The International Franco - Palestinian Congress in Sleep Medicine

“Temporomandibular Disorders and Sleep Apnea”

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Notre Dame Hotel, Jerusalem
The Consequences of Untreated Sleep Apnea

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Goals

• Social Consequences
• Economic Consequences
• Physical Health Consequences
Social Consequences in Children

• **Social:** Loud snoring can become a significant social problem if a child shares a room with siblings or at sleepovers and summer camp.

• **Behavior and learning:** Children with SDB may become moody, inattentive, and disruptive both at home and at school. Sleep disordered breathing can also be a contributing factor to attention deficit disorders in some children.
Social Consequences in Children

- **Enuresis:** SDB can cause increased nighttime urine production, which may lead to bedwetting.
- **Growth:** Children with SDB may not produce enough growth hormone, resulting in abnormally slow growth and development.
Social Consequences in Adults

• Negative effect on loved ones
  • Calloused elbow syndrome, the vanishing spouse syndrome
  • Sleep deprivation and irritability of bed partner
• Halitosis from dry mouth, increased incidence of tooth decay
• Morning headaches and irritability
• Tiredness and fatigue
  • School, employment, driving issues, social life and activities consequences
Social Consequences in Adults

- Decreased memory, ability to concentrate, mental acuity and increased befuddlement
  - Reduced alertness, difficulty directing attention and trouble focusing on tasks.
  - Involuntary microsleeps, often undetected, impact information gathering and processing.
  - Limited short-term and working memory, preventing adaptation and strategic thought.

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Social Consequences in Adults

• Judgement and Decision Making
  • Less able to recognize and respond to threats and estimate the difficulty of future tasks.
  • More likely to misinterpret verbal and nonverbal cues, limiting interpersonal skills.
  • Skewed evaluation of consequence and reward, resulting in risky behaviors and decisions.
  • More likely to disregard the moral implications of actions taken by themselves and others.

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Social Consequences in Adults

• Traffic Accidents
  • People with moderate to severe sleep apnea have an up to 15-fold increase of being involved in a traffic accident\textsuperscript{28}
  • People with sleep apnea are at twice the risk of having a traffic accident\textsuperscript{29}
  • Treating all US drivers suffering from sleep apnea would save $11.1 billion in collision costs and save 980 lives annually\textsuperscript{30}

\textsuperscript{28} Horstmann et al. \textit{Sleep} 2000
\textsuperscript{29} Teran-Santos et al. \textit{New Engl J Med} 1999
\textsuperscript{30} Sassani et al. \textit{Sleep} 2004
Economic Related Consequences

- About 30 million people in US suffer from sleep apnea (~ 12%)
- Annual economic burden of untreated sleep apnea is ~ 150 billion dollars
  - $87 billion in lost productivity
  - $26 billion in car crashes
  - $6.5 billion in workplace accidents.
- Hypertension, Heart Disease, Diabetes, Depression
  - $30 billion additional cost healthcare and medications for these co-occurring conditions

Economic Related Consequences

• Undiagnosed patients used $200,000 more in the two-year period prior to diagnosis than matched controls\textsuperscript{24}

• Prior to sleep apnea diagnosis, patients utilized 23–50% more medical resources\textsuperscript{25}

• Total economic cost of sleepiness = approximately $43–56 billion\textsuperscript{26}

• Undiagnosed moderate to severe sleep apnea in middle-aged adults may cause $3.4 billion in additional medical costs in the US\textsuperscript{27}

\textsuperscript{24} Kryger et al. \textit{Sleep} 1996
\textsuperscript{25} Smith et al. \textit{Chest} 2002
\textsuperscript{26} Leger et al. \textit{Sleep} 1994
\textsuperscript{27} Kapur et al. \textit{Sleep} 1999
Sleep Apnea and co-morbid conditions

7. O’Keeffe & Patterson. *Obes Surg* 2004
Cardiovascular Disease

• 5.7 million people in the US have heart failure (American Heart Association)
• Approximately 76% of congestive heart failure patients have SDB
• Heart failure is the most expensive disorder to treat
• OSA noted in 49% of atrial fibrillation patients and 30% of cardiovascular patients
• OSA presents in 70% of heart attack patients with AHI ≥5 and 52% of heart attack patients with AHI ≥10

15. Kuniyoshi et al. J Am Coll Cardiol
Hypertension

• High blood pressure affects nearly 75 million people in the U.S.

• Studies have shown that sleep apnea is an independent risk factor for hypertension

• 30–83% of patients with hypertension have sleep apnea\(^6,12\)

• 43% of patients with mild OSA and 69% of patients with severe OSA have hypertension\(^5\)

• AHA guidelines on drug-resistant hypertension have shown treatment of sleep apnea with CPAP likely improves blood pressure control

5. Young et al. Sleep 2008
Diabetes

• Eight percent of the US population has diabetes (24 million people), a further 57 million are considered pre-diabetic
• ~ 50% of people with Type II diabetes also have sleep apnea\textsuperscript{11}
• OSA may have a causal role in the development of Type II diabetes\textsuperscript{16}
• OSA is associated with insulin resistance independent of obesity\textsuperscript{17}
• 30% of patients presented to a sleep clinic have impaired glucose tolerance\textsuperscript{18}
• Mild forms of SDB may be important in predicting the risk for pre-diabetes\textsuperscript{19}
• 86% of obese, Type II diabetics have sleep apnea\textsuperscript{20}

