Session 12:
Obstructive Sleep Apnea:
Interventions That Will Help Your Patients Sleep Better

Learning Objectives

1. Implement practice-based procedures to screen and manage patients at risk for or with evidence of obstructive sleep apnea.
2. Co-manage patients with OSA and encourage continued monitoring and compliance with CPAP therapy.
Session 12: Obstructive Sleep Apnea: Interventions That Will Help Your Patients Sleep Better

Faculty

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Recognized as a specialist in clinical hypertension, he is also widely published in the field of hypertension. He reviews for the Journal of Clinical Hypertension and Blood Pressure Monitor among others.

He is also an elected fellow in the American College of Physicians (ACP) and the American Society of Hypertension (ASH). He serves on both regional and national committees for both the ACP and the ASH.

Faculty Financial Disclosure Statement
The presenting faculty reports the following:

F. Wilford Germino, MD, FACP, FASH, receives speaking/teaching honoraria from Eisai, and consulting fees from AstraZeneca and Bristol-Myers Squibb.
SESSION 12
2:45–3:45pm
Obstructive Sleep Apnea: Interventions That Will Help Your Patients Sleep Better

SPEAKER
F. Wilford Germino, MD, FACP, FASH

Presenter Disclosure Information
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Off-Label/Investigational Discussion
► In accordance with pmiCME policy, faculty have been asked to disclose discussion of unlabeled or unapproved use(s) of drugs or devices during the course of their presentations.

Learning Objectives
Implement practice-based procedures to screen and manage patients at risk for or with evidence of obstructive sleep apnea
Co-manage patients with OSA and encourage continued monitoring and compliance with CPAP therapy

Todays Topics For Discussion
1) What is obstructive sleep apnea and who’s at risk?
2) How to make the diagnosis?
3) Why we need to treat OSA?
4) How to treat OSA patients?

What is Obstructive Sleep Apnea (OSA)?
• Caused by a decrease in upper airway size and patency during sleep
• Hypercapnia and hypoxemia
• Repeated arousals from sleep
  – Arousals are protective, but cause adrenalin release
• Apnea - cessation of airflow for 10 seconds or longer
• Hypopnea - decrease in airflow lasting > 10 seconds
  – 30% reduced airflow and at least a 4% oxygen desaturation
  – Shallow breathing; decreased minute ventilation

Why Obstruction Occurs During Sleep
• Humans have sleep apnea – because we speak and have advanced speech we have a more collapsible airway to shape sounds.
• Human airway - susceptible to collapse during sleep when muscles that maintain airway patency relax
• Additional factors
  • Hormonal influences
  • Decreased sensitivity to hypercapnia
  • Structural variations in airway
  • Obesity and fat deposition around airway
Symptoms and signs of OSA

**Diurnal Symptoms of OSA**
- Waking with dry mouth, or irritated throat
- Memory and concentration dysfunction
- Behavioral (irritability, depression, chronic fatigue)
- Daytime road traffic accidents
- Gastro-esophageal reflux
- Daytime sleepiness

**Nocturnal Symptoms of OSA**
- Heavy snoring - worse supine or after ETOH/sedative
- Nighttime accidents related to sleepiness
- Limb movements - witnessed or on PSG
- Insomnia (often maintenance insomnia)
- Sudden awakening with noisy breathing
- Nocturnal sweating/nocturnal epilepsy
- Nighttime sleepiness
- Nocturia

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**Case**

**Patient – Mrs Pancelli**
- Age - 52-year-old woman, perimenopausal
- PMHx - Obesity, HTN, pre-diabetes, and depression
- Meds - atenolol, citalopram, and calcium
- PE - BP 142/88, BMI is 33

**CC**
- Tired all the time/no energy
- Frequent awakenings all night
- Un-refreshed sleep
- Wonders if menopause is cause of symptoms?

