



BEHAVIORAL HEALTH ECHO

MODULE 4: SLEEP DISORDERS

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Identifying and Treating Sleep Apnea



I have no pertinent financial or commercial conflicts to disclose.

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OBJECTIVES

- Gain an understanding of obstructive sleep apnea pathology
- Recognize of symptoms of sleep apnea
- Employ the proper diagnostic modalities
- Familiarize with the treatment modalities of sleep apnea
- Be able to give basic education to our patients

A 64-year-old man is evaluated for a 3-month history of loud snoring and “gasping” during sleep. He also frequently falls asleep in a chair while reading in the evening. His medical history is otherwise unremarkable.

On physical examination, temperature is 37.4°C (99.3°F), blood pressure is 130/82 mm Hg, pulse rate is 80/min, and respiration rate is 14/min; BMI is 36. Neck circumference is 45.7 cm (18 in), and a low-lying soft palate is noted.

Polysomnography discloses severe obstructive sleep apnea, with an apnea–hypopnea index of 44 per hour.

Which of the following is the most appropriate next step in treatment?

- A. Continuous positive airway pressure
- B. Nocturnal oxygen therapy
- C. Oral appliance
- D. Upper airway surgery

WHY DO WE CARE?

- OSA in 4% of men and 2% in women
- Obesity epidemic
- Poor sleep quality
- Increased sleepiness affecting productivity
- Preventable motor vehicular accidents related to sleepiness

DEFINITION OF TERMS

Apnea

Cessation of breathing

Obstructive Apnea (continued effort with no air flow)

Central Apnea (no respiratory effort, similar to holding your breath voluntarily)

Hypopnea

Shallow breathing

Respiratory flow reduction of about 30% from baseline

3% or 4% desaturation

DEFINITION OF TERMS

AHI

Apnea-Hypopnea Index: frequency of apneas and hypopneas per hour of sleep

Used to determine severity of sleep apnea

Mild OSA : 5-14 events/hr plus symptoms

Moderate OSA : 15-29 events/hr

Severe OSA : 30 or more events/hr

PATHOPHYSIOLOGY

Upper airway mechanics

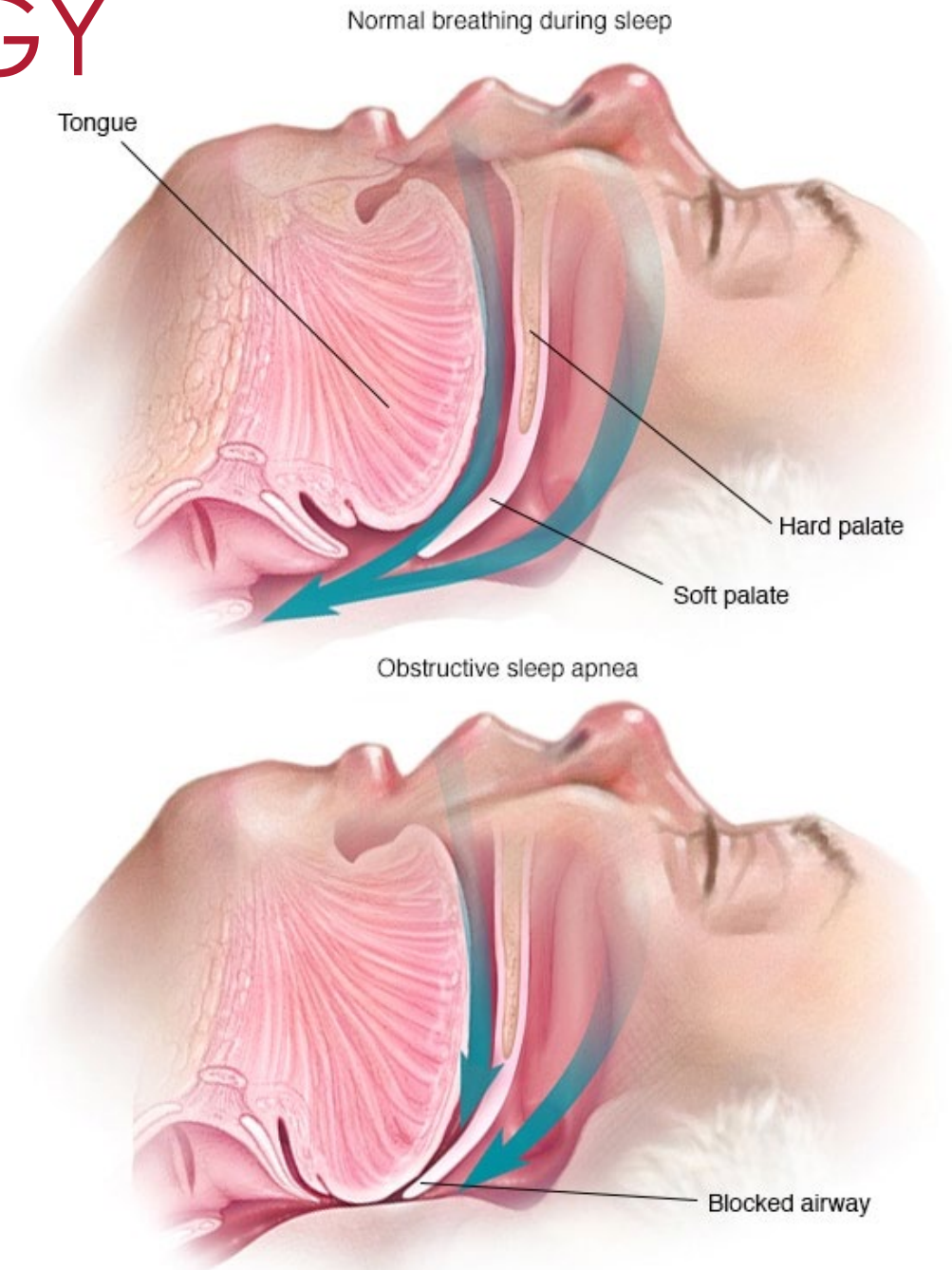
- Decreased muscle activity
- Changes in airway caliber and compliance
- Breathing muscle dynamics

