Sleep Apnea

Lifespan Cardiovascular Institute

Rhode Island Hospital • The Miriam Hospital
Newport Hospital

Delivering health with care®

Center For Cardiac Fitness

Pulmonary Rehab Program

The Miriam Hospital

Outline

- Define sleep apnea
- Causes and risk factors
- Diagnosis
- Cardiovascular consequences
- Treatment
- Summary

What is sleep apnea?

- Potentially serious sleep disorder in which breathing repeatedly stops and starts during sleep
- Diagnosed by a sleep study
- Two main types of sleep apnea
  - Obstructive sleep apnea (most common)
  - Central sleep apnea

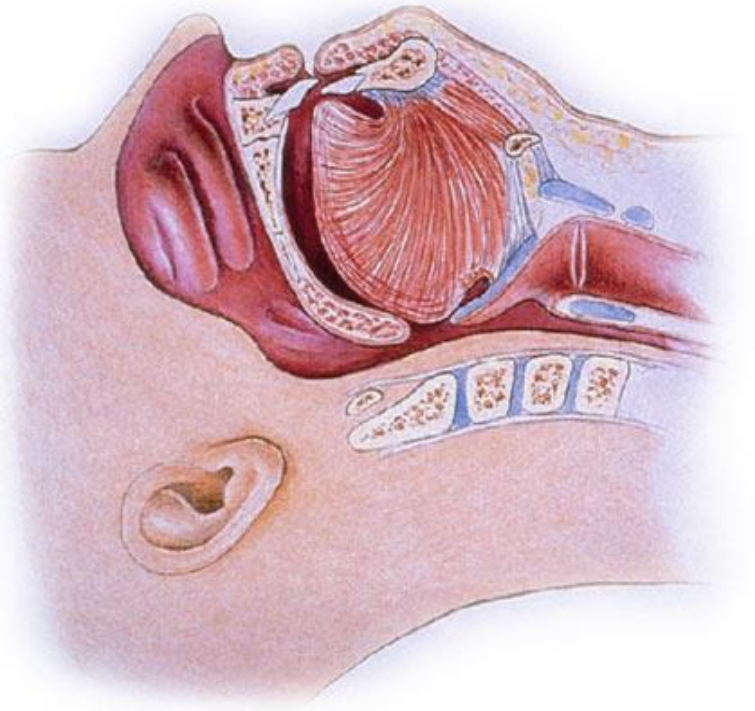
Central Sleep Apnea

- In central sleep apnea, breathing is disrupted regularly during sleep because of the way the brain functions.
- It is not that you can’t breathe, rather, your brain fails to transmit signals to the respiratory muscles to breathe.
- Most common causes are severe heart failure, stroke and medications (particularly narcotics)

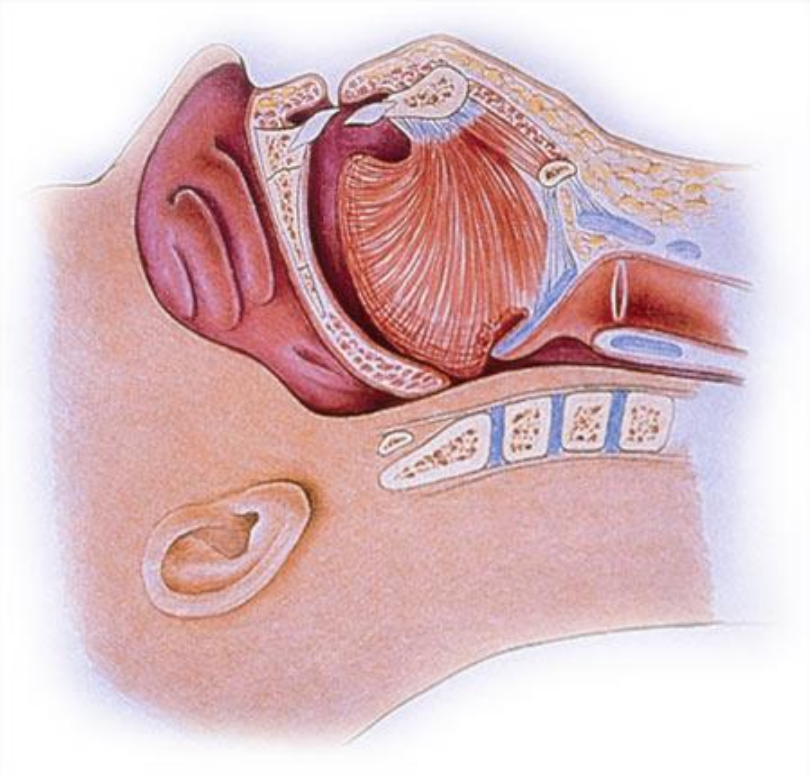
Obstructive Sleep Apnea (OSA)

- Much more common than central sleep apnea
- Occurs when your throat muscles intermittently relax and block your airway during sleep
- Most commonly caused by obesity

Pathophysiology of OSA



While awake our reflexes help to maintain the patency of the airway

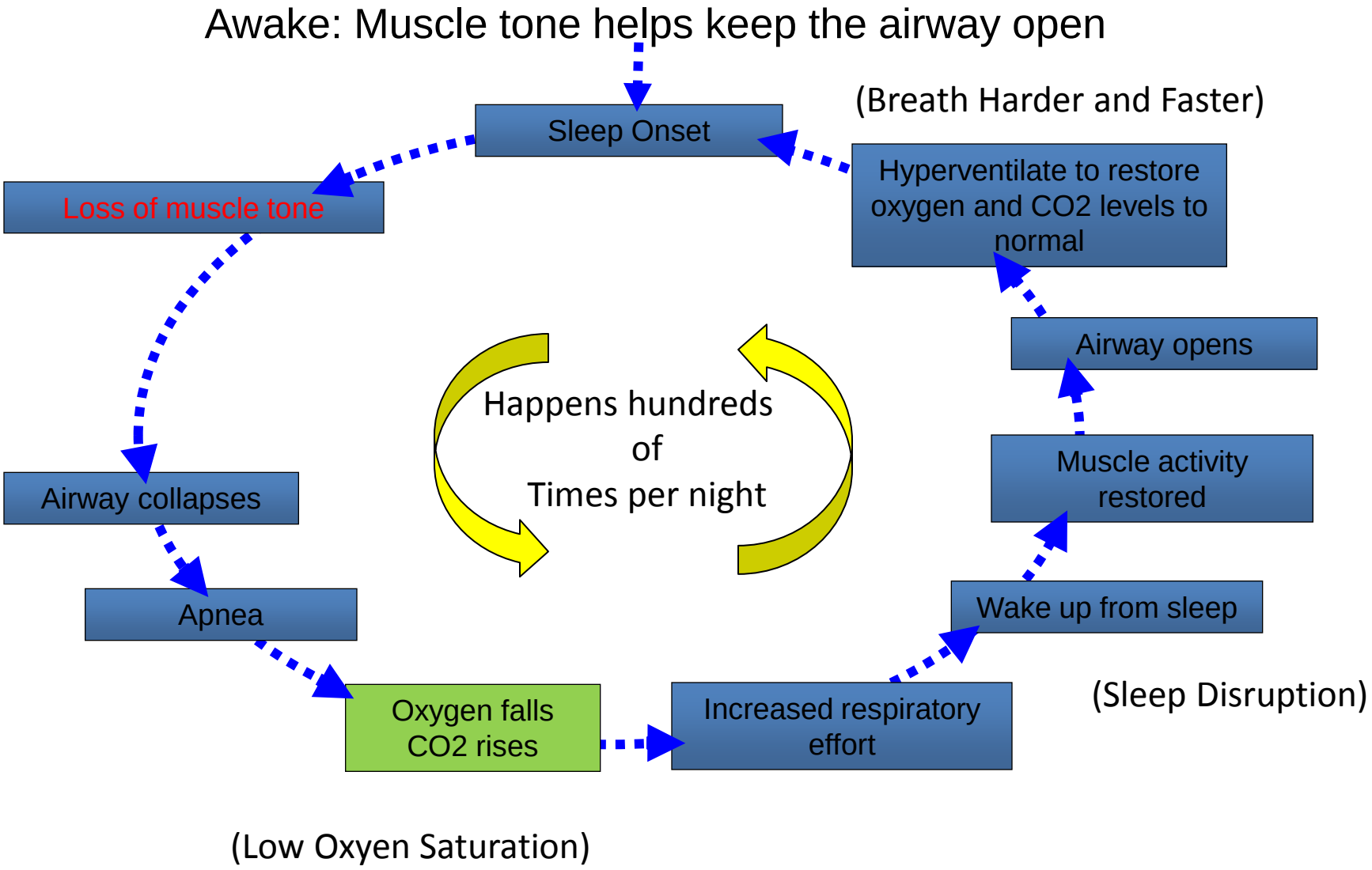


In sleep muscle tone is less and we have collapse of the airway

Sleep Apnea Symptoms

- Nighttime Symptoms
  - Snoring
  - Apneic events (stop breathing)
  - Nocturnal choking/gasping
  - Insomnia
  - Nocturia (needing to urinate during the night)
- Daytime Symptoms
  - Excessive Daytime Fatigue
  - Memory Impairment
  - Morning Headaches
- Other
  - Increase in Motor Vehicle Accidents
  - Impaired Quality of Life

