Managing Sleep Health in a Primary Care Setting CME Program

April 26, 2018 | Atlantic City, NJ
NJAPOS AROC Conference & Expo

*Earn up to 1 AMA PRA Category 1 Credits™*

---

Pre-Assessment

Please take a minute to fill out our survey via your mobile devices

[www.surveymonkey.com/r/NSFAROC](http://www.surveymonkey.com/r/NSFAROC)

---

The Importance of Sleep Health
Managing Sleep Health: The Importance of Sleep

Faculty – Paul Doghramji, MD

• Family Physician, Collegeville Family Practice

• Disclosures
  - I have the following relevant financial relationship(s) with one or more commercial interests to disclose:
    • Merck, Speakers Bureau, Faculty, Peer Reviewer

Learning Objectives

• Define sleep health and summarize its clinical importance.
• Communicate risk factors associated with not getting enough sleep.
• Explain the sleep/wake cycle and circadian rhythms.
• Identify common sleep disorders in primary care.
• Use appropriate diagnostic tools to assess patients’ sleep health.

Outline

• What is sleep?
  • Sleep stages
  • Sleep neurophysiology
  • Dreaming
  • Sleepiness
  • Sleep disorders
  • Insomnia and comorbidities
Managing Sleep Health: The Importance of Sleep

Sleep Perspectives

- Behavioral
- Reversible
- Perceptual disengagement from, and unresponsiveness to, the environment

- Neurophysiological
  - Two distinct states: REM sleep and NREM
  - Actively produced, not a result of passive inactivity
  - Highly regulated by homeostatic and circadian processes
  - Produces changes in the entire organism, not just the CNS

- Teleological
  - Necessary for survival; deprivation leads to functional impairments and eventual death
  - Important for clearance of neurotoxic waste products (e.g., beta amyloid) that accumulate in the brain during wakefulness


Why is sleep important?

- Cognition and performance
- Mood regulation
- Mental health
- Physical health
- Safety
Fig. 4 Aβ plaque deposition after chronic sleep restriction and chronic orexin receptor blockade in transgenic mice (A) Mice that underwent chronic sleep restriction for 21 days showed significantly greater Aβ plaque deposition in multiple subregions of the cortex compared to age-matched control mice. The glymphatic system supports interstitial solute and fluid clearance from the brain.

Sci Transl Med 2012;4:147ra111
Managing Sleep Health: The Importance of Sleep

Outline

• What is sleep?
• Sleep stages
• Sleep physiology
• Dreaming
• Sleepiness
• Sleep disorders
• Insomnia and comorbidities

SLEEP ≠ REST

Two States of Sleep

Rapid eye movement (REM) sleep
• When dreaming occurs
• "Active brain in a paralyzed body"

Non-REM sleep
• 3 stages
• Based primarily on EEG

Typical Sleep Architectural Pattern of a Young Human Adult

Sleep Architecture

- Sleep is entered through stage N1
- Orderly progression from stage N1 to N3 and, typically within 90 minutes of sleep onset, to the 1st REM period
- 90-minute cycle of REM-NREM repeats throughout sleep
- As the night progresses
  - REM periods increase in duration and density of eye movements
  - N3 sleep becomes less prominent in the 2nd half of the night

Sleep Stage Characteristics

<table>
<thead>
<tr>
<th></th>
<th>NREM</th>
<th>REM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Steady</td>
<td>Variable</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Steady</td>
<td>Labile</td>
</tr>
<tr>
<td>Respiration</td>
<td>Regular</td>
<td>Irregular</td>
</tr>
<tr>
<td>Skeletal muscle tone</td>
<td>Normal</td>
<td>Decreased</td>
</tr>
<tr>
<td>Thermoregulation</td>
<td>Waking modes</td>
<td>Decreased</td>
</tr>
<tr>
<td>Penile tumescence</td>
<td>Infrequent</td>
<td>Frequent</td>
</tr>
<tr>
<td>Mental activity</td>
<td>Limited</td>
<td>Dreaming</td>
</tr>
<tr>
<td>Brain O₂ consumption</td>
<td>Decreased</td>
<td>Waking level</td>
</tr>
</tbody>
</table>


Sleep Across the Life Span

Managing Sleep Health: The Importance of Sleep

Outline

• What is sleep?
• Sleep stages
• Sleep physiology
  • Dreaming
  • Sleepiness
• Sleep disorders
• Insomnia and comorbidities

Two Process Model of Sleep Regulation

Adapted from Drake CL. J Fam Pract. 2010;59:S9-S17.
Orexin = Hypocretin

- Hypothalamic peptides (OX1 and OX2)
- Localized in the dorsolateral hypothalamus
- Wide projections throughout brain and spinal column
- Peptide neurotransmitters involved in
  - Arousal
  - Locomotion
  - Metabolism (energy and appetite control)
  - Increase blood pressure & heart rate


Brain Activity in Wake-Promoting Areas in Insomnia

Brain structures did not show the expected decreased metabolic activity in wake-promoting areas of the brain during the transition from wake to sleep. Measured in 7 patients with primary insomnia compared with 20 healthy controls.


