OSA: Who, When and Why

Differences in the symptoms, consequences and treatment options in pediatric, adult and elderly patients with Obstructive Sleep Apnea

By:
Matthew Robertson, MD
Outline

- Why we sleep
- OSA in general
  - pathophysiology
- Testing for OSA:
  - Polysomnography
  - Home Sleep Screening

- Pediatric OSA
  - Symptoms and clinical exam findings
  - Consequences of OSA
  - Treatment options

- Adult OSA
  - Symptoms and exam findings
  - Consequences of untreated OSA
  - Treatment options

- Elderly OSA
  - Symptoms
  - Consequences
  - Treatment options
Why we sleep

• Sleep is a highly conserved behavior that occurs in animals ranging from fruit flies to humans.
• Sleep is necessary for survival in mammals.
• Needed for DNA repair, memory consolidation, hormonal regulation, thermal regulation and “brain cleaning” via activation of the glymphatic system.
OSA
Pathophysiology:

Testing Options for OSA: Polysomnography

- Gold standard for obtained data
- Can be expensive/inconvenient for patients
- Multi-channel monitoring of physiological parameters during sleep
  - EEG (allows direct measurement of sleep!)
  - EOG (ocular movement)
  - EMG (muscle tone including limb movements)
  - ECG
  - SpO2
  - Video & audio monitoring (parasomnia activity)
- Additional monitoring may include parameters such as CO2
Testing Options for OSA: Home Sleep Screening

• Sleep not directly measured (no EEG)
• Indicated to test for OSA in:
  • Uncomplicated patients with high pre-test probability
• Not Recommended for:
  • Significant cardiorespiratory disease
    • COPD, CHF, CVA
  • Risk for hypoventilation
    • neuromuscular, morbid obesity
  • Chronic opioid use
  • Severe insomnia
  • Pediatrics

Kapur, JCSM Practice Guideline 2017
Obstructive Hypopnea Index (AHI) = number of apneas and hypopneas per hour
Respiratory Disturbance Index (RDI) = number of apneas, hypopneas and RERAs per hour

**Obstructive Apnea**

**Obstructive Hypopnea**

**Respiratory Effort Related Arousal (RERA)**
Pediatric OSA: Epidemiology and Definitions

• Primary snoring:
  • Snoring > 3 nights per week without apneas, hypopneas, frequent arousals or gas exchange abnormalities.
  • Estimated prevalence is 7.45%

• Upper airway resistance syndrome (UARS):
  • Snoring, increased work of breathing and frequent arousals, without recognizable obstructive events or gas exchange abnormalities.

• OSA syndrome (OSA or OSAS):
  • Recurrent partial (hypopnea) or complete (apnea) upper airway obstructions with disruption of normal oxygenation, ventilation and sleep pattern.
  • Prevalence of OSAS has been reported to be between 1% and 5%

## When to Suspect OSA in Kids

<table>
<thead>
<tr>
<th>Nighttime symptoms</th>
<th>Daytime symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Snoring</td>
<td>• Nonspecific!</td>
</tr>
<tr>
<td>• Gasping</td>
<td>• Hyperactivity</td>
</tr>
<tr>
<td>• Increased work of breathing</td>
<td>• Inattention</td>
</tr>
<tr>
<td>• Paradoxical breathing</td>
<td>• Learning disability</td>
</tr>
<tr>
<td>• Restless sleep</td>
<td>• Irritability</td>
</tr>
<tr>
<td>• Witnessed apneas</td>
<td>• Excess Daytime Sleepiness</td>
</tr>
<tr>
<td>• Mouth breathing</td>
<td>• Growth retardation</td>
</tr>
<tr>
<td>• Neck hyperextension while sleeping.</td>
<td></td>
</tr>
</tbody>
</table>
Pediatric Exam Findings Suggestive of OSA

- Tonsillar hypertrophy
- Obesity
- Midface deficiency
- Macroglossia
- Mandibular hypoplasia
- Trisomy 21
- History of prematurity
- Family history of OSA

Pediatric OSA: Consequences...not the same as adults

- Increased cardiovascular morbidity?
  - Limited data
  - Reduced nocturnal dipping of BP and diminished cardiac output and oxygen consumption at peak exercise capacity.