17. Punjabi et al. Am J Respir Crit Care Med 2002
19. Stamatakis et al. Sleep 2008
20. Foster et al. Diabetes Care 2009
Diabetes

• International Diabetes Federation in a position statement recommends screening of patients with diabetes for sleep apnea
  • The possibility of OSA should be considered in the assessment of all patients with Type II diabetes and the metabolic syndrome.
  • Patients should be assessed for symptoms of OSA:
    • snoring, observed apnea during sleep and daytime somnolence.
  • There should be a low threshold for referral to establish the diagnosis, because of the established benefits of therapy on hypertension and quality of life.
Metabolic Syndrome

• Central Obesity, hypertension, dyslipidemia, diabetes/insulin resistance
• Prevalence is ~ 25% of the US population\textsuperscript{37}
• 60% OSA patients have metabolic syndrome\textsuperscript{38}
  • Direction of causality is not clearly defined
• OSA Independent risk factor for Metabolic Syndrome\textsuperscript{39}

\textsuperscript{37} Ford, et al., JAMA 2002
\textsuperscript{39} Coughlin, et al, Eur Heart J, 2004
Anesthesia

• An estimated 40 million anesthetics are administered each year in the United States

• 68.4% of cases with Stop-Bang score ≥ 5 had OSA (AHI ≥ 5), 38.5% had moderate to severe OSA (AHI ≥ 15) ⁴⁰

• The STOP-Bang score can help the healthcare team to stratify patients for unrecognized OSA, practice perioperative precautions, or triage patients for diagnosis and treatment ⁴⁰

• Complications from anesthesia were present in 44% of patients with OSA vs. 28% of patients with no OSA ⁴¹

• Interestingly, OSA patients had a more profound increase in AHI on post operative night 3 than earlier and return to pre-surgery baseline by postoperative night 7 ⁴¹

• Combining preoperative screening of OSA and identifying recurrent PACU respiratory events will allow risk stratification of diagnosed or suspected OSA patients for more focused postoperative care. ⁴¹

⁴¹ Subramanyam, et al., Medicamund 2010
Stroke Risk

• 65% of stroke patients have SDB\textsuperscript{21}

• Up to 70% of patients in rehabilitation therapy following stroke have significant SDB (AHI >10)\textsuperscript{22}

\textsuperscript{21} Dyken et al. \textit{Stroke} 1996
\textsuperscript{22} Good et al. \textit{Stroke} 1996
Mortality Links

• SDB is associated with a 3-fold increase in mortality risk\(^5\)
• There is an independent association of moderate to severe OSA with increased mortality risk\(^3\)
• Severe sleep apnea raises death risk by 46%\(^23\)

5. Young et al. *Sleep* 2008
OSA Treatment Shown to Reduce Cardiovascular Events

- Untreated severe OSA (AHI of 30+) is associated with an increased risk of both fatal and non-fatal cardiovascular events
- Consistent treatment with Continuous Positive Airway Pressure\(^1\) (CPAP) or an AHI <15 reduces risk

\(^1\) Consistent use - Average daily use more than 4 hours; Long-term cardiovascular outcomes in men with obstructive sleep apnoea-hypopnoea w/ or w/o treatment with CPAP: an observational study; Marin et al., Lancet 2005
What to do?

• It is apparent that sleep apnea presents a huge problem, socially, economically, medically.
• It knows no age limits
• We are only diagnosing and treating the tip of the iceberg
• If sleep apnea is so prevalent why are seeing and treating only a small portion of these patients?
What to do?

• Early recognition
  • Medical Education
    • More than just 20 min -1 hr in a 4 year medical school curriculum
    • Midlevel providers, physician extenders, nurses, medical assistants must be included
  • Public Awareness
  • Patient education
    • Successful treatment requires patient “buy in” to treatment
    • Patient has to “want to” and “want to” requires patient education
    • Education needs to start at the initial office visit to the sleep practitioner and continue on through diagnosis, treatment and treatment adherence
What to do?

• Routine sleep apnea awareness triggers for health care providers
  • **STOP-BANG** at routine office visits?
  • Patients are not likely to bring sleep apnea issues up on their own
    • More likely to talk about insomnia
  • The task may fall on the office nurse or medical assistant
# STOP-BANG Questionnaire

A simple, eight-item questionnaire may be an effective way to identify patients at risk for obstructive sleep apnea syndrome.

## STOP-BANG Scoring Model\(^1\)

<table>
<thead>
<tr>
<th><strong>Snoring</strong></th>
<th><strong>BMI</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?</td>
<td>BMI more than 35kg/m(^2)?</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tired</strong></th>
<th><strong>Age</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you often feel tired, fatigued or sleepy during daytime?</td>
<td>Age over 50 years old?</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Observed</strong></th>
<th><strong>Neck Circumference</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Has anyone observe you stopping breathing during your sleep?</td>
<td>Neck circumference greater than 40?</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Blood Pressure</strong></th>
<th><strong>Gender</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have or are you being treated for high blood pressure?</td>
<td>Gender-male?</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**High risk of obstructive sleep apnea:**  "Yes" to three or more items  
**Low risk of obstructive sleep apnea:**  "Yes" to less than three items

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