Pathophysiology of Sleep Apnea

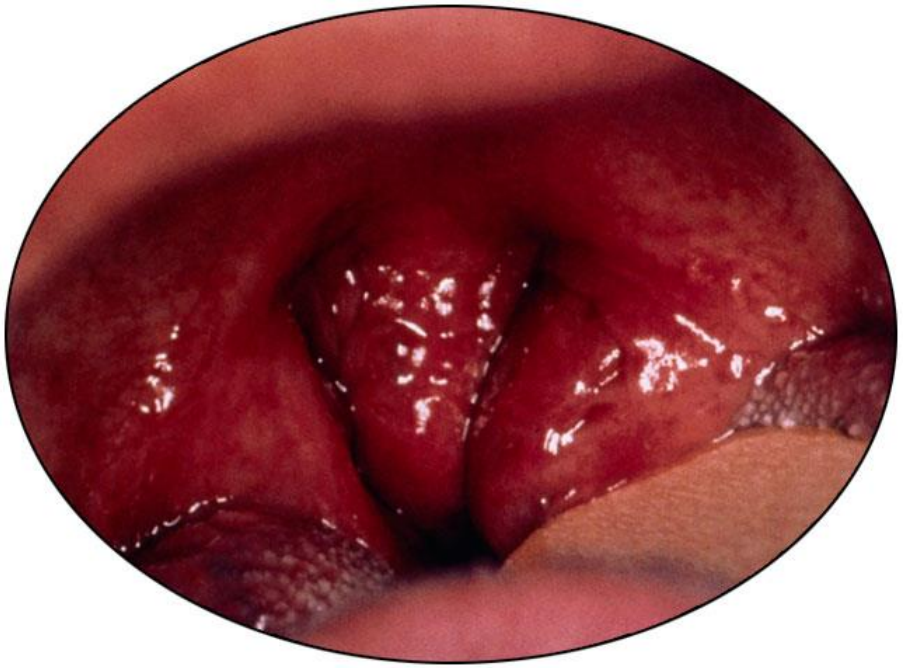


Physical Examination: Structural Abnormalities

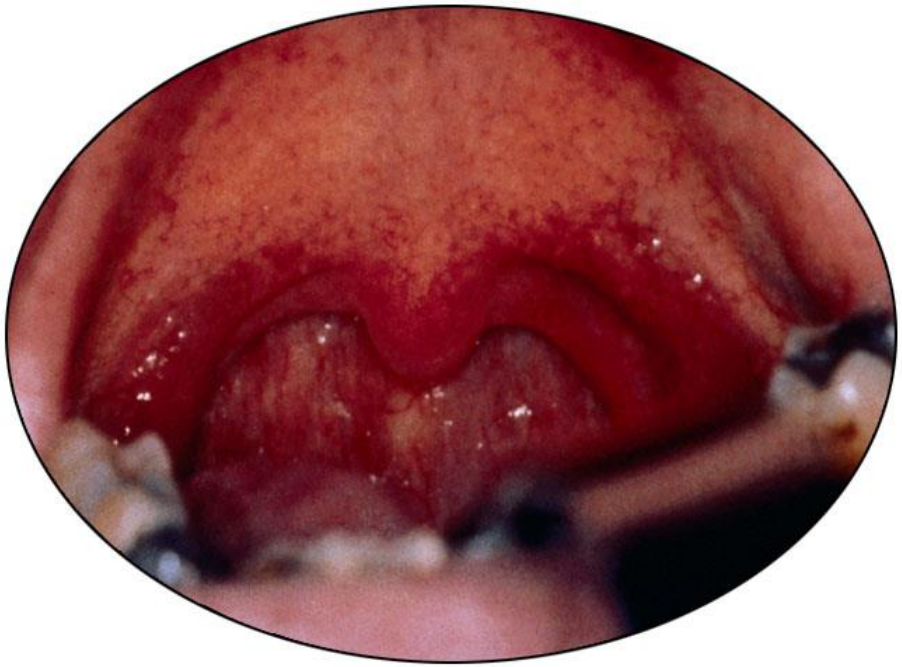
Guilleminault C et al. Sleep Apnea Syndromes. New York: Alan R. Liss, 1978.

Physical Exam: Tonsillar Hypertrophy

Oropharynx With Tonsillar Hypertrophy



Normal Oropharynx



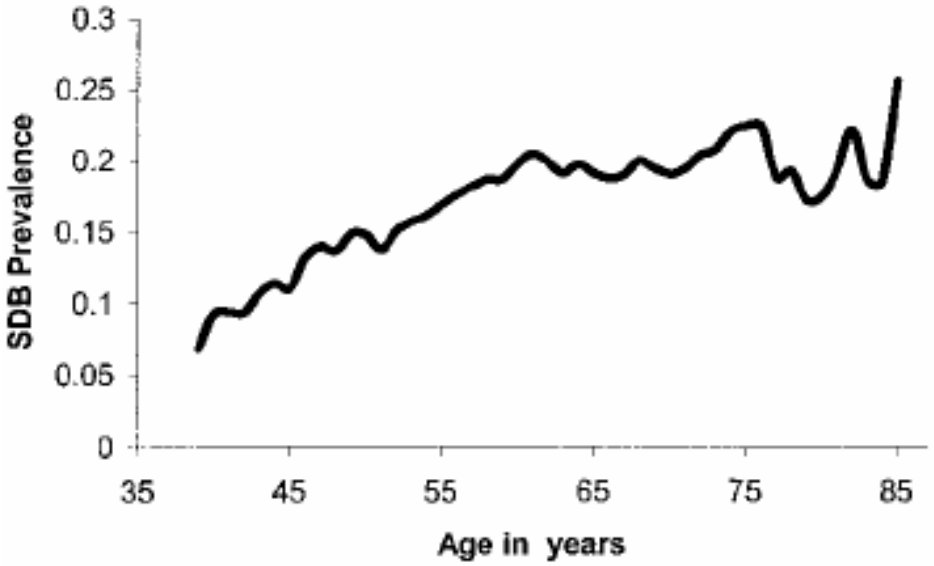
Shepard JW Jr et al. Mayo Clin Proc 1990;65.

Risk Factors Associated with OSA

- Age
  - More common as we get older
- Body Weight
- Sex
  - Men 5x more likely to have OSA
- Tobacco and Alcohol use
- Other Medical Comorbidities

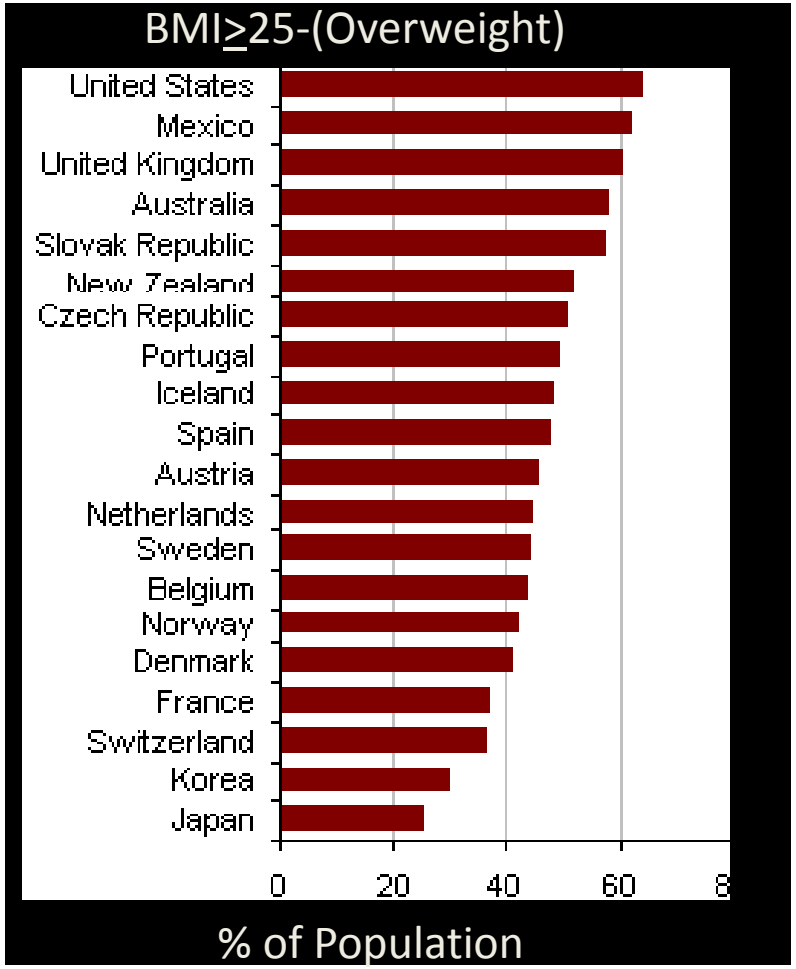
Sleep disorders become more common as we get older