- Metabolic consequences?
  - Data confounded by pubertal status and the presence of obesity.
  - Elevations in LDL and reduced levels of HDL observed in both obese and non-obese children with OSA, that improve after OSA treatment.
  - Association between OSA and “metabolic syndrome” demonstrated in post pubertal adolescents.

- Excess Daytime Sleepiness (EDS)?
  - Sleepiness during the day is not a common presenting symptom in children (except obese).
  - Sleep fragmentation often manifests as hyperactivity, difficulties concentrating, and irritability instead.
Consequences:

- **Nocturnal enuresis:**
  - More prevalent in children with OSA.
  - Possibly due to the inhibitory effects of OSA on arousal responses to changes in bladder pressure, or effects of elevated BNP levels which affect the renin-angiotensin pathway, vasopressin, and excretion of sodium and water.

- **Increased healthcare utilization:**
  - More hospital visits
  - More medication prescriptions

- **Increased oxidative stress and inflammation:**
  - AM levels of H2O2 (marker of oxidative stress) elevated in kids with OSA
  - Elevated pro-inflammatory cytokines (TNF-α, IL-6, IL-8)
  - Decreased regulatory cytokines (IL-10)
    - Reduction in inflammatory cytokines s/p T&A

References:


Leon-Cabrera S, Arana-Lechuga Y, Esqueda-León E, et al. Reduced systemic levels of IL-10 are associated with the severity of obstructive sleep apnea and insulin resistance in morbidly obese humans. Mediators Inflamm 2015;2015:493409.
Consequences: Neurocognitive

- Tucson Children’s Assessment of Sleep Apnea (TuCASA) study:
  - Tracked neurocognitive and behavioral outcomes over 5 years
- Increased attention problems and hyperactivity
- Increased aggressive behaviors
- Lower social competencies
- Poor communication and/or diminished adaptive skills.
- Negative correlation between AHI and immediate recall, full-scale IQ, performance IQ and mathematics achievements
- Nocturnal hypoxemia adversely affected nonverbal skills.

TuCASA Odds Ratios

<table>
<thead>
<tr>
<th>Scale Name</th>
<th>Persistent SDB (n = 17) Odds (95% CI)</th>
<th>Adjusted Odds (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral Symptoms Index(^b)</td>
<td>6.82 (2.09, 22.30)***</td>
<td>6.19 (1.87, 20.50)**</td>
</tr>
<tr>
<td>Adaptive Behavior Composite</td>
<td>2.26 (0.72, 7.09)</td>
<td>–</td>
</tr>
<tr>
<td>Social Skills</td>
<td>2.18 (0.74, 6.43)</td>
<td>–</td>
</tr>
<tr>
<td>Leadership</td>
<td>4.36 (1.41, 13.51)**</td>
<td>–</td>
</tr>
<tr>
<td>Externalizing Composite</td>
<td>5.59 (1.76, 17.79)**</td>
<td>–</td>
</tr>
<tr>
<td>Hyperactivity(^a)</td>
<td>5.60 (1.86, 16.91)**</td>
<td>5.15 (1.66, 15.99)**</td>
</tr>
<tr>
<td>Aggression(^b)</td>
<td>3.85 (1.06, 14.01)*</td>
<td>3.27 (0.87, 12.19)+</td>
</tr>
<tr>
<td>Conduct Problems(^a)</td>
<td>3.60 (1.11, 11.73)*</td>
<td>3.23 (0.97, 10.83)+</td>
</tr>
<tr>
<td>Internalizing Composite</td>
<td>2.29 (0.67, 7.88)</td>
<td>–</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1.39 (0.36, 5.33)</td>
<td>–</td>
</tr>
<tr>
<td>Depression(^a)</td>
<td>2.46 (0.71, 8.53)</td>
<td>2.11 (0.58, 7.63)</td>
</tr>
<tr>
<td>Somatization(^c)</td>
<td>0.77 (0.16, 3.61)</td>
<td>0.67 (0.14, 3.24)</td>
</tr>
<tr>
<td>Atypicality</td>
<td>1.07 (0.22, 5.13)</td>
<td>–</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>3.09 (0.97, 9.95)+</td>
<td>–</td>
</tr>
<tr>
<td>Attention Problems(^b)</td>
<td>2.71 (0.85, 8.59)+</td>
<td>2.42 (0.75, 7.81)</td>
</tr>
</tbody>
</table>

Odds ratios of being in at risk or clinically “significant” category
Consequences: Neurocognitive

- Meta-analysis of impaired school performance.

