



TITRATION OF AVANCED PAP THERAPIES : WHAT TO USE, WHEN, WHY AND HOW

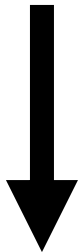
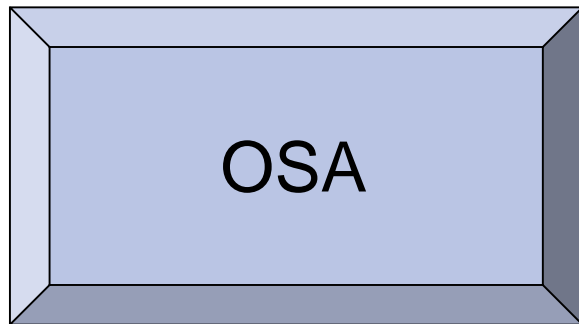
- Kala Bingham, CRT RCP RPSGT
- Sleep Care Manager
- The Sleep Wellness Institute



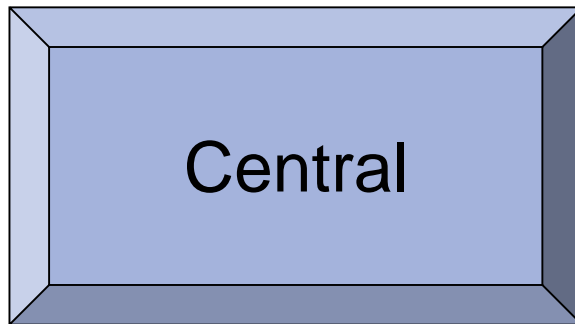
General Titration Goals

- THE GOALS SHOULD BE INDIVIDUALIZED TO MEET THE PATIENT NEED
 - AIRWAY MANAGEMENT-KEEP THE AIRWAY OPEN
 - STABILIZE BREATHING PATTERNS BY MONITORING THE PATIENTS RESPONSE TO THERAPY
 - SET PARAMETERS FOR OPTIMAL THERAPY
 - ENSURE MASK FIT

Sleep disordered breathing



CPAP
BiPAP



Noninvasive ventilation:
BiPAP
ASV



BiPAP
AVAPS

BiLevel: indications for use

- ☐ **OSA patients with:**
 - intolerance of CPAP pressures
 - hypoxemia despite resp event control
 - elevated CO₂ levels despite resp event control

- ☐ **Hypoventilation syndrome**
- ☐ **Complex or Central Sleep Apnea**

What is BiLevel

- Provides two independently set pressures to maintain airway stability and support ventilation requirements while the patient sleeps
 - IPAP
 - EPAP

BiLevel terms

- Rise Time=the time it takes for BiPAP to change from EPAP to IPAP. You can adjust for patient comfort
- Tidal Volume - V_t