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**Risk Factors for OSA**

- Obesity
  - After age 60, BMI becomes less important as a risk factor
- Male gender
  - After age 50
- Diabetes
- Hypertension
- Postmenopausal
  - risk in women becomes similar to men
- Large neck circumference ≥ 16 inches

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**Caution: Women with Sleep Apnea Are Different from Men**

Women with OSA are more likely to
- Present with insomnia
- Be depressed
- Have thyroid disease
- Report nightmares, palpitation, and hallucinations
- Have comorbid restless leg syndrome (RLS)

And are less likely to have snoring and witnessed apneas


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**Gender and BMI Effects Change with Age**

- **After age 50**, GENDER becomes an unimportant variable
- **After age 60**, BMI becomes an unimportant variable

References:
Risk Factors for OSA, cont’d

• History of atrial fibrillation
• Professional football player or truck driver
• African-American, Asian, or Hispanic
• Frequent nocturia
• Upper airway anatomic obstruction (eg, enlarged tonsils)


Obesity and OSA Risk

• Excess weight increases both risk and consequences of OSA
  – Increases severity of oxygen desaturation during/after apneas and hypopneas
• Prevalence of undiagnosed OSA is high among obese patients especially with type 2 diabetes (86.6%)2
• The risk for obstructive sleep apnea correlates on a continuum with obesity, large neck circumference, and hypertension3
  – Combinations of these factors increase the risk for OSA in a non-linear manner


Mrs. Pancelli

She complains of chronic fatigue

Anemia, hypothyroidism, and other causes of fatigue are ruled out.

Screening tests for fatigue include

• Epworth Sleepiness Scale (ESS)
• Multiple Sleep Latency Test (MSLT)
• Functional Outcomes of Sleep Questionnaire (FOSQ)
• Maintenance of Wakefulness Test (MWT)

Epworth Sleepiness Scale (ESS)

• How likely are you to doze off or fall asleep in the following situations, in contrast to just feeling tired?
• Use the following scale to choose the most appropriate number for each situation:
  0 = would never doze
  1 = slight chance of dozing
  2 = moderate chance of dozing
  3 = high chance of dozing


Typical ESS Scores

<table>
<thead>
<tr>
<th>Subject</th>
<th>ESS Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal controls</td>
<td>5.9</td>
</tr>
<tr>
<td>Primary snorers</td>
<td>6.5</td>
</tr>
<tr>
<td>OSA</td>
<td>11.7</td>
</tr>
<tr>
<td>Narcolepsy</td>
<td>17.5</td>
</tr>
<tr>
<td>Idiopathic hypersomnia</td>
<td>17.9</td>
</tr>
<tr>
<td>Insomnia</td>
<td>2.2</td>
</tr>
</tbody>
</table>


The STOP-BANG Scoring Model

Sensitivity to identify moderate-severe OSA is 93%, NPV 90%

From JNC7....

Assess for Identifiable Causes of Hypertension

- Sleep apnea
- Drug-induced/related
- Chronic kidney disease
- Primary aldosteronism
- Renovascular disease
- Cushing’s syndrome or steroid therapy
- Pheochromocytoma
- Coarctation of aorta
- Thyroid/parathyroid disease

Mrs. Pancelli

Her ESS score is 16. In addition, she reports that she has been told that she stops breathing during sleep. Confirming the diagnosis of OSA:

- Polysomnography (PSG)
- HST (Home sleep test)

Institute for Clinical Systems Improvement

Clinical Practice Recommendation

ICSI Practice Recommendation:

- Polysomnography is the accepted standard test for the diagnosis of obstructive sleep apnea syndrome
- The benefit of using attended polysomnography for diagnosis is the ability to establish a diagnosis and ascertain an effective continuous positive airway pressure (CPAP) treatment pressure

Polysomnogram (PSG)

- EEG Leads
- EOG Leads
- Nasal Respiration
- Submental EMG
- EKG
- Chest Belts
- Abdominal Belts

Hyponogram of Normal Adult Sleep Architecture

Polysomnography (PSG) Parameters

- AHI = Apneas + Hypopnea Index
  - Total sleep time, in hours
- RDI = Respiratory Disturbance Index
  - AHI, more or less*
- ODI = Oxygen Desaturation Index
  - Number of 4% desats/hr

SDB = Sleep-disordered breathing**
RERA= Respiratory effort related arousal

*May include RERAs
** May include snoring, RERAs, oxygen desaturation
American Academy of Sleep Medicine Severity Criteria Based on PSG