Flip Flop Switch Model of Arousal and Sleep

Outline

• What is sleep?
• Sleep stages
• Factors affecting sleep architecture
• Sleep physiology
• **Dreaming**
• Sleepiness
• Sleep disorders
• Insomnia and comorbidities

When do we dream?

• Dreaming occurs in all stages of sleep
• 80% of persons who are awakened during REM sleep and sleep onset (N1 & N2)
• 40% of persons who are awakened from a deep sleep

REM and Non-REM Dreams

<table>
<thead>
<tr>
<th></th>
<th>N1 &amp; N2</th>
<th>N3</th>
<th>REM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dreams</strong></td>
<td>simpler, shorter and have fewer associations than REM sleep dreams</td>
<td>More diffuse (e.g., about a color or an emotion)</td>
<td>Tend to be bizarre and detailed, with storyline plot associations</td>
</tr>
<tr>
<td>Highest recall during sleep stages with EEG patterns most like those in the waking state</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Managing Sleep Health: The Importance of Sleep

Frightening Dreams

<table>
<thead>
<tr>
<th>TYPE OF DREAM</th>
<th>INCIDENCE</th>
<th>SYMPTOMS</th>
<th>SLEEP STAGE</th>
<th>ASSOCIATED FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent nightmares in children</td>
<td>40 to 50%, declines with age</td>
<td>Frightening, detailed plots</td>
<td>REM sleep, usually late in sleep (4-6 a.m.)</td>
<td>Usually no pathology</td>
</tr>
<tr>
<td>Frequent nightmares in adults</td>
<td>5 to 8%</td>
<td>Increased awakenings</td>
<td>REM sleep</td>
<td>&quot;Thin boundary&quot; / creative personality</td>
</tr>
<tr>
<td>Prys 0.8 to 1.0% of veterans</td>
<td>REM sleep; stereotypic dreams of the trauma intensity rage, fear, grief</td>
<td>REM sleep and sleep onset</td>
<td>Significant trauma; &quot;Thin boundary&quot;; anxiety</td>
<td></td>
</tr>
<tr>
<td>REM sleep behavior disorder</td>
<td>Most common in late middle age and in men</td>
<td>Acting out of dreams Nocturnal injuries</td>
<td>REM sleep REM EMG tone Depression in elderly</td>
<td></td>
</tr>
<tr>
<td>Night terrors</td>
<td>1 to 4% of children, decreases with age Rare in adults</td>
<td>Blood-curdling screams Nocturnal injuries</td>
<td>Deep sleep, early (1-3 a.m.) Stages 3 &amp; 4 arousals on PSG No pathology in children Psychiatric &amp; neurologic disorders in adults</td>
<td></td>
</tr>
</tbody>
</table>

REM = rapid eye movement, EMG = electromyography


Outline

• What is sleep?
• Sleep stages
• Factors affecting sleep architecture
• Sleep physiology
• Dreaming
• Sleepiness
• Sleep disorders
• Insomnia and comorbidities

Sleepiness: How do patients describe it?

• "I’m tired all the time"
• "I have no energy"
• "I feel fatigued"
• "I feel depressed"
• "I don’t feel rested"
• "I don’t sleep well"
Managing Sleep Health: The Importance of Sleep

Patients Also Mean Other Things
“TIRED”

<table>
<thead>
<tr>
<th>Sleepiness</th>
<th>Fatigue</th>
<th>Lack of motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tendency to fall asleep or inability to stay awake</td>
<td>Sensation of weariness, tiredness, exhaustion, loss of energy, the desire to rest</td>
<td>“I don’t feel like doing anything...”</td>
</tr>
<tr>
<td>Improved by sleep</td>
<td>Improved by rest, exertion makes it worse</td>
<td></td>
</tr>
</tbody>
</table>

Sleepiness in America
% of US Adults Reporting that They Are So Sleepy
if Interferes with Their Daily Activities

- At least a few days per month: 40%
- At least a few days per week: 37%
- At least a few days per month: 16%


Assessment Options: Sleep Parameters

- Subjective: based on self-report
  - Epworth
  - Insomnia Severity Scale
  - Diaries
  - Often do not reflect objective sleep measures
- Objective: Sleep lab or home sleep monitor
- Wearable technology (eg, Fitbit) increasingly capable of more objective sleep assessment: eg, total sleep time, slow wave sleep, REM sleep
- Not reimbursable, not validated in clinical practice
<table>
<thead>
<tr>
<th>Rate the chances of dozing in sedentary situations</th>
<th>Never</th>
<th>Slight</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Watching television</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sitting, inactive in a public place (e.g., movie theater or a meeting)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>As a passenger in a car for an hour without a break</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lying down to rest in the afternoon when circumstances permit</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sitting quietly after lunch without alcohol</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>In a car, while stopped for a few minutes in the traffic</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Score >=10 Prompts Further Evaluation

Worldwide Prevalence of ESS Scores >10

- US women 20.4%, US men 29.7%
- South Africa 24.5%
- Japan 12.4%
- China 6.2%
- Austria 17.5%
- Belgium 17.5%
- Brazil 14.3%
- Germany 7.2%
- Portugal 18.3%
- Slovakia 13.7%
- Spain 12.7%
- Norway 17.7%

N=35,327 survey respondents aged 39 ± 15.3 years.1

ESS, Epworth Sleepiness Scale.


