

# Sleep Disorders: Assessment and Therapeutic Options

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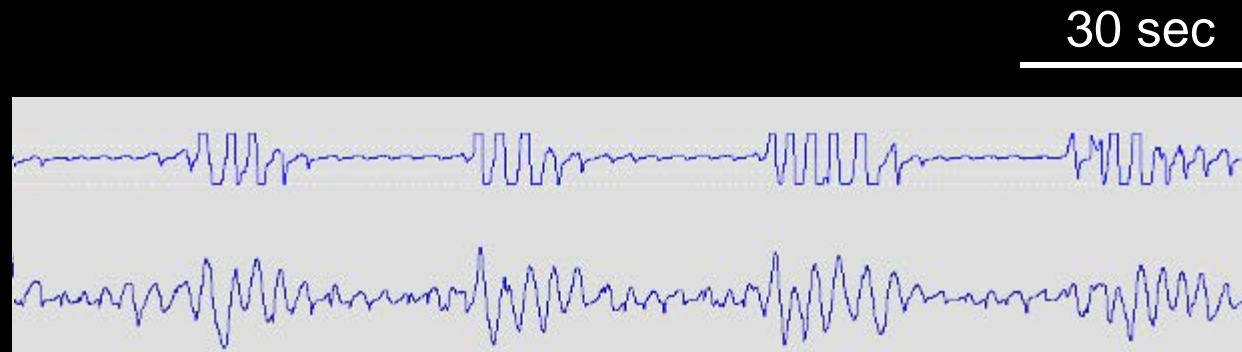
## Disclosures:

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# Overview

- Sleep apnea
  - Diagnosis, treatment options, complex apnea
- Insomnia
  - Phenotypes, misperception, treatment options
- Other sleep disorders
  - Narcolepsy, Restless Legs, parasomnia, circadian delay

# Obstructive Sleep Apnea (OSA)



AHI = apneas and hypopneas *per hour of sleep*

0-5 Normal

5-15 Mild

15-30 Moderate

>30 Severe

# Evolution of Sleep Apnea Practice

## Historical Standard of Care

- Treat only if elevated AHI + symptoms (e.g., sleepiness)
- No treatment if asymptomatic, *even with severe apnea*

## Modern Standard of Care

- Increasing links to cardiac, stroke, death, car accidents
- Treat moderate or severe OSA, *regardless* of symptoms
- Treat mild OSA if sleep symptoms or co-morbid disease

## Emerging Trends

- Home sleep devices for diagnosis and auto-titrating CPAP
- Insurance prior authorizations reducing lab usage
- Recognizing complex apnea

# Why OSA still remains undiagnosed...

- Even among those with severe OSA, half will:
  - have no subjective sleepiness
  - have normal Epworth Sleepiness scores
  - have normal objective sleep latency (MSLT)
- The most common clues, snoring and obesity, explain <25% of the variance in apnea severity
- *Even clinical impression of sleep specialists has sensitivity & specificity ~70% (Skomro, 1999)*
- Demographics and co-morbidities, rather than symptoms, carry predictive value (*Ustun, Bianchi, in press*)

# Epworth Sleepiness Scale

<i>Situation</i>	<i>Chance of Dozing</i>
Sitting and reading	
Watching TV	
Sitting inactive (in a public place)	
Passenger in a car for 1 hour	
Lying down to rest in afternoon	
Sitting and talking to someone	
Sitting quietly after lunch (no ETOH)	
When stopped in traffic for a few min	

0 = no chance

1 = slight chance

2 = moderate chance

3 = high chance

If we can't trust symptoms to predict  
sleep apnea, then what?

We can't test everyone (yet)...



