

SLEEP APNEA: THE UNWANTED BEDFELLOW

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DISCLOSURES

I have no relevant relationships with ineligible companies to disclose within the past 24 months.

OBJECTIVES

At the conclusion of this session, participants should be able to:

1. Define Obstructive Sleep Apnea (OSA) and differentiate from central sleep apnea
2. Correlate OSA pathophysiology to complications of untreated disease
3. Identify risk factors for OSA and indications for a sleep study
4. Describe treatment options for OSA, including considerations for specific patient populations

OBSTRUCTIVE SLEEP APNEA: WHY WE CARE

Prevalence

Symptoms overlooked or misinterpreted

Can contribute to development or worsening of chronic conditions

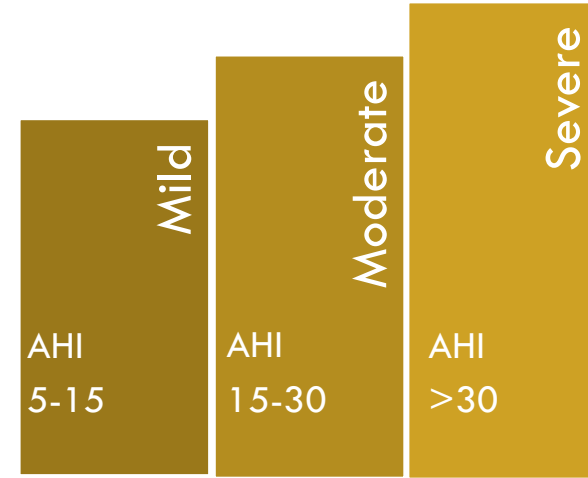
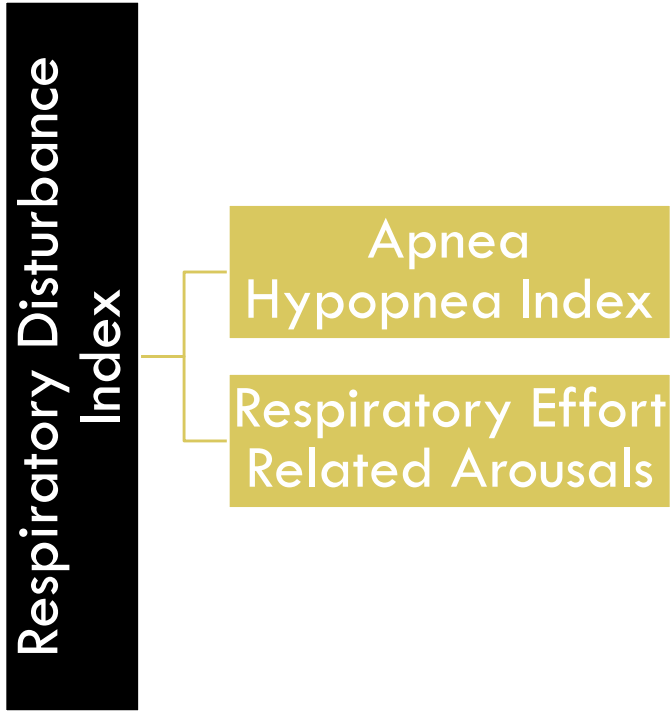
Apnea: Breathing cessation \geq
10 secs

Hypopnea: Decrement in
airflow

Obstructive: Cessation or
reduction of airflow despite
respiratory effort

Central: Cessation or
reduction of airflow without
respiratory effort

Mixed: Initially appears
central with respiratory effort
in latter portion of episode



DETERMINING SEVERITY

OBSTRUCTIVE SLEEP APNEA



Definition: Repetitive episodes of upper airway obstruction during sleep



Clinical Cutoffs Vary: Lower AHI/RDI threshold with symptoms or associated comorbidities

CENTRAL SLEEP APNEA

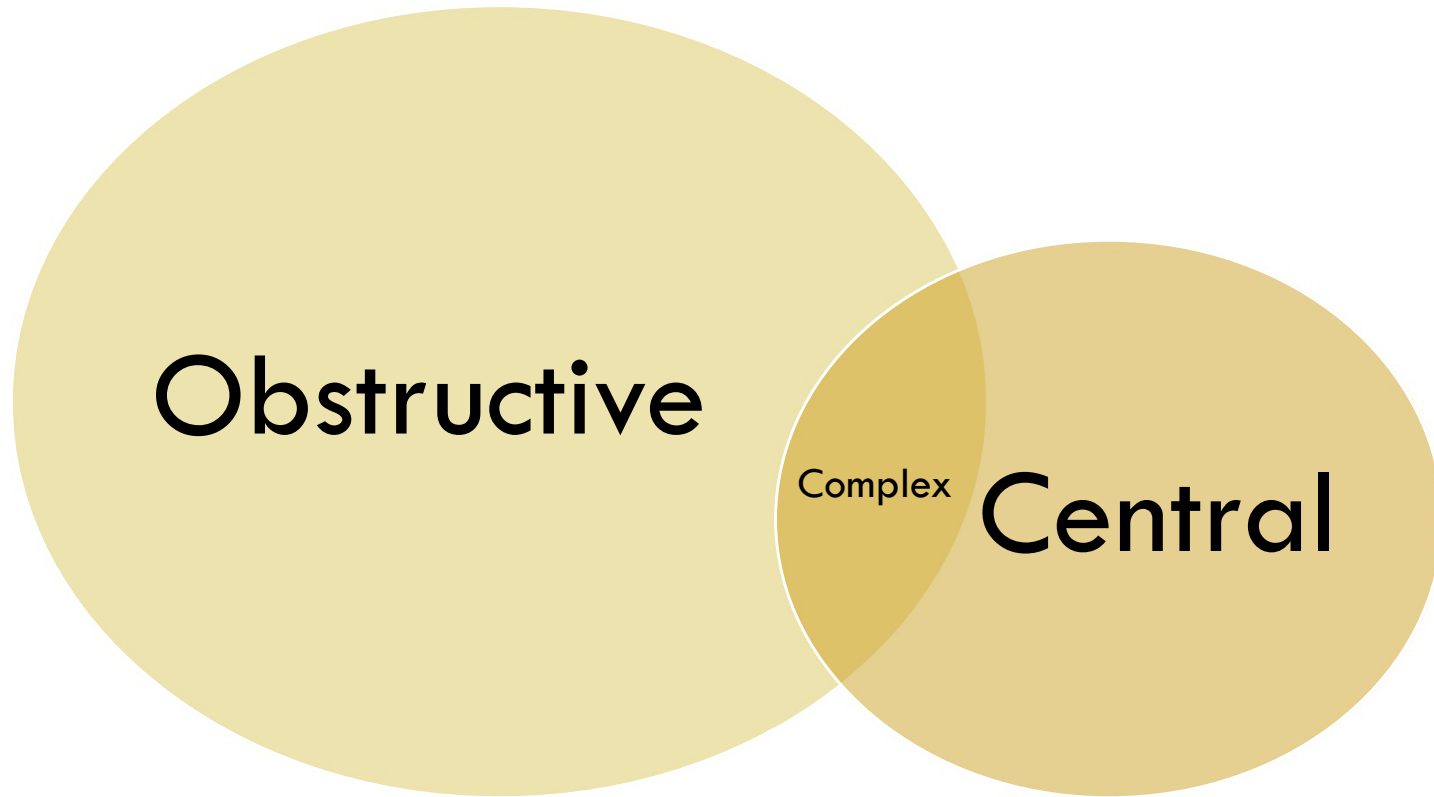


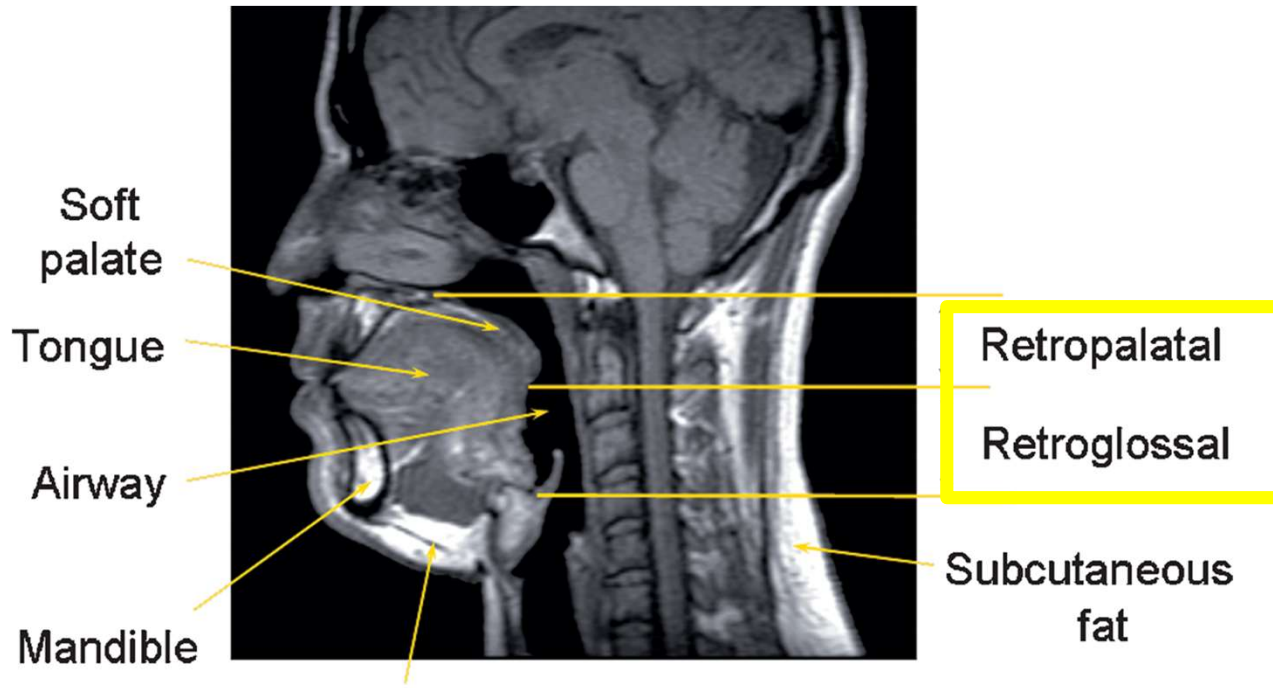
Apneas in absence of respiratory muscle effort