Categories of Sleepiness

- Insufficient sleep
- Factitious
- Insomnia
- Poor quality sleep
- Obstructive sleep apnea
- Restless Legs Syndrome
- Disturbed timing of sleep
- Circadian rhythm disorders
- Medications and substances
- Rx, OTC, herbals
- Illicit drugs, alcohol
- Brain “damage”
- MS, Parkinson’s, TBI, stroke, Alzheimer’s
- Narcolepsy
Managing Sleep Health: The Importance of Sleep

Outline

- What is sleep?
- Sleep stages
- Factors affecting sleep architecture
- Sleep physiology
- Dreaming
- Sleepiness
- Sleep disorders
  - Insomnia and comorbidities

Sleep-Wake Disorders: Prevalence in Adults

- Insufficient Sleep Syndrome: 10%-16%
- Restless Legs Syndrome: 10%-16%
- Comorbid Insomnia: 6%
- Narcolepsy: 0.06%
- Shift Work Disorder: 5%-32%

Obstructive Sleep Apnea: 3%-28%

How to Diagnose the Cause of Sleepiness

- Get detailed sleep/wake history
- Determine whether sleepy, fatigue, or depression
- Quantify degree of sleepiness: ESS
- Start probing for the causes, looking for clues
  - Insufficient Sleep Syndrome: doesn’t get enough sleep
  - OSA: loud snoring, waking up choking, witnesses apneas, waking with sore throat, headache, enuresis, nocturia
  - RLS: uncomfortable feelings in legs prevent sleep, need to move them to relieve symptoms
  - PLMD: no clues except excessive sleepiness
  - Narcolepsy: hypnogogic/hypnopompic hallucinations, sleep paralysis, cataplexy

*Managing shift and rotating shift workers. Prevalence of hypersomnias such as narcolepsy without cataplexy may be higher.
† Among night and rotating shift workers; prevalence of hypersomnias such as narcolepsy without cataplexy may be higher.
Obstructive Sleep Apnea

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Physical Findings</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loud Snoring</td>
<td>Large neck</td>
<td>CPAP/BiPAP/Auto-PAP</td>
</tr>
<tr>
<td>Gasp, choking</td>
<td>Crowded pharynx</td>
<td>Oral appliance</td>
</tr>
<tr>
<td>Witnessed apneas</td>
<td>Obesity</td>
<td>Surgery</td>
</tr>
<tr>
<td>Morning headaches, sore throat</td>
<td>Micronorchia, short chin</td>
<td>Weight loss</td>
</tr>
<tr>
<td>Enuresis/nocturia</td>
<td></td>
<td>Positioning</td>
</tr>
</tbody>
</table>
<pre><code>                                                                |                                            | “Provent”                                     |
                                                                |                                            | “Inspire”                                     |
</code></pre>

Screening for OSA: STOP-BANG Method

STOP Questionnaire*  BANG†
• Snoring             • BMI > 35
• Tiredness (daytime) • Age > 50 years
• Observed you stop  • Neck circumference
  breathing during sleep > 40 cm (~ 16 in)
• High blood Pressure • Gender: Male

* High risk = Yes to > 2 of 4 STOP items
† High risk = Yes to > 3 of 8 STOP-BANG items

Airway Assessment: OSA Mallampati Scale

Odds of OSA increase >2-fold for every 1-point increase

Class I  Class II  Class III  Class IV

Restless Leg Syndrome

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Etiology</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Irresistible urge to move legs usually with unpleasant sensations</td>
<td>• Dopaminergic dysfunction</td>
<td>• Dopaminergic agents</td>
</tr>
<tr>
<td>• Relief with movement</td>
<td>• Iron deficiency</td>
<td>• Iron if deficient</td>
</tr>
<tr>
<td>• Worse at night</td>
<td>• Renal insufficiencies</td>
<td>• Sedative hypnotics</td>
</tr>
<tr>
<td>• Worse with rest</td>
<td>• Peripheral neuropathies</td>
<td>• Anticonvulsants</td>
</tr>
<tr>
<td></td>
<td>• 25% secondary</td>
<td>• Opiates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sleep hygiene</td>
</tr>
</tbody>
</table>


Periodic Limb Movement Disorder vs. RLS

• Substantial overlap
  • Up to 85% of RLS patients have PLMD
  • 30% of PLMD patients have RLS
• RLS diagnosis is made clinically
• PLMD diagnosis is made via PSG
  • No other daytime clues, just sleepiness
• Treatments are the same

Outline

• What is sleep?
• Sleep stages
• Factors affecting sleep architecture
• Sleep physiology
• Dreaming
• Sleepiness
• Sleep disorders
• Insomnia and comorbidities
Insomnia

As a disorder:
- Trouble getting to sleep and/or
- Trouble staying asleep and/or
- Waking up too early and/or
- Occurring more days of the week than not
- Ongoing for over 3 months

Why Should PCP’s be Proactive about Insomnia?

