Sleep Apnea

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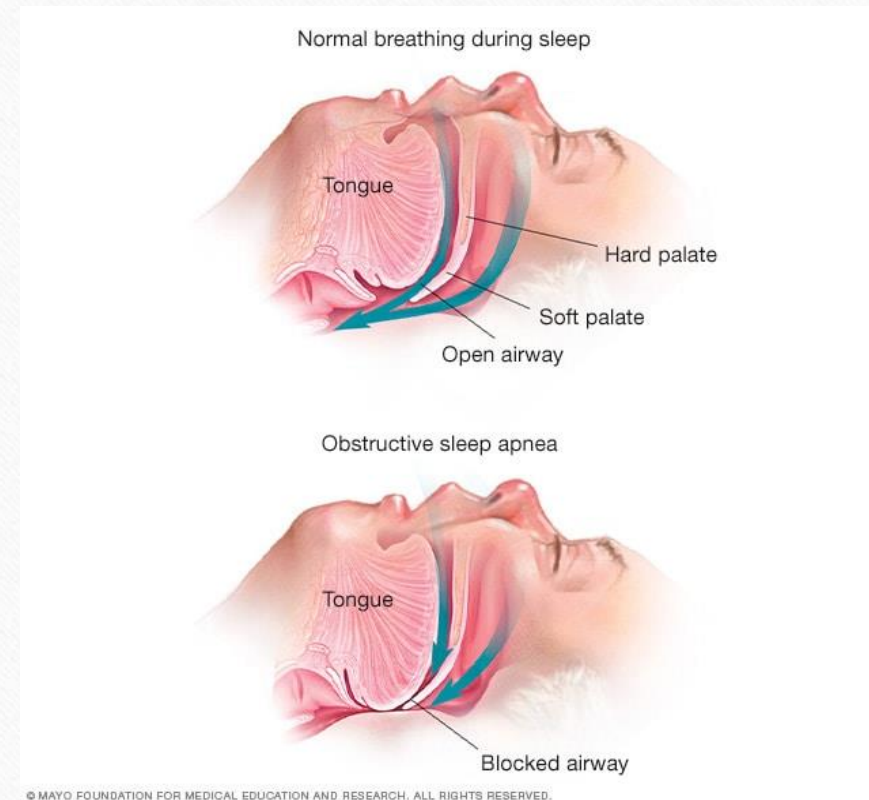
Avera Pulmonary & Sleep Medicine Clinic

Objectives

- Identify patients at risk for sleep apnea
- Identify signs and symptoms of sleep apnea
- Differentiate the between types of sleep apnea testing
- Explain treatment options for sleep apnea

What is sleep apnea

- 3 types of sleep apnea
  - Obstructive sleep apnea
  - Central sleep apnea
  - Complex sleep apnea

Obstructive Sleep Apnea

- Muscles in back of throat relax
  - Support soft palate
  - Uvula
  - Tonsils
  - Throat
  - Tongue
- Airway narrows or closes as you breath in

Normal breathing during sleep

Tongue

Hard palate

Soft palate

Open airway

Obstructive sleep apnea

Tongue

Blocked airway

Central Sleep Apnea

- Brain fails to send signals to breathing muscles

- Patient makes no effort to breath

- Can occur sporadically or cyclically

Complex Sleep Apnea

- Starts with obstructive sleep apnea
    - Diagnosed by sleep study
- Start positive airway pressure treatment (CPAP/BiPAP)
- Obstructive events turn into Central events

Epidemiology

- Older males

- Postmenopausal women

- 15-30% males in North America

- 10-15% females in North America

- 936 million worldwide- mild

- May be more prevalent in African Americans

- Asian populations

Undiagnosed Sleep Apnea: *A Hidden Health Crisis*

In the U.S. the estimated economic cost of undiagnosed obstructive sleep apnea was nearly $150 billion in 2015.