Structural Factors

- Craniofacial structure
- Soft tissue structure

PATHOPHYSIOLOGY

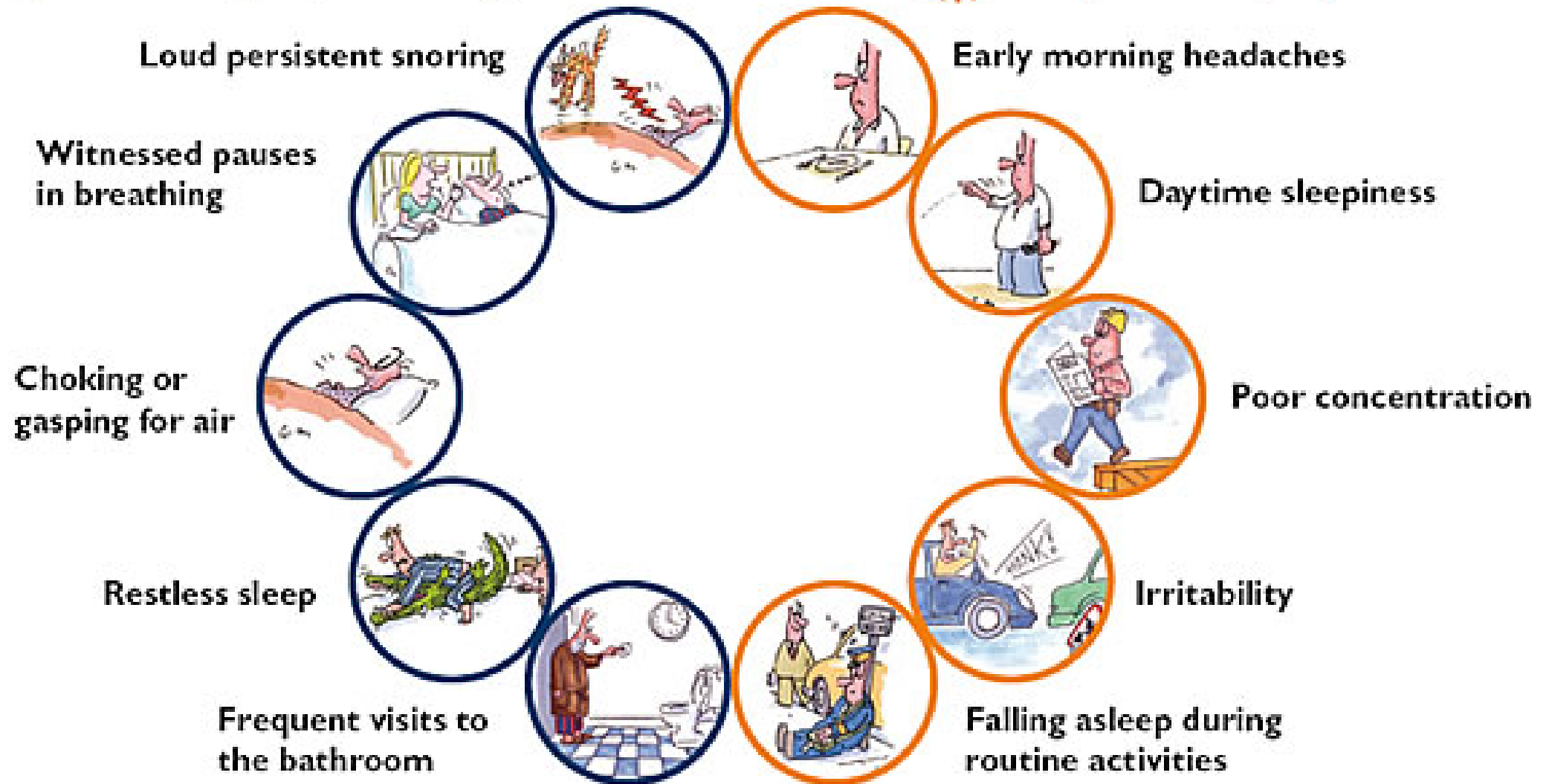
- Pharyngeal obstruction during sleep
- Intermittent hypoxemia
- Cortical arousals from sleep
- Increased sympathetic activity