Treatment Options:

• Weight loss if the child is overweight or obese:
  • Impactful in obese adolescents.
  • Limited studies on obese younger children.

• Nasal corticosteroids and/or oral montelukast:
  • 6 to 12 week course of nasal steroids and/or montelukast may reduce adenoidal size with improvements in severity of mild to moderate OSA.

Treatment Options:
Adenotonsillectomy (T&A)

- T&A is efficacious in children with OSA AND adenotonsillar hypertrophy.
- AAFP suggests T&A as treatment, and AAP recommends T&A as first line treatment for children with adenotonsillar hypertrophy.
- Majority of children show marked improvement in their PSG parameters post-surgery, but many do not achieve complete normalization.
  - success rate of T&A for OSA is ~ 75%.
- OSA may recur after initial postoperative improvement.

Risk factors for residual OSA and T&A:
- Obesity
- Severe OSA (AHI of >20)
- Age > 7 years,
- High Mallampati score
- African-American ethnicity
- Diagnosed asthma
- Craniofacial abnormalities
- Chromosomal anomalies (trisomy 21)
- Neuromuscular disease.

Treatment Options: RME

• Rapid maxillary expansion or orthodontic appliances:

• Potentially efficacious in select patients with correct craniofacial anatomy.

Treatment Options:

Myofunctional Therapy

• Exercises for strengthening the muscles of the oropharynx.

• Recent meta-analysis demonstrated improvements in AHI by approximately 50% in adults and 62% in children.

• Also prevented recrudescence of OSA in post T&A children.
Treatment Options:

Positive Airway Pressure (CPAP/BiPAP)

Consider if:
- Residual OSA after adenotonsillectomy
- OSA related to obesity, craniofacial abnormalities
- Neuromuscular disorders
- OSA without adenotonsillar hypertrophy.
- Challenging implementation
  - Requires period of desensitization.
  - Parental involvement and education is crucial.
- Complications of CPAP/BiPAP:
  - Nasal congestion, rhinorrhoea, epistaxis,
  - Facial skin erythema related to mask, dry mouth, aerophagia
  - Midface retrusion.

Treatment Options: Surgical

• Craniofacial surgery (mandibular distraction) has been shown to be successful in children with syndromic craniofacial abnormalities (micrognathia).

• Tracheostomy is almost universally successful, but associated with social stigma as well as short and long term complications.
Treatment Options:

Watchful Waiting

• Obstructive SDB can resolve spontaneously:
  • Most common in mild OSA and adenotonsillar hypertrophy.
  • Resolution rate as high as 42% in selected populations
  • Likely secondary to ebb and flow of lymphoid tissue and growth of airway.

• Risk factors for the persistence of untreated OSA: the usual suspects
  • Obesity
  • AHI >5
  • African-American ethnicity
  • Complex underlying conditions, such as chromosomal aberrations, neuromuscular diseases or craniofacial malformations.

Treatment:

Need for Ongoing Monitoring

• Given dynamic changes during development, repeat polysomnography is indicated at different intervals depending on intervention:
  • 6 weeks s/p T&A
  • 12 weeks of montelukast/nasal steroid treatment
  • 12 months after rapid maxillary expansion
  • Children on CPAP or BiPAP should be re-evaluated at least every 12 months after initial titration.

