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Types of Sleep Studies

Type 1 – Attended in-lab polysomnography (PSG) – 18 leads

Type 2 – Comprehensive portable PSG. At home set up with a technician – 7 leads

Type 3 – Home sleep testing (HST) – 4 leads

Type 4 – Home sleep testing (HST) – 2 biomarkers (usually blood O₂ and HR)

HST

TWO MAIN TYPES

- **Type 3** (only MD can use for diagnosis)
 - Four physiologic variables
 - Can be used for MAS titration
 - Expensive

HST TYPE 3



HST

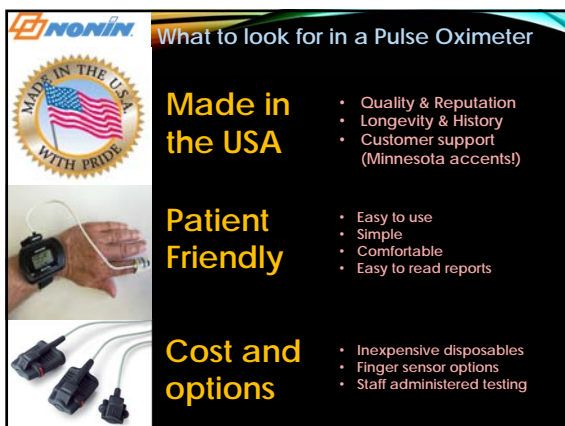
TWO MAIN TYPES

- **Type 4** (not used for diagnosis)
 - Record one or two variables usually include:
 - Arterial oxygen saturation
 - Heart rate



WristOx₂ 3150
Wrist-Worn Pulse Oximeter

The advertisement features three images: a close-up of the device, a patient in a hospital bed wearing it, and a hand with the device on the wrist. The Nonin logo and a 'MADE IN THE USA WITH PRIDE' seal are also present.



What to look for in a Pulse Oximeter

Made in the USA

- Quality & Reputation
- Longevity & History
- Customer support (Minnesota accents!)

Patient Friendly

- Easy to use
- Simple
- Comfortable
- Easy to read reports

Cost and options

- Inexpensive disposables
- Finger sensor options
- Staff administered testing



Start with diagnosis by MD:

- Subjective (symptoms)
- Objective (signs)

Subjective

- Sleep history
- Sleep Questionnaires (ESS, Bed Partner, Quality of life)
- Patients chief sleep complaints (this is what you will track)

Objective

- Sleep testing by MD
- HST or PSG
- Video EEG

PSG Diagnostic Report

AHI

RDI

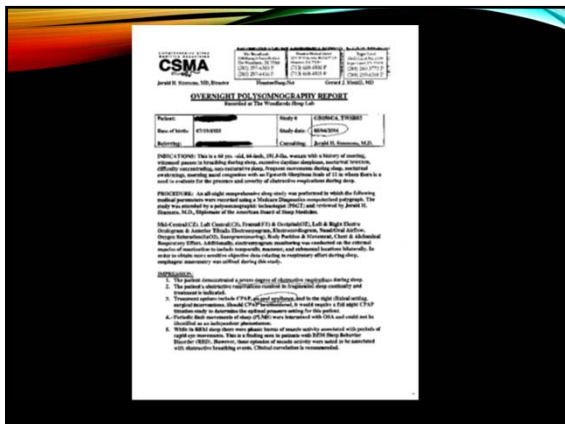
ODI

PSO2

Study Index	WASO	Apnea	Study Index	WASO
#	#	#	#	#
1	0	0	81	81
2	0	0	8	8
3	0	0	83	83
4	0	0	144	144
5	0	0	88	88
6	0	0	81	81
7	0	0	0	0
8	0	0	0	0
9	0	0	107	107
10	0	0	142	142
11	0	0	87	87
12	0	0	138	138
13	0	0	138	138