Most common etiologies: heart failure and stroke

SLEEP APNEA

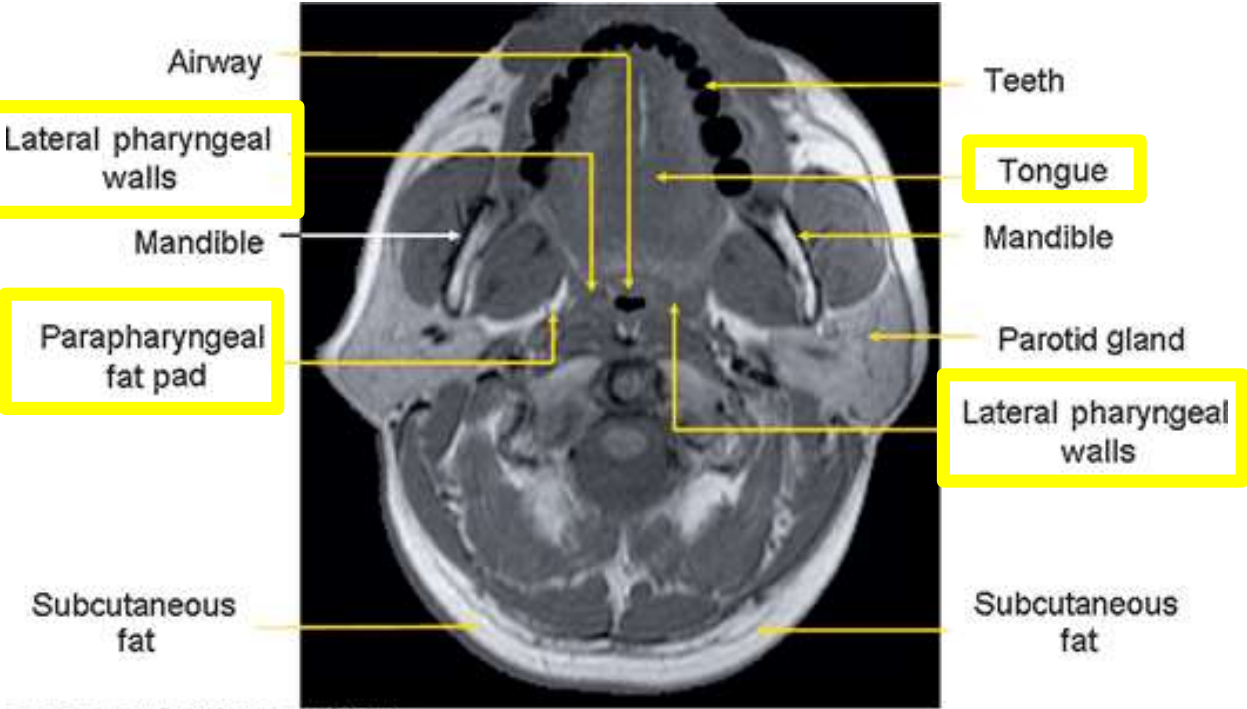




THE OBSTRUCTION IN OSA

Subcutaneous fat

Source: Michael A. Grippi, Jack A. Elias, Jay A. Fishman, Robert M. Kotloff, Allan I. Pack, Robert M. Senior, Mark D. Siegel: *Fishman's Pulmonary Diseases and Disorders*: www.accessmedicine.com
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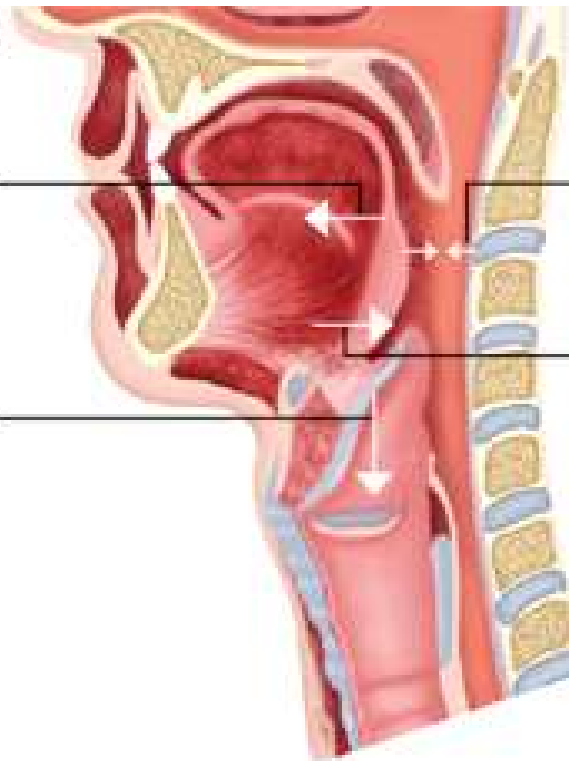
Source: Michael S. Green, Jack A. Elias, Jay A. Fishman, Robert W. Lovell, Alan L. Park, Robert M. Sano, Mark D. Sogal. Fishman's Pulmonary Diseases and Disorders, www.accessmedicine.com. Copyright © Wolters Kluwer Education. All rights reserved.

THE OBSTRUCTION IN OSA

**Forces that increase
airway caliber**

Contraction of
genioglossus muscle
to enlarge pharynx

Lung weight when
upright to lengthen
and straighten larynx
and pharynx



**Forces that decrease
airway caliber**

Partial vacuum
created by negative
inspiratory pressure

Compression by
micrognathia, facial
obesity, or prone
position

Source: Andrew J. Lechner, George M. Matuschak, David S. Brink:
Respiratory: An Integrated Approach to Disease
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Extracellular fluid shift
in supine sleep

