falck-Ytter, MD[12,13]; Anita V. Shelgikar, MD, MHPE, FAASM[14]; Lynn Marie Trotti, MD[15]; Arthur S. Walters, MD, FAASM[16]

- All patients with clinically significant RLS should undergo serum iron/ferritin studies
- Patients with **serum Ferritin of 75 ng/mL or below** (or transferrin saturation < 20%) should be treated with oral or IV iron
    - Ferric carboxymaltose (Injectafer) > iron dextran > ferumoxytol
    - Retesting should occur in 3 months to evaluate efficacy and further needs
- Gabapentin encarbil > Gabapentin/Pregabalin (up to 70% reported clinical improvement reported by patients)
    - **Pramipexole is no longer indicated and, therefore, is always going to be a distractor on exams**

QUESTION #4

A 70-year-old man comes to the office due to trouble sleeping. He has experienced progressively worsening urge to move his legs when he watches television at night; the urge persists when he goes to bed and often prevents him from getting to sleep. The sensation to move his legs goes away when he gets up and walks and is not present during the day. There is no associated lower extremity numbness, tingling, or weakness. Medical history is notable only for mild hypertension treated with lisinopril.

Physical examination, including neurologic examination, is unremarkable.

Which of the following is the most appropriate next step in the management of this patient?

A. Serum free iron and TIBC measurement
B. Pramipexole at bedtime
C. Gabapentin at bedtime
D. Serum ferritin level measurement
E. Diagnostic Sleep Study

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PARASOMNIAS

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What is it?

- Undesirable physical events/experiences which occur during entry into sleep, within sleep, or during arousal from sleep.
- Characterized by abnormal sleep-related movements, behaviors, emotions, perceptions, dreams, and autonomic nervous system activity
- No conscious or deliberate control

How does it happen?

- Result of a **state-dissociation** leading to altered consciousness (think wakefulness of the body while the brain is sleeping)
- Skeletal muscle and autonomic nervous system activation during sleep + disinhibition of "basic drive states" = fleeing (sleep walking), feeding (sleep-related eating), sex (sexsomnia), aggression (dream enactment behaviors)
    - NREM parasomnias = sleep terrors, sleepwalking, sleep-related eating disorder (SRED), sexsomnia
    - REM parasomnias = REM sleep behavior disorder, sleep paralysis, nightmare disorder

RBD and its associations

- Close relationship with Parkinson's Disease (PD), Lewy Body Dementia (DLB), and Multiple System Atrophy (MSA)
- Estimated **annual risk of conversion from isolated RBD ~6.3% with ~73.5% of patients converting after 12 years**
    - Greatest rates of conversion in patients who showed symptoms of abnormal motor testing, olfactory deficit, and cognitive impairment

THE TRAGIC STORY OF KENNETH PARKS

- 23-year-old married father living in Toronto, Canada falls asleep on the couch watching television (typical dad)
- Gets up, puts on his coat, then drives 14 miles to his in-laws house with whom he has a close relationship
- Strangles his father-in-law until he is unconscious then bludgeons his mother-in-law with a tire iron before stabbing them both with a kitchen knife (MIL dies, FIL survives)
- During investigation, it was found that Parks had been recently unemployed and under a great deal of stress
- He and his wife had been talking that day about driving to her parents to share his financial and gambling issues
- Turns out, he had a strong family history of parasomnias, something which was linked via expert testimony in court
- Parks had been wandering through his in-laws' home and, in an attempt to restrain him, they provoked an attack
- FIL testified on his behalf (good relationship, didn't seem to be aware of what was happening)
- Acquitted of murder due to "non-insane automatism"

Source: https://sleepforensicmedicine.org/case-studies/sleep-walking/#rvparks

QUESTION #5

A 55-year-old man comes to the office due to excessive daytime sleepiness. Over the last year, the patient has experienced sleep disturbances, including dream-enactment behaviors such as talking, yelling, punching, kicking, and jumping from bed. His mood has changed and he is now often depressed and anxious. The patient has noticed increasing difficulty with his sense of smell and no longer enjoys a morning cup of coffee. Bowel movements have also become less regular, and he is often constipated. The patient has no headaches, changes in vision, trouble swallowing, slurred speech, numbness, weakness, tremors, or difficulties walking. He also has no delusions or visual/auditory hallucinations. The patient works as an attorney and doesn't use tobacco, alcohol, or recreational drugs.

Temperature is 36.7*C (98.1*F), BP is 140/90 mmHg, HR 92 bpm, RR 12 bpm with SpO2 96% on room air. BMI is 35 kg/m2. MMSE is normal. Patient has diminished sense of smell on scratch-and-sniff testing. The remainder of his examination is normal.

Which of the following is the most likely explanation for this patient's symptoms?

A. Cerebellar degeneration
B. Early Parkinson disease
C. Hypothyroidism
D. Midbrain infarction
E. Obstructive sleep apnea

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Which of the following is the most likely explanation for this patient's symptoms?

A. Cerebellar degeneration (3%)
B. **Early Parkinson disease (56%)**
C. Hypothyroidism (14%)
D. Midbrain infarction (13%)
E. Obstructive sleep apnea (12%)


YORK BEACH
MAINE

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THANK YOU!

ROTATE WITH US, SLEEP MEDICINE IS COOL

MATTHEW.BOLIAUX3@BANNERHEALTH.COM