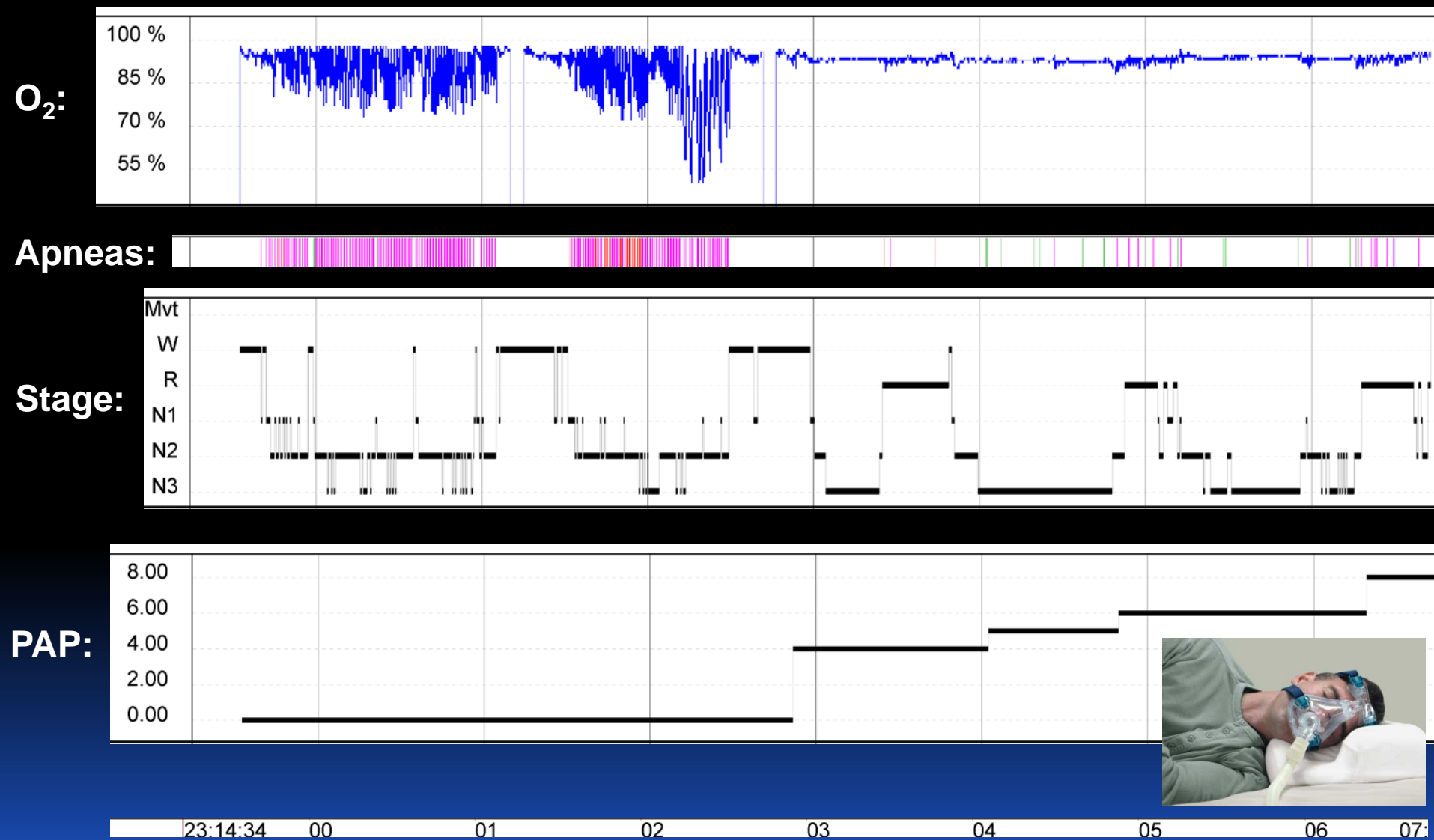
# Solution: Be a Bayesian!

General Adult Population:	5-20% ( <i>Kapur 2010</i> )
Gen Surg outpatients:	65% ( <i>Chung 2008</i> )
Refractory Epilepsy:	30-80% ( <i>van Golde 2011</i> )
HTN requiring 3 drugs:	>60% ( <i>Logan 2001</i> )
Congestive Heart Failure:	35% ( <i>Sin 1999</i> )
Bariatric clinic:	80% ( <i>Lopez 2008</i> )
Ischemic stroke:	30-60% ( <i>Bassetti 2006</i> )
Down syndrome:	60% ( <i>Marcus 1991</i> )
Diabetes (type 2):	50% ( <i>Aurora 2013</i> )

# Polysomnogram options for sleep apnea

<b><i>Test Type</i></b>	<b><i>Considerations</i></b>
<b>Diagnostic</b>	<ul style="list-style-type: none"><li>➤ Most information (sleep stages, body position)</li><li>➤ Increased time to treatment if OSA</li></ul>
<b>Split-Night</b>	<ul style="list-style-type: none"><li>➤ Trial PAP if OSA criteria is met</li><li>➤ Accelerates treatment path</li><li>➤ Less Dx/Rx time = more uncertainty</li></ul>
<b>Full Night Titration</b>	<ul style="list-style-type: none"><li>➤ Maximize time for testing pressures, masks, CPAP vs BiPAP, across sleep stages and body positions</li></ul>

# Example: Split-Night PSG report



# Example: Split-Night PSG report

## Respiration Events

	<u>Diagnostic</u>	<u>Treatment</u>
Total Sleep Time (min.):	141.5	223
Number of Obstructive Apneas:	15	2
Number of Mixed Apneas:	0	0
Number of Central Apneas:	0	1
Number of Hypopneas*:	137	17
Number of Apneas + Hypopneas:	152	20
Apnea Index:	6.4	0.8
Hypopnea Index:	58.1	4.6
<b>Apnea-Hypopnea Index (AHI):</b>	<b>64.5</b>	<b>5.4</b>
Number of RERAs:	2	14
RDI:	65.3	9.1
Continuous Oxygen Saturation, mean value:	75.5	91.5
Minimum Oxygen Saturation During NREM	50	88
Minimum Oxygen Saturation During REM	N/A	89
O2 Desaturation:	141	16
O2 Desaturations Index:	42.5	4.2
Hypoventilation:	No	No
Cheyne Stokes Breathing:	No	No
Total Time $\leq$ 88% (min.):	<b>61.7</b>	