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Nighttime symptoms

Daytime symptoms



SCREEN FOR OBSTRUCTIVE SLEEP APNEA

Obesity

accounts for 41% of all OSA cases, 58% of moderate to severe cases

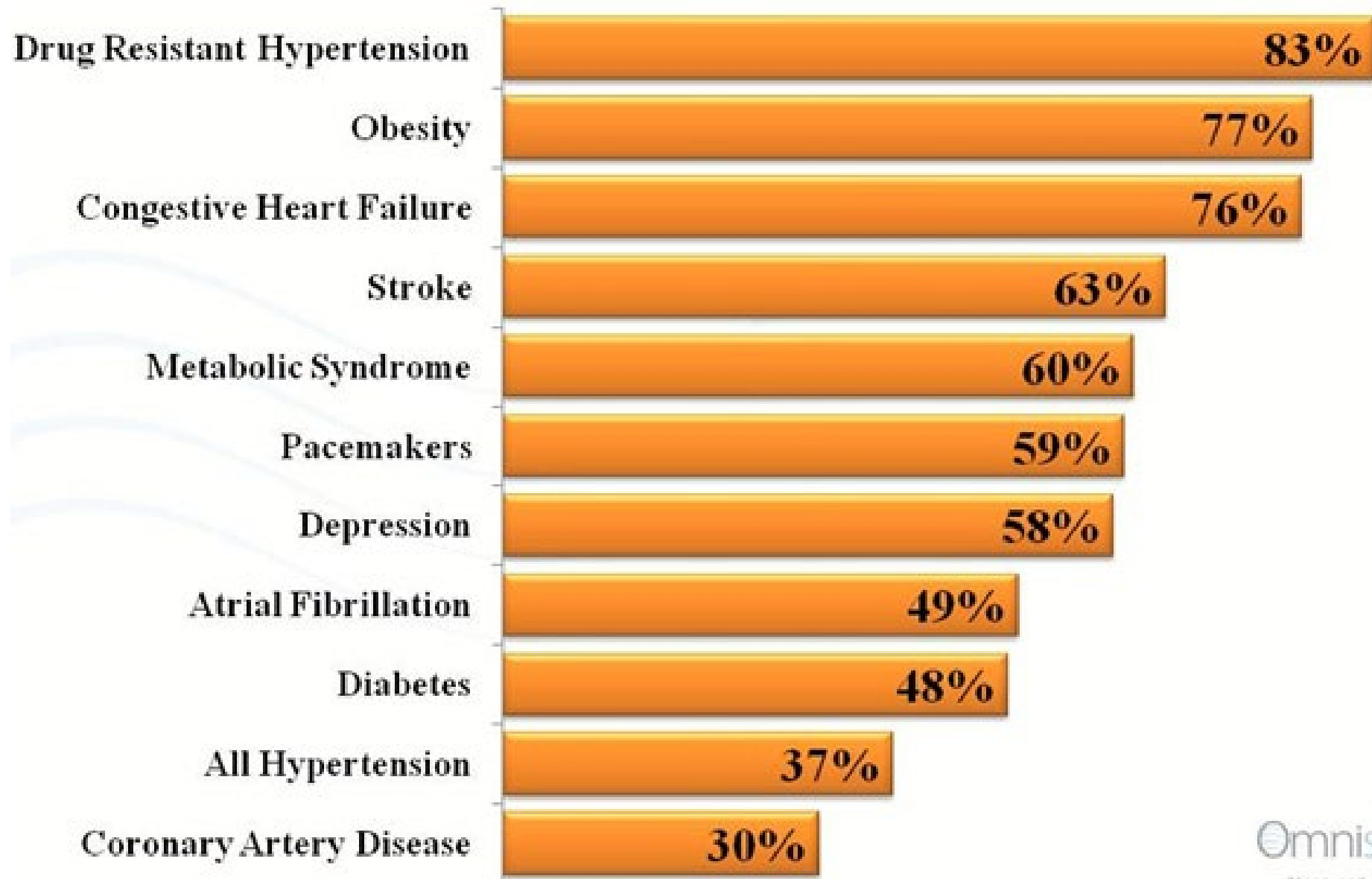
High Risk Occupations

Commercial drivers

Public Transit operators

Heavy machinery operators

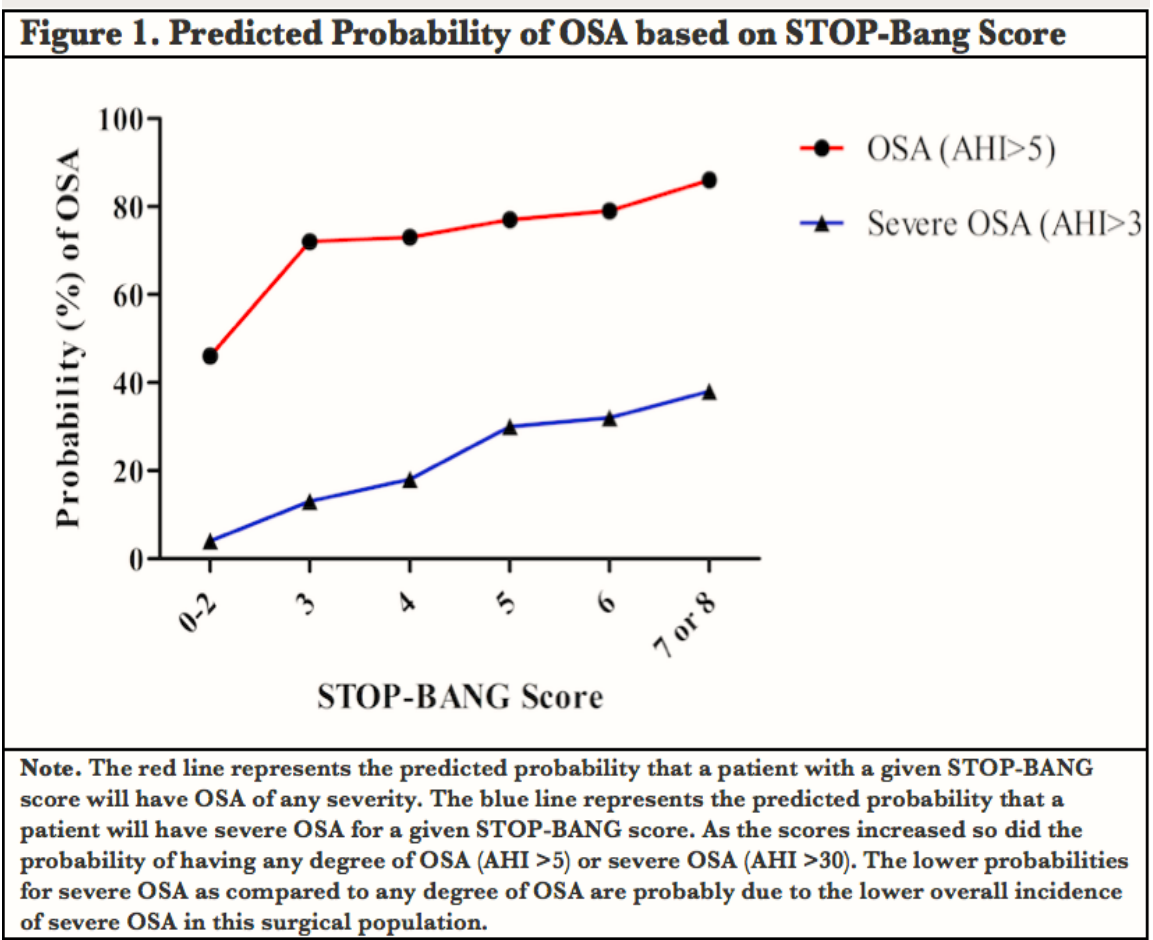
SCREEN FOR OBSTRUCTIVE SLEEP APNEA



Omnisleep
SOLUTIONS
— Sleep and Beyond —

STOP BANG

SNORING? Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?	Yes	No
TIRED? Do you often feel tired, fatigued, or sleepy during the daytime?	Yes	No
OBSERVED? Has anyone observed you stop breathing during your sleep?	Yes	No
PRESSURE? Do you have or are you being treated for high blood pressure ?	Yes	No
BODY MASS INDEX more than 35 kg/m ² ?	Yes	No
AGE older than 50 years?	Yes	No
NECK circumference? Neck circumference greater than 40 cm?	Yes	No
Gender= male?	Yes	No



STOP-BANG scores ≥ 3

Specificity - 28%

Sensitivity - 95%

STOP BANG scores ≥ 5

Specificity - 74%

Sensitivity - 56%

Chung et al. High STOP-BANG Score Indicates A High Probability Of Obstructive Sleep Apnea. *Br J Anaesth* 2012;108:768-75.
 Chung et al. STOP questionnaire: a tool to screen patients for obstructive sleep apnea. *Anesthesiology* 2008;108[5]:812-21,

EXCESSIVE DAYTIME SLEEPINESS

Epworth Sleepiness Scale

Name: _____ Today's date: _____

Your age (Yrs): _____ Your sex (Male = M, Female = F): _____

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired?

This refers to your usual way of life in recent times.

Even if you haven't done some of these things recently try to work out how they would have affected you.

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

It is important that you answer each question as best you can.

Situation

Chance of Dozing (0-3)

Sitting and reading _____

Watching TV _____

Sitting, inactive in a public place (e.g. a theatre or a meeting) _____

As a passenger in a car for an hour without a break _____

Lying down to rest in the afternoon when circumstances permit _____

Sitting and talking to someone _____

Sitting quietly after a lunch without alcohol _____

In a car, while stopped for a few minutes in the traffic _____

- 0-5 Lower Normal Daytime Sleepiness
- 6-10 Higher Normal
- 11-12 Mild Excessive Daytime Sleepiness
- 13-15 Moderate EDS
- 16-24 Severe EDS

THANK YOU FOR YOUR COOPERATION

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HISTORY OF PRESENT ILLNESS

- Loud snoring characterized as “bothersome to others”
- Choking, gasping during sleep
- Witnessed apneas
- Excessive daytime sleepiness (Epworth Score of 10/24)
- Self medication with caffeine
- Insomnia
- Fatigue
- Morning headaches
- Nocturnal bruxism
- Irritability