Adult OSA

Cost of undiagnosed OSA in USA in 2015:
$150,000,000,000

Source: American Academy of Sleep Medicine, 2016  |  www.sleepeducation.org
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AHI &gt; 5/hr (30-70)</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>AHI &gt; 15/hr (30-70)</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td><strong>Women (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AHI &gt; 5/hr (30-70)</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>AHI &gt; 15/hr (30-70)</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>
Prevalence of OSA in Patients with Comorbid Conditions:

- Drug-Resistant Hypertension: 80%
- Congestive Heart Failure: 80%
- Type 2 Diabetes: ~72%
- Atrial Fibrillation: ~50%
- All Hypertension: 35%
- CAD: 30%
- Angina: 30%

## Symptoms

<table>
<thead>
<tr>
<th>Nighttime symptoms</th>
<th>Daytime symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Snoring</td>
<td>• Excess Daytime Sleepiness</td>
</tr>
<tr>
<td>• Gasping</td>
<td>• Fatigue</td>
</tr>
<tr>
<td>• Witnessed apneas</td>
<td>• Cognitive slowing “fog”</td>
</tr>
<tr>
<td>• Insomnia</td>
<td>• Poor concentration</td>
</tr>
<tr>
<td>• Frequent arousals from sleep</td>
<td>• Irritability/mood disorder</td>
</tr>
<tr>
<td>• Nocturia</td>
<td>• Decreased libido</td>
</tr>
<tr>
<td>• Parasomnia activity</td>
<td>• Morning headaches</td>
</tr>
<tr>
<td>• RLS</td>
<td>• Impaired pain tolerance</td>
</tr>
</tbody>
</table>

Physical Exam Findings

- Epworth Sleepiness Scale Score
- BMI
- Neck circumference
  - >17” men = high risk
  - >16” women = high risk
- Oropharynx:
  - Lateral pharyngeal wall narrowing
  - High arched palate
  - Large tongue (scalloping)
  - Large uvula and tonsils
  - High Modified Mallampati score
  - Large overjet (retrognathia)

STOP-BANG

• Validated screening tool for obstructive sleep apnea
• Score of ≥ 3:
  • >90% sensitivity to detect moderate to severe OSA
• High positive predictive value (85%)

<table>
<thead>
<tr>
<th>STOP-BANG Sleep Apnea Screening Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Snoring</strong></td>
</tr>
<tr>
<td>louder than talking, heard through doors</td>
</tr>
<tr>
<td><strong>Tired</strong></td>
</tr>
<tr>
<td>tired, fatigued, sleepy during the day</td>
</tr>
<tr>
<td><strong>Observed</strong></td>
</tr>
<tr>
<td>stop breathing, choking, gasping</td>
</tr>
<tr>
<td><strong>Pressure</strong></td>
</tr>
<tr>
<td>hypertension</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
</tr>
<tr>
<td>&gt; 35</td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>&gt; 50</td>
</tr>
<tr>
<td><strong>Neck</strong></td>
</tr>
<tr>
<td>&gt; 17 in (male) or &gt;16 in (female)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>male</td>
</tr>
</tbody>
</table>

≥ 3 points indicates significant risk for OSA

Chung; Anesthesiology; 2008
Chung; Br. J Anaesth; 2012
Consequences

• Increased mortality: multifactorial
• Increased rates of all cardiovascular events
• Increased risk of ischemic stroke
• Increased cardiac arrhythmias:
  • Sinus pauses
  • Atrial fibrillation: both incident and recrudescent
  • Sudden death
• Worsened diabetes control
• GERD
Consequences: Non-fatal Cardiovascular Events

Consequences: Hypertension

Wisconsin Sleep Cohort Study: Adjusted Odds Ratios for Hypertension at 4-year Follow-up
Participants who were Normotensive at Baseline

Consequences: Stroke

Stroke-free survival by AHI quartile among male smokers

QIV --- AHI >20

Consequences: Arrhythmias
OSA and Sudden Cardiac Death

Consequences: Diabetes

- Severe OSA patients with excess daytime sleepiness are at increased risk for diabetes.

- 71% of patients with type 2 diabetes have comorbid OSA.
  - Meta-analysis of studies demonstrated range of prevalence from 58% to 87%

- Insulin sensitivity improves after CPAP therapy.