- >50% people over age 65 have some sleep difficulties
  - Falling asleep
  - Staying asleep
- In women, risk of OSA is 4x greater after menopause than before
  - Changes in weight and throat muscles



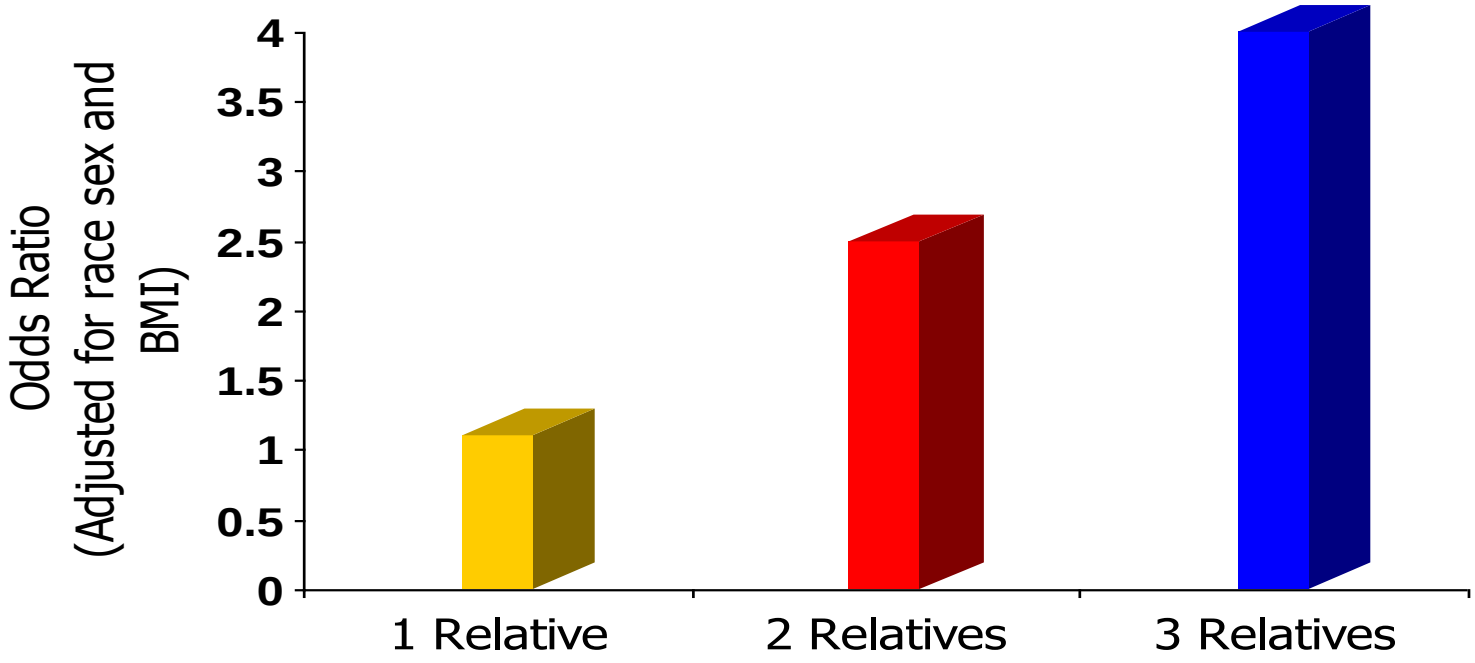
Obesity and OSA

- 4x increase in OSA in people who are overweight compared to those who are not
- Gastric bypass surgery cohort (morbidly obese)
  - 95.7% of men
  - 65.9% women



OECD Health Statistics, 2004

OSA Runs in Families



No recommendation to screen family members

Redline S et al. AMJRCCM 1995;151.

Risk Factors Associated with OSA

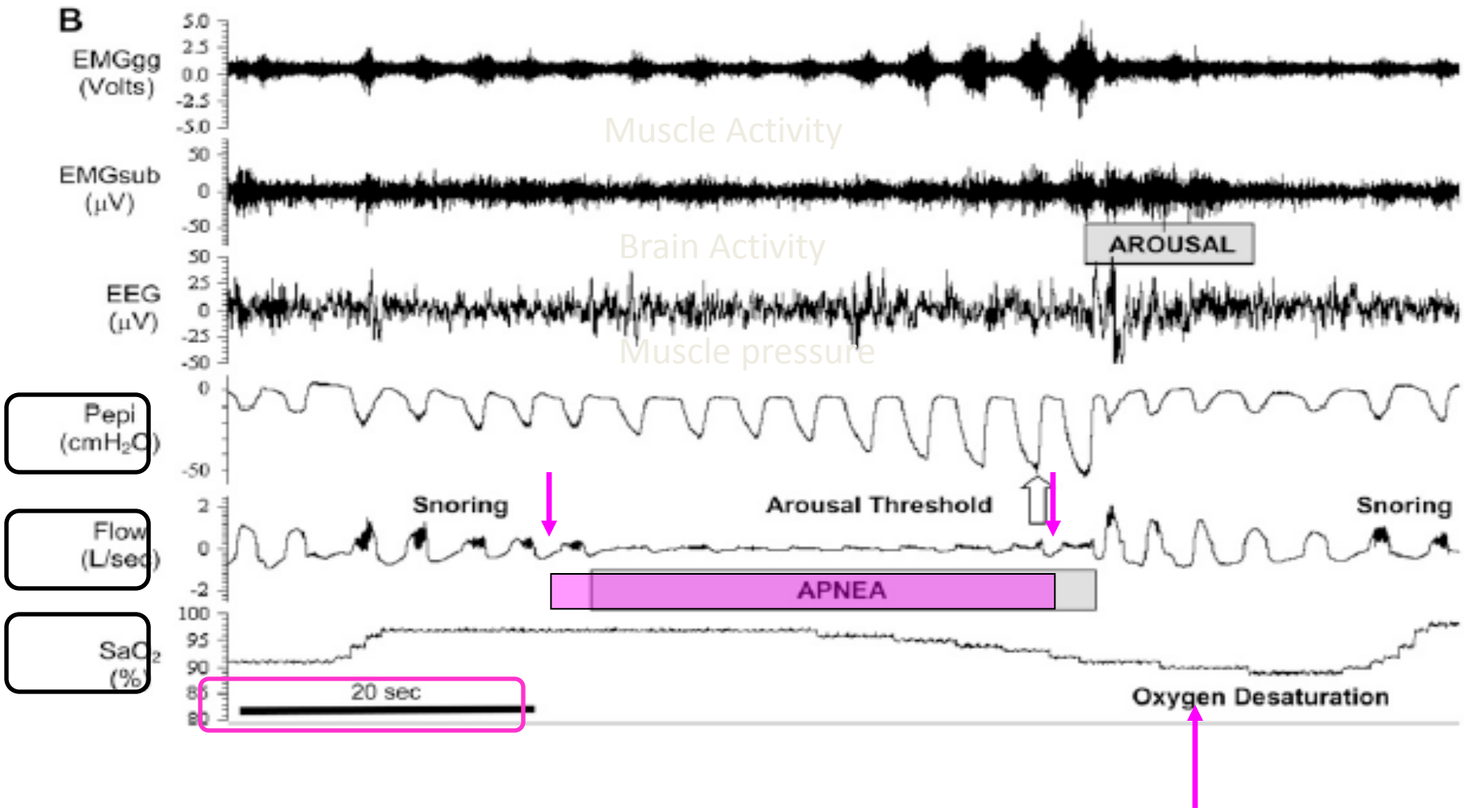
- Other Factors
  - Tobacco:
    - Smokers have higher prevalence of snoring and OSA
    - Increased inflammation alters upper airway properties
  - Alcohol Use:
    - Increases upper airway collapsibility
    - Prolongs apnea duration
  - Polycystic ovarian syndrome (PCOS)
  - Hypothyroidism