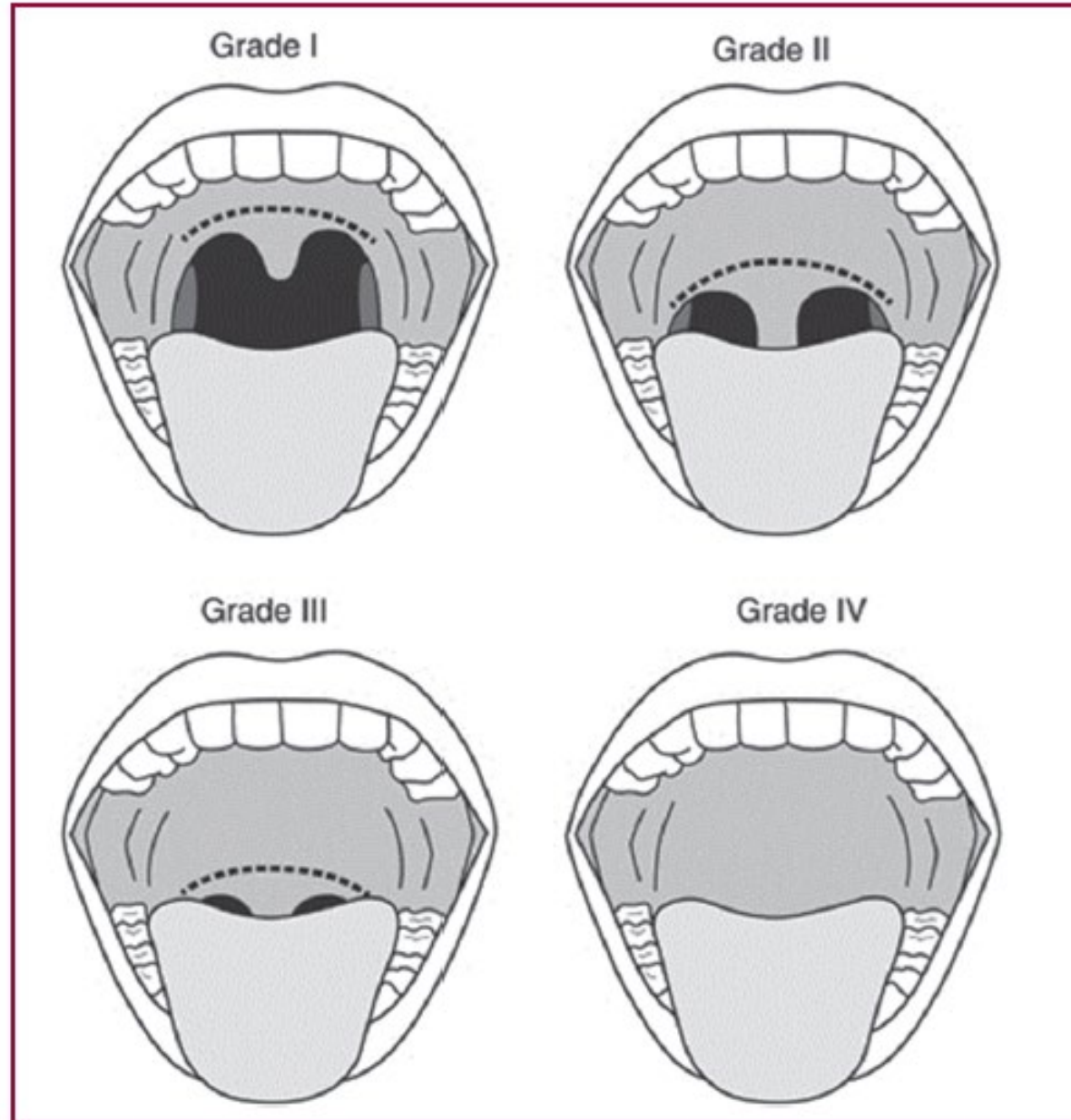


PHYSICAL EXAMINATION

- Vital signs, note weight
- Neck Circumference
- Check for macroglossia, tonsillar hypertrophy, enlarged or elongated uvula
- Retrognathia



MODIFIED MALLAMPATI CLASSIFICATION



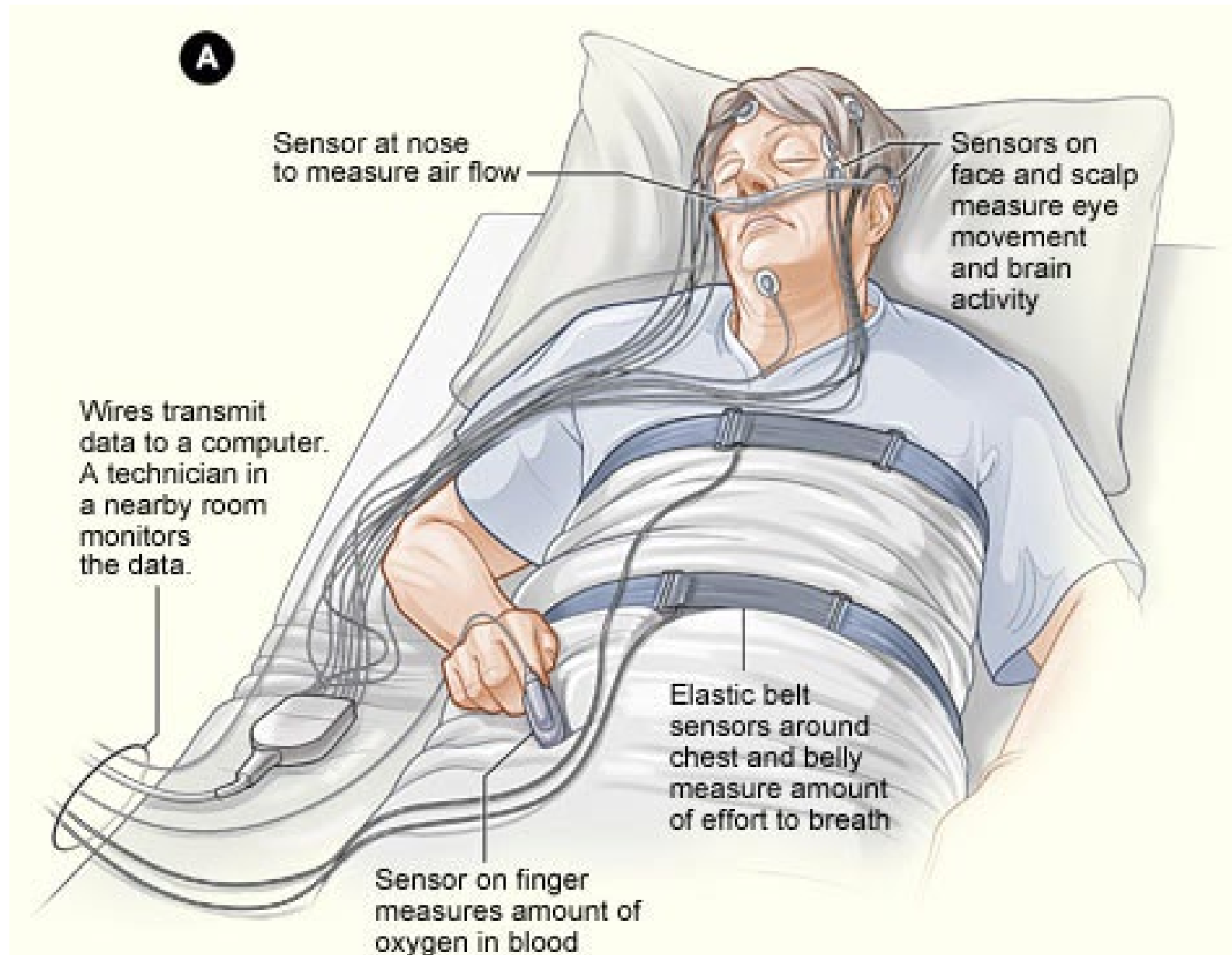
ATTENDED DIAGNOSTICS

Diagnostic Polysomnogram (In-Lab Sleep Study)