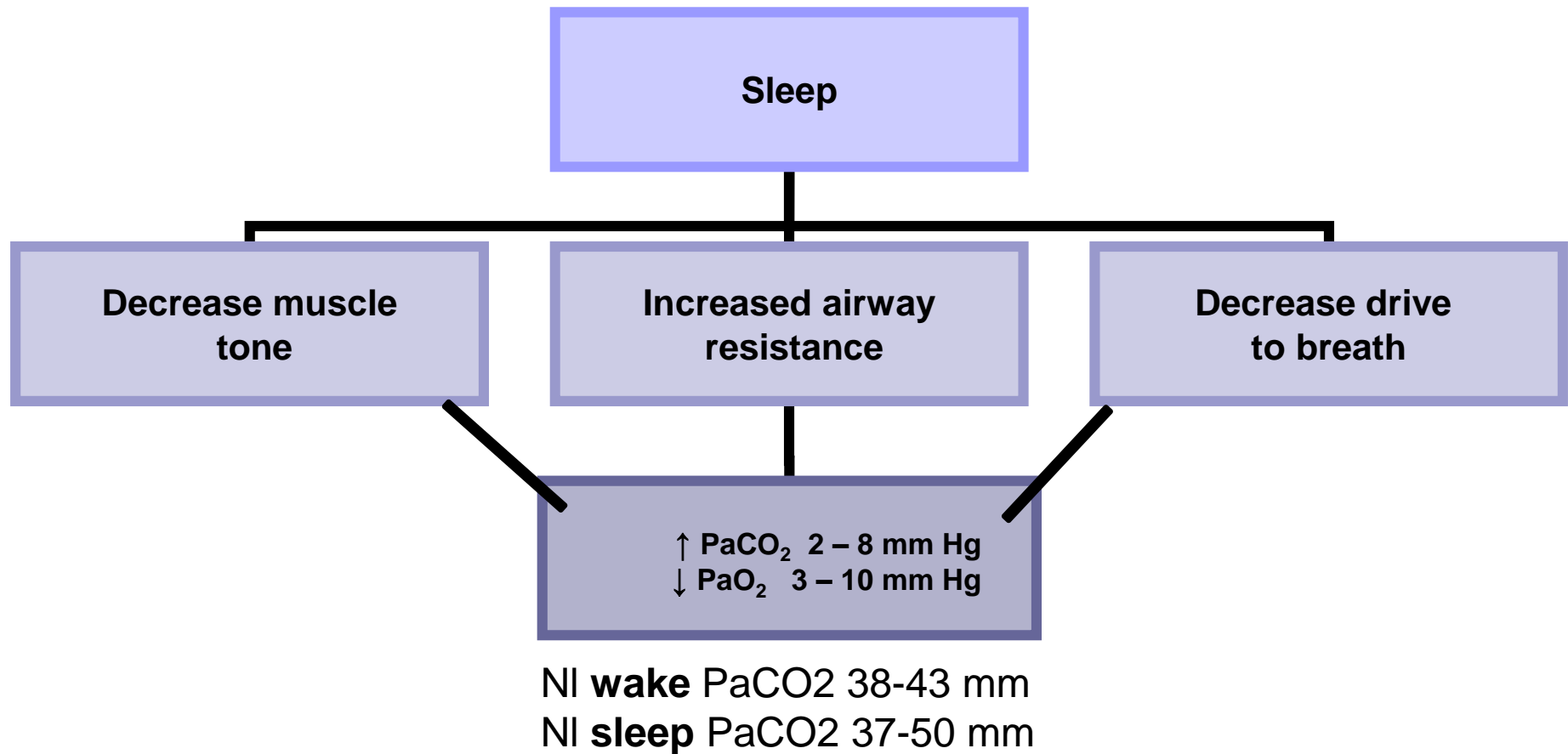
Titration BiLevel for control of apnea:

- Increase **expiratory** pressure (**EPAP**) in a stepwise fashion to control obstructive **apnea**
- Increase Inspiratory pressure (**IPAP**) in a stepwise fashion (maintaining at least 4 cm difference from EPAP) to control **hypopneas and snoring**.
 - IPAP 4-6 cm > EPAP and snoring or hypopneas persist, → trial of increasing EPAP.
 - **Central apneas → back up rate**

Titration of BiLevel for persistent hypoxemia in OSA

- IPAP/EPAP → control of apnea, hypopnea and snoring.
 - Hypoxemia persists → increase IPAP in 2 cm increments.
 - IPAP > 4 cm above level for control of OSA without benefit to sats **or** increases not tolerated → reduce to lowest effective level + add supplemental O2 to keep sats \geq 89-90%
- NOT ALL HYPOXEMIA IS HYPOVENTILATION

Effects of sleep on normal ventilation



Hypoventilation-Respiratory Insufficiency

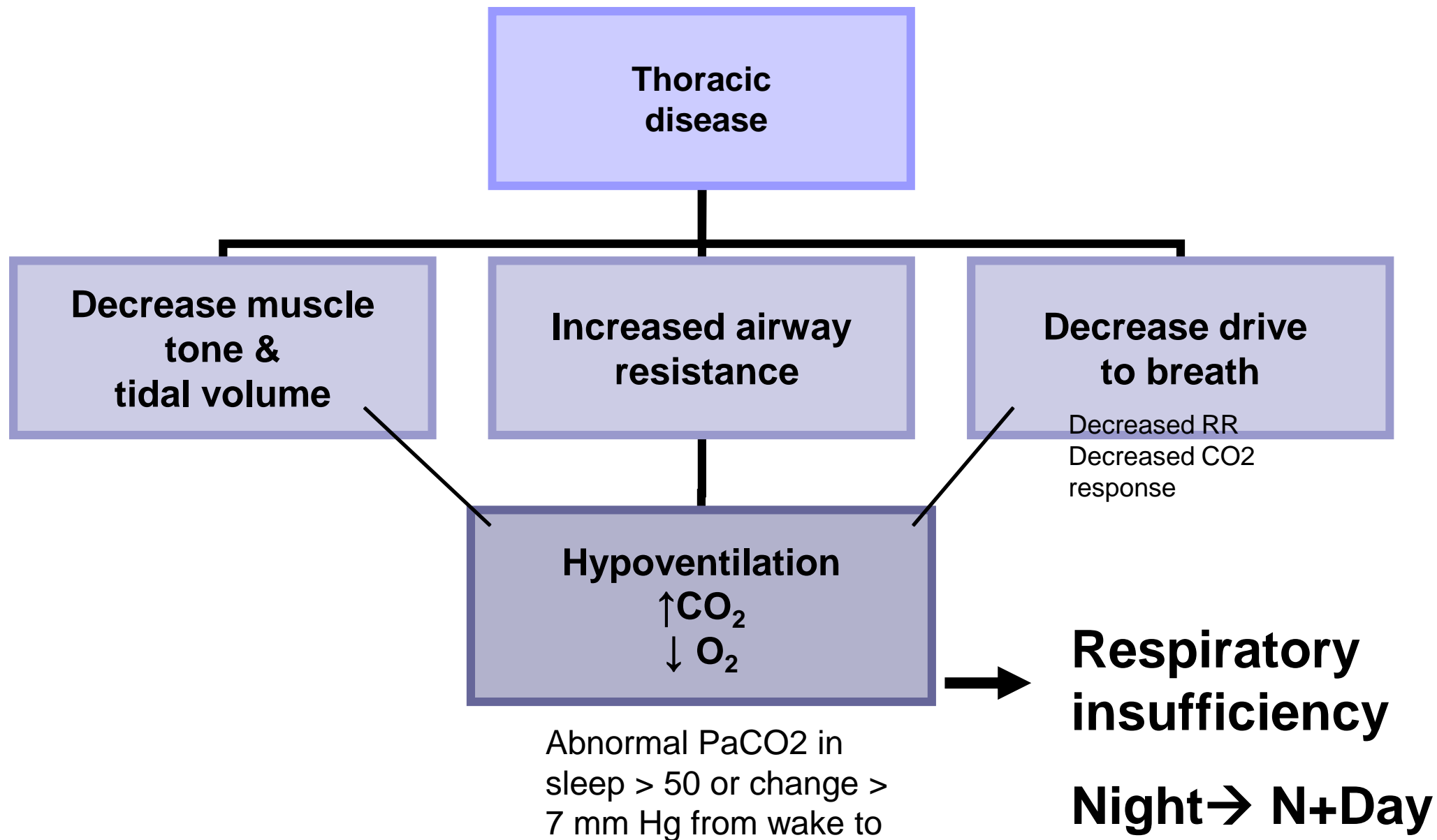
- The state in which a reduced amount of air enters the alveoli of the lungs resulting in:
 - PaO₂ falls
 - PaCO₂ rises

Occurs due to:

1. decrease tidal volume (V_t)
2. increased dead space (V_d)
3. decreased respiratory rate (RR)

Development of respiratory insufficiency

HYPOVENTILATION





Common causes of thoracic disorder

- 1. Respiratory muscle weakness –
decreased V_t , increased dead space,
increased RR**
 - **Amyotrophic Lateral Sclerosis**
 - **Muscular Dystrophy**
 - **Spinal Muscular Atrophy**
 - **Post-Polio Syndrome**



Common causes of thoracic disorder

2. Restrictive thoracic –decrease in the lung's ability to expand due to an external restriction of the chest wall or stiffness of the lung tissue.

- **Kyphoscoliosis**
- **Sarcoidosis**

Common causes of thoracic disorders

3. Obstructive lung disease –Increased airway resistance, partial air-flow obstruction, increased dead space, air trapping.

- **COPD**
- **Emphysema**
- **Severe Asthma**
- **Overlap syndrome**



Common causes of thoracic disorders

- 4. Obesity hypoventilation syndrome –
decreased V_t , increased RR**



Titration options for patients with hypoventilation or respiratory insufficiency

1. Bi-Level PAP
2. Average Volume Assured
Pressure Support (AVAPS)



Titration of BiLevel for persistent hypoxemia in OSA

- Titrate BiLevel to pressures appropriate for control of apnea, hypopnea and snoring
- If hypoxemia persists, increase IPAP in 2cm increments in attempt to improve O₂ saturation

Titration of BiLevel for persistent hypoxemia in OSA

- If increasing IPAP >4 cm above level appropriate for control of OSA without benefit to sats or increases not tolerated, add supplemental O₂ as needed to maintain sats \geq 89-90%

□ NOT ALL HYPOXEMIA IS
HYPOVENTILATION



BiLevel S (spontaneous mode)

- Used with patients who are able to maintain a constant respiratory rate, but require an IPAP:EPAP pressure difference to augment tidal volume while you sleep.



BiLevel S (spontaneous mode)

- Can be used with the following patients:
 - ☐ Obesity hypoventilation
 - ☐ Neuromuscular weakness disorders
 - ☐ Restrictive thoracic disease
 - ☐ Obstructive lung disease

BiLevel S/T (timed back up rate)

- This mode is used with patients that require:
 - Time rate from the device to support their inconsistent respiratory pattern (more common in NM disease)

BiLevel S/T (timed back up rate)

- ☐ Pressure support to augment their tidal volume when the device provides a breath to the patient
- ☐ Patient has the ability to spontaneously initiate breaths or tolerate timed back up breaths from the device

How can we affect ventilation?

- To increase ventilation:

- ☐ 1. Insure patent airway.

- ☐ 2. Increase V_t .

- I:E differential

- V_t setting with AVAPS.

- ☐ 3. Increase respiratory rate

- ☐ 4. Body position

Titration of BiLevel for control of hypoventilation

1. Transcutaneous (TCCO₂) or End-Tidal CO₂ (ETCO₂) monitoring.
2. *Excessive leakage must be prevented.*
3. Initiate BiLevel at IPAP/EPAP 10/4 cm or EPAP at pressure **previously demonstrated as effective to control obstructive apnea**. Initiate **IPAP at (EPAP +6 cm)**.
4. Increase EPAP only until obstructive events are controlled.

Increase EPAP → increase IPAP same

*****Want lowest possible EPAP**

Titration of BiLevel for control of hypoventilation (cont'd)

5. Increase IPAP (as tolerated) until the following parameters are achieved:
 - a. TCCO₂ or ETCO₂ < 50 mm (**or** RR 2-4 BPM < baseline wake RR)
 - b. Minimal hypopneas
 - c. Improvement in O₂ sat if > 89%

Titration of BiLevel for control of hypoventilation (cont'd)

5. **Central apneas** or inconsistent efforts → back up rate → = match RR during relaxed wake.
6. Increase RR in increments of 2 BPM if CO₂ remains > 50 mm despite use of maximally tolerated IPAP.