Diagnosing Sleep Apnea

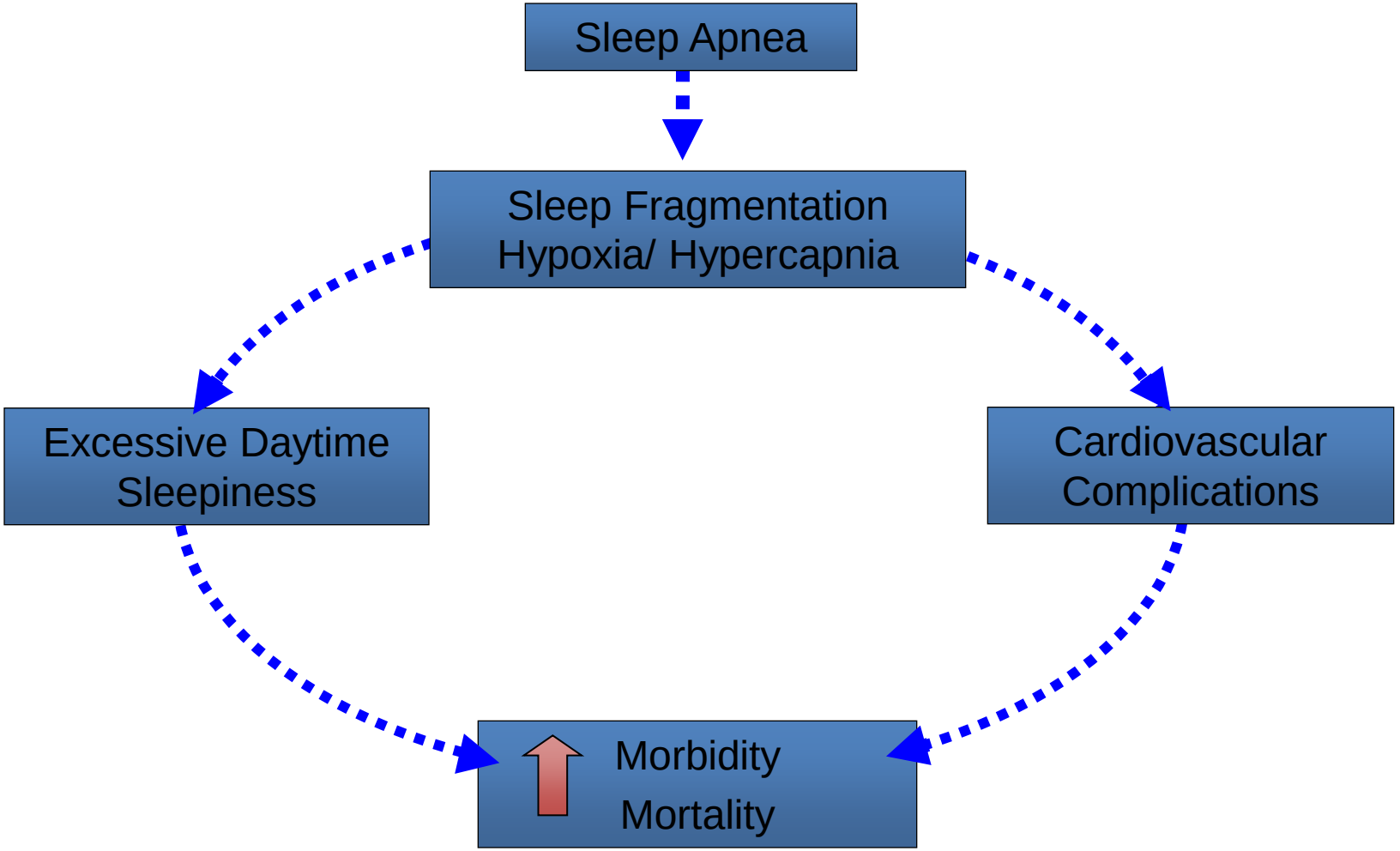
Polysomnography

Diagnostic Evaluation

Sleep Data


B
EMGgg (Volts)
5.0
2.5
0.0
-2.5
-5.0
Muscle Activity
EMGsub (μV)
50
0
-50
Brain Activity
AROUSAL
EEG (μV)
50
25
0
-25
-50
Muscle pressure
Pepi (cmH2O)
0
-50
Snoring
Arousal Threshold
Snoring
Flow (L/sec)
2
0
-2
APNEA
SaO2 (%)
100
95
90
85
80
20 sec
Oxygen Desaturation

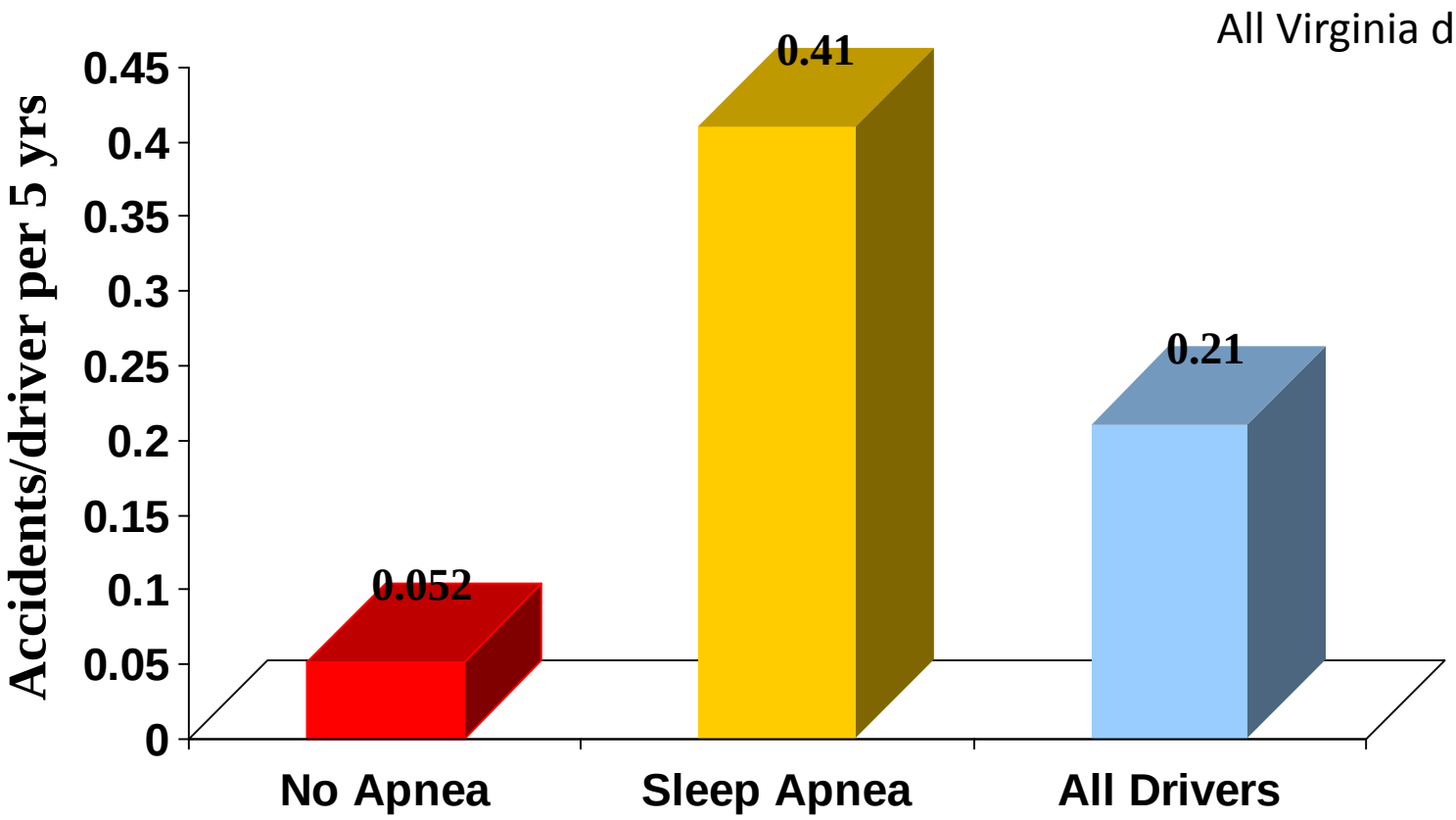
Clinical Consequences of OSA



Clinical Consequences of OSA: Excessive Daytime Sleepiness

- Increased motor vehicle crashes
- Increased work-related accidents
- Poor job performance
- Depression
- Family discord
- Decreased quality of life