Workplace Accidents
$6.5 billion

Motor Vehicle Accidents
$26.2 billion

TOTAL
$149.6 billion

Lost Productivity
$86.9 billion

Comorbid Diseases
$30 billion

Source: American Academy of Sleep Medicine, 2016 | www.sleepeducation.org

https://aasm.org/economic-burden-of-undiagnosed-sleep-apnea-in-u-s-is-nearly-150b-per-year/

Risk Factors

- Age
- Sex- males>females
- Obesity
- Craniofacial/upper airway abnormalities
- Less established risk factors
  - Smoking, family history, nasal congestion

Risk Factors Continued

- Medications
  - Etoh, benzos, and narcs
- Medical conditions
  - OHS, CHF, Afib, PHTN, HTN, ESRD, Chronic Lung Disease, Stroke/TIA, Pregnancy, Acromegaly, Hypothyroidism, PCOS, Parkinsons, Floppy eyelid syndrome

Signs & Symptoms

- Daytime sleepiness
  - Fatigue, tired, low energy, poor focus
- Snoring and/or apnea
- Choking and/or gasping
- Morning headaches
  - Hypercapnia, vasodilation, increased intracranial pressures, impaired sleep quality

Epworth Sleepiness Scale

Tool to address concerns for EDS

Widely available

Easy, quick

0-5 Lower normal daytime sleepiness

6-10 higher normal

11-12 mild excessive

13-15 moderate excessive

16-24 severe excessive

0= No chance of dozing off   2 = Moderate chance of dozing off

1 = Slight chance of dozing off   3 = High chance of dozing off

Rate the chance that you will doze off in the following situations:

Sitting and reading

Watching television

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

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

Lying down to rest in the afternoon when circumstances permit

Sitting and talking to someone

Sitting quietly after lunch without alcohol

In a car while stopped for a few minutes in traffic

Add above total score

STOP-BANG

Originally used to screen prior to surgery

Highly accurate when scored higher

Quick & easy

Readily available

High risk if score is 5-8

Intermediate risk 3-4

STOP-Bang questionnaire

Please answer the following questions by checking "yes" or "no" for each one.

	Yes	No
Snoring (Do you snore loudly?)	❑	❑
Tiredness (Do you often feel tired, fatigued, or sleepy during the daytime?)	❑	❑
Observed Apnea (Has anyone observed that you stop breathing, or choke or gasp during your sleep?)	❑	❑
High Blood **P**ressure (Do you have or are you being treated for high blood pressure?)	❑	❑
BMI (Is your body mass index more than 35 kg per m^2?)	❑	❑
Age (Are you older than 50 years?)	❑	❑
Neck Circumference (Is your neck circumference greater than 40 cm [15.75 inches]?)	❑	❑
Gender (Are you male?)	❑	❑

Score 1 point for each positive response.

*Scoring interpretation: 0 to 2 = low risk, 3 or 4 = intermediate risk, ≥5 = high risk.*

Source: University Health Network, Toronto, Ontario, Canada (www.stopbang.ca/ osa/screening/php). Used with permission from Sauk Prairie Healthcare.

Signs and Symptoms

- Insomnia
- Neuropsychiatric symptoms
- Postoperative hypoxemia
- Nocturia

Physical Exam

- Obesity >30 kg/m2
  - Can be normal range
- Crowded airway
- Large neck
  - Male >17 inches
  - Female > 16 inches