- "Mild" sleep apnea = 5-15 events/hour
- "Moderate" sleep apnea = 15-30 events/hour
- "Severe" sleep apnea = >30 events/hour

"Events" include apneas, hypopneas, and RERAs


Mrs. Pancheli

Polysomnography Results

- AHI 42 events/hour
- Sa02 lowest 76%; 26 minutes with Sa02 below 85%
- Sleep efficiency 64%, TST 4.8 hours
- No Stage 3 sleep, 5% REM sleep

OSA Increases Risk of Clinical Events

<table>
<thead>
<tr>
<th>Clinical Event</th>
<th>Increased Risk (HR, OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause mortality</td>
<td>1-1.5 (mild-severe AHI)</td>
</tr>
<tr>
<td></td>
<td>2 (men 40-70 years with severe AHI)</td>
</tr>
<tr>
<td></td>
<td>27 (Wisconsin Sleep Study)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>2</td>
</tr>
<tr>
<td>mortality</td>
<td>&gt;3 (Sleep Heart Health Study)</td>
</tr>
<tr>
<td></td>
<td>5 (Wisconsin Sleep Study; severe AHI)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Stroke</td>
</tr>
<tr>
<td></td>
<td>Atrial fibrillation</td>
</tr>
<tr>
<td>Incident HT</td>
<td>1.5-3 (Wisconsin Sleep Study; mild-severe AHI)</td>
</tr>
</tbody>
</table>

HR = hazard ratio; OR = odds ratio


OSA Management

Behavioral Therapy

Clinical Practice Recommendation

- Practice Recommendation
  Lifestyle modifications, particularly weight loss and reduced alcohol consumption can play a significant role in the reduction of severity of sleep apnea
  ➢ No studies showing total abolishment of OSA with even dramatic weight loss—always must be vigilant about continued presence of residual OSA.

Institute for Clinical Systems Improvement
http://www.icsi.org/sleep_apnea/sleep_apnea__diagnosis_and_treatment_of_obstructive_.html

Does Surgery Work?

- Hypopharyngeal surgery in OSA
  I. Associated with improved outcomes
  II. However benefit supported largely by level 4 evidence
  III. Level 4 evidence = Case Series= Grade C Recommendation

- Exception to the above - tonsillectomy in children ≤ age 18
- Future research should include larger, higher level studies
  I. Consider the variety of treatment effects
  II. Compare surgical treatments, and identify factors associated with outcomes

Managing Patients with OSA Treated with CPAP

CMS: Obstructive Sleep Apnea
12-week period of CPAP covered in adult patients with OSA if either of the following criterion are met:

- AHI or RDI ≥ to 15 events per hour
- AHI or RDI > than or equal to 5 events ≤ to 14 events per hour with documented symptoms of:
  - excessive daytime sleepiness, impaired cognition, mood disorders or insomnia
  - documented history of: hypertension, ischemic heart disease, or stroke

CPAP Improves Clinical Outcomes

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular outcomes¹,²</td>
<td>-64% ↓ CV risk indep. of age and CV comorbid.</td>
</tr>
<tr>
<td>Stroke survival²</td>
<td>-Long-term treatment reduces risk of mortality in patients with moderate to severe OSA and ischemic stroke</td>
</tr>
<tr>
<td>Blood pressure¹</td>
<td>-Mean (day and night) arterial BP decreased by ~10 mm Hg (mean [p=0.01], DBP [p=0.04], SBP) [p&lt;0.005]</td>
</tr>
<tr>
<td>Glucose parameters¹</td>
<td>-Improved HbA1c (p&lt;0.02) in all patients and in patients with baseline HbA1c &gt; 7</td>
</tr>
<tr>
<td></td>
<td>-Days of CPAP use significantly correlated to reduction in HbA1c</td>
</tr>
</tbody>
</table>


Insurance Coverage for CPAP

- Adherence to therapy is defined as use of CPAP = 4 hours per night on 70% of nights during a consecutive 30 day period anytime during the first 3 months of initial usage
- If the above criteria are not met, continued coverage of a PAP device and related accessories will be denied as not medically necessary

Center for Medicare and Medicaid Services, 2008.