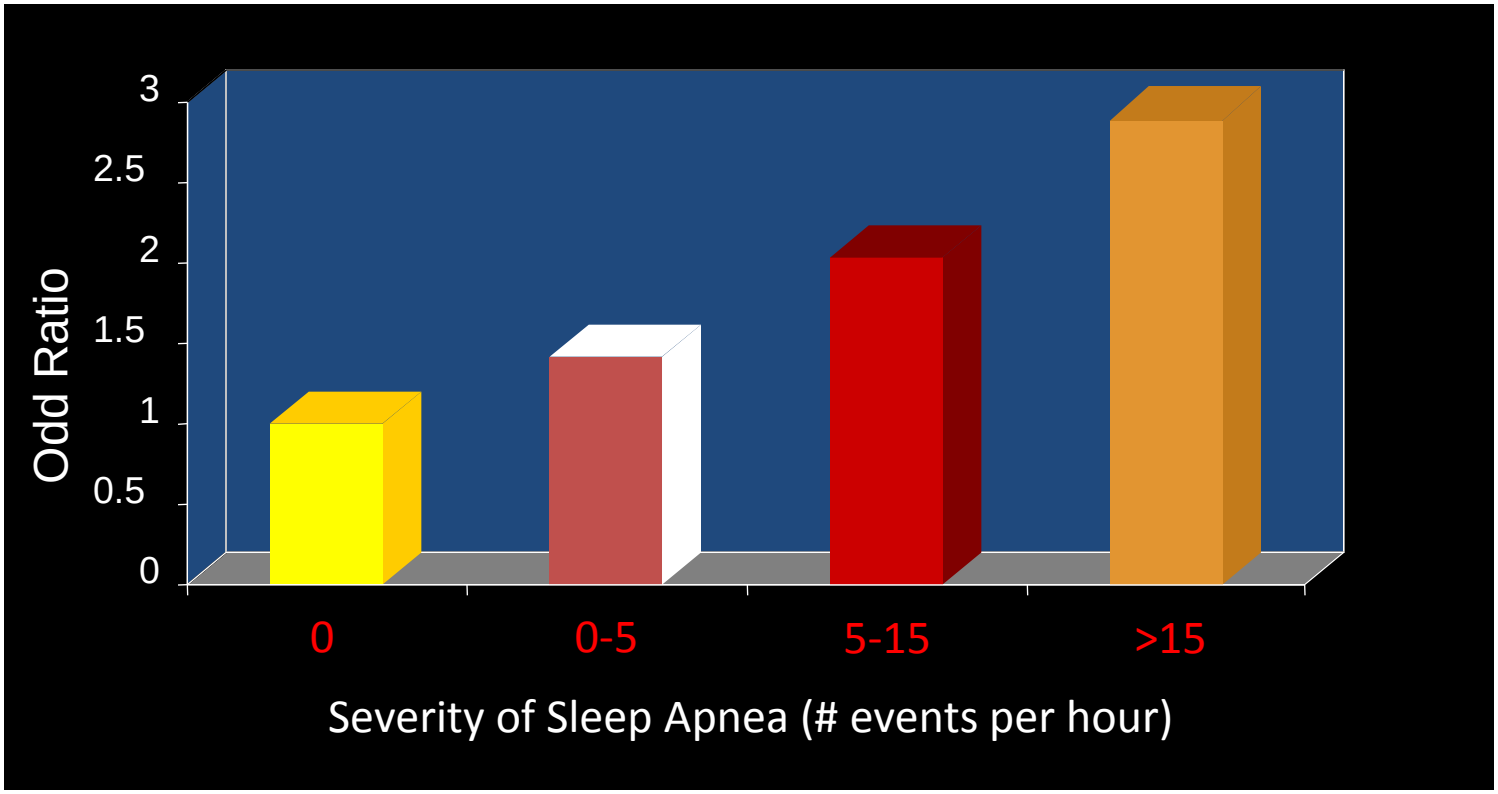
Clinical Consequences of OSA Automobile Accidents



7-8 fold Risk in Patients with OSA

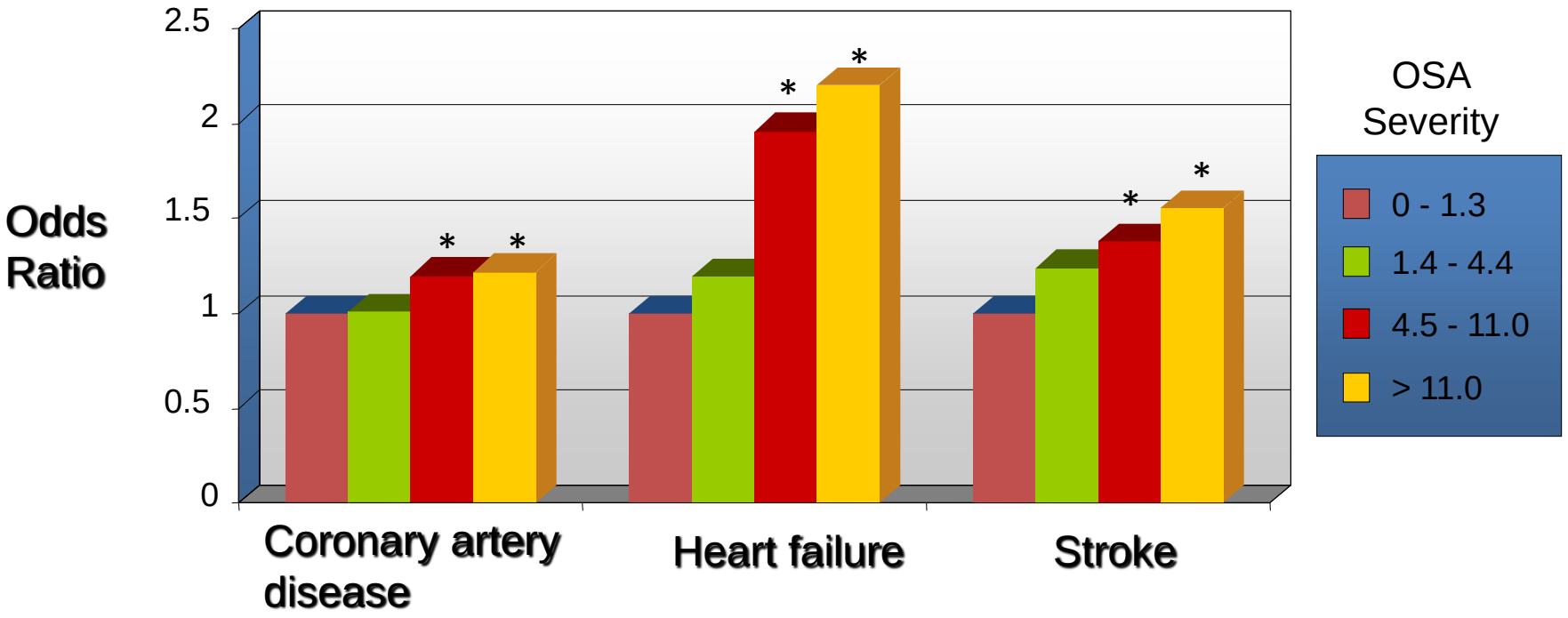
Findley LJ et al. Am Rev Respir Dis 1988;138.

Clinical Consequences of OSA Hypertension



Peppard PE et al. NEJM 2000;342.