Pamidi et al, Front Neurology 2012; 3, 126
Consequences: GERD

- 54-76% of OSA patients have Gastroesophageal Reflux Disease (GERD)
  - More frequent and prolonged in OSA patients versus BMI matched controls
- OSA may trigger GERD due to decreased intrathoracic pressure.
- Symptoms often improve once OSA treated.
Consequences: Excessive Daytime Sleepiness

• Reduced alertness & vigilance
• Increased motor vehicle crashes
  • Patients with OSA are two to four times more likely to have traffic accidents from reduced alertness while driving.
• Increased work-related accidents
• Poor job/school performance
• Difficulty concentrating & reduced productivity
• Falling asleep in inappropriate social circumstances

Consequences: Cognition

- Meta-analysis of 19 studies of cognitive impacts of OSA show:
  - Significant negative effect sizes for all cognitive domains with the exception of perception.
  - OSA patients were most impaired on tests measuring non-verbal memory, concept formation, and psychomotor speed.

<table>
<thead>
<tr>
<th>Cognitive domain</th>
<th>N_{studies}</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-verbal memory</td>
<td>7</td>
<td>-0.79*</td>
</tr>
<tr>
<td>Concept formation</td>
<td>4</td>
<td>-0.78*</td>
</tr>
<tr>
<td>Psychomotor speed</td>
<td>7</td>
<td>-0.70*</td>
</tr>
<tr>
<td>Construction</td>
<td>7</td>
<td>-0.69*</td>
</tr>
<tr>
<td>Executive function</td>
<td>12</td>
<td>-0.64*</td>
</tr>
<tr>
<td>Perception</td>
<td>1</td>
<td>-0.61</td>
</tr>
<tr>
<td>Motor control/performance</td>
<td>6</td>
<td>-0.60*</td>
</tr>
<tr>
<td>Attention</td>
<td>14</td>
<td>-0.57*</td>
</tr>
<tr>
<td>Speed of processing</td>
<td>11</td>
<td>-0.52*</td>
</tr>
<tr>
<td>Working memory</td>
<td>8</td>
<td>-0.41*</td>
</tr>
<tr>
<td>Verbal memory</td>
<td>10</td>
<td>-0.39*</td>
</tr>
<tr>
<td>Verbal functions/language</td>
<td>3</td>
<td>-0.38*</td>
</tr>
<tr>
<td>Verbal reasoning</td>
<td>11</td>
<td>-0.36*</td>
</tr>
</tbody>
</table>

Notes: Nfs = Fail safe N values.
*Significance at the .05 level.

Treatments
Behavioral Interventions

- Encourage patients to:
  - Lose weight (if overweight)
  - Exercise
  - Avoid alcohol and sedative-hypnotics
  - Avoid sleep deprivation
  - Stop smoking
  - Maintain clear nasal passages
Medical Interventions

• Positive Airway Pressure (PAP)
  • CPAP, BiPAP, auto servo ventilation depending on tolerance and apnea type.

• Mandibular Repositioning Devices (MRD/MAD)

• Tongue retention devices

• Position therapy

• Surgical Options
Positive Airway Pressure

Impact of CPAP therapy:

Complex, controversial:
• Conflicting studies on impact on long term stroke risk, general CV risk and mortality.
• Improved HTN control
• Improved blood sugar control
• Decreased nocturia
• Improvements in quality of life measures
• Improved cognitive domains

Does CPAP Improve quality of life?

Reversal of brain atrophy with 6 months of CPAP use.

Mandibular Repositioning Devices

Without MRD airway is collapsed

With MRD mandible is pulled anterior and airway is open

Images from http://www.topsnoringmouthpieces.com
When to consider Oral Appliance

Indications:
• Lower initial AHI
• Lower age
• Lower BMI
• Supine-dependent OSA
• Large degree of mandibular protrusion
• Low nasal resistance

Contraindications:
• Insufficient number of teeth to hold device
• Untreated periodontal disease
• Active TMJ disorder
• Limited mandibular protrusion distance (<6mm)
• Significant bruxism (teeth grinding)
Position Therapy:
• Option if significant difference in AHI when supine vs. non-supine.
• Tennis ball trial
• Sleep positioning belt