Improving CPAP Adherence

Patient education improves adherence
- Patients value education about CPAP more than health care providers do
- Can improve adherence in previously non-compliant patients³
- Video education may help⁵
  - CBT can improved adherence⁴

Also
- Discussion of the risks of OSA and efficacy of treatment
- Phone calls and visits
- Attention to machine-patient interface


CPAP: Complications

- Sinus discomfort
- Rhinorrhea
- Nasal congestion or dryness
- Epistaxis
- Skin abrasions/rashes
- Chest discomfort
- Claustrophobia
- Aerophagy
2006 AASM Practice Parameters Compliance Recommendations

- Interventions to improve compliance
  - Heated humidification (standard)
  - Education (standard)
- Follow-up
  - CPAP usage should be objectively monitored (standard)
  - Initial follow up in first few weeks (standard)
  - Yearly and as needed follow-up thereafter (option)

Alternatives to CPAP therapy

- Weight Loss
- Oral Appliances
- Nasal EPAP
- Positional Therapy
- Surgical Therapy
- Head Elevation
- Didgeridoo
- Compression Stockings

Oral Appliances

- Indicated for patients with mild-to-moderate obstructive sleep apnea who:
  - Prefer oral appliances to CPAP
  - Do not respond to CPAP
  - Are not appropriate candidates for CPAP
  - Fail treatment attempts with CPAP
- Not as effective as CPAP
- Lower blood pressure 3-4 mm/Hg
- Outperformed surgery in the only head-to-head trial
- Preferred to CPAP in head-to-head trials

Summary

- OSA is common, treatable, and associated with considerable morbidity and mortality
- PCP roles are to screen for OSA and co-manage patients with OSA
  - Screen patients at risk for OSA (eg, obese, large neck, hypertensive)
  - Refer for sleep studies
  - Monitor and support adherence to treatments, ie, CPAP
  - Counsel about and support lifestyle changes

Didgeridoo Study for OSA

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Didgeridoo Group</th>
<th>Control</th>
<th>Mean Raw Difference</th>
<th>Mean Adjusted Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epworth Scale At 4 Months</td>
<td>7.4 (2.3)</td>
<td>9.6 (6)</td>
<td>-2.3, P=0.04</td>
<td>-2.8, P=0.03</td>
</tr>
<tr>
<td>Change from Baseline</td>
<td>4.4 (2.7)</td>
<td>1.4 (2.6)</td>
<td>3.0, P=0.03</td>
<td>2.8, P=0.04</td>
</tr>
<tr>
<td>Pittsburgh Quality of Sleep Index At 4 Months</td>
<td>4.4 (2.1)</td>
<td>6.0 (2.7)</td>
<td>1.6, P=0.27</td>
<td>1.8, P=0.30</td>
</tr>
<tr>
<td>Change from Baseline</td>
<td>0.9 (1.8)</td>
<td>-0.2 (1.7)</td>
<td>-0.7, P=0.27</td>
<td>-0.8, P=0.30</td>
</tr>
<tr>
<td>Partner Rating of Sleep Disturbance At 4 Months</td>
<td>2.3 (1.4)</td>
<td>4.8 (2.2)</td>
<td>2.5, P=0.01</td>
<td>2.7, P=0.01</td>
</tr>
<tr>
<td>Change from Baseline</td>
<td>1.4 (2.4)</td>
<td>-0.6 (1.9)</td>
<td>-2.6, P=0.01</td>
<td>-2.7, P=0.01</td>
</tr>
<tr>
<td>Apnea-Hypopnea Index At 4 Months</td>
<td>11.6 (8.1)</td>
<td>15.4 (9.8)</td>
<td>-3.8, P=0.05</td>
<td>-4.6, P=0.05</td>
</tr>
<tr>
<td>Change from Baseline</td>
<td>-10.7 (7.7)</td>
<td>-4.5 (8.9)</td>
<td>-6.2, P=0.05</td>
<td>-6.6, P=0.01</td>
</tr>
</tbody>
</table>

Puhan MA et al. BMJ. 2006 Feb 4;332(7536):266-70.

Questions?