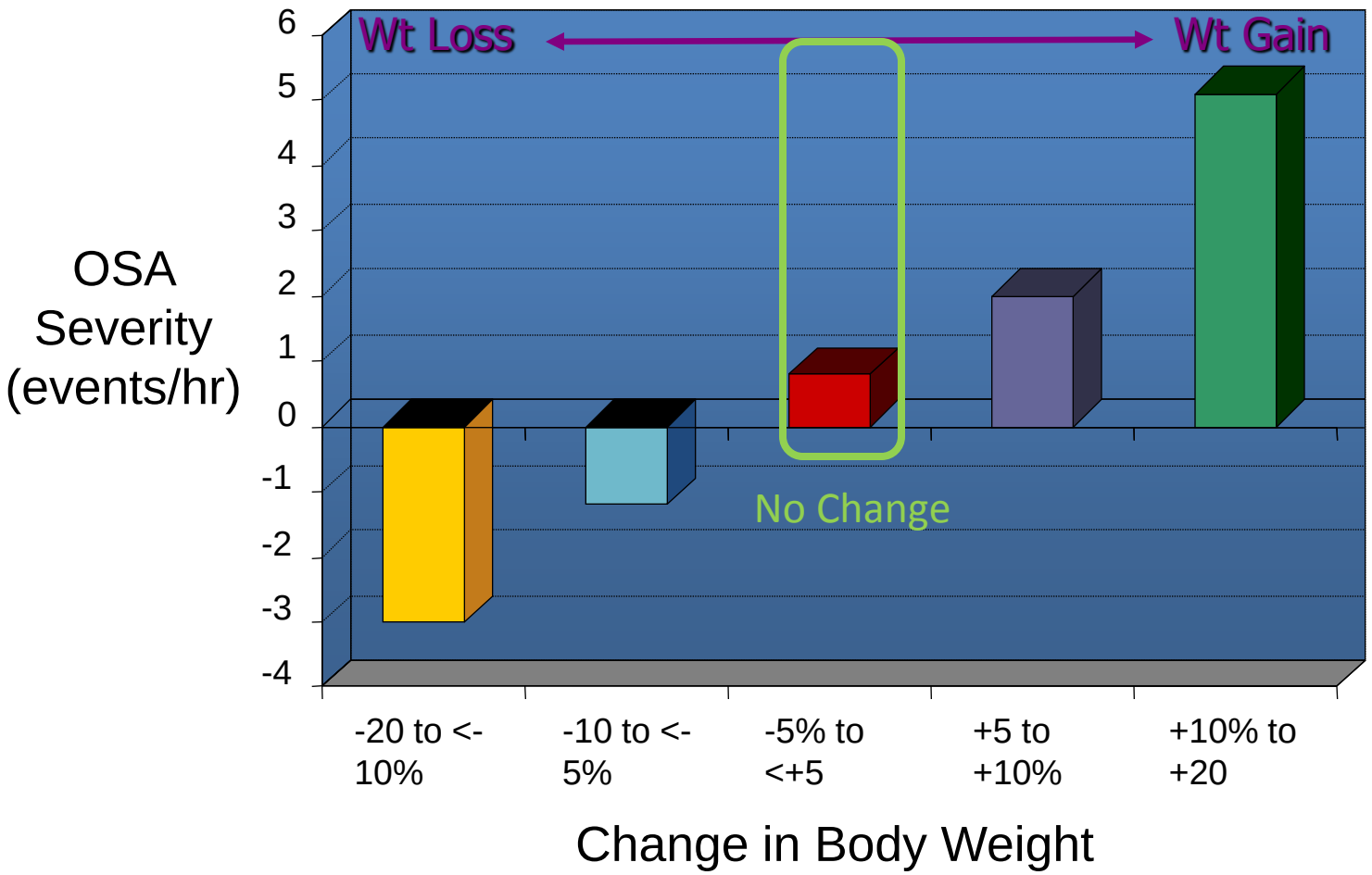
Clinical Consequences of OSA Cardiovascular Disease



Shahar E et al. AJRCCM 2001;163.

Treatment

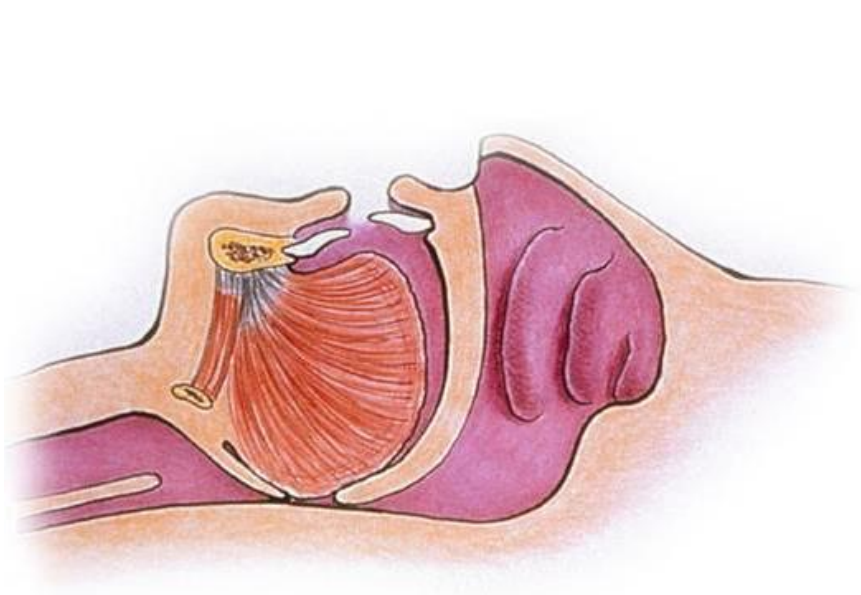
Weight Loss and Sleep Apnea



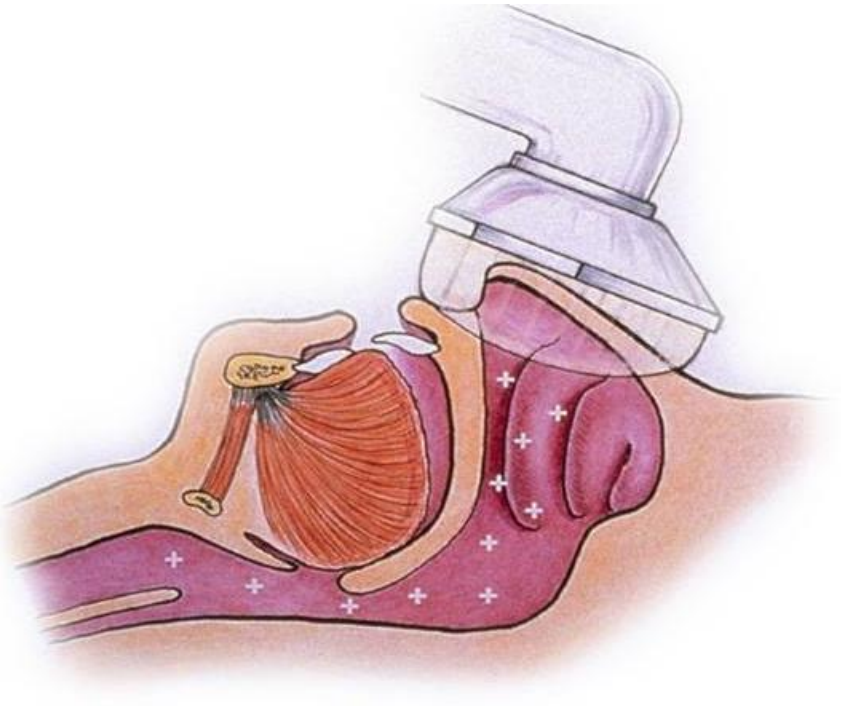
Peppard PE et al. JAMA 2000;284 3015-3021.