Titration Polysomnogram

Split-Night Sleep Study

ATTENDED POLYSOMNOGRAPHY



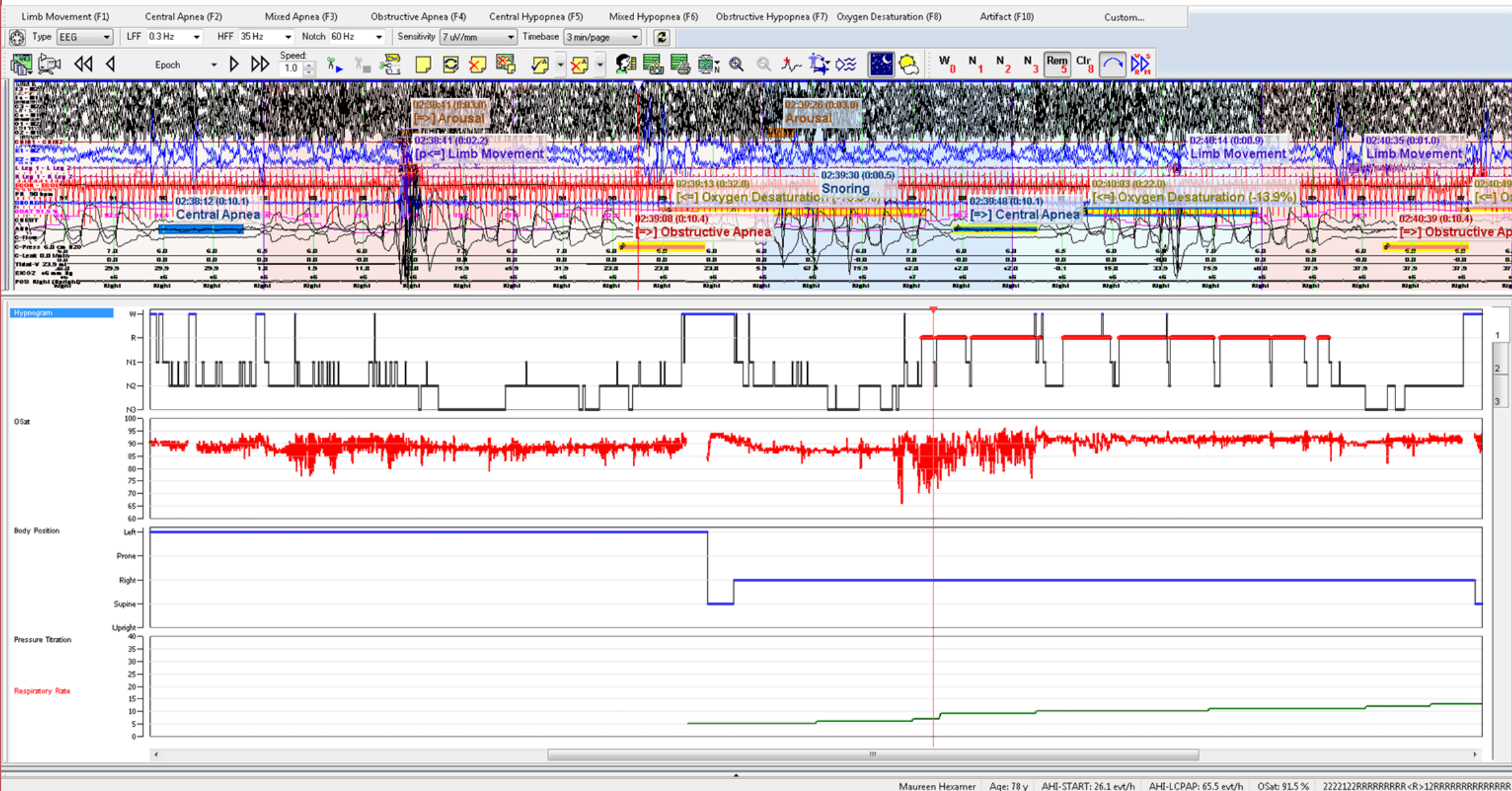
ATTENDED POLYSOMNOGRAPHY

- EEG
- EMG
- EOG
- Air Flow
- Thermistor
- ECG
- Respiratory effort
- Pulse Oximetry
- EtCO₂/TcCO₂
- Audio/video
- PAP

FULL-NIGHT DIAGNOSTIC PSG



SPLIT NIGHT PSG WITH PAP TITRATION



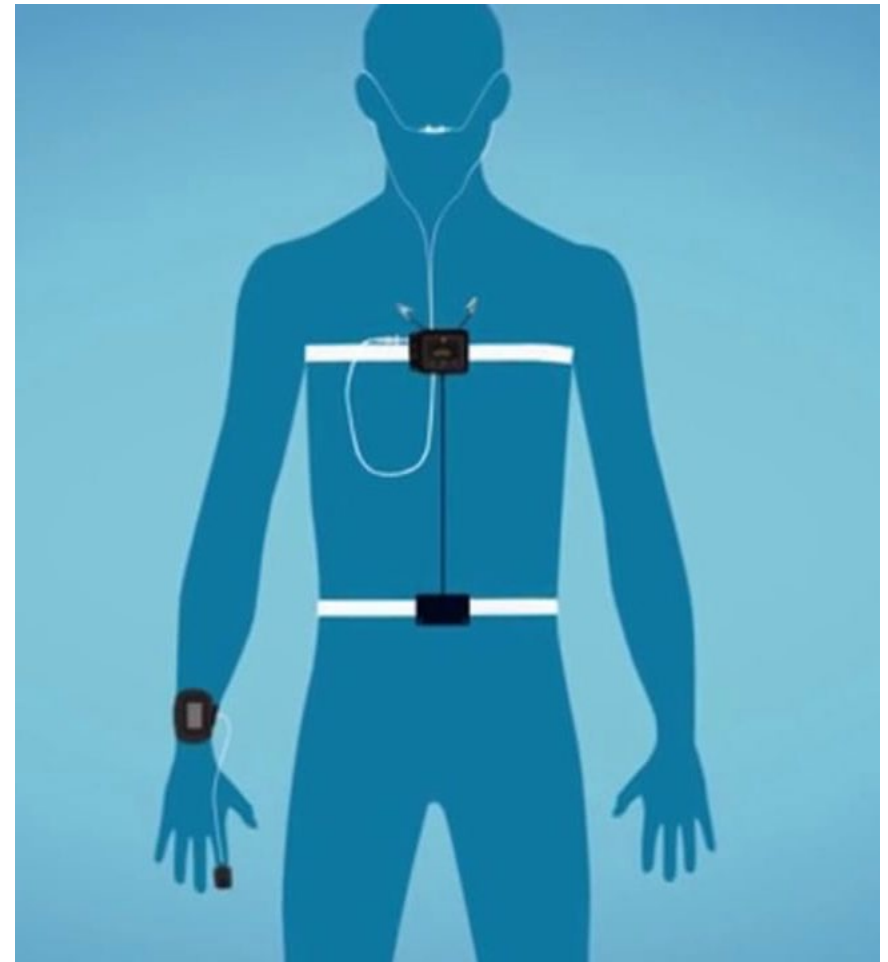
Maureen Hexamer Age: 78 y AHI-START: 26.1 evt/h AHI-LCPAP: 65.5 evt/h OSat: 91.5 % 2222122RRRRRRRRR<R>12RRRRRRRRRRRRR