- Waist circumference
- Signs of associated symptoms
  - Hypertension
  - Heart failure
  - Pulmonary hypertension
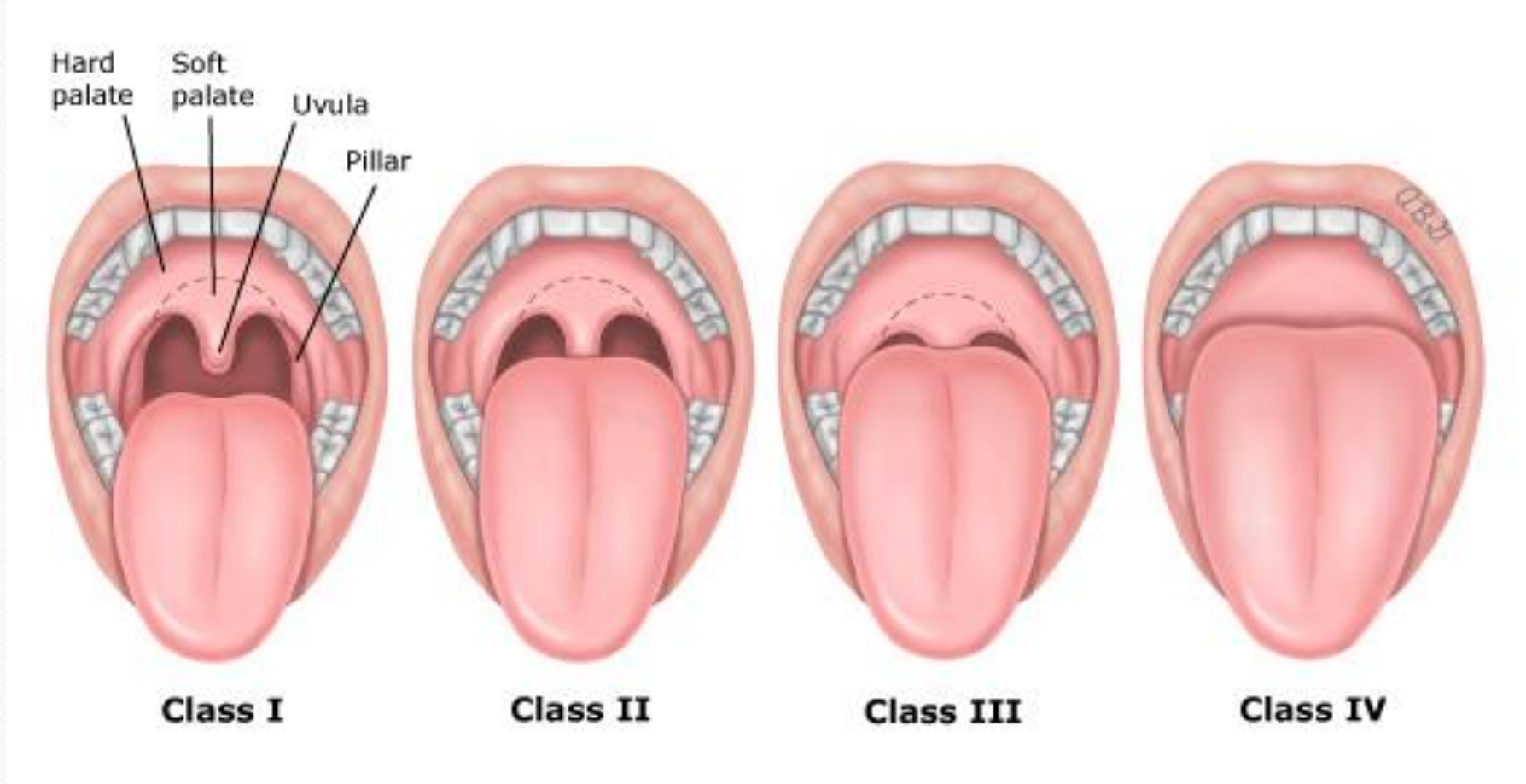
Mallampati Airway Classification

Diagnostics

- Overnight desaturation study
  - Quick, screening tool for OSA
  - Useful in high pretest probability

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7065557/
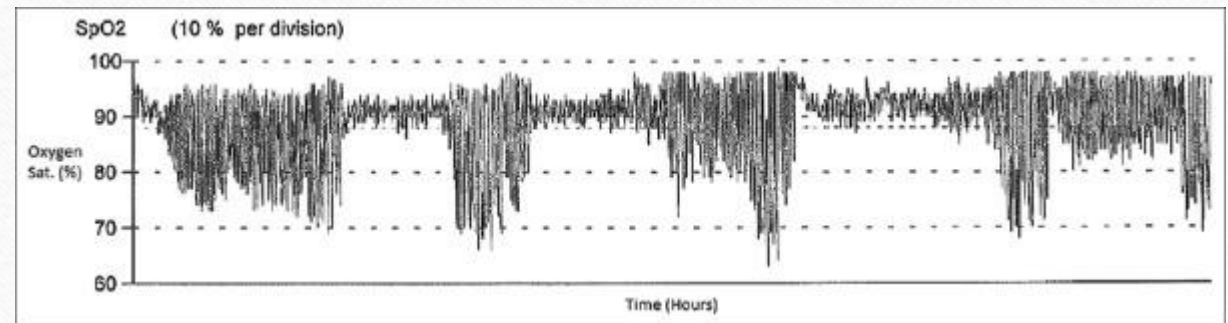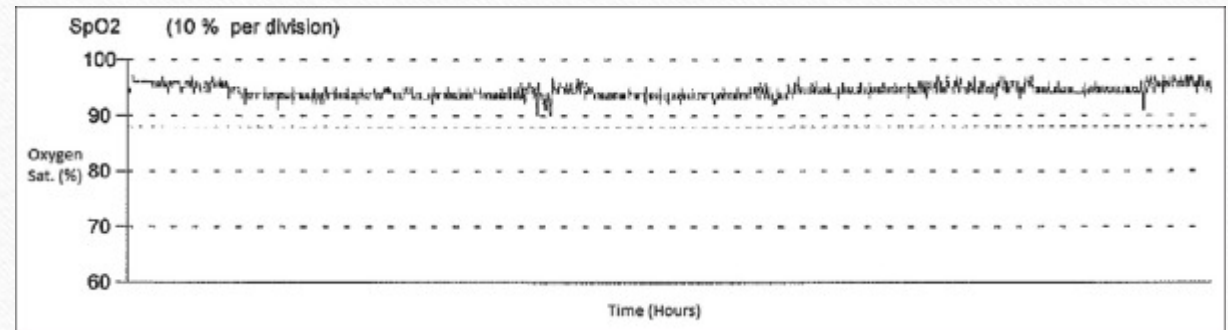
Home Sleep Apnea Testing