<table>
<thead>
<tr>
<th>Why</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very prevalent in primary care</td>
<td>• Relieves an upsetting symptom</td>
</tr>
<tr>
<td>• But patients don’t tell you</td>
<td>• Improves next day consequences</td>
</tr>
<tr>
<td>• Serious consequences</td>
<td>• Improves outcome of co-morbidity</td>
</tr>
<tr>
<td>• Day to day life</td>
<td>• Psychiatric</td>
</tr>
<tr>
<td>• Poor outcome on mental and physical health</td>
<td>• Medical</td>
</tr>
<tr>
<td>• Insomnia is a clue</td>
<td>• Majority is done by PCP</td>
</tr>
<tr>
<td>• Most insomnia is co-morbid</td>
<td></td>
</tr>
<tr>
<td>• Easy to identify</td>
<td></td>
</tr>
</tbody>
</table>

Insomnia Risk Factors

- Age (older)
- Sex (especially post-1 and perimenopausal2 females)
- Divorce/separation/widowhood
- Psychiatric illness (mood and anxiety disorders)
- Medical conditions
- Cigarette smoking
- Alcohol and coffee consumption
- Certain prescription drugs

Insomnia Screening and Follow-up

• Sleep Schedule: Do you have trouble getting to sleep, staying asleep, or waking up too early?
• Daytime consequences: Do you feel like you have slept well throughout the day?
• Sleep timing: When do you go to bed? ...Wake up? ...Middle of the night awakening? ...How long does it take you to fall back to sleep?
• Treatments: What remedies have you tried? Any previous Rx’s?
• Sleep hygiene/lifestyle issues: Alcohol? Smoking? Exercise? Medications that cause insomnia?
• Duration, frequency, prior: How long has this been going on?...How often?...Have you had it before?...


Is the Duration of Sleep Important?

**Insomnia with**

- Objective Short Sleep Duration
  - Genetic predisposition
  - Unremitting
  - Associated with CV and metabolic risk mediators

- Objective Normal Sleep Duration
  - Cognitive-emotional
  - Cortical arousal
  - Sleep misperception, but,
  - NOT activation of the stress system or medical complications
  - More likely to remit


How Frequent are Comorbidities?

![Graph showing prevalence of medical conditions in primary care patients with insomnia and insomnia with medical conditions.](image-url)
How does Inadequate Sleep Increase CVD?

- Total sleep time (TST) < 5 hours compared to TST > 5 hours:
  - Higher glucose & cortisol levels
  - HPA-associated endocrine & metabolic imbalances
  - Hypercholesterolemia even after controlling for other risk factors
- **Night time BP**: Nighttime SBP higher and day-to-night SBP dipping was lower (-8% vs -15%, P < 0.01) in insomniacs
- **Atherosclerosis**: Total sleep time (P = 0.005), and sleep quality (P = 0.05) contributed to increased carotid intima-media thickness
- **Inflammation**: Serum CRP levels higher and increased at a steeper rate

---

Does insomnia contribute to development of hypertension?

<table>
<thead>
<tr>
<th>Prospective Follow-up</th>
<th>Rate of Developing Hypertension (per 10,000 person-years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active duty in US Military</td>
<td>Controls 46.2, Insomnia 95.6</td>
</tr>
<tr>
<td>Excluded: Chronic insomnia prior to 1/1/1998</td>
<td></td>
</tr>
<tr>
<td>Without hypertension at baseline</td>
<td></td>
</tr>
<tr>
<td>Chronic insomnia led to higher risk of hypertension (aHR 2.00)</td>
<td></td>
</tr>
</tbody>
</table>

---

Does Insomnia Increase Risk of CVDs?

- **AMI**:
  - aOR of CV Event: Women 1.6, Men 1.3
  - aOR for CHF: Women 0.96, Men 1.35
- **Stroke**: aOR of CV Event: Women 1.4, Men 1.3
- **1st CV Event**: aOR of CV Event: Women 1.6, Men 1.3

---

References:
Managing Sleep Health: The Importance of Sleep

How Much Does Insomnia Contribute to CV Mortality?

<table>
<thead>
<tr>
<th>Health Professionals Follow-Up Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>US men free of cancer</td>
</tr>
<tr>
<td>Insomnia symptoms in 2004, followed through 2010</td>
</tr>
<tr>
<td>Adjusted for age, lifestyle factors, and common chronic conditions</td>
</tr>
</tbody>
</table>

Metaanalysis of 13 Prospective Studies

- 122,501 subjects followed for 3-20 yrs
- Insomnia increased risk by 45% of developing or dying from CVD
  \( \text{RR} = 1.45, 1.29-1.62; p < 0.00001 \)


Does Insomnia Contribute to Developing Diabetes?

<table>
<thead>
<tr>
<th>Health Professionals Follow-Up Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years after assessment, those with insomnia at baseline:</td>
</tr>
<tr>
<td>35.8 more kcal/day (95% CI: 17.4-54.1)</td>
</tr>
<tr>
<td>Higher consumption of trans fat and Na+ (P &lt; 0.01)</td>
</tr>
<tr>
<td>Lower vegetable intake (P &lt; 0.01)</td>
</tr>
</tbody>
</table>

Study of Active Duty Military

aHRs for Type II diabetes

<table>
<thead>
<tr>
<th>Chronic insomnia vs. Without insomnia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age&lt;50</td>
</tr>
<tr>
<td>Age&lt;50</td>
</tr>
<tr>
<td>Age&lt;50</td>
</tr>
<tr>
<td>Total Mortality</td>
</tr>
<tr>
<td>CVD Mortality</td>
</tr>
<tr>
<td>Difficulty initiating &amp; Nonrestorative</td>
</tr>
<tr>
<td>Difficulty initiating</td>
</tr>
<tr>
<td>Difficulty maintaining</td>
</tr>
<tr>
<td>Early-morning awakenings</td>
</tr>
</tbody>
</table>


How Does Insomnia Contribute to Diabetes Risk?