UNATTENDED DIAGNOSTICS

Home Sleep Testing

Overnight Pulse Oximetry

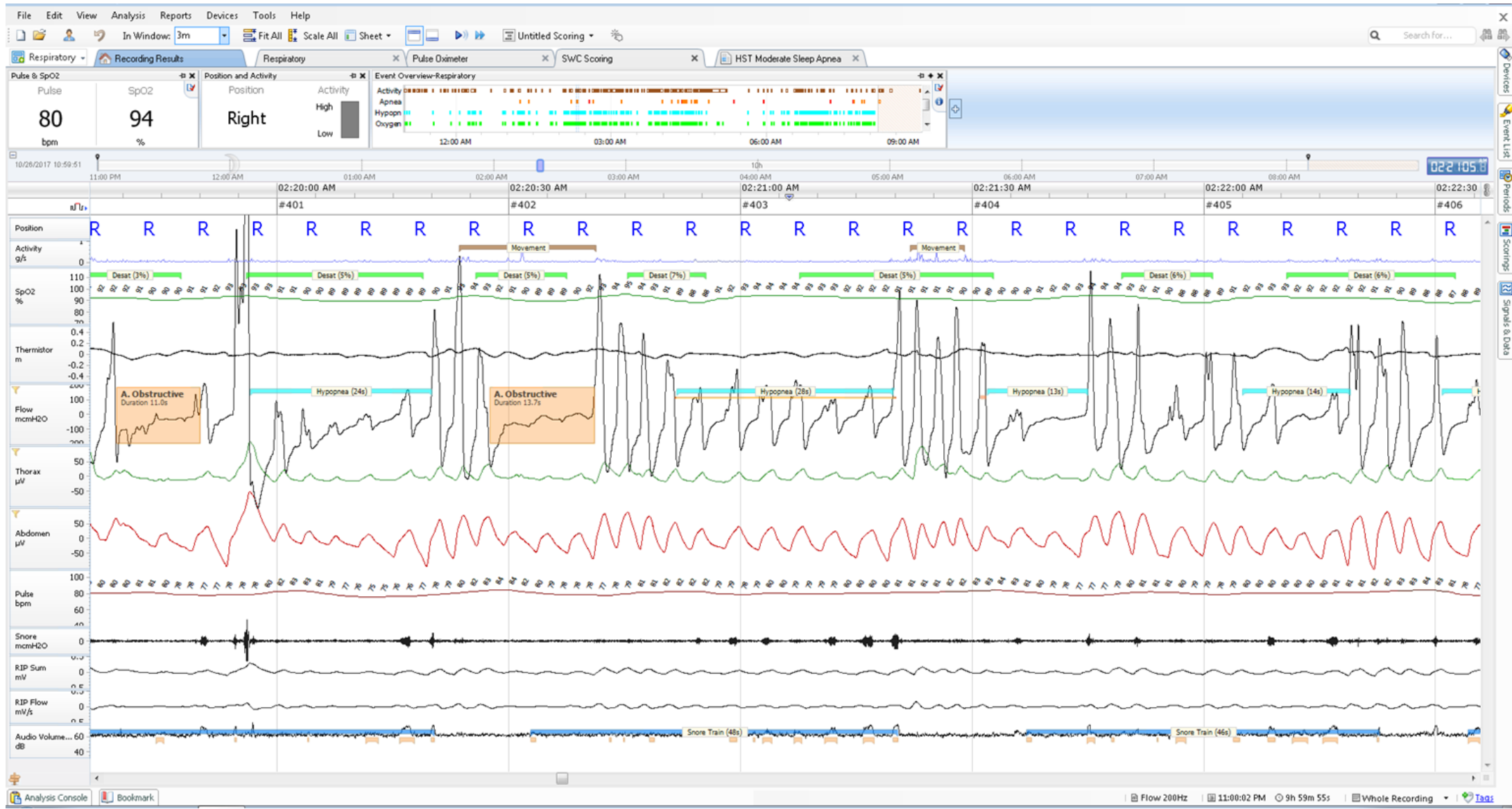
HOME SLEEP TEST (HST)



HOME SLEEP TESTING

- Air Flow Cannula
- Thermistor
- Respiratory effort
(chest/abdomen)
- Pulse oximeter
- Audio
- Position/movement

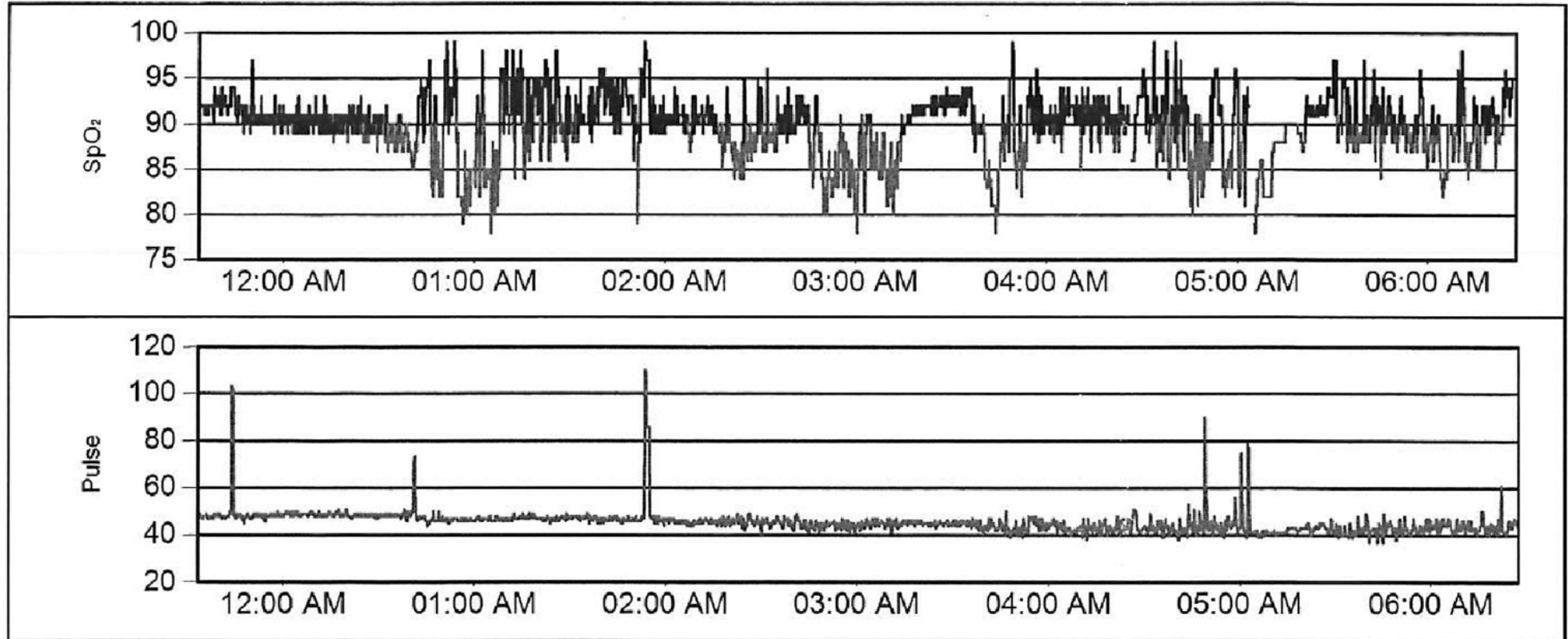
HOME SLEEP TESTING



OVERNIGHT CONTINUOUS PULSE OXIMETRY

Condition of test: Overnight Room Air

Session ID: 15144722



- Useful for screening but cannot diagnose OSA

OVERNIGHT CONTINUOUS PULSE OXIMETRY

SpO ₂ Data	Pulse Data	Considerations
<p>Time ≤ 88% 117.7 MIN</p> <p>Time ≤ 89% 163.1 MIN</p> <p>High SpO₂ 99.0%</p> <p>Low SpO₂ 78.0%</p> <p>Basal SpO₂ 89.8%</p> <p>Delta SpO₂ 37.6 MIN</p> <p>Time consecutive ≤ 88% 9.8 MIN</p> <p>Awake SpO₂ 94.0%</p> <p>Artifact events 3.4 MIN</p> <p>The above are key values to assess qualifications under Medicare guidelines.</p>	<p>High pulse 110 BPM</p> <p>Low pulse 37 BPM</p> <p>Artifact events 3.4 MIN</p> <p>Oxygen Desaturation Index (ODI)</p> <p>Total desaturation events: 235</p> <p>Average events per hour: 33</p> <p>A desaturation event is defined as a decrease in SpO₂ ≥ 3 percentage points within a 3 minute window of onset.</p>	<p>Oxygen</p> <p>It appears this patient qualifies for Nocturnal Oxygen per Medicare guidelines; please inquire with respiratory company for Coverage Guidelines for Group I.</p>
<p>Desaturation</p> <p>Cumulative minutes ≤ 88% Medicare requires ≥ 5 minutes for oxygen coverage in group I</p> <p>Cumulative minutes ≤ 89% Medicare requires ≥ 5 minutes for oxygen coverage in group II</p>	<p>RAD Protocol</p> <p>Sleep oximetry demonstrates oxygen saturation ≤ 88% for ≥ 5 minutes of nocturnal recording time (minimum recording time of 2 hours), done while breathing oxygen at 2 LPM or the patient's prescribed FIO₂ (whichever is higher).</p>	<p>Delta SpO₂</p> <p>A measurement of cumulative SpO₂ readings > 5% below the recorded baseline SpO₂. Medicare requires oxygen ≥ 5 minutes coverage in group I.</p>
	<p>Please refer to group I qualification, duration and test condition to see if patient qualifies. Effective date 2/1/2010.</p>	

TREATMENT

Who do we treat?