Mean	Min	Max	SD	SD	SD
Mean	80.0	80.0	87.0	80.0	80.0
Min	80.0	80.0	87.0	80.0	80.0
Max	85.0	85.0	91.0	85.0	85.0
SD	80.0	80.0	87.0	80.0	80.0

Mean	Min	Max	SD	SD	SD
Mean	75.7	67.1	85.4	75.7	75.7
Min	69.1	67.1	85.4	69.1	69.1
Max	77.0	100.0	85.4	77.0	77.0
SD	69.0	100.0	85.4	69.0	69.0



ORAL APPLIANCE - MOVES THE JAW FORWARD

1. Therapy more effective
2. Increase risks of side effects

ORAL APPLIANCE EFFECTIVE?

Subjective symptoms (feels)

- Track original symptoms
- Fatigue
- Restful sleep
- Daytime energy

HOW? ----Ask Questions

ORAL APPLIANCE EFFECTIVE?

Objective signs (testing)

- Blood oxygen levels
- Heart rate
- Number of arousal events

HOW? --- Pulse oximetry

Oral Appliance Titration Evaluation

Patient Name: _____ DOB: _____

Main Sleep Complaint: _____

Subjective

- Feeling?
- Original symptoms improve?
- Questionnaire

Patients Global Impression of Changes Scale (PGIC)
Since beginning treatment at this practice, how would you describe the change (if any) in ACTIVITY LIMITATIONS, SYMPTOMS, EMOTIONS and OVERALL QUALITY OF LIFE, related to your condition? (Scale 0-7)

No change (or condition has worsened) 1
 Almost the same, hardly any change at all 2
 A little better, but no noticeable change 3
 Somewhat better, but the change has made no real difference 4
 Moderately better, and a slight but noticeable change 5
 Better, a definite improvement that has made a real difference 6
 Much better, huge improvement that has made a big difference 7

Epworth Sleepiness Scale (ESS)
How likely would be for you to become drowsy during the day in the following situations:
 0= Would never doze 1= Slight chance of dozing 2= Moderate chance of dozing 3= High chance of dozing

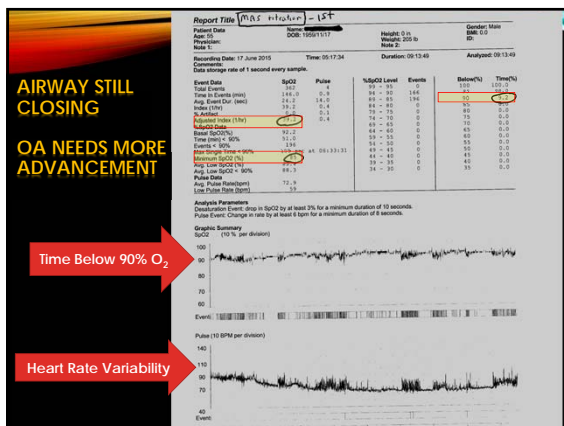
Situation	Chance of dozing
Sitting & reading	
Watching TV	
Sitting inactive in a public place (i.e. theater)	
As a car passenger for an hour without a break	
Lying down to rest in the afternoon	
Sitting and talking to someone	
Sitting quietly after lunch without alcohol	
In a car, stopped for a few minutes in traffic	
Total score:	