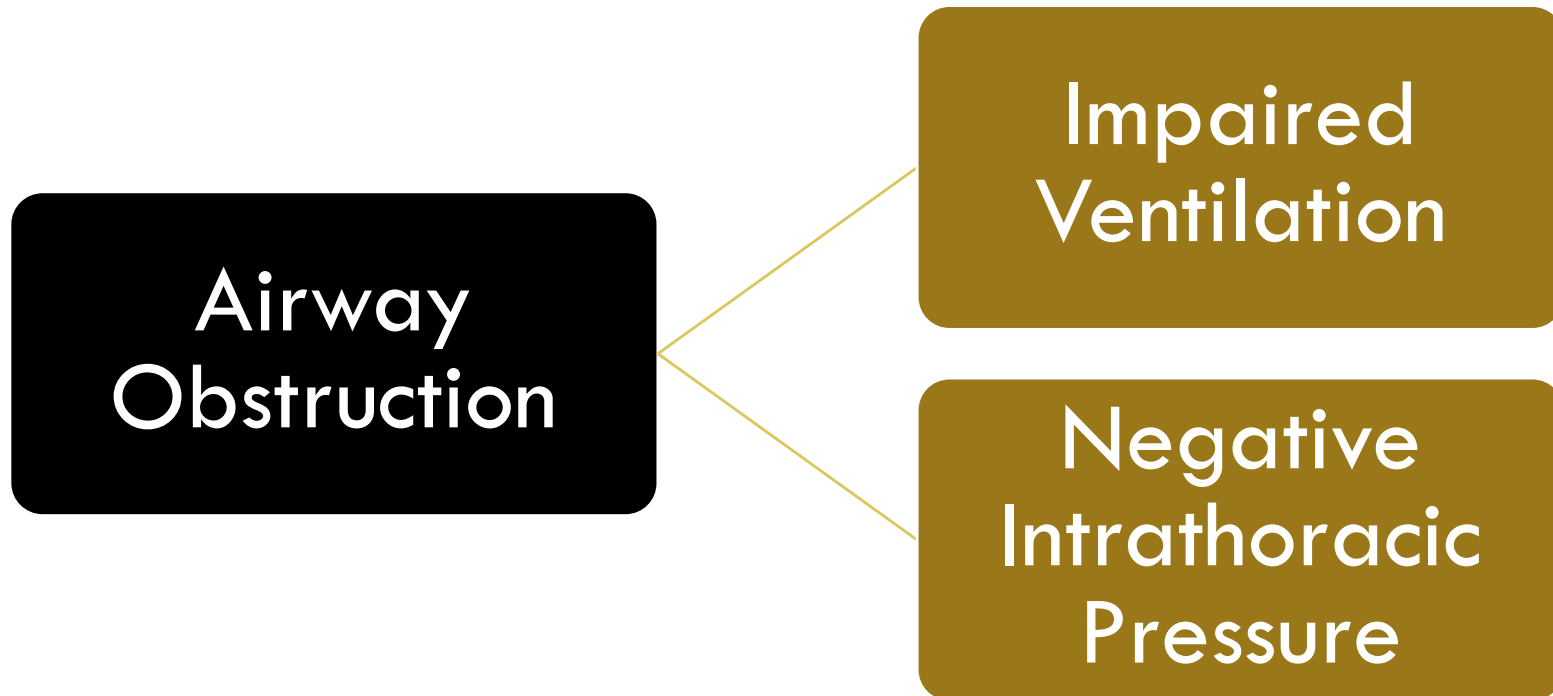
Reduced muscle
contractility

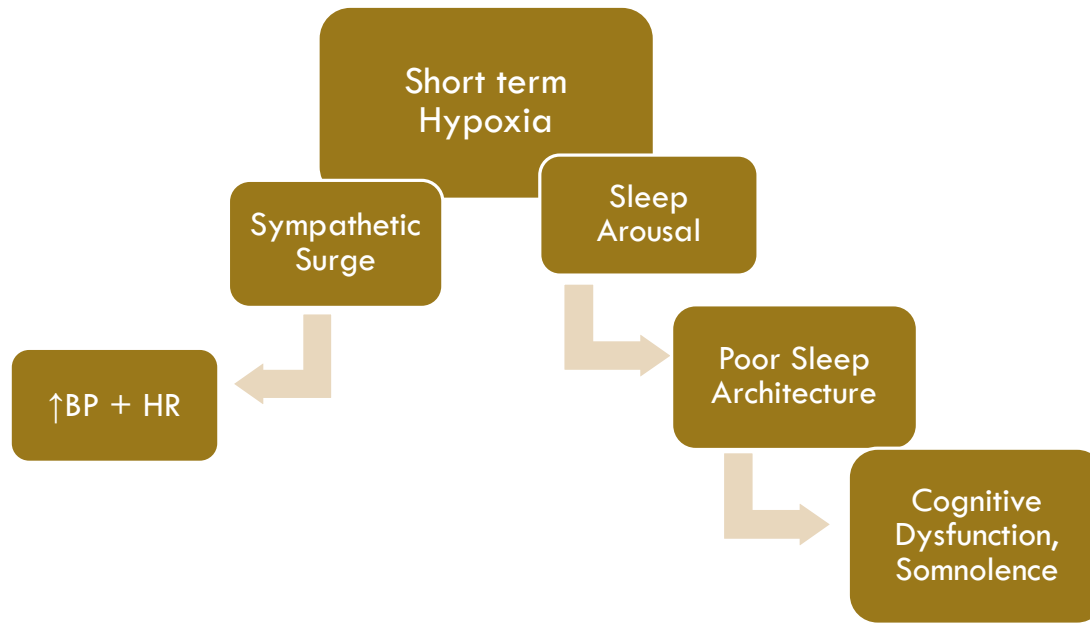
Reduced upper airway
reflexes during sleep