CPAP Therapy

Treatment of OSAS
Positive Airway Pressure

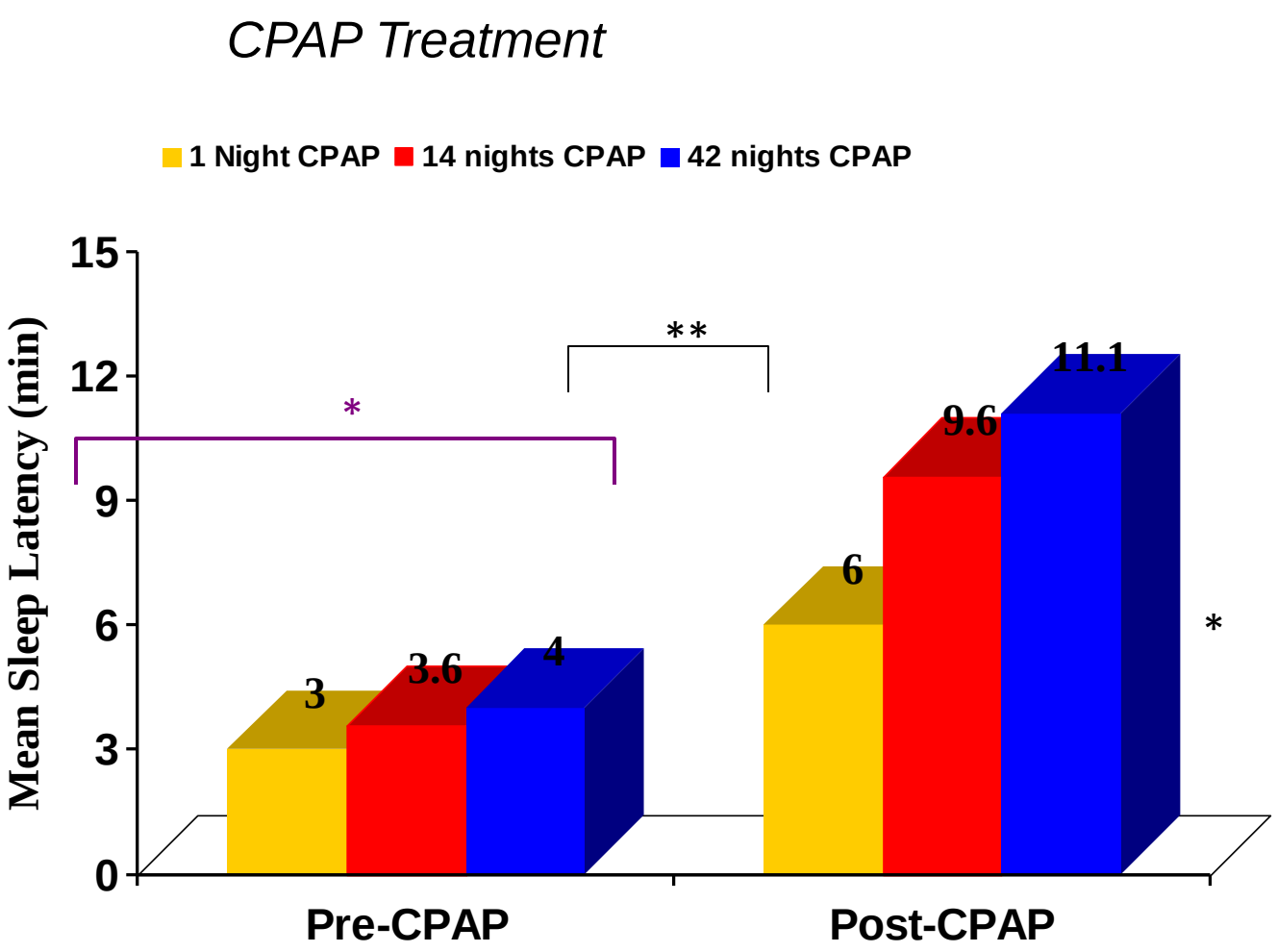


Airway Closure without CPAP



Airway Splinted Open with CPAP

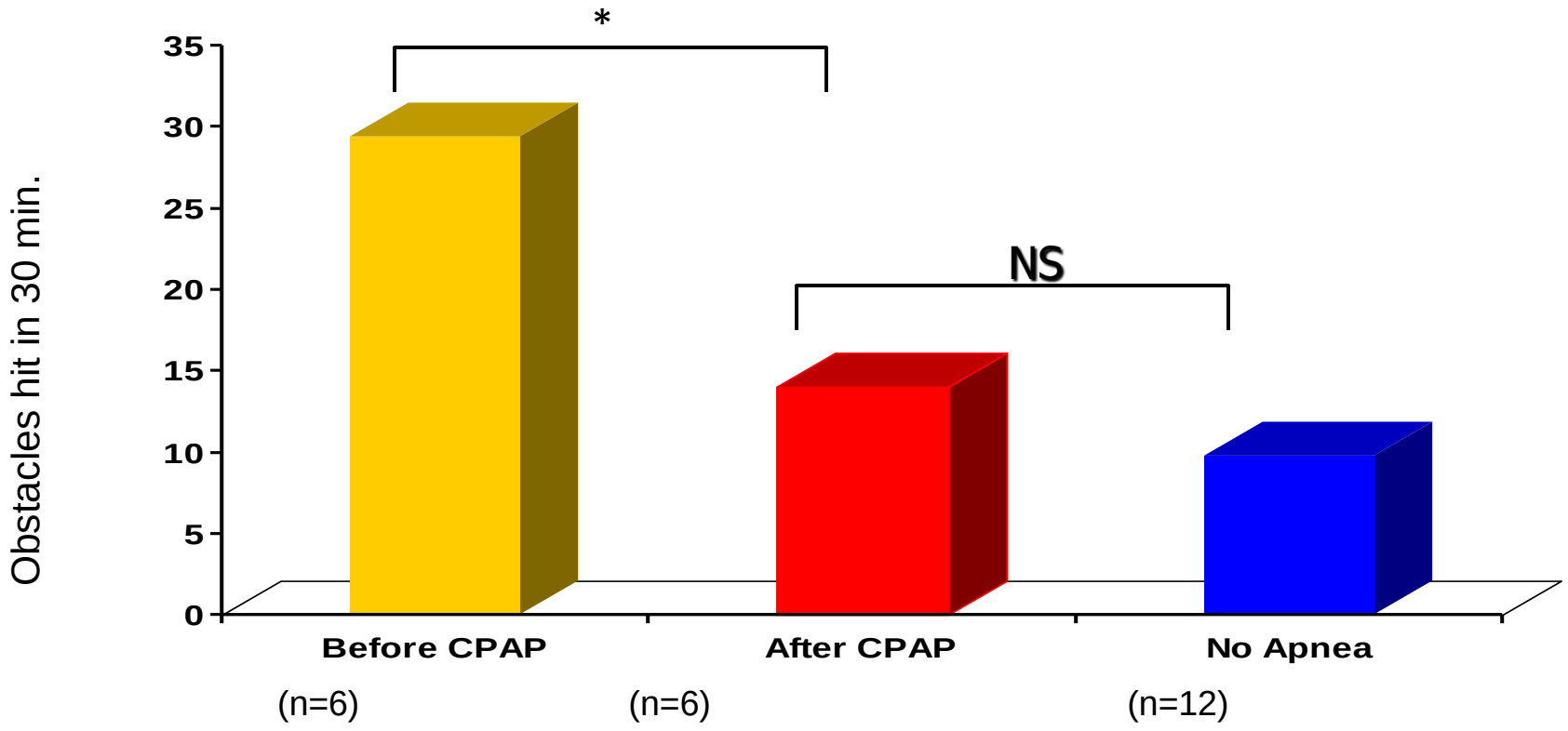
Benefits of CPAP: Sleepiness



Mean sleep latency is a measure of sleepiness

Lamphere J et al. Chest 1989;96.

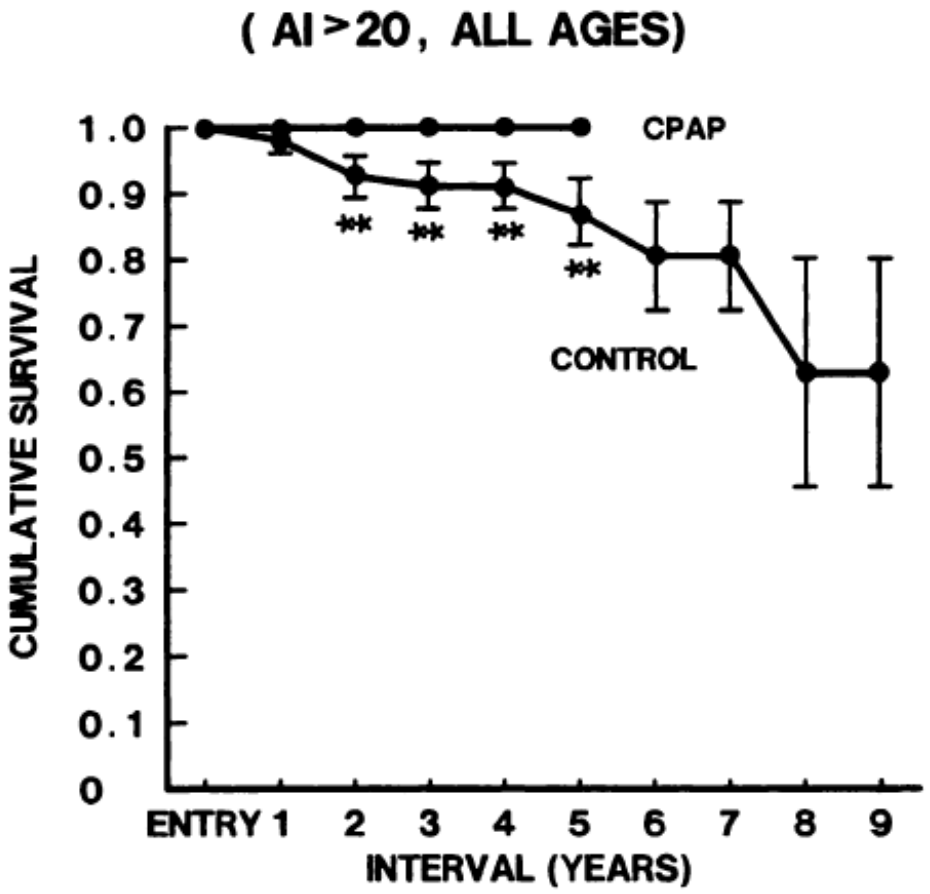
Benefits of CPAP: Performance



Test of driving performance after 3-5 months of OSA treatment

Findley L et al. Clin Chest Med 1992;13.