Tongue Retention Device:
• Torture?
## Surgical Therapy for OSA

<table>
<thead>
<tr>
<th>Surgery Type</th>
<th>Purpose</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjunctive</td>
<td>Facilitate PAP or MRD adherence</td>
<td>Turbinate reduction, polypectomy, septoplasty</td>
</tr>
<tr>
<td>Salvage</td>
<td>In place of PAP or MRD</td>
<td>UPPP, Lingual advancement, MMA, trach, hypoglossal nerve stimulator</td>
</tr>
</tbody>
</table>

Source: [www.sciencenews.org](https://www.sciencenews.org/sites/default/files/main/articles/ns_apnea-implant.jpg)

Elderly OSA: Epidemiology

- OSA ranges in prevalence from 20% to 40% depending on the study.

- OSA prevalence tends to increase with age:
  - Patients with AHI >10 and associated EDS, OSA was present at 3.2%, 11.3% and 18.1% in the 20–44, 45–64 and 61–100-year age groups, respectively.

Elderly OSA Risk: Why does Prevalence Increase?

- Reduced pharyngeal muscle function.
- Reduced upper airway reflex sensitivity and genioglossus response to hypoxia.
- More collapsible upper airway:
  - mean ± SD critical closing pressure:
    - $-8.3 \pm 2.3 \text{ cmH}_2\text{O}$ in elderly
    - $-16.0 \pm 6.9 \text{ cmH}_2\text{O}$ in younger
  - Independent of body mass index.


Symptoms

• Elderly report sleepiness differently for the same level of OSA severity compared to younger populations.

• Older OSA patients typically have a lower BMI and neck circumference, compared to younger patients with similar disease severity.

• Increased daytime sleepiness may be less debilitating in older people.

• Fragmented sleep, frequency of arousals from sleep, difficulty returning to sleep and early morning awakenings are more common in elderly regardless of OSA status.

• These changes can mask symptoms from OSA and are often considered “normal aging” and rarely come to clinical attention.

**Risk Factors/Consequences?**

- 50% of patients with mild (or greater) symptomatic chronic heart failure will have Sleep Disordered Breathing (OSA and Central Sleep Apnea).

- Declining cognitive function associated with both the increasing severity of OSA and self-reported increasing daytime sleepiness.

- 70% of Patients institutionalized with dementia an AHI ≥5 and up to 48% had an AHI ≥20 events.

- 49% of patients with dementia with nocturnal agitation have AHI >15.

- Apolipoprotein E (APOE) gene is a common genetic risk factor for the development of Alzheimer’s disease.
  - Significantly higher probability of at least moderate OSA (AHI ≥15) with APOE independent of age, sex, BMI and ethnicity compared to those with an AHI <15.


Consequences of OSA

• Link with elevated CV risk or HTN in elderly is hazy.

• However, all-cause and cardiovascular mortality appears increased primarily in the severe OSA category (AHI >30).

• Benefit from (compliant) CPAP has been demonstrated.

• Less clear association in elderly possibly due to a reduced acute cardiovascular response to arousal from sleep compared to the young.

• Second theory is “pruning” of those vulnerable earlier in life.

Consequences

• Study in older patients (mean age 77 years) demonstrated severe OSA (AHI ≥30) increased risk of ischemic stroke, independent of known risk factors:
  • hazard ratio=2.52, 95% CI=1.04 to 6.01, P=0.04
• Symptomatic elderly OSA patients experience:
  • mood changes
  • reduced quality of life
  • reduced social functioning and vitality
  • Increased difficulty maintaining sleep.

Treatment options:

• Similar to options for adults:
  • Position therapy
  • Mandibular Advancement Device
  • CPAP/BiPAP
  • Surgical options less impactful and often contraindicated due to comorbidities.

Conclusion

• Sleep is a necessary bodily function for healthy life.

• OSA impairs sleep quality, daytime function and has varying long term risks depending on severity and age.

• Treatments for OSA can be cumbersome, but work!

• If OSA is a “non-starter” for a patient, counsel them on adequate total sleep time.

Topics not addressed:
• Gender differences in OSA symptoms and consequences.
• Treatment outcomes (at length).
Questions?