<table>
<thead>
<tr>
<th>ORs</th>
<th>Insomnia</th>
<th>Daytime Sleepiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex and age</td>
<td>1.68 (1.09-2.58)</td>
<td>1.80 (1.22-2.66)</td>
</tr>
<tr>
<td>Fully*</td>
<td>1.24 (0.74-2.09)</td>
<td>1.75 (1.10-2.77)</td>
</tr>
</tbody>
</table>

*Adjusting for sex, age, alcohol consumption, smoking, exercise, occupational status, BMI, and family history of diabetes

Insulin Resistance Associated with Subjective Sleep Complaints in Those without Diabetes

aORs for HbA1c >= 6.0%

<table>
<thead>
<tr>
<th>Sleep Quality</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty initiating &amp; Nonrestorative</td>
<td>6.70</td>
<td>3.96</td>
</tr>
<tr>
<td>Difficulty maintaining</td>
<td>2.33</td>
<td></td>
</tr>
<tr>
<td>Early AM awakening</td>
<td>2.77</td>
<td></td>
</tr>
</tbody>
</table>

Males 22-69 years old with no hx of diabetes


Does Treating Insomnia Lower Blood Pressure?

**Standard BP treatment + estazolam vs. Standard BP treatment + placebo**

- **Insomnia treatment efficacy**
  - Estazolam: 67.3% (p < 0.001)
  - Placebo: 14.0%
- **Goal BP (<140/90 mmHg)**
  - Estazolam: 74.8% (p < 0.001)
  - Placebo: 50.5%

**Blood Pressure Reduction from Baseline**

- Systolic Days of Treatment
- Diastolic

<table>
<thead>
<tr>
<th></th>
<th>Placebo</th>
<th>Estazolam</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-8</td>
<td>-8</td>
</tr>
<tr>
<td>14</td>
<td>-4.4</td>
<td>-2.2</td>
</tr>
<tr>
<td>21</td>
<td>-3.1</td>
<td>-2.3</td>
</tr>
<tr>
<td>28</td>
<td>-2.7</td>
<td>-0.9</td>
</tr>
</tbody>
</table>


---

Does Treating Insomnia Improve Comorbidities?

**% Remaining at High Risk**

- **By Sleep Quality**
  - Poor
  - Good

- **By Intervention**
  - Control
  - Tai Chi

<table>
<thead>
<tr>
<th></th>
<th>4 months</th>
<th>16 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tai Chi</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Risk score based on 8 biomarkers: HDL, LDL, triglycerides, C-reactive protein, fibrinogen, HbA1c, glucose, insulin

- **High risk = 4 or more abnormal**


---

Does Insomnia Increase Risk of Psychiatric Disorders?

**Incidence (%) over 3.5 years**

<table>
<thead>
<tr>
<th>Patients (%)</th>
<th>Major depression</th>
<th>Any anxiety disorder</th>
<th>Alcohol abuse/deep</th>
<th>Drug abuse/deep</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>31.1</td>
<td>35.9</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>21</td>
<td>18</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incidence (%)</th>
<th>No Insomnia(n=739)</th>
<th>Insomnia(n=240)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major depression</td>
<td>14.4</td>
<td>30</td>
</tr>
<tr>
<td>Any anxiety disorder</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>Alcohol abuse/deep</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Drug abuse/deep</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>


---

Managing Sleep Health: The Importance of Sleep
How is Insomnia Best Conceptualized to Guide Treatment?

- Genetic: heritability 42% - 57% in chronic insomnia
- Final common pathway: Autonomic and CNS hyperarousal
  - Greater whole-brain metabolism during both sleep and wake periods
  - Increased secretion of corticotropin and cortisol throughout sleep-wake cycle
- Sleep-wake regulation imbalance
  - Overactivity of arousal systems
  - Hypoactivity of sleep-inducing systems
  - Both
- Failure of wake-promoting structures to deactivate during the transition from waking to sleep states


---

Stepwise Approach for Managing Insomnia

1. Diagnosis
2. Education, including good sleep practices
3. Nonpharmacologic and/or pharmacologic therapy
4. Referral to sleep specialist (in cases of treatment failure)

---

Patient Education: Most Powerful Tool

- Inform WHY management is so important
  - Consequences
- Emphasize keeping regimented sleep schedule
  - Wake up same time every day
  - Naps usually not a good idea
- Emphasize sleeping long enough
  - Can't catch up on weekends
- Emphasize lifestyle measures
  - Alcohol, exercise, smoking, caffeine, diet (no large meals)
Managing Sleep Health: The Importance of Sleep

Treatments: CBT and/or Medications?