\* Definitions:

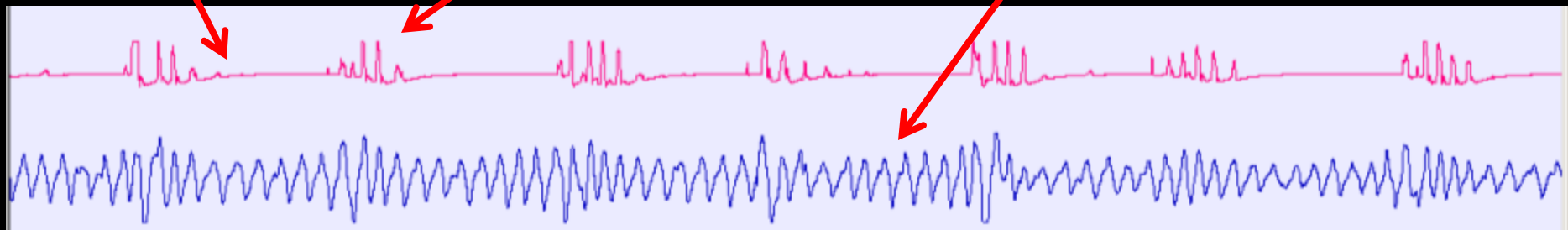
1. "Hypopnea" is defined as  $> 30\%$  decrease in airflow or respiratory effort, by nasal pressure signal excursion, lasting  $\geq 10$  seconds, in association with a  $4\%$  or greater oxygen desaturation
2. "apnea" is  $\geq 90\%$  drop in thermal sensor excursion lasting  $\geq 10$  seconds.