What is your HT: _____ WC: _____

Patient Signature: _____ Date: _____

OBJECTIVE

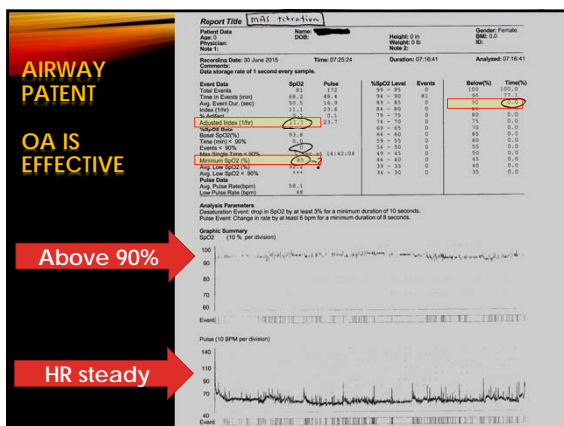
- Pulse oximetry



AIRWAY STILL CLOSING
OA NEEDS MORE ADVANCEMENT

Time Below 90% O₂

Heart Rate Variability



AIRWAY PATENT
OA IS EFFECTIVE

Above 90%

HR steady



PULSE OXIMETRY INTERPRETATION

OSA

- Symptoms
- Simple ODI and time under 90%

• UARS

- Symptoms
- Heart Rate Variability (suggests effort)



MAS Titration - 15'

This is a 2012 literature study of a patient who is wearing a MAS (mechanical airway support) device under 100% oxygen. Also note the number of events, apnea events (apnea), time of onset, and the patient's response. But also note the correlation of the oxygen levels in the lungs (SpO2) and the patient's response. When the oxygen drops, the heart rate increases. There is a direct correlation that may correlate to MAS. I say that because during PBM the patient's heart rate increased, including the apnea that happened during PBM. The patient's heart rate was able to return to MAS and we voided the study.

MAS Titration - resolved

This 2012 literature study indicates the answer is present and stable. Despite that about 100% of oxygen and there is very little heart rate variability. Supplement are provided as well. She was sent for a final PBM with the Bariatric Sleep MD.

Screening - Severe OSA

This is a screening study on 60 primary care physicians who have not been for the OSA. Note that the number of MAS events and the number of MAS. Also note the number of events, for the patient's OSA. The patient was concerned to go to a PBM ASAP.

Screening - Severe REM OSA

This is a screening question for patients who do not fit into the OSAI. Most the time under 80% oxygen. Also note the number of events. Be sure into the correlation of the oxygen drops on the apnea graph and the color graph. When the oxygen is low, the heart rate increases. What is going to be in sleep in addition that may correlate to REM sleep. I like that structure for REM the patient needs go through that period including the minutes that support breathing. During REM the apnea is more noticeable to collapse. Then consider the sleep and how that sleep study, either the events that were long and long period of broken flow. The patient was not intended to go to a PSG.

Screening - UARS

There is something that can be done with fatigue and sleeping with that just the work being for right often in order to justify sending her for a PSG. This study shows normal oxygen levels at night. But look at the variable that lead. This is an indicator of disturbance of the respiratory nervous system (RNS) in response to the arousal system to sleep. The brain awakens the collapse and stimulates the RNS in order to reach breathing the tongue forward which results in the arousal during sleep. But the URS structure and arousals heart rate. So we send her for a PSG in order to have the PSG with our resources and resources (types) of upper airway resistance syndrome (UARS).

IMRS Titration - resolved

This is a screening question for patients who do not fit into the OSAI. Most the time under 80% ap-ri-ght and there is very little heart rate variability. Turbulence are associated as well. She was sent for a PSG with the standard Sleep MRI.

OAT Titration Worksheet

Patient name _____ Weight _____ DOB _____ Age _____ BMI _____

Type of MAS: _____ Date of insertion: _____ Initial _____ Date Returned _____

Pulse Ox sat: _____ Date Disposed _____

Original sleep MD facility: _____

HST type on this report: Pulse Ox HST Type 3 Other _____

Original PSG date	PSG	HST date	HST date

Original Sleep Complaints: fatigue OSA snoring

Check one:

patient satisfied symptoms not resolved

Current disposition:

All symptoms resolved

Titration study to see if advancement needed

MAS not as far as possible - what is next?

Final to determine if MAS is effective

Dr. Comments: _____

Dr. Recommendations: Adv MAS redo HST

Adv MAS done and for final HST/PSG with Sleep MD

Send for final HST with Sleep MD now

Send for PSG w/ PEG to see why symptoms remain

Send for PSG with Sleep MD to consider Combination Therapy

Other _____

Objective

Assistant

Doctor



Building Bridges