- **Address the co-morbid condition** as well as the insomnia
- Discuss with patient pros and cons of meds and CBT
  - Medications:
    - Which are best applicable?
    - Habit forming?
    - How long to use?
    - Side effects?
  - CBT: at your discretion — ability, time, interest
- **Allow patient to voice his/her concerns, fears, and needs**

How Does Cognitive Behavioral Therapy Compare To Pharmacotherapy?

**CBT-I Components**
- Sleep hygiene education
- Cognitive therapy
- Sleep restriction therapy
- Stimulus control therapy
- Relaxation training

**Sleep Hygiene**
- Regular wake time
- Limit time awake and in bed
- Limit napping during the day
- Avoid clock watching if awake
- Avoid caffeine (after 2 PM), alcohol after dinner, or eating dinner just before bedtime
- Avoid stressful activities in the evening

Treating Insomnia: Choosing the Right Pharmacotherapy

- **Trouble with sleep initiation only**: rapid and short acting
  - Ramelteon, triazolam, zaleplon, zolpidem
- **Trouble staying asleep with sleep initiation problems**: rapid and long acting
  - Zopiclone, temazepam, zolpidem ER, zolpidem (if awakes early in evening), suvorexant
- **Trouble staying asleep without sleep initiation problems**: Doxepin (taken at sleep onset), sublingual zolpidem (taken if one awakens)
- **Issues with controlled substances**: both of these unscheduled
  - Ramelteon, doxepin
- **Generic medications**:
  - Temazepam, triazolam, zaleplon, zolpidem, eszopiclone
When to Consider Referral to a Sleep Expert

- Suspected obstructive sleep apnea or narcolepsy
- Violent behaviors or unusual parasomnias
- Daytime tiredness (sleepiness) that you can’t figure out
- Insomnia fails to respond to behavioral and/or pharmacologic therapy after an appropriate interval
- You don’t feel comfortable treating the condition

Additional Resources

- For additional resources, visit:
  - Sleepfoundation.org
  - Sleep.org
  - Sleephealthjournal.org
Managing Sleep Health in a Primary Care Setting CME Program

April 26, 2018 | 2pm – 5pm
NJAOPS AROC Conference & Expo

Earn up to 2 AMA PRA Category 1 Credits™

Faculty - Larry Culpepper, MD, MPH

- Professor of Family Medicine
- Boston University School of Medicine

Disclosures
- I have the following relevant financial relationship(s) with one or more commercial interests to disclose:
  - Alkermes, Allergan, Consultant
  - Lundbeck A/S Foundation, Consultant
  - Shire PLC, Inc., Consultant
  - Sunovion Pharmaceuticals, Inc., Consultant
  - Physicians Postgraduate Press, Faculty, Journal Editor-in-Chief
  - Oxford University Press and UpToDate, Royalties

Faculty - David N. Neubauer, MD

- Associate Professor of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine

I have no relevant financial relationship with any commercial interest to disclose.
Faculty – Paul Doghramji, MD

- Family Physician, Collegeville Family Practice

Disclosures
- I have the following relevant financial relationship(s) with one or more commercial interests to disclose:

Faculty – Marcella Frank, DO

- Staff Physician, Sleep Medicine, Deborah Heart and Lung Center

I have no relevant financial relationship with any commercial interest to disclose.

Learning Objectives

By the end of the session the learner will be able to:

1. Explain how sleep health, management, and treatment of sleep disorders contribute to overall well-being.
2. Identify risk factors and symptoms of insomnia, circadian rhythm disorders, restless leg syndrome, and obstructive sleep apnea.
3. Define and differentiate common treatments available for these conditions.
4. Determine when it's appropriate to prescribe medications and/or refer patient for a sleep study.
Case Study 1

Setting
- 11:30 AM in your office examination room
- Middle age female patient sitting in the chair next to the desk, tapping her feet.
- She looks quite tired and anxious.

Chief Complaint
“I have been waiting for a sleep disorders appointment and cannot get in for 6 months!”
She becomes teary.
“I can’t sleep and can’t take this any more!”
Present Illness

• 42 years old attorney.
• Has not slept well for over 3 years.
• Bedtime is 10:30 PM and she falls to sleep at about 11:30 PM to 1:00 AM.
• She wakes at night and has difficulty falling back to sleep, often remaining awake until her 6:00 AM alarm.
• "Tired and wired" at work

Present Illness

• Commercial activity monitoring device shows only 3 hours of sleep each night.
• Tried deep breathing exercises, yoga, wine, diphenhydramine. Each worked for 1 – 2 days and then the problem recurred.

Present Illness

• Always fatigued.
• Irritable and easily angered.
• Difficulty concentrating and paying attention.
• Has fallen to sleep in court and during depositions.
Physical Examination

- Vital signs normal.
- General appearance: tired and anxious.
- Comprehensive physical examination was normal.

Synthesis

- Next steps?
- What is your differential evaluation?

Closure

- What are the pharmacological considerations?
- Are there other methods for management and how would you approach management in this patient?
Summary: Case Study 1

1. Define insomnia.
   - SHORT TERM INSOMNIA DISORDER:
     • Symptoms present for less than 3 months;
     • Difficulty initiating and/or maintaining sleep;
     • Waking earlier than desired; resistance going to bed on an appropriate schedule;
     • Daytime symptoms of fatigue, sleepiness, attention problems, mood/behavior problems;
     • Reduced motivation;
     • Accident and error prone.
   - CHRONIC INSOMNIA DISORDER: Symptoms present for 3 months or longer.