- Discuss with patient treatment options
- Potential symptom relief or sleepiness
- Moderate to Severe sleep apnea

Lifestyle changes

- Weight loss
- Change sleeping position

TYPES OF THERAPY

CPAP/APAP

Positional Sleeper Devices

Mandibular Advancement
Devices

ENT surgical options

Novel therapy: *Inspire*

AASM GUIDELINES FOR USING CPAP

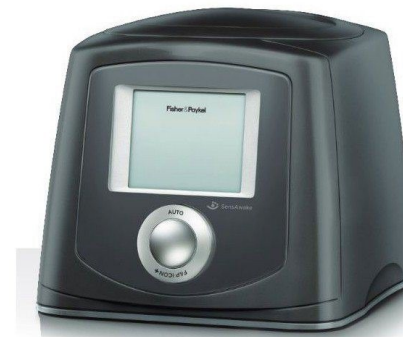
We recommend:

- ...that clinicians use PAP, compared to no therapy, to treat OSA in adults with **excessive sleepiness**.
- ...that clinicians use PAP, compared to no therapy, to treat OSA in adults **with impaired sleep-related quality of life**.
- ...that PAP therapy be initiated using either **APAP** at home or **in-lab CPAP titration** in adults with OSA and no significant comorbidities.
- ...that clinicians use either **CPAP or APAP for ongoing treatment** of OSA in adults.
- ...that **educational interventions** be given with initiation of PAP therapy in adults with OSA

We suggest:

- ...that clinicians use PAP, compared to no therapy, to treat OSA in adults with **co-morbid hypertension**.
- ...that clinicians use **CPAP or APAP over BPAP** in the routine treatment of adults with OSA.
...that behavioral and/or troubleshooting interventions be given during the initial period of PAP therapy in adults with OSA.
- ...that clinicians use telemonitoring-guided interventions during the initial period of PAP therapy in adults with OSA.

CPAP (CONTINUOUS POSITIVE AIR PRESSURE) APAP (AUTO-TITRATING POSITIVE AIR PRESSURE)





CPAP INTERFACE (MASKS)



DIAGNOSIS TO TREATMENT FLOW

- Clinical evaluation
 - HPI (Epworth, s/sx of OSA)
 - Physical exam (BMI, neck circumference, mallampati)
 - Assessment/Plan (MDM/pre-test probability)
- Diagnostic testing (in-lab or home testing)
- Rx of CPAP to DME
- CPAP dispensed
- Clinic follow up
 - Within 90 days of starting treatment
 - Demonstrate compliance (>4hr/night >70% of nights in 30 days) based on machine usage download
 - Repeat testing if poor response/intolerance or to verify effectiveness of therapy

CPAP COMPLICATIONS

- Intolerance
 - Claustrophobia
 - Desensitization
 - Sedative medication (time limited Rx)
 - Aerophagia
 - Change mask
 - Adjust pressure
 - BIPAP
- Mask discomfort/leak
 - Adjust/change mask interface
- Treatment emergent central sleep apnea
 - Up to 15% of patients
 - Combination of hyperventilation, hypocapnia, stretch receptor reflex
 - Can spontaneously resolve
 - May need advanced PAP therapy
- Respiratory infections
 - Evidence suggests protective effects of CPAP

SLEEP POSITION TRAINERS



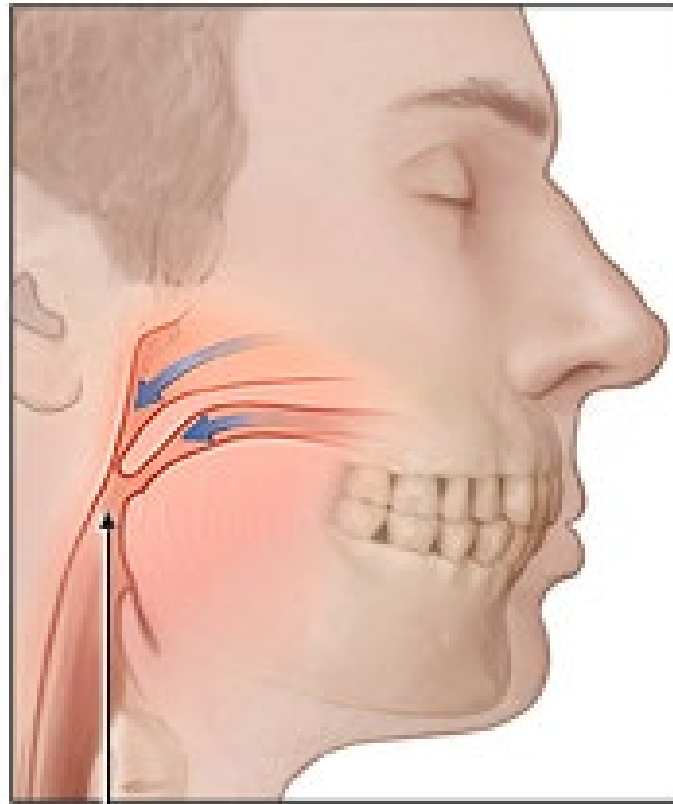
ORAL APPLIANCE THERAPY

AASM GUIDLINES

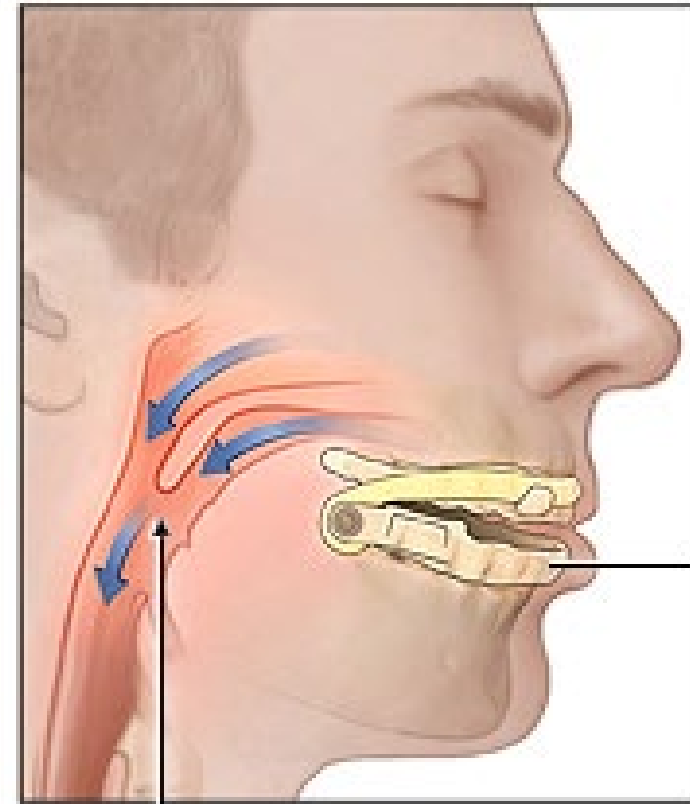
- When oral appliance therapy is prescribed by a sleep physician for an adult patient with obstructive sleep apnea, we suggest that a qualified dentist use a **custom, titratable appliance** over non-custom oral devices.
- We recommend that sleep physicians **consider prescription of oral appliances, rather than no treatment**, for adult patients with obstructive sleep apnea who are intolerant of CPAP therapy or prefer alternate therapy.
- We suggest that qualified dentists **provide oversight**—rather than no follow up—of oral appliance therapy in adult patients with obstructive sleep apnea, **to survey for dental-related side effects or occlusal changes and reduce their incidence**.
- We suggest that sleep physicians conduct **follow-up sleep testing** to improve or confirm treatment efficacy, rather than conduct follow-up without sleep testing, for patients fitted with oral appliances.
- We suggest that sleep physicians and qualified dentists instruct adult patients treated with oral appliances for obstructive sleep apnea to **return for periodic office visits**—as opposed to no follow-up—with a qualified dentist and a sleep physician.