Neck Circumference

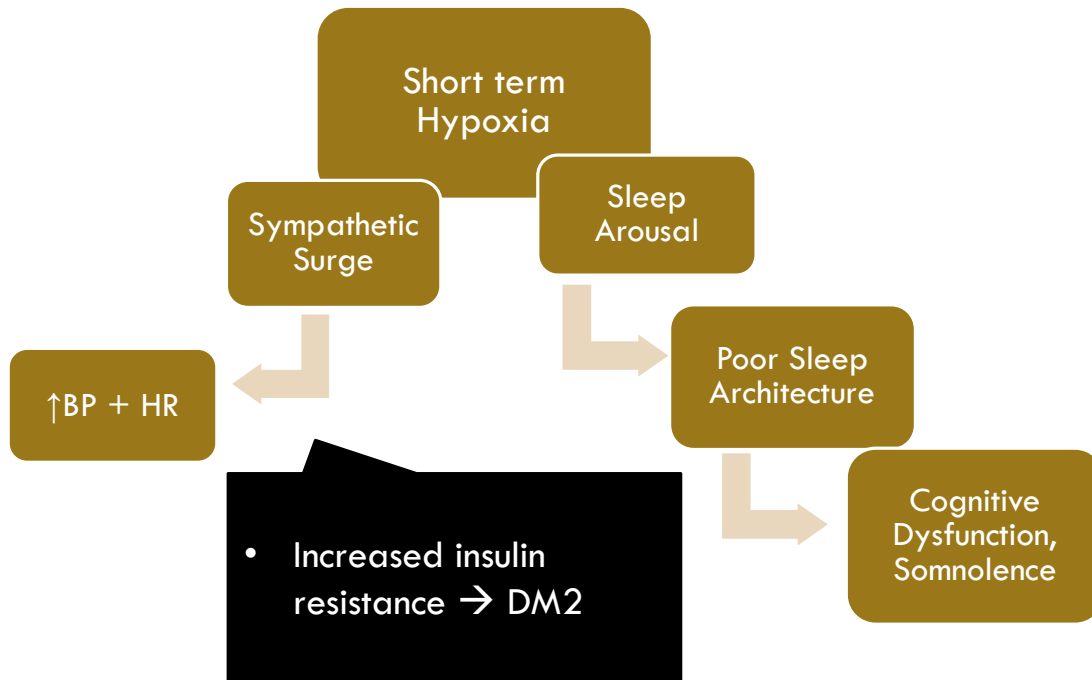
**FACTORS
CONTRIBUTING
TO
OBSTRUCTION**

OSA: TWO PATHWAYS FOR DISEASE IMPLICATION

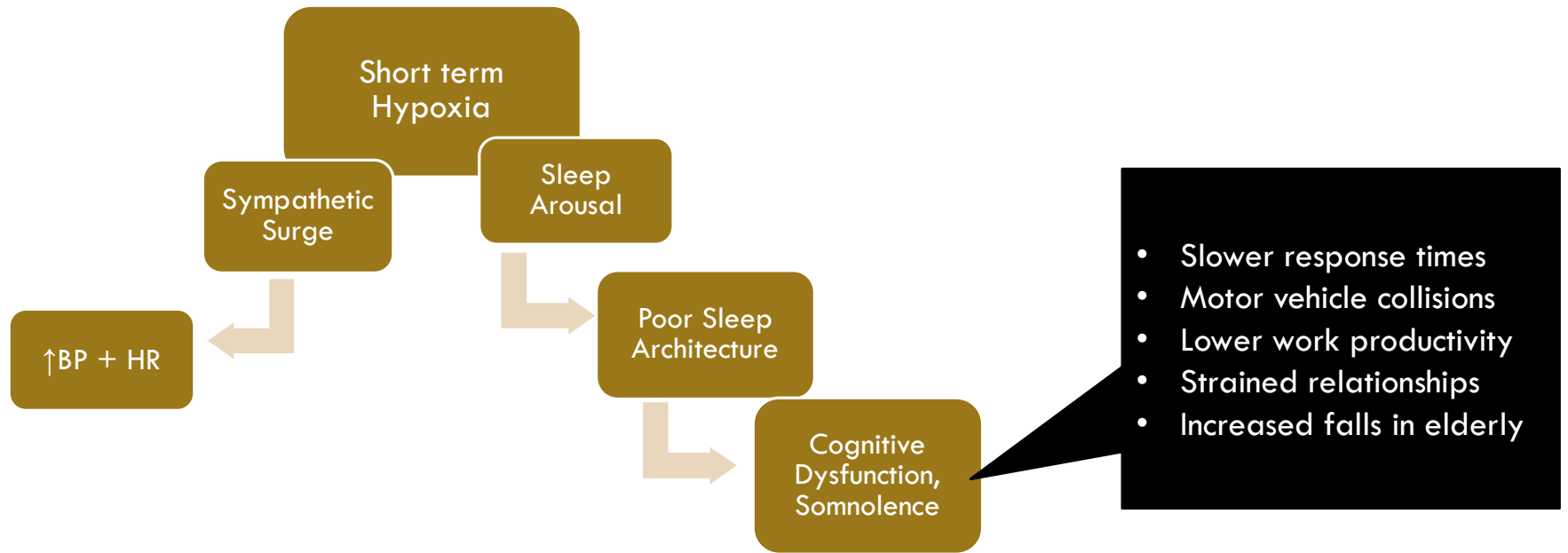




IMPAIRED VENTILATION



IMPAIRED VENTILATION



IMPAIRED VENTILATION

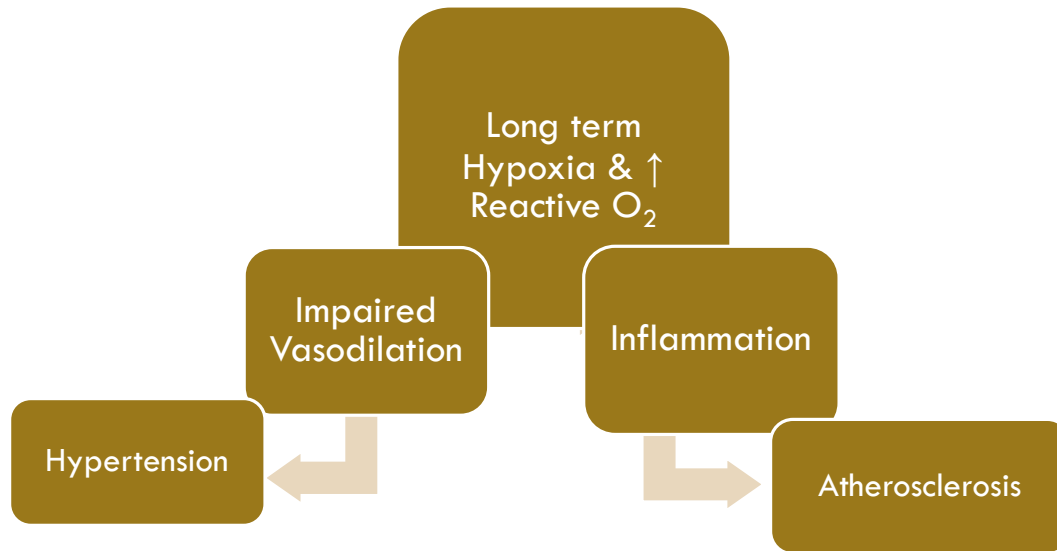
NEUROCOGNITIVE CONSEQUENCES

Reduced vigilance → vehicle crashes

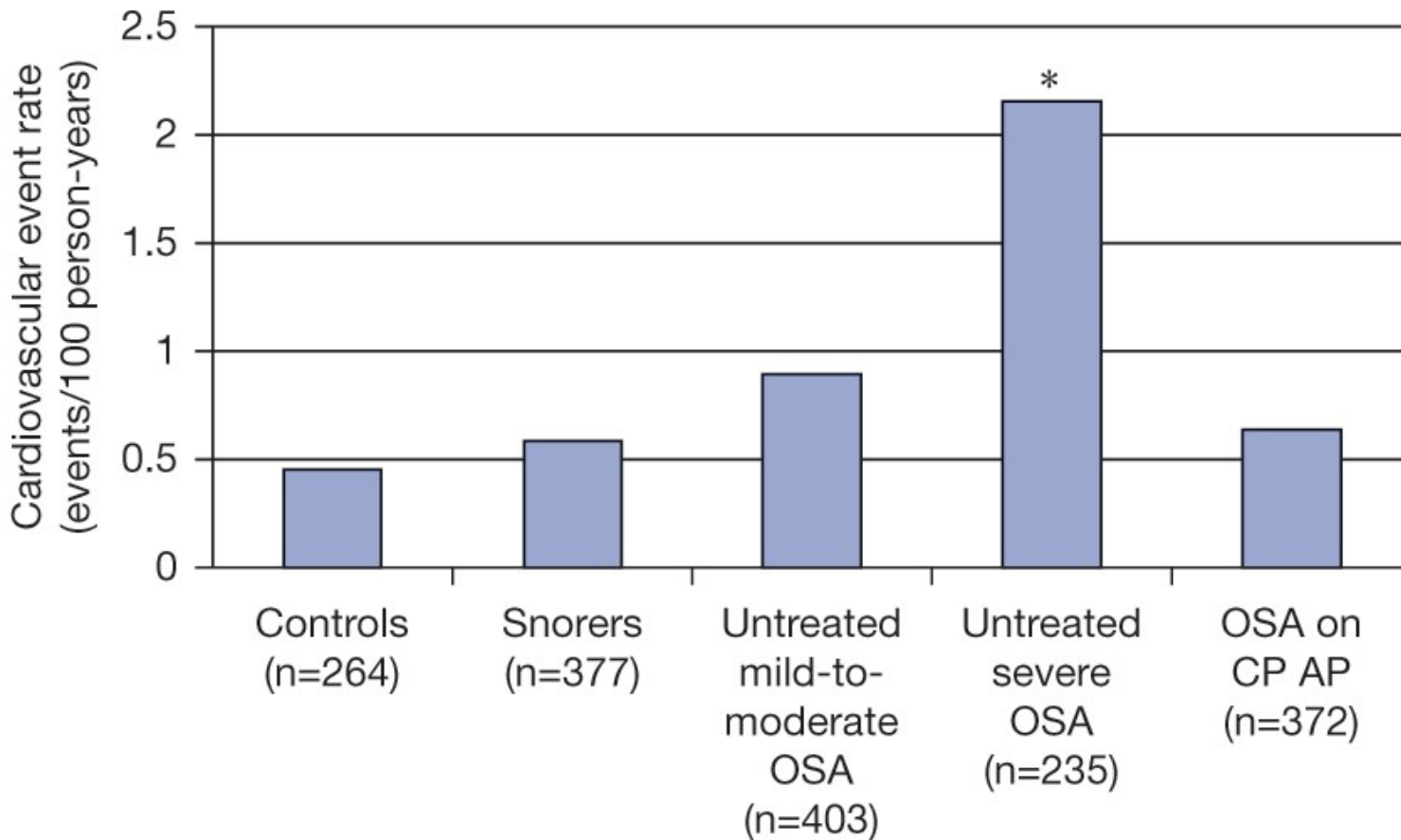
Depression

Poor Quality of Life

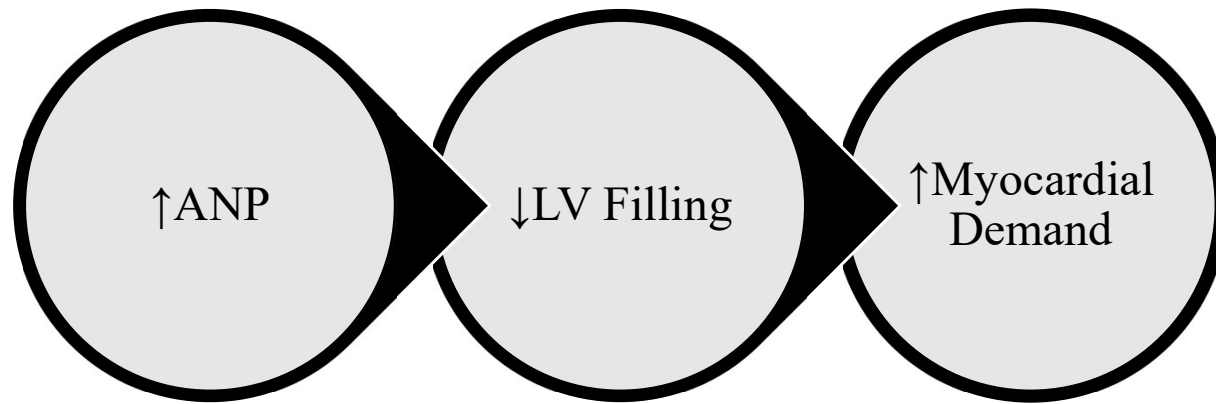
Increased risk of dementia



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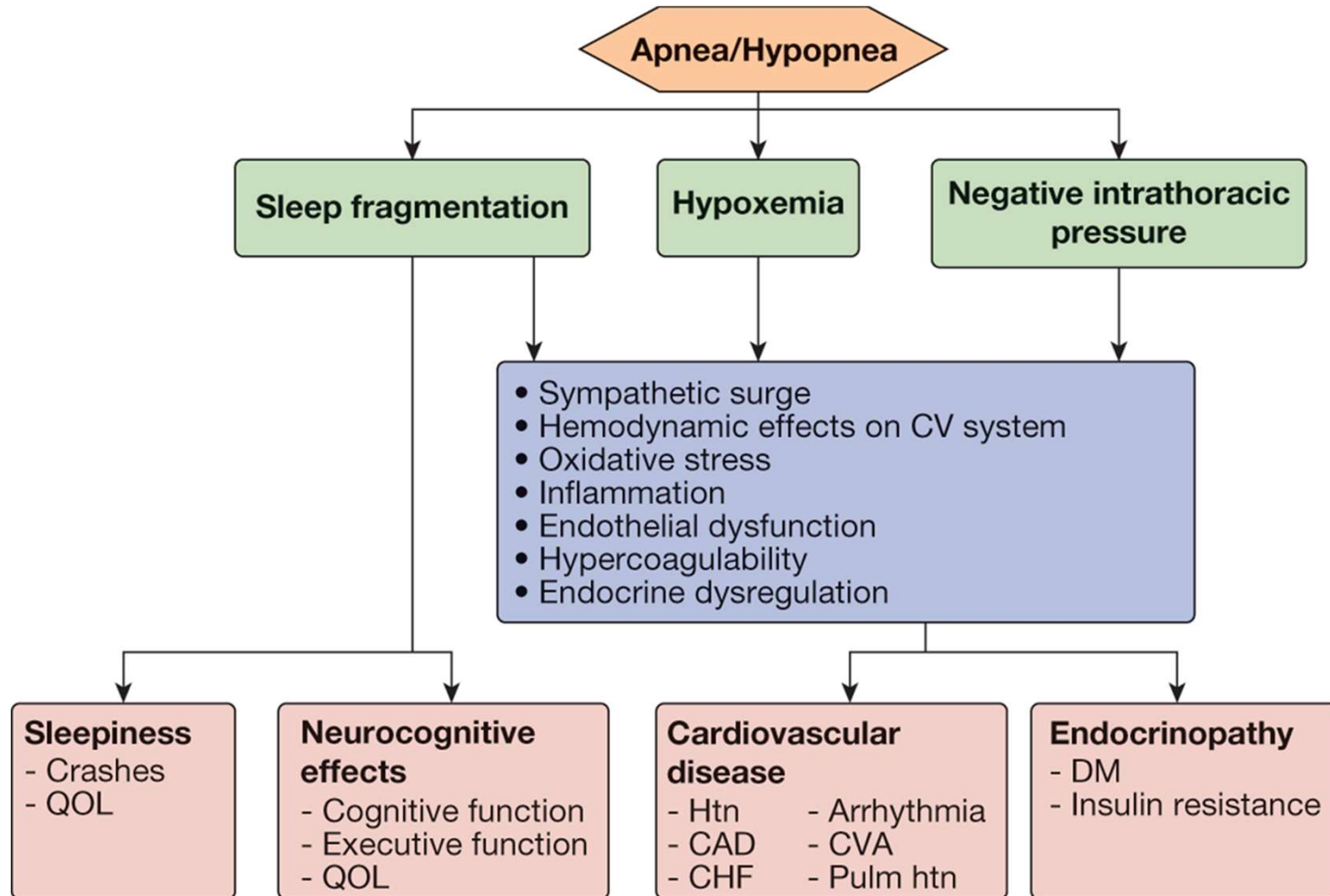