2. Discuss the evaluation of patients with complaints of difficulty falling to sleep and staying asleep.
   - Comprehensive sleep history; standardized questionnaires; sleep diary/sleep log; actigraphy.

3. Describe appropriate treatment options for insomnia.
   - CBT-I
   - Pharmacotherapy
   - Other Interventions.
Case Study 2

SETTING

• Friday 3:00 PM in your clinic/office.
• 5 more patients in the waiting room.
• You have a medical staff meeting at 6:30 PM.

Setting

• Patient is 15 years old and his mother is present
• He appears quite unhappy and only stares at the floor.
• He does not look up when you enter the room and his mother is texting on her cell phone.
Chief Complaint

"Johnny is going to be kicked out of school because of being late almost every day. He has missed more days of school than I can count. He used to be a good student, but now he is failing most of his subjects."

Chief Complaint

Johnny just glares at his mother, then looks back to the floor.

What are your initial thoughts?
History – obtained after mother leaves room
1. Symptoms began upon entering high school last year.
2. Difficulty falling to sleep before 2:00 AM – 3:00 AM.
3. Difficulty waking up in the morning.
4. Sleeps until 2:00 PM – 3:00 PM on Saturdays and Sundays.

History
5. Has to catch the school bus at 6:45 AM.
6. School starts at 7:45 AM.
7. Falls asleep on the bus and in school on a daily basis.
8. Has tried melatonin at night but it does not help him fall to sleep.

History
9. No medical problems, allergies, hospitalizations, surgeries, or head injuries.
10. No substance use/abuse.
11. Does not snore.
12. Father treated with CPAP for OSA.
With this information:

- **Next steps?**

---

**Physical Examination**

- **Vital Signs:**
  - BP 92/75
  - Pulse 85
  - Temperature 37 degrees C
  - Respiration 16/minute
  - Height 155.1 cm
  - Weight 48.9 kg (BMI 20.33 kg/m²)
  - Oxygen Saturation (room air) 97%

---

**Physical Examination**

- **Positive Findings:**
  - Mallampati score 3 sitting and 4 supine
  - Tonsils 2+ enlarged

- **Remainder of the complete physical examination was normal.**
Synthesis

• Next steps?

• Differential diagnosis?

Closure

• Other disorders to consider?

• How would you manage Delayed Sleep Phase Syndrome?

Summary: Case Study 2

1. Describe symptoms of delayed sleep phase circadian rhythm disorder in the adolescent/young adult.
   • Difficulty falling to sleep at a desired time.
   • Waking significantly later than desired when permitted to wake ad lib in the morning.
   • When permitted to sleep ad lib, there are no other sleep complaints.
   • Daytime symptoms typically include excessive daytime sleepiness and school performance problems.
   • They may also include mood disturbances and behavioral changes.
2. Describe methods of diagnosis of delayed sleep phase circadian sleep disorder in the adolescent/young adult.

   - Comprehensive history and physical. Sleep diary / sleep log; actigraphy.

3. Discuss three (3) important countermeasures to address delayed sleep phase circadian sleep disorder.

   - Realistic consistency in sleep-wake schedule both week days and weekends.
   - Morning phototherapy; darken room at night; avoid bright screens at night.
   - Prophylactic naps when needed.
Setting

- 2:00 PM in your examination room.
- New patient ... 45 years old female
- Works as a school bus driver.
- Looks somewhat distressed and tired.

Chief Complaint

“No matter how hard I try, I can’t fall to sleep at night. It seems that I just can’t get comfortable in bed. I have bought different mattresses, pillows, sheets and blankets. Nothing seems to work.”

History

- Symptoms are difficult to describe.
- Predominantly occur when she gets into bed at night, but also can occur in the evening when she is reading on the sofa.
- Often feels like she has to stretch her arms and legs.
History

- Takes more than 3 hours to fall to sleep
- Cannot concentrate at work
- Has fallen to sleep while driving the bus after dropping off the last child.
- Symptoms improve if she gets out of bed and walks around her apartment.

History

- Arms feel “twitchy” and sometimes it feels like she has “bugs crawling” on her legs.
- No leg cramps or other movement problems.

Physical Examination

- Height: 5' 2"
- Weight: 100 lbs
- BMI: 18.3
- PR: 78
- RR: 12
- BP: 90/70
- Exam is negative. There is no
  - positional discomfort of extremities
  - tenderness or pain
  - evidence of arthritis
  - edema
  - varicosities
Managing Sleep Health: Diagnosing, Treating, and Managing Sleep Disorders

Next Steps

- Next steps?
- Would you obtain a polysomnogram?

Case 3 continues

- You check her iron stores and ferritin is 112 nanograms per ml
- No family history of RLS symptoms
- Bikes on occasion for exercise, but not strenuously. This does not influence her symptoms.

Next Steps

- What can she do to minimize RLS symptoms?
- Treatment options?
- What would you tell her about prognosis?
3. Differentiate RLS from PLMD
   - RLS is typically a clinical diagnosis.
   - PLMD is a clinical and polysomnographic diagnosis (Limb movements > 15/hour in adults; 5/hr children)
   - Patients with RLS may also have PLMD.
   - Patients with PLMD often do not have RLS.