# Obstructive vs Central Apnea

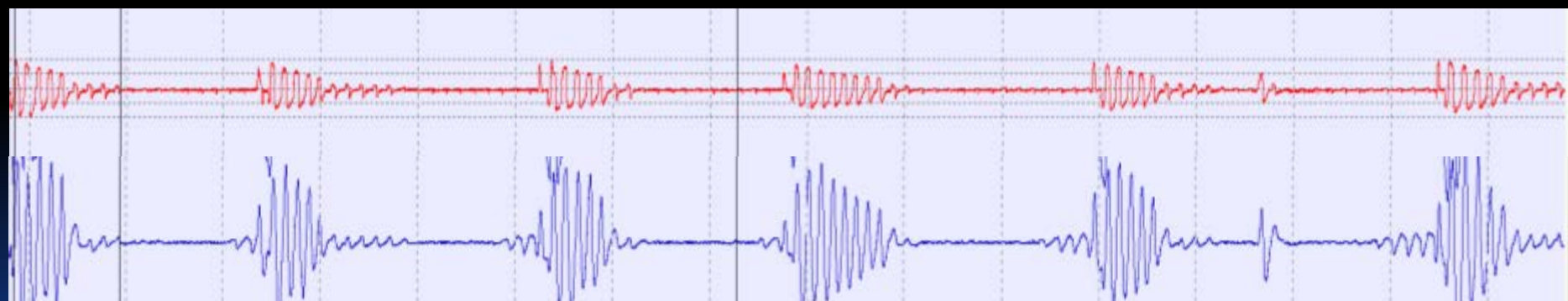
Apnea

Recovery breaths

Continued Effort

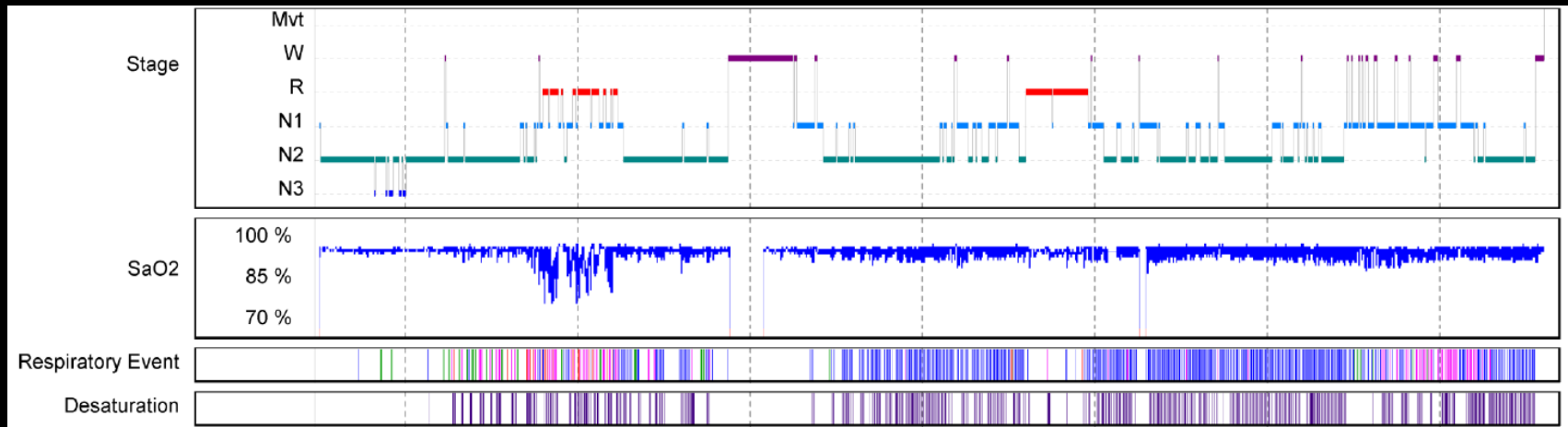


1 min



1 min

# Example: Split-Night PSG, complex apnea



## Respiration Events

	<u>Diagnostic</u>	<u>Treatment</u>
Total Sleep Time (min.):	140.9	244
Number of Obstructive Apneas:	16	2
Number of Mixed Apneas:	0	1
Number of Central Apneas:	41	338
Number of Hypopneas*:	32	44
Number of Apneas + Hypopneas:	89	385
Apnea Index:	24.3	83.9
Hypopnea Index:	13.6	10.8
Apnea-Hypopnea Index (AHI):	37.9	94.7
Number of RERAs:	18	8
RDI:	45.6	96.6
Continuous Oxygen Saturation, mean value:	87.5	93
Minimum Oxygen Saturation During NREM	77	88
Minimum Oxygen Saturation During REM	77	90
O2 Desaturation:	71	303
O2 Desaturations Index:	27.0	67.9
Hypoventilation:		
Cheyne Stokes Breathing:		
Total Time $\leq$ 88% (min.):		6.2

# Types of Positive Airway Pressure

- CPAP: continuous pressure
- BiPAP: 2-level: insp > expir
  - comfort
  - hypoventilation

## Auto-PAP

- range of pressures
- adjusts in real time
- Adaptive “ASV” system
  - Complex apnea

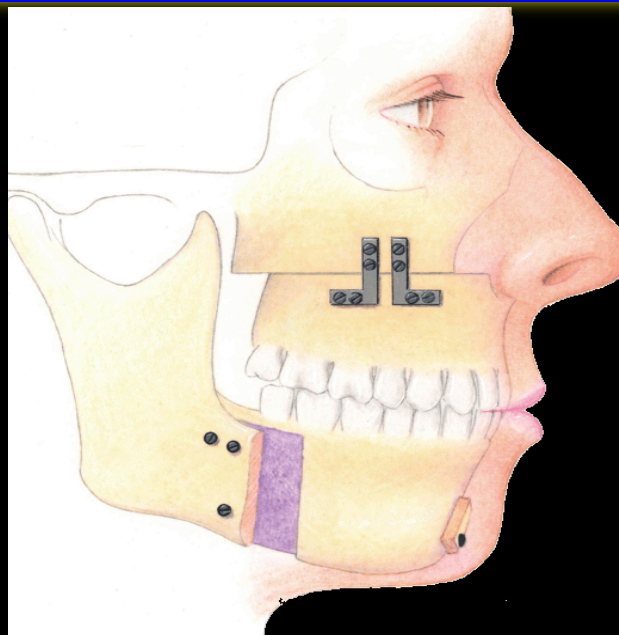


# CPAP alternatives

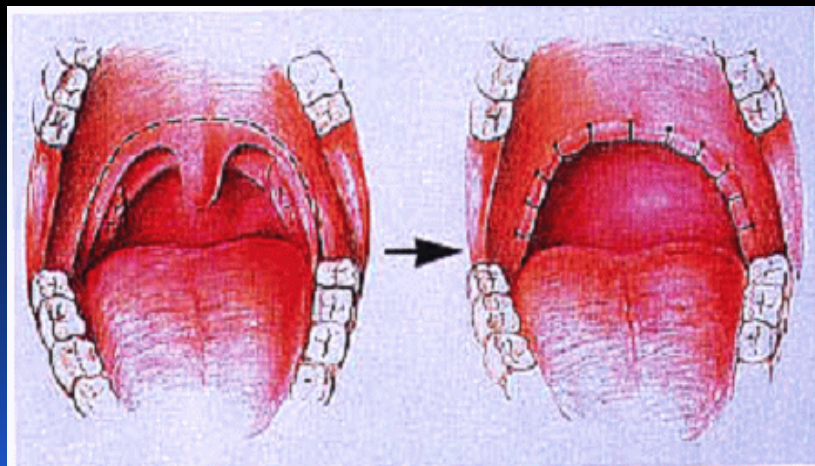
Oral Appliance (dentist)



Jaw Surgery (OMFS)



Palate Surgery (ENT)