- Good test if high suspicion for OSA

- Uncomplicated patient

- Lunch box

  - Cannula under nose

  - Strap around chest

  - Probe on finger

https://www.resmed.com/en-us/sleep-apnea/sleep-blog/your-sleep-apnea-test-what-to-expect/

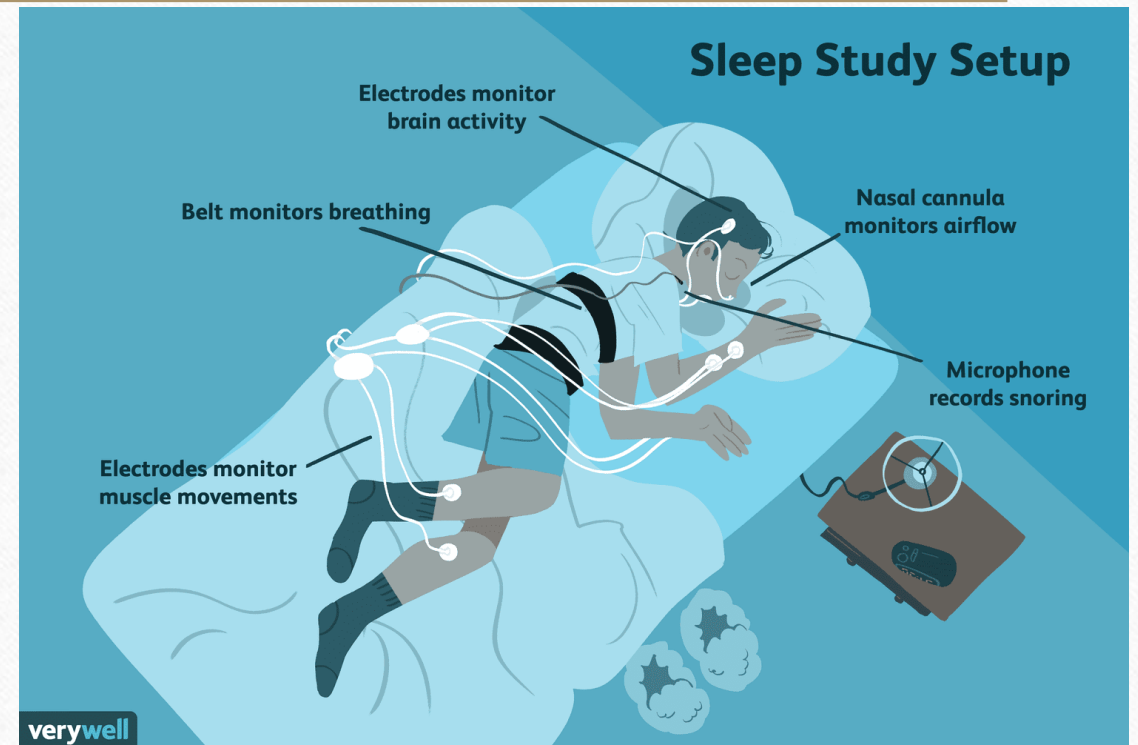# Home Sleep Apnea Testing

Advantages

- Cheap
- Convenient
- Easily accessible
- One night

Disadvantages

- Technical errors
- Misinterpretation due to limited data
- Can underestimate
- Not as detailed as in-lab

In-lab Polysomnogram

- Gold standard
- Recommended for mission critical workers
- Better choice if patient is complex
  - Neuromuscular disease
  - COPD
  - CHF
  - Restless legs
  - Stroke
  - Obesity hypoventilation