1. Define Restless Leg Syndrome (RLS)
   - Irresistible urge to move legs (limbs) particularly in the evening.
   - Symptoms improve with movement / walking about.
   - Sleep Onset Insomnia.
   - There is no other identifiable reason for the paresthesia.
   - Daytime sleepiness and its consequences can occur.

2. Define Periodic Limb Movement Disorder (PLMD)
   - Greater than 15 limb movements/hour in adults
   - Greater than 5 limb movements/hour in children
   - Clinical symptoms are present:
     - Insomnia and/or EDS in Adults
     - Hyperactivity alternating with EDS/Attention Problems/School performance difficulties in children
     - Children can complain of growing pains.
   - Other movement disorders ruled out.
Summary: Case Study 3

4. Discuss management of RLS and PLMD.

   Counsel regarding:
   - Avoid caffeine, nicotine, and alcohol.
   - Physical Therapy.
   - Stretching.
   - Hot or cold compresses.
   - Massage
   - Exercise and relaxation

   • Medication options:
     - Dopaminergic medications.
     - Benzodiazepines.
     - Opioids.
     - Gabapentin.

Case Study 4

Setting

- 9:00 AM in your office exam room
- 39 years old obese male reading a copy of *Sports Illustrated*
Chief Complaint

“I was told to come to your office by our corporate health center because I failed my blood pressure test.”

History

• 39 years old accountant.

• Hypertension for 8 years.
  – Previously treated with amlodipine and benazepril.

• No SOB or chest pain

• Frequent morning headaches.

• Pre-diabetic (diagnosed 2 years ago)
  – HgbA1c = 6.2

• Quit smoking 4 years ago.

• Occasional alcohol on weekends.
Discussion

- What sleep-related information is important to obtain?

History

- Married with a 12 y/o son and 9 y/o daughter.

- Sleepy during the day. Fell asleep at a stoplight and has had 2 near miss MVA's.

- Falls to sleep at work.

- Sometimes has difficulty concentrating.
  - Making mistakes at work and fearful of being fired.

- Wife tells him he snores loudly and has breathing pauses and snorts.
  - He denies snoring.

- Family history positive for OSA (father).

- Has had difficulty falling to sleep for the past 2 years.
History

• Wakes multiple times at night to void.

• Reports that once asleep he has no problem sleeping.
  – His wife says his sleep is very restless, he wakes her frequently with snoring and restless sleep. She often has to sleep in another room of the home.

• Wakes on weekends spontaneously at 8:00 – 9:00 AM.

Physical Examination

• Vital signs:
  – BP 150/95
  – Height 5’10”
  – Weight 206 lbs
  – BMI 29.6
  – Neck circ: 20.5”
  – PR 80
  – RR 10
  – Pain VAS 2.

• Heart: Normal S1, S2 with accentuated split
  – No S3, S4 or murmurs.

• Lungs: Clear.

• No increased work of breathing.

• Remainder of exam normal.

Mallampati Scale

Odds of OSA increase more than 2-fold for every 1-point increase

Class I

Class II

Class III

Class IV

With this information:

- Next steps?

Physical Examination

- Epworth Sleepiness Scale = 18
- Mallampati class 4 airway.

PSG

- Arousal Index (AI) = 10/hr.
- Apnea Hypopnea Index (AHI) = 30/hr.
- Respiratory Disturbance Index (RDI) = 50/hr.
- Loud snoring and increased WOB.
- Sleep was fragmented by frequent brief movement and/or electrocortical arousals.
Synthesis

- **Next step?**
- **Differential diagnosis?**
- **Most likely diagnosis?**

Closure

- **Other sleep related disorders to consider?**
- **How would you approach management?**

Case 4 continues

- He returns in 4 months, having worked with a respiratory therapy company to start CPAP.
- After using it for several weeks, during which he felt less tired and more “with it” at work, he became irritated with the machine, especially after awakening in the middle of the night.
- He stopped CPAP use 2 weeks ago and is having difficulties at work again.
- He asks if there are alternatives to CPAP.
Case 4 Closure

• What further information do you want?
• What options would you consider for him?

Summary: Case Study 4

1. Identify symptoms of obstructive sleep apnea (OSA).
   • Principle features include habitual loud snoring, daytime sleepiness; possible near-miss or actual MVA; difficulty with attention, concentration and/or daytime performance; cardiovascular consequences occur, including systemic hypertension.

2. Describe symptoms and consequences of excessive daytime sleepiness.
   • Unintentional sleep episodes and sleep attacks; falling asleep at unusual and undesired times; mood and behavioral difficulties; performance difficulties; possible memory deficits.
Summary: Case Study 4

3. Demonstrate common office procedures used to diagnose excessive sleepiness.
   - Epworth Sleepiness Scale
   - Stanford Sleepiness Scale
   - Others

4. Discuss common treatment and describe appropriate treatments for these problems.
   - CPAP
   - bilevel PAP
   - Surgical options
   - Oral appliances

Additional Resources

- For additional resources, visit:
  - Sleepfoundation.org
  - Sleep.org
  - Sleephealthjournal.org

Thank You!