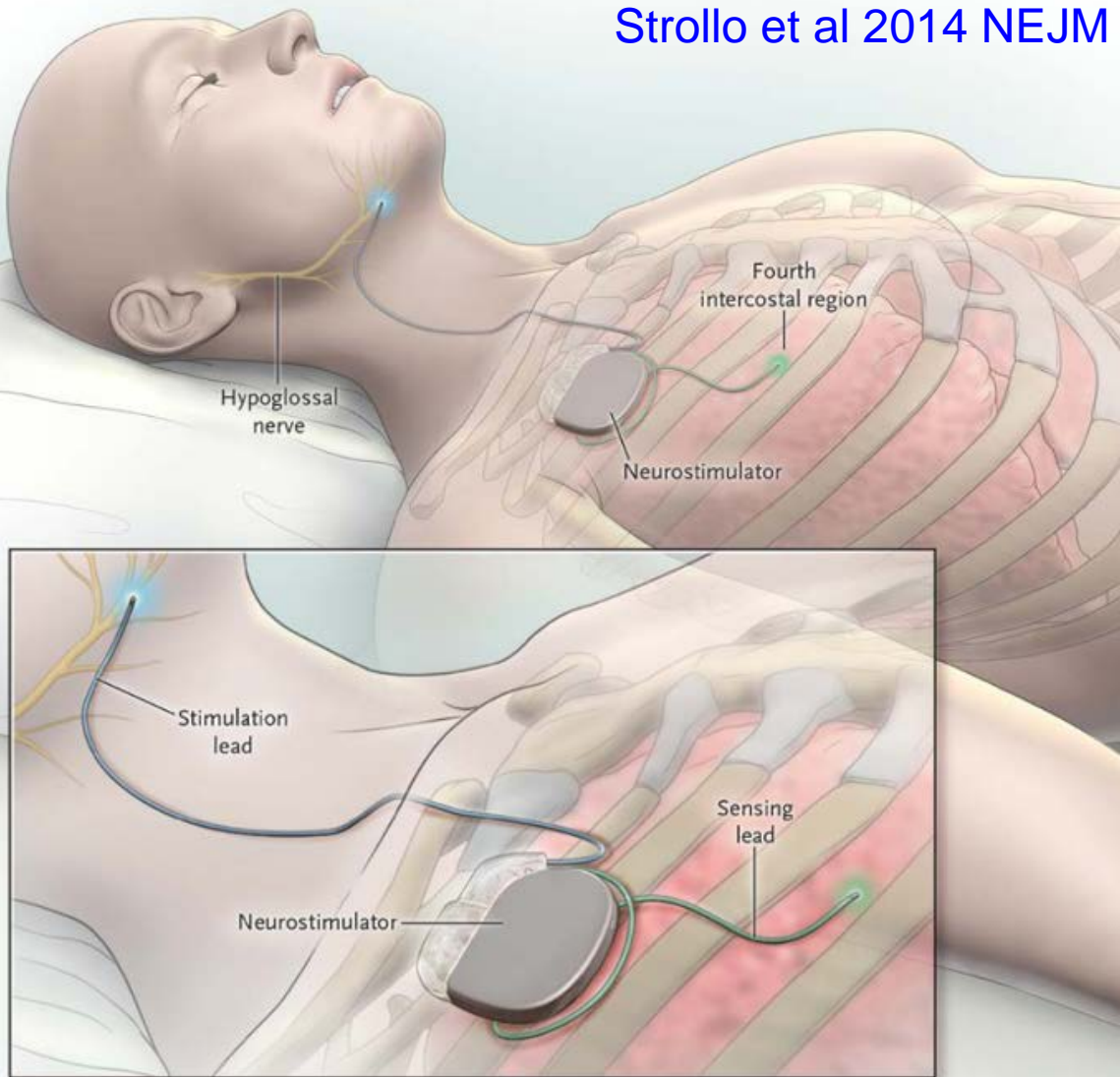
Provent Valves





# Newly Approved: Tongue Stimulator

Strollo et al 2014 NEJM



- Drug induced sleep endoscopy to enroll
- Open label, no control arm
- BMI < 32, AHI 20-50
- Non-positional
- 1y follow-up
- 70% success\*  
(\*mild AHI persisted)

Figure 1. Upper-Airway Stimulation.

# Position Therapy

“zzzoma”



Other examples:

- Tennis balls sewn into shirt
- Wedge pillow
- Neck alarm: (Levendowski, 2014)



# What *doesn't* work (in isolation)

- Special pillows
- Chin strap
- Breathe-right strips
- Nasal sprays
- Tongue exercises
- Deviated septum repair
- Sinus surgery
- “Lose 10 lbs”
- Oxygen



# OSA Follow-up & Management Topics

- DME companies handle supplies/refills
- Insurance increasingly requires objective compliance data from the machines (“4hrs, 70% of nights”)
- CPAP pressure change may be needed if:
  - 10% or more weight change (up or down)
  - Data card shows ongoing apnea
  - Snoring, gasping, etc resumes
- 60% remain compliant at 1-year; consider alternatives