Benefits of CPAP: Mortality



Treatment with continuous positive airway pressure (CPAP) reduces mortality

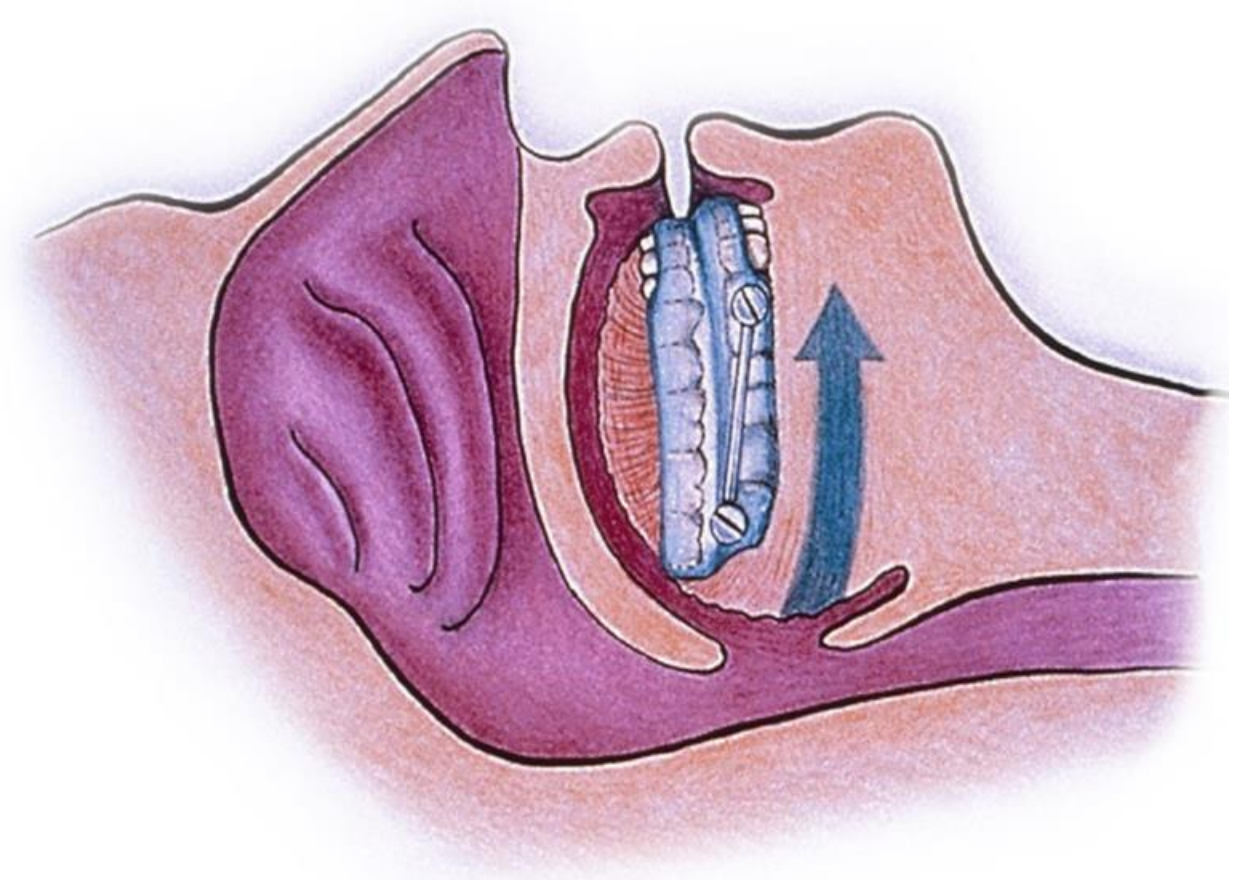
He J et al. Chest 1988;94:9-14.

CPAP Compliance

- 75% of patients report that they use their CPAP regularly
- Objectively 46% of patients use their CPAP for $\geq$ 4 hrs for $\geq$ 5 nights per week
- Asthma medicine compliance is even worse (30%)

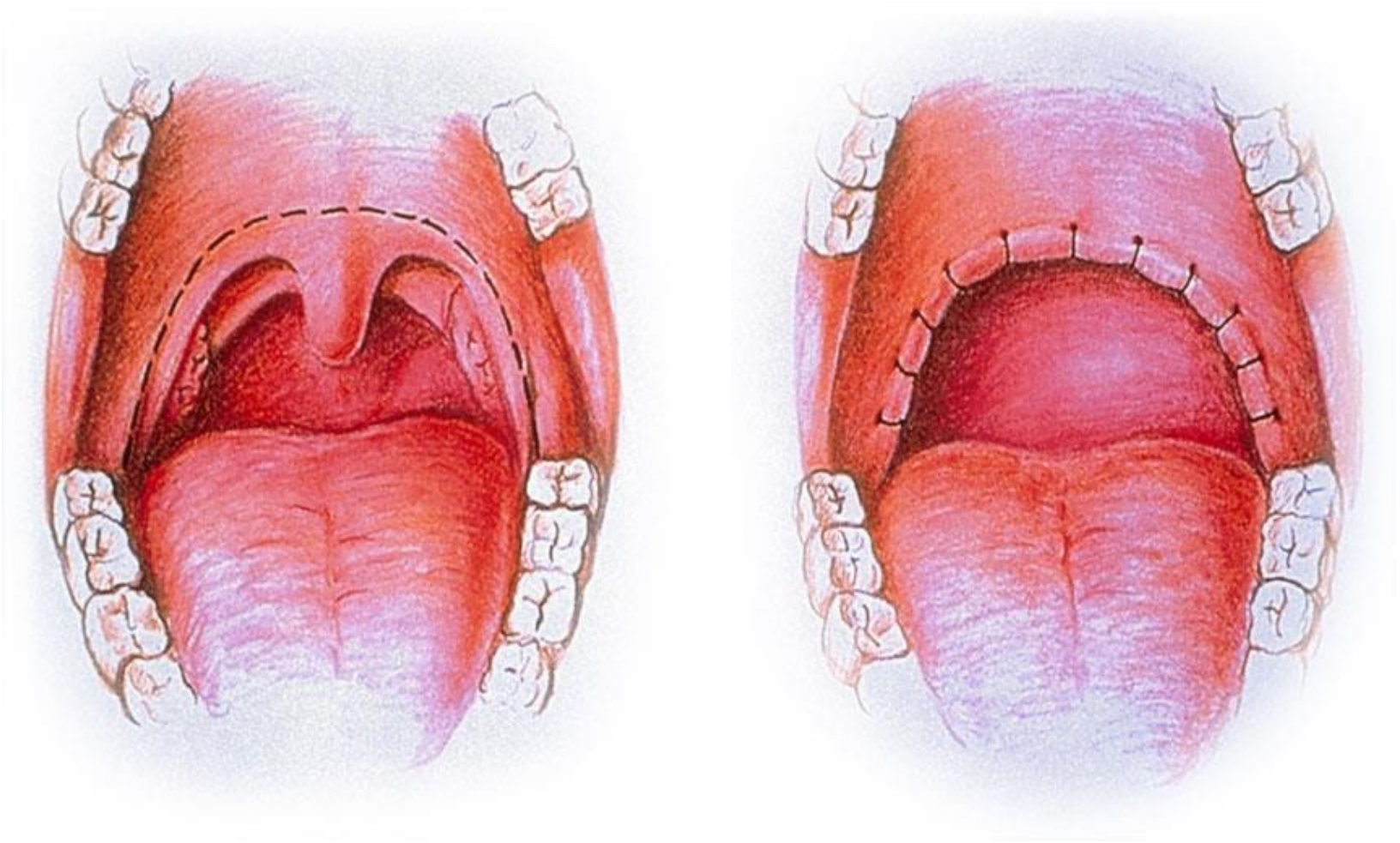
Treadmill Clothes Hanger

Treatment of OSA
Oral Appliance



Enlarges the airway, reduces airway collapsibility
and decreases airway resistance

Uvulopalatopharyngoplasty (UPPP)



40-50% success rate to cure OSA

Tracheostomy

- Last resort
- Extremely effective for the treatment of OSA
- Used for patients with severe life-threatening disease who can’t tolerate CPAP

Summary

- Sleep is common and under diagnosed
- There are two types (central and obstructive) and obstructive is by far the most common
- Diagnosis is made by overnight sleep study
- There are several risk factors for OSA
  - some modifiable: alcohol intake and weight
- There are a number of consequences of untreated OSA that improve with treatment
- Treatment options include dental device, CPAP, surgery