Source: Michael A. Grippi, Jack A. Elias, Jay A. Fishman, Robert M. Kotloff, Allan I. Pack, Robert M. Senior, Mark D. Siegel: *Fishman's Pulmonary Diseases and Disorders*: www.accessmedicine.com
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NEGATIVE INTRATHORACIC PRESSURE

CONSEQUENCES OF OSA



Source: Michael A. Grippi, Jack A. Elias, Jay A. Fishman, Robert M. Kotloff, Allan I. Pack, Robert M. Senior, Mark D. Siegel: *Fishman's Pulmonary Diseases and Disorders*: www.accessmedicine.com
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Est. 9-38% US population

Males >> Females

Increased age

EPIDEMIOLOGY

RISK FACTORS

Menopause

Family history

Genetic syndromes

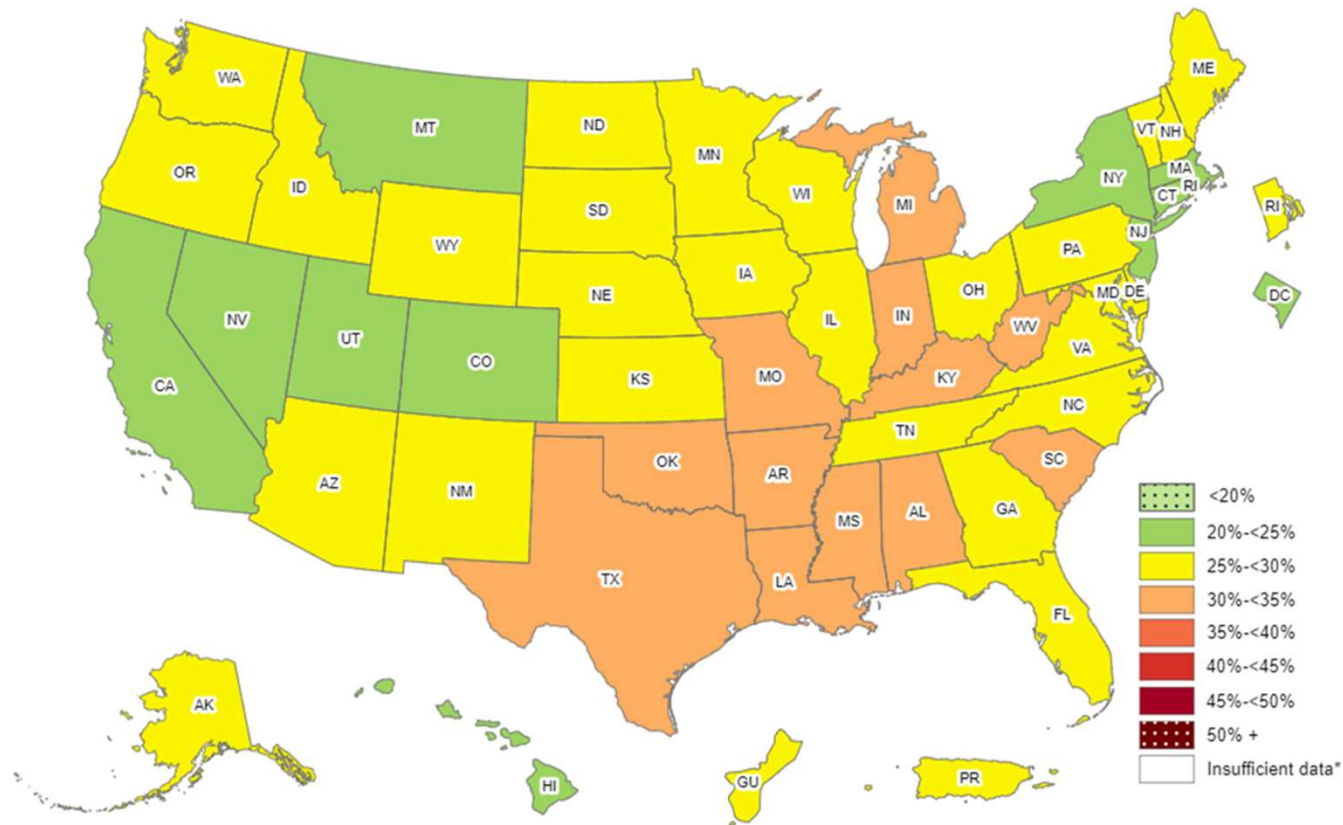
Alcohol, sedative, hypnotic use

Cigarette smoking

Obesity

PREVALENCE[†] OF SELF-REPORTED OBESITY AMONG U.S. ADULTS BY STATE AND TERRITORY, BRFSS, 2011

[†] Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

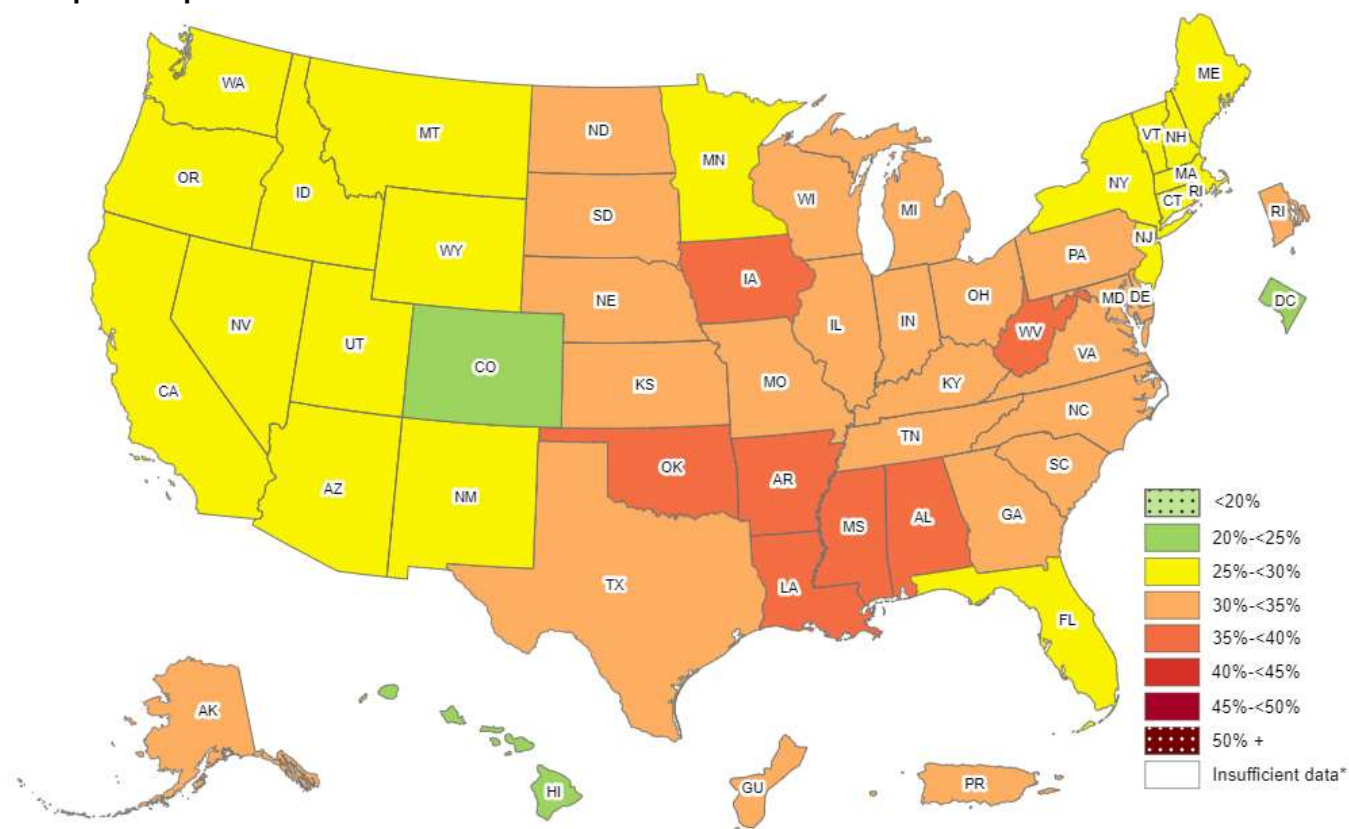


*Sample size <50, the relative standard error (dividing the standard error by the prevalence) $\geq 30\%$, or no data in a specific year.