Sleep Study Setup

Electrodes monitor brain activity

Belt monitors breathing

Nasal cannula monitors airflow

Microphone records snoring

Electrodes monitor muscle movements

verywell

https://www.verywellhealth.com/what-to-expect-in-a-sleep-study-3015121

Diagnosis

- Polysomnogram
- AHI >5 or more obstructive events
  - Sleep symptoms, holding breath, snoring, or underlying CVD, DM2 or mood disorder
- >15 events without associated symptoms or underlying disease

- HSAT
- Uses Respiratory event index REI or Respiratory disturbance index RDI
- Uses same scoring as PSG

Diagnosing Severity

- Mild 5-15

- Moderate >15 events <30

- Severe >30

Other things to consider is nocturnal hypoxemia >5 minutes is considered significant

Consequences of Sleep Apnea

- Decreased survival rates
  - Increased risk for CVD
- Impaired cognitive function
- Higher risk for automobile accidents
- Hypertension
  - Apnea causes a slight rise, then an abrupt rise at apnea termination
  - Due to arousal from sleep and sympathetic activation
  - Effective treatment can lower Bp by 10mmHg

Consequences of Sleep Apnea

- Pulmonary hypertension
- Arrhythmias
  - Slowing of HR with apnea onset, increased during apnea, dramatic rise post apnea
- Coronary artery disease
- Congestive heart failure
  - Negative intrathoracic pressure, hypoxemia, increased sympathetic tone
- Increased risk for developing stroke
  - Increases in ICP, secondary to increased CVP, systemic pressure, and vasodilation from increased CO_2

Treatment

- ENT referral
- Inspire
  - Invasive
  - Moderate sleep apnea
  - BMI <35,
  - Intolerant to CPAP
  - Can reduce AHI by 67%
- Surgery
  - Reconstructive surgery, removal of tonsils, adenoids, polyps, nasal turbinate reduction
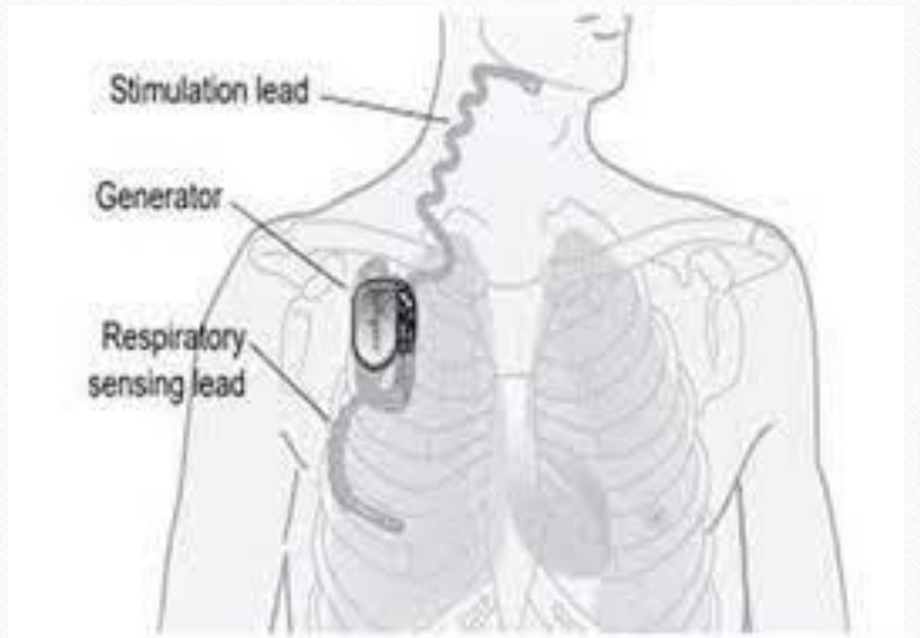
Treatment

- Dental device
  - Mild to moderate OSA
  - pulls lower jaw forward
  - expensive, need repeat sleep study
  - Bite changes, risk for TMJ, loose teeth, mouth dryness
- Weight loss

Oral Appliance Pulls the Lower Jaw Forward, Opening the Airway
©Dear Doctor, Inc.

https://www.coshoctondental.com/my-blog/626474-this-oral-appliance-could-help-solve-your-sleep-apnea-problem