MANDIBULAR ADVANCEMENT/REPOSITIONING DEVICES





During sleep there is restricted airway space



Mandibular repositioning device (MRD) increases airway space

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SURGICAL OPTIONS

- Tracheostomy
- Maxillo-Mandibular Advancement (MMA)
- Uvulopalatopharyngoplasty (UPPP)
- Multi-Level/Stepwise Surgery (MLS)
- ~~Laser Assisted Uvuloplasty (LAUP)~~
- Radiofrequency Ablation (RFA)
- Palatal Implants

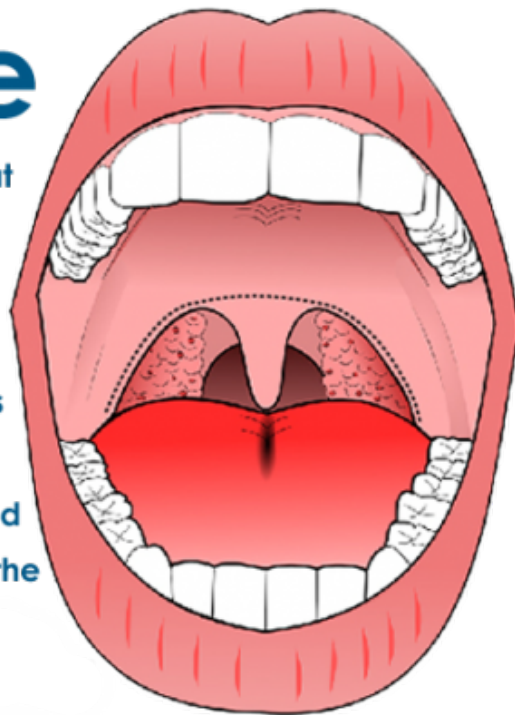
Aurora RN, et al. Practice parameters for the surgical modifications of the upper airway for obstructive sleep apnea in adults. SLEEP 2010;33(10):1408-1413.

"THE SLEEP APNEA SURGERY"

- UPPP
(uvulopalatopharyngoplasty)

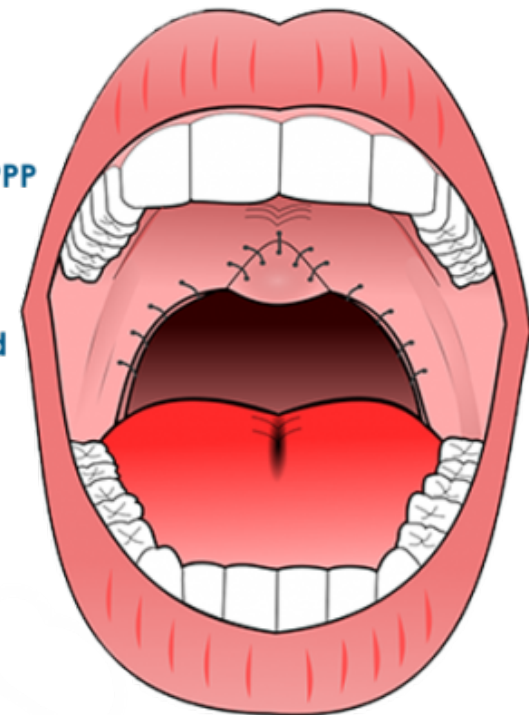
Before

Appearance of throat prior to UPPP surgery. Note the anatomy which is common to sleep apnea patients to include the large tonsils, long uvula and narrow arch behind the tonsils.



After

Appearance after UPPP surgery. The tissue in the front part of the throat is trimmed and the uvula is folded and sutured.



HYPOGLOSSAL NERVE STIMULATOR

in·spire[®]
UPPER AIRWAY STIMULATION



MEDICAL INTERVENTIONS FOR OSA

- Selective serotonergic uptake inhibitors (SSRIs) are **not recommended** for treatment of OSA
- Protriptyline is **not recommended** as a primary treatment for OSA
- Methylxanthine derivatives (aminophylline and theophylline) are **not recommended** for treatment of OSA
- Estrogen therapy (estrogen preparations with or without progesterone) is **not indicated** for the treatment of OSA
- Modafinil is **recommended** for the treatment of residual excessive daytime sleepiness in OSA patients who have sleepiness despite effective PAP treatment and who are lacking any other identifiable cause for their sleepiness.
- Oxygen supplementation is **not recommended** as a primary treatment for OSA.
- Positional therapy, consisting of a method that keeps the patient in a non-supine position, is an effective secondary therapy or can be a supplement to primary therapies for OSA in patients who have a low AHI in the non-supine versus that in the supine position.
- Short-acting nasal decongestants are **not recommended** for treatment of OSA.
- Topical nasal corticosteroids may improve the AHI in patients with OSA and concurrent rhinitis, and thus may be a useful adjunct to primary therapies for OSA

FOLLOW UP

- Assess treatment adherence
- Optimize mask fitting
- Discuss other therapies if intolerant
- Address other residual symptoms
- Consider testing to evaluate treatment efficacy

A 55-year-old woman is evaluated in follow-up after starting nasal continuous positive airway pressure (CPAP) 6 weeks ago for obstructive sleep apnea. She is unable to wear the mask for more than 3 or 4 hours per night because of nasal congestion. She continues to have residual sleepiness during the day. Her husband notes that she does not snore or have apnea when the mask is on.

On physical examination, temperature is 37.4°C (99.3°F), blood pressure is 122/74 mm Hg, pulse rate is 76/min, and respiration rate is 14/min. BMI is 26. Nasal mucosa is boggy and erythematous with a clear mucoid discharge.

Which of the following management steps is most likely to improve this patient's adherence to CPAP therapy?

A. Add heated humidification to the CPAP circuit

B. Initiate oral modafinil

C. Initiate oxymetazoline nasal spray

D. Refer for nasal septal surgery

OTHER SLEEP-BREATHING DISORDERS

- Obesity hypoventilation
 - BMI >50 kg/m²
- Primary central sleep apnea
 - Neurodegenerative disease/stroke
- Cheyne-Stokes Respirations
 - Congestive heart failure
- Hypoventilation secondary to neuromuscular or restrictive chest physiology
 - ALS, polio, kyphoscoliosis, etc.

Thank