PREVALENCE[†] OF SELF-REPORTED OBESITY AMONG U.S. ADULTS BY STATE AND TERRITORY, BRFSS, 2017

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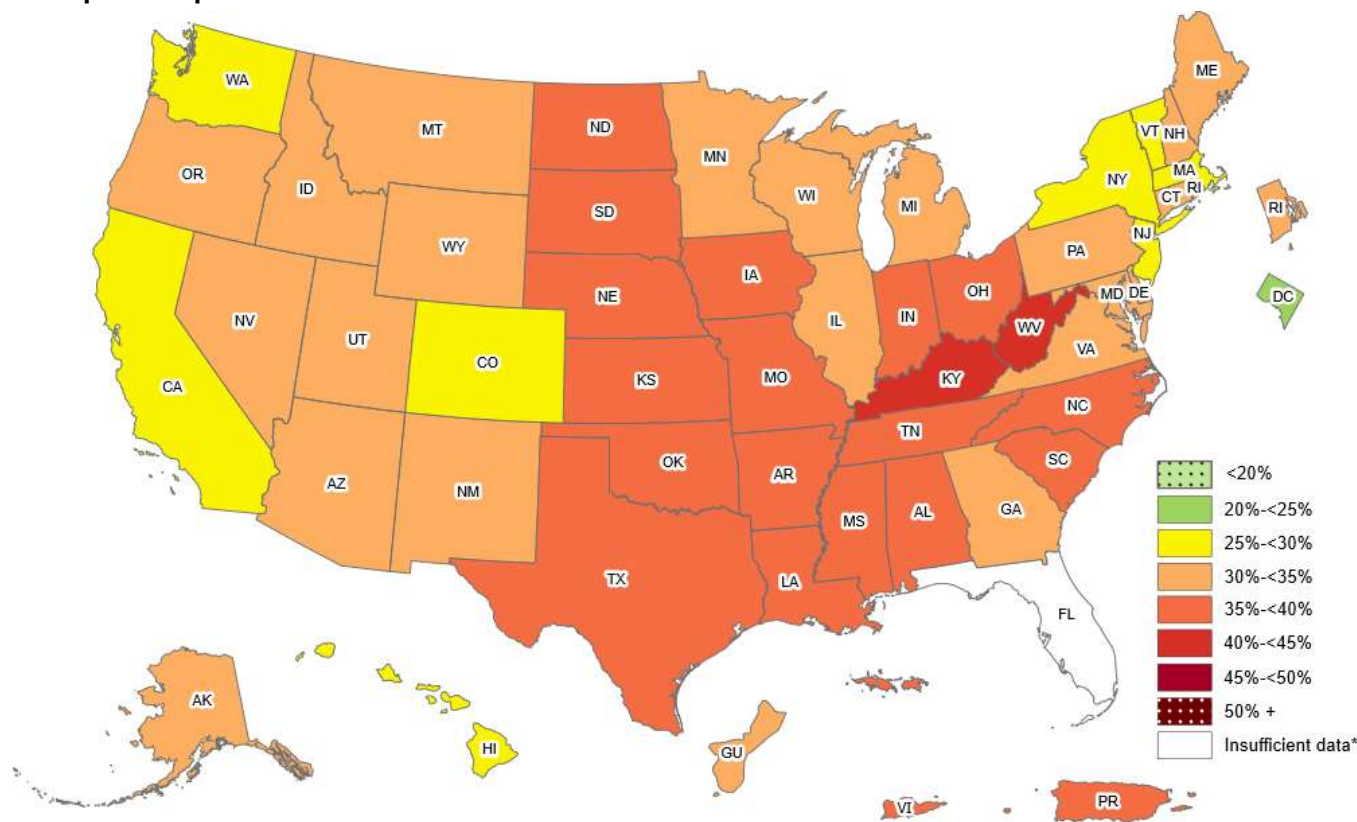


*Sample size <50, the relative standard error (dividing the standard error by the prevalence) $\geq 30\%$, or no data in a specific year.



PREVALENCE[†] OF SELF-REPORTED OBESITY AMONG U.S. ADULTS BY STATE AND TERRITORY, BRFSS, 2021

[†] Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

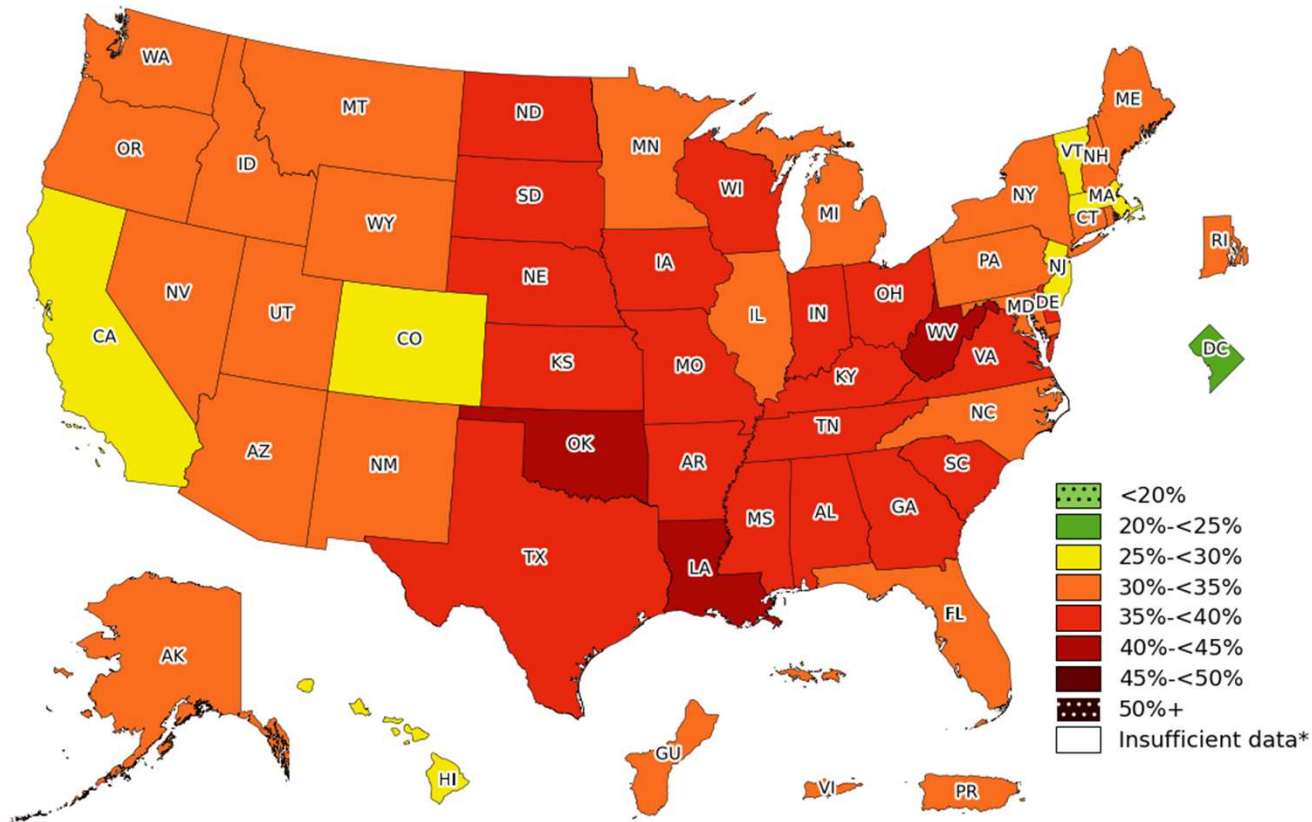


*Sample size <50, the relative standard error (dividing the standard error by the prevalence) $\geq 30\%$, or no data in a specific year.



PREVALENCE[†] OF OBESITY BASED ON SELF-REPORTED WEIGHT AND HEIGHT AMONG US ADULTS BY STATE AND TERRITORY, BRFSS, 2022

[†] Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.





OBESITY AND SLEEP APNEA

Strongest risk factor for OSA

Dose response relationship

BMI correlates with fat
deposition in the tongue

Bidirectional relationship

**RISK FACTORS:
ENDOCRINE
ABNORMALITIES**

Hypothyroidism

Acromegaly

PCOS

RISK FACTORS: CRANIOFACIAL AND UPPER AIRWAY ANATOMY

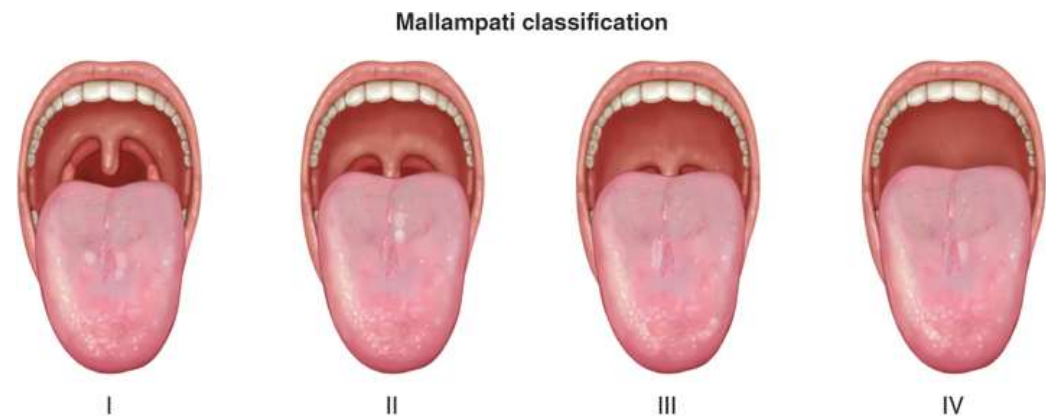
Tonsillar hypertrophy

Nasal septum deviation

Macroglossia

Class III/IV Mallampati airway

Micro/retrognathia



Source: John M. Oropello, Stephen M. Pastores,
Vladimir Kvetan: Critical Care
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CLINICAL PRESENTATION

Awakening with gasping or choking sensation
Loud snoring
Witnessed apneas
Nocturia
Daytime sleepiness
Difficulty concentrating
Morning headaches
Irritability/depressive symptoms/personality changes
Sexual dysfunction



SCREENING



Insufficient evidence for screening asymptomatic patients

Pulmonary hypertension
Recurrent atrial fibrillation
Difficult to treat hypertension

SCREENING TOOLS

	Format	Clinical Considerations
Berlin Questionnaire	Three sections with 10 questions	More complex scoring method; more commonly used in research settings
STOP-Bang Questionnaire	Four subjective and four demographic items	Easy to administer
Epworth Sleepiness Scale	Eight items measure daytime sleepiness in Likert scale	May be used to assess response to OSA therapy

WHY IS THE PATIENT PRESENTING NOW?



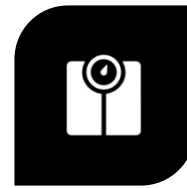
DAYTIME
SYMPTOMS



QUALITY OF
SLEEP



HISTORY FROM
PARTNER



WEIGHT
CHANGES



FACIAL TRAUMA
OR SURGERY

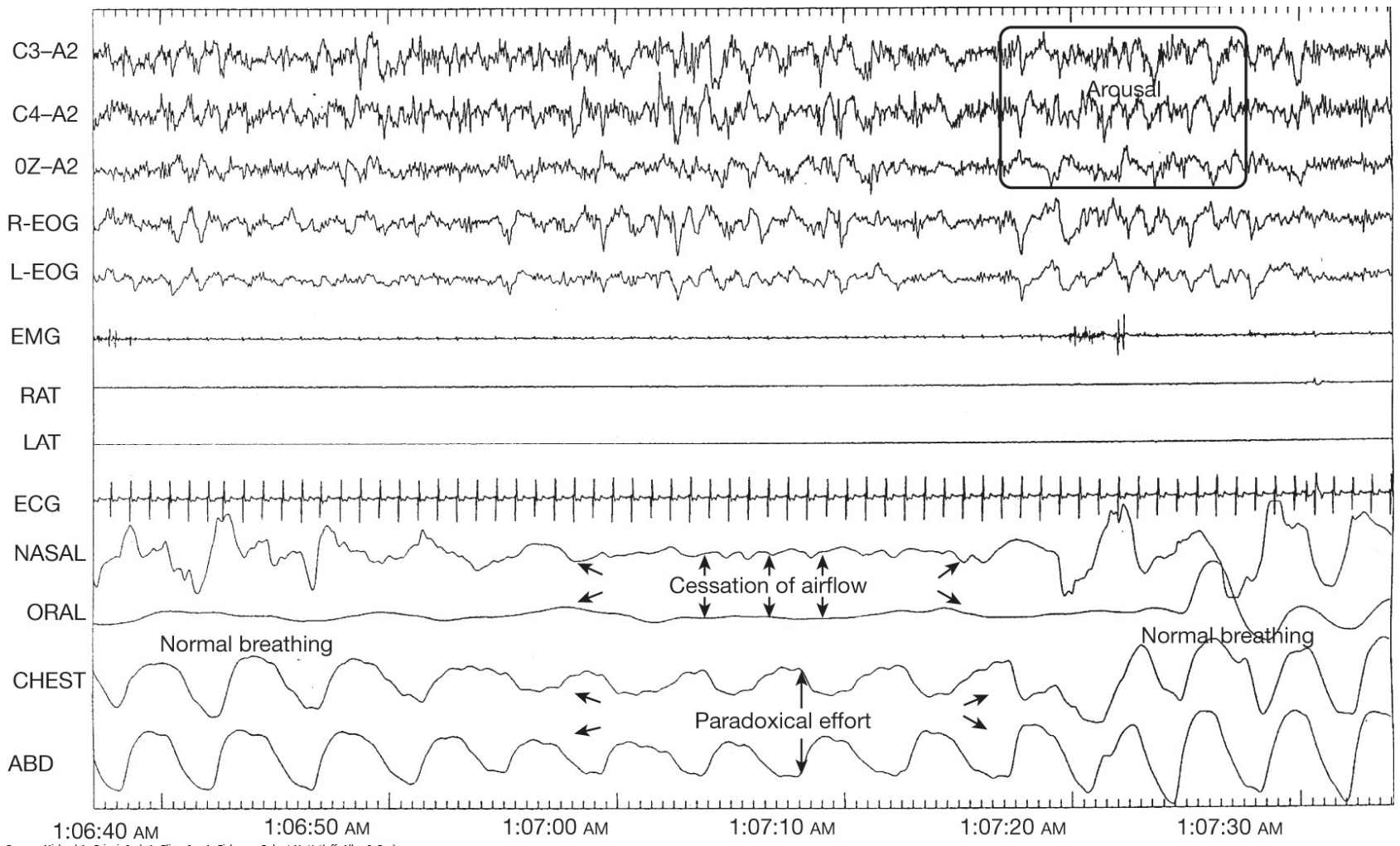
DIAGNOSIS

Polysomnogram

- O₂ saturation
- Nasal and oral air flow
- Respiratory movement
- Snoring
- EEG
- ECG
- Electromyography
- Ocular movement

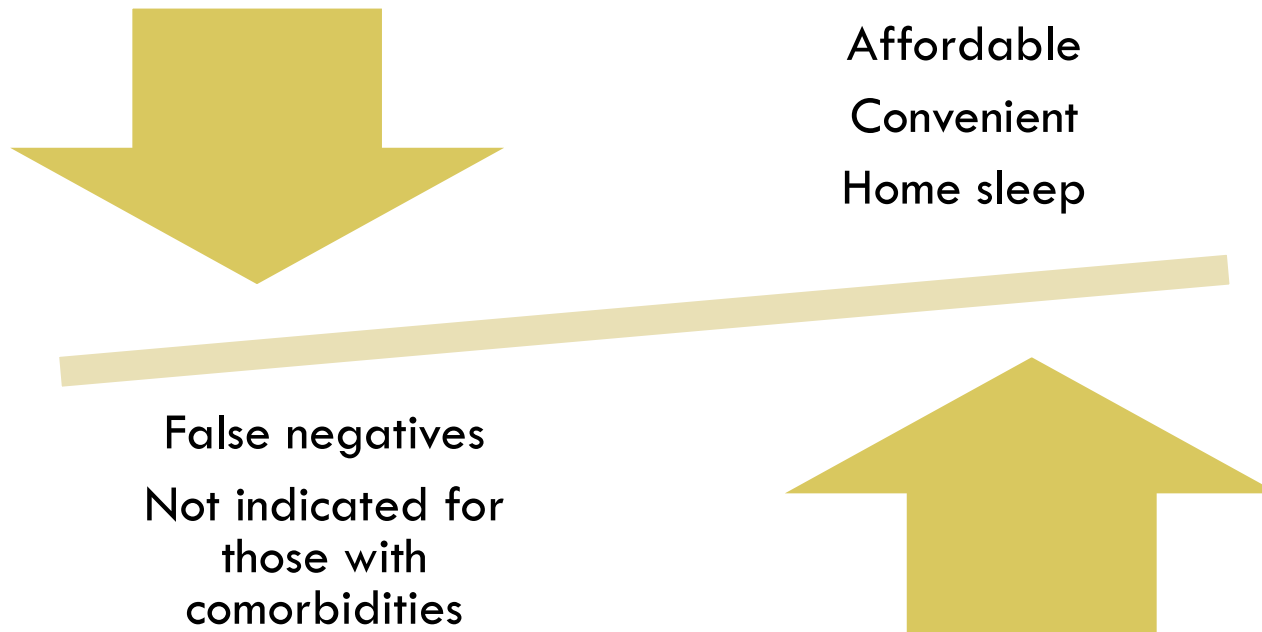
Home Sleep Test

- O₂ saturation
- Nasal airflow
- Respiratory movement



Source: Michael A. Grippi, Jack A. Elias, Jay A. Fishman, Robert M. Kotloff, Allan I. Pack, Robert M. Senior, Mark D. Siegel: *Fishman's Pulmonary Diseases and Disorders*; www.accessmedicine.com
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HOME SLEEP STUDIES: PROS & CONS



POLYSOMNOGRAM AS FIRST LINE

Significant cardiorespiratory disease

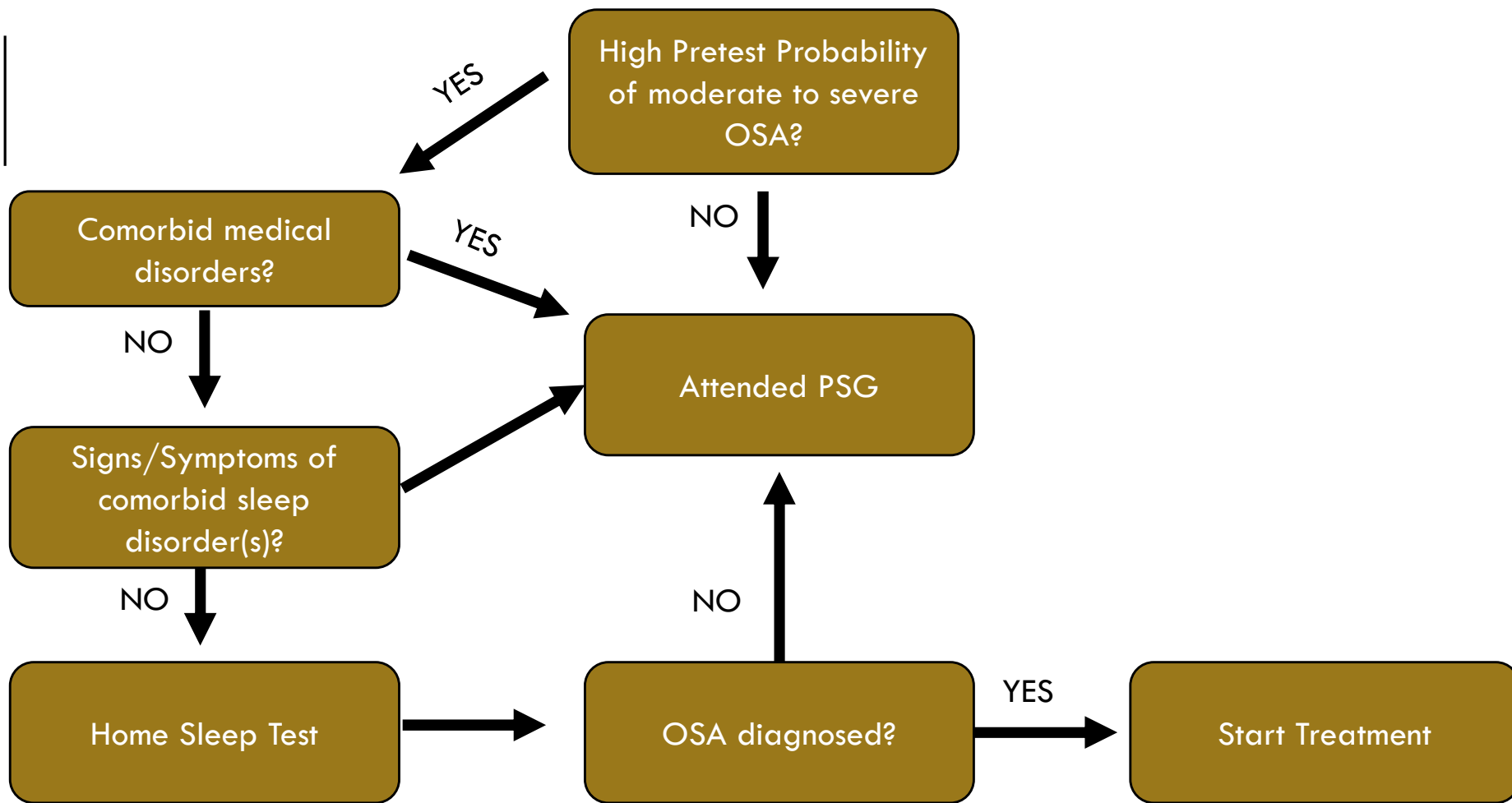
Potential respiratory muscle weakness due to neuromuscular condition

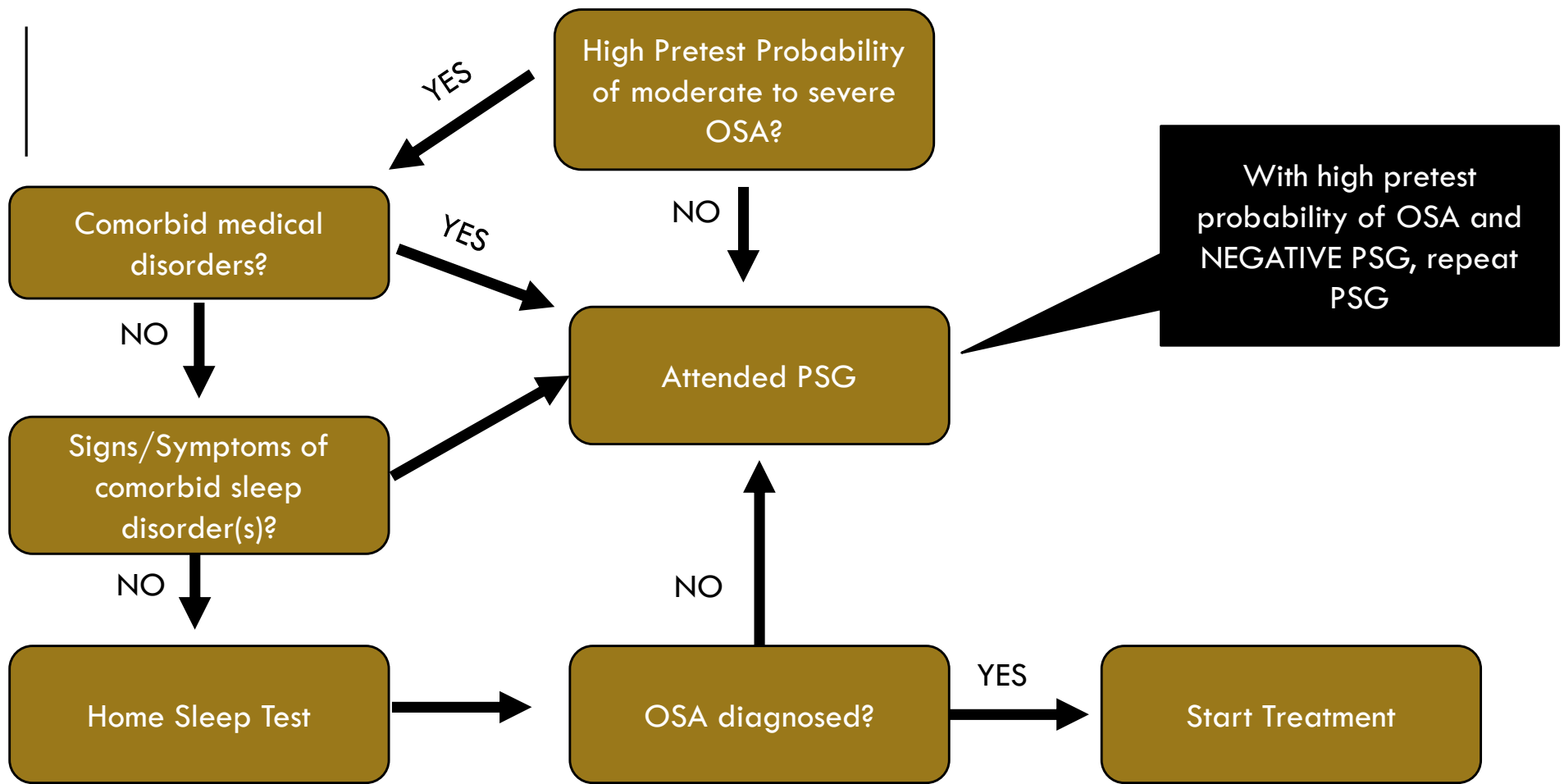
Awake hypoventilation or suspicion of sleep related hypoventilation

Chronic opioid use

History of stroke

Severe insomnia





LIMITATIONS OF AHI

Duration of apneic or hypopneic events

Severity and duration of oxygen desaturation

Heart rate variability

Awakenings

Periodic limb movements

Daytime sleepiness



NOT EVERY SLEEPY PATIENT HAS OSA

Other Causes of Daytime Sleepiness

Nocturnal respiratory failure secondary to neuromuscular weakness

Narcolepsy

Sleep related movement disorders

Depression

Post-viral fatigue

Metabolic or drug induced hypersomnolence

Insufficient sleep

Circadian rhythm sleep disorders

Head Injury

Idiopathic hypersomnolence

TO TREAT OR NOT TO TREAT

Severity

- AHI ≥ 15

Symptoms

- Sleepiness
- Mild/Moderate OSA

Comorbidities

- HTN
- Hx of CVA
- Ischemic Heart Disease

TREATMENT OPTIONS FOR MILD/MODERATE OSA



Weight loss



Sleep Hygiene



Medication list diuresis



Sleep Position

Continuous (CPAP)

- Requires titration

Auto-Titrating (APAP)

- Adjusts based on breathing patterns

Bi-Level (BiPAP)

- Two pressure settings
- More tolerable with higher pressure

POSITIVE AIRWAY PRESSURE (PAP)

Normal

0 cm H₂O

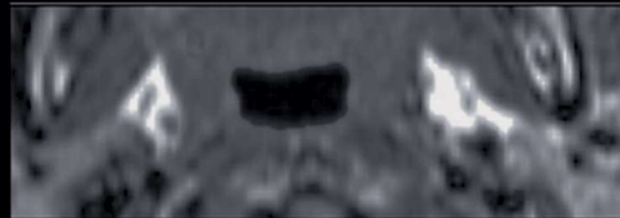


5 cm H₂O

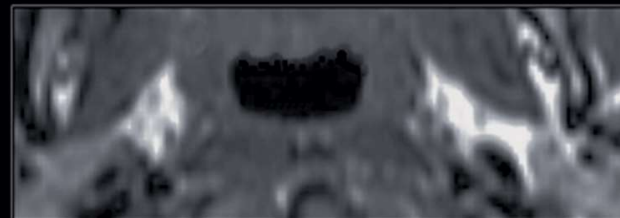


Progressive increases in CPAP

10 cm H₂O



15 cm H₂O



PAP MASKS

Nasal insert



Full-face mask



Nasal mask

B

Source: Michael A. Grippi, Jack A. Elias, Jay A. Fishman, Robert M. Kotloff, Allan I. Pack, Robert M. Senior, Mark D. Siegel: *Fishman's Pulmonary Diseases and Disorders*; www.accessmedicine.com
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PAP TOLERABILITY

Patient Education

Nasal irritation/rhinitis → heated humidification, nasal steroid

Claustrophobia → alter mask type

Air leaks/dry mouth → alter mask type, add a chin strap

Aerophagia → alter mask type, alter body position

PAP ADHERENCE

Timeline

- 30-90 days after set up
- Annually with stability

Assess:

- Residual AHI
- Symptoms
- Number of hours each night
- Percentage of nights in use

Surgical Evaluation

- Anatomical variations
- Can reduce minimum required PAP pressure and tolerability
- Weigh risk vs benefit

Oral Appliance

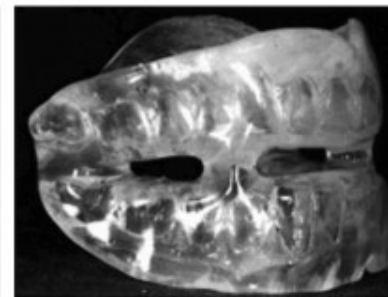
- May be considered for mild to moderate OSA

Hypoglossal nerve stimulation

- Moderate to severe OSA
- BMI < 35

SECOND LINE TREATMENT OPTIONS

ORAL APPLIANCE



WHEN TO REPEAT THE STUDY

Weight loss of 10% or
more of body weight

Return of symptoms

- With weight gain
- Despite initial improvement

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QUESTIONS

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