Positive Airway Pressure

- Continuous positive airway pressure
  - Can be fixed or auto
  - Splints upper airway open
  - Must be able to initiate breath
- Bilevel positive airway pressure
  - Delivers pressure at different levels with inspiration and expiration
  - Can be fixed or auto
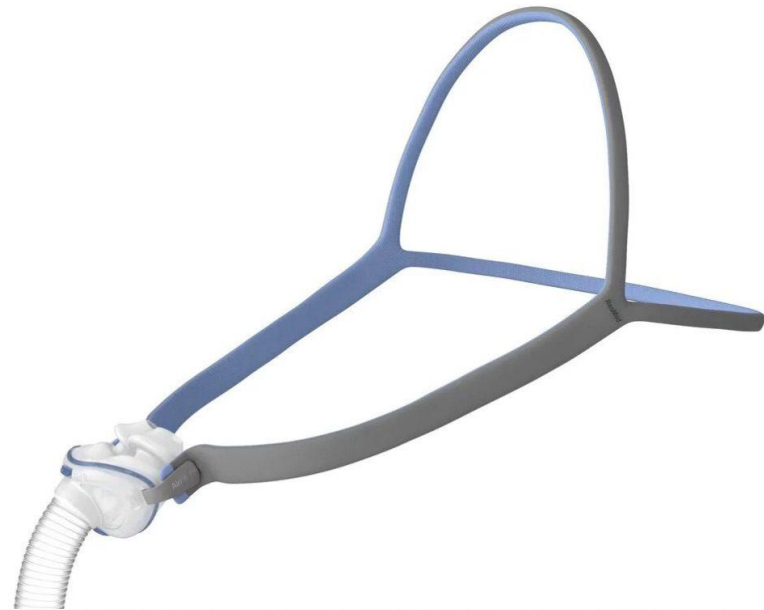
Compliance visit

>4 hours of use 70% of the time

Average pressures

Average leak

Residual AHI

ResMed
Independent/ Private
SleepSafe Drivers
855-723-3378 X 2

AirView™

Patient A
01/12/2020 - 02/10/2020
DOB: 10/25/1966
Age: 53 years

Compliance Report

Usage	01/12/2020 - 02/10/2020
Usage days	**30/30 days (100%)**
>= 4 hours	29 days (97%)
< 4 hours	1 days (3%)
Usage hours	227 hours 21 minutes
Average usage (total days)	7 hours 35 minutes
Average usage (days used)	7 hours 35 minutes
Median usage (days used)	7 hours 40 minutes
Total used hours (value since last reset - 02/10/2020)	13,901 hours

AirSense 10 AutoSet	
Serial number	22141270378
Mode	AutoSet
Min Pressure	8 cmH2O
Max Pressure	20 cmH2O
EPR	Off
EPR level	1

Therapy						
Pressure - cmH2O	Median:	10.5	95th percentile:	13.1	Maximum:	15.0
Leaks - L/min	Median:	1.6	95th percentile:	16.2	Maximum:	23.9
Events per hour	AI:	0.9	HI:	0.4	AHI:	1.3
Apnea Index	Central:	0.1	Obstructive:	0.7	Unknown:	0.0
Cheyne-Stokes respiration (average duration per night)					**0 minutes (0%)**	

Usage - hours

https://sleepsafedrivers.com/compliance-reporting-for-work/
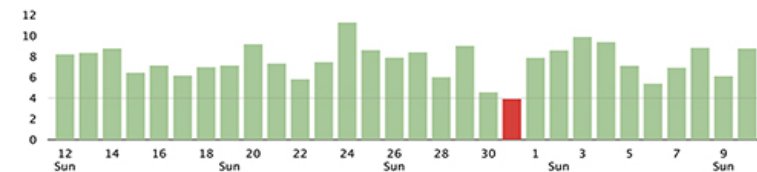
Trouble Shooting

- Pressure is overwhelming → check ramp

- Claustrophobic with mask → watch tv

- Snoring or gasping for air → increase pressures

- Bloating, burping, gas → too much pressure

- Sores, uncomfortable → mask liner, Gecko nasal pad, mask fitting session

- Mask comes off during night → need a different style mask

Trouble Shooting

- Dry eyes → mask leaking
- Machine is loud → leak, older than 5 years- may need new machine
- Dry mouth → chin strap, change humidity
- Consider sleep aid to gain compliance
- Refer to sleep specialist
- Consider ENT referral or dental device

Questions

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