# Home vs Lab Testing

# Limited-channel home apnea kit examples



NovaSom



EMBLA



WatchPAT



ApneaLink



ARES

# Published guidelines

SPECIAL ARTICLE

JCSM 2007

## Clinical Guidelines for the Use of Unattended Portable Monitors in the Diagnosis of Obstructive Sleep Apnea in Adult Patients

Portable Monitoring Task Force of the American Academy of Sleep Medicine

## **Obstructive Sleep Apnea Devices for Out-Of-Center (OOC) Testing: Technology Evaluation**









Nancy A. Collop, M.D.<sup>1</sup>; Sharon L. Tracy, Ph.D.<sup>2</sup>; Vishesh Kapur, M.D.<sup>3</sup>; Reena Mehra, M.D., M.S.<sup>4</sup>; David Kuhlmann, M.D.<sup>5</sup>; Sam A. Fleishman, M.D.<sup>6</sup>; Joseph M. Ojile, M.D.<sup>7</sup>

## Practice Parameters for the Use of Autotitrating Continuous Positive Airway Pressure Devices for Titrating Pressures and Treating Adult Patients with Obstructive Sleep Apnea Syndrome: An Update for 2007

An American Academy of Sleep Medicine Report

(Re-affirmed content in UpToDate as of July 2015)

# Guidelines: Insurance vs Academy

<b>American Academy of Sleep Medicine Guideline Topics</b>	HPHC / Care- Core	BCBS / AIM	Cigna / Care- Centrix
Central/complex apnea			
CHF, COPD, NMJ, cognitive impairment			
80% pre-TP of AHI>15	No	No	No
Insomnia (contra-indication for home)	No	No	No
PLMS (reason for in-lab)	No		



# Bottoms lines

- The intention of home testing is to “rule in” high suspicion cases of significant OSA (moderate or severe)
- If the home device is negative, in-lab PSG is recommended to confirm (due to false negative risk)
- If used for screening, i.e., in low-probability cases, two errors occur:
  - 1) false negatives (algorithms under-estimate AHI)
  - 2) false-positives (by Bayes' Theorem)

Insomnia

# Insomnia Phenotypes

Circadian

Sleep Hygiene

Adjustment

“Primary”

*New Criteria:  
Acute vs Chronic*

Medical Dx

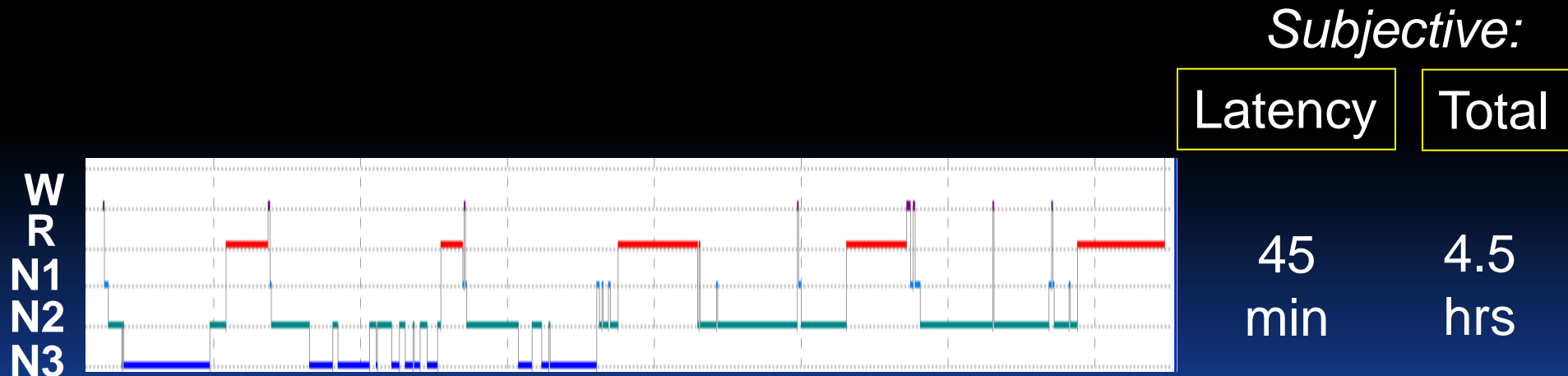
Misperception

Psych Dx

Psychophysiological

# Insomnia: Sleep-Wake Misperception

- Tendency to OVER-estimate onset latency
- Tendency to UNDER-estimate total sleep time



# Misperception insomnia: what is known?

Of the ~30 million chronic insomniacs in USA:

- “Extreme” misperception in ~5%
- “Spectrum” misperception more common (~50%)
- Predictors and mechanisms are unclear
- Prospective epidemiology suggests insomnia

morbidity only if objective short sleep on PSG

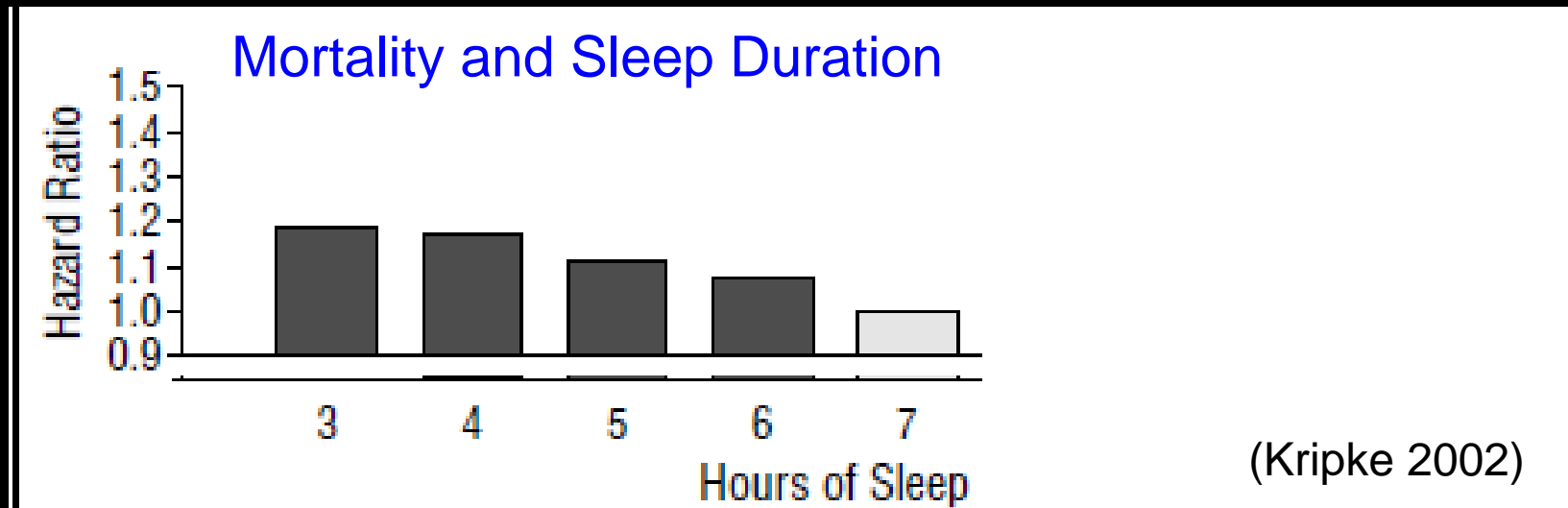
# Isn't perception what matters most?

Maybe: for mild/occasional insomnia, or for those treated non-pharmacologically

Maybe not: for chronic/severe cases (10% of adults)

- *When objective data is available in other settings, we do not use self-report (HTN, DM, obesity)*
- *Risks of medications (dependence, side effects)*
- *Uncertainty whether medicated sleep is “normal”*
- *20-50% of insomniacs have occult OSA*

# Habitual Sleep Duration: Epidemiology



- Nearly every risk reportedly “associated” with short sleep duration is even worse with longer sleep durations.
- Many potential confounding factors in epidemiology
- Scant objective data
- No evidence that modifying sleep duration is beneficial

# Insomnia Treatment Options



# Outpatient approach to insomnia

- Is there a treatable contributor?
  - apnea, depression, anxiety, pain, restless legs
- Insomnia phenotype informs treatment pathways:
  - Circadian delay (Rx: light, melatonin, sched)
  - Sleep Hygiene (Rx: education, sleep restrict)
  - Psychophysiological (Rx: CBT-I versus meds)
  - Misperception (Rx: CBT-I, reassurance)

# Sleep Hygiene

## DO:

- Allow adequate time and environment for sleep
- Have “wind-down” time before bed
- Get out of bed at the same time each day
- Go to bed only when sleepy
- Keep a regular daily schedule (meals, exercise, etc)
- If not sleeping within 20 minutes, get out of bed\*\*

***\*\*caution: clockwatching & misperception!***

## DON'T:

- Have caffeine, alcohol, or nicotine 4-6hrs before bed
- Take naps (but if you must, keep <3pm)
- Read or watch TV or check email etc in bed
- Go to bed hungry (but avoid heavy meals at night)

# Issues re: hypnotic choice

- Little evidence for objective benefit, so individual risk-benefit discussions are challenging
- Choice may be influenced by:
- Co-morbidities
  - Gabapentin: pain, RLS, headache
  - Tricyclics: pain, headache
  - Benzos/Z-drugs: parasomnia, complex apnea
- Pharmacokinetics
  - Short acting (zolpidem, zaleplon)
  - Long acting (zolpidem CR, eszopiclone)

# Insomnia treatment: Risk considerations

- Many sedating agents used off-label with little data
- Even approved drugs yield only 30-60 minutes extra
- No studies have shown medical benefit  
(though some data indicates mood improvement)
- Long-term use not recommended
- Dependence / Addiction
- Parasomnia (some can be dangerous)
- Drug-Drug interactions
- Hangover / Cognitive impact (\*FDA: morning car risk)
- Falls

# Insomnia treatment: CBT-I

- A specialized subset of CBT field
- Equivalent or superior to medications in clinical comparative effectiveness trials
- PhD therapists and online versions are available

## *Cognitive Behavioral Therapy for Insomnia:*

- Stimulus control
- Sleep hygiene
- Sleep restriction
- Relaxation training
- Cognitive therapy (refocus beliefs)

# Other Sleep Disorders

# Narcolepsy (in one slide)

- Sleepiness + peri-sleep paralysis/hallucinations
- Half have cataplexy (triggered atonia attacks)
- Cataplexy is *not* on differential of syncope/seizure
- Testing: PSG + nap test (“MSLT”)
  - Rule out OSA and PLMS
  - Confirm fast sleep latencies and REM in >2 naps
  - Off psych meds/stimulants for >2 weeks prior
- Genetics and spinal fluid not routinely tested
- Rx: stimulants for sleepiness (modafinil, amphetam)
- Rx: anti-depressants for cataplexy
- Xyrem helps both sleepiness and cataplexy

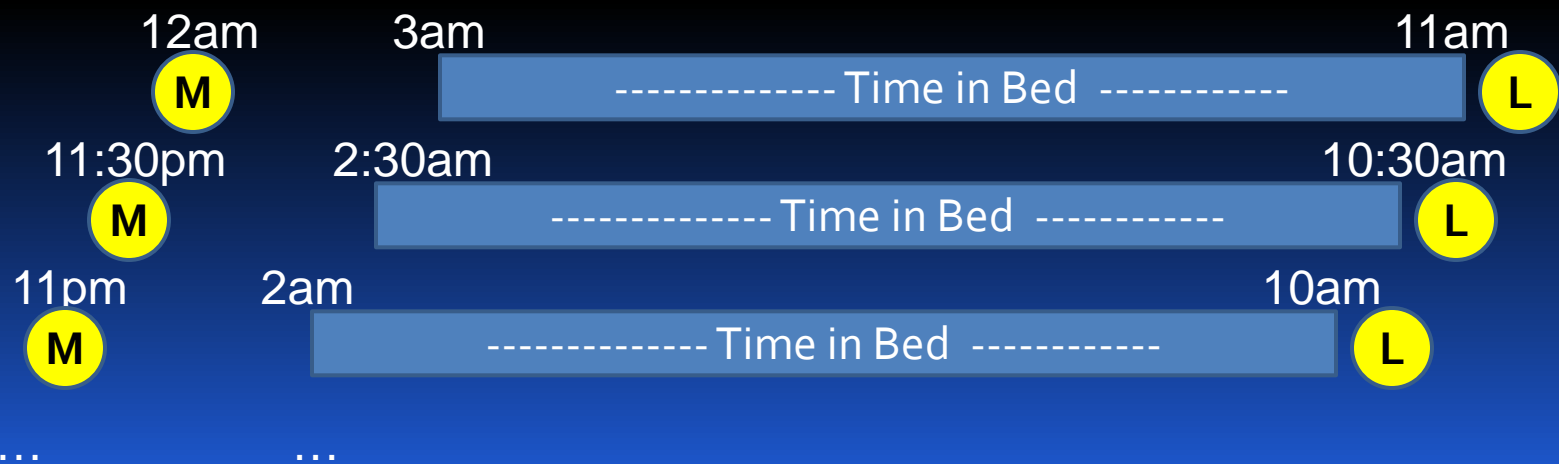
# Restless Legs (in one slide)

- Uncomfortable sensation (movement not required)
  - Better with movement, massage, stretch
  - Worse at night or “at rest” in day (car, plane, etc)
  - Dx: history. PSG if refractory or OSA risk factors
  - First Rx: oral iron if Ferritin <50
  - Next Rx: pramipexole, ropinirole, gabapentin
- 
- *Related: Periodic limb movements of sleep (PLMS)*
  - *Most RLS patients also have PLMS*
  - *Most PLMS patients do not have RLS*
  - *Need PSG for Dx*
  - *Rx options same as RLS (shared pathophys)*



# Circadian Phase Delay (in one slide)

- Most common circadian problem
- Sleep is normal with late bed / late rise
- Shift schedule, if patient desires:
  - Melatonin 3 hrs before bedtime (M)
  - Darkness while in bed
  - Light exposure at end of “night” (L)
  - Shift sleep block by 30 minutes every other day



# Parasomnia (in one slide)

## ➤ NREM parasomnias (walking, talking eating, terror)

Course: usually benign

DDx includes seizure, REM behavior disorder

Behavioral management (EtOH, caffeine, schedule)

Treat occult sleep apnea or periodic limb movements

## ➤ REM behavior disorder: dream enactment

Linked to Parkinson's (may precede by decades)

Other neurological disorders (concurrently)

PSG confirms REM without atonia, rules out apnea

Rx: Clonazepam, melatonin

Bedroom safety, as injury is not uncommon

When all else fails and you can't wake up...



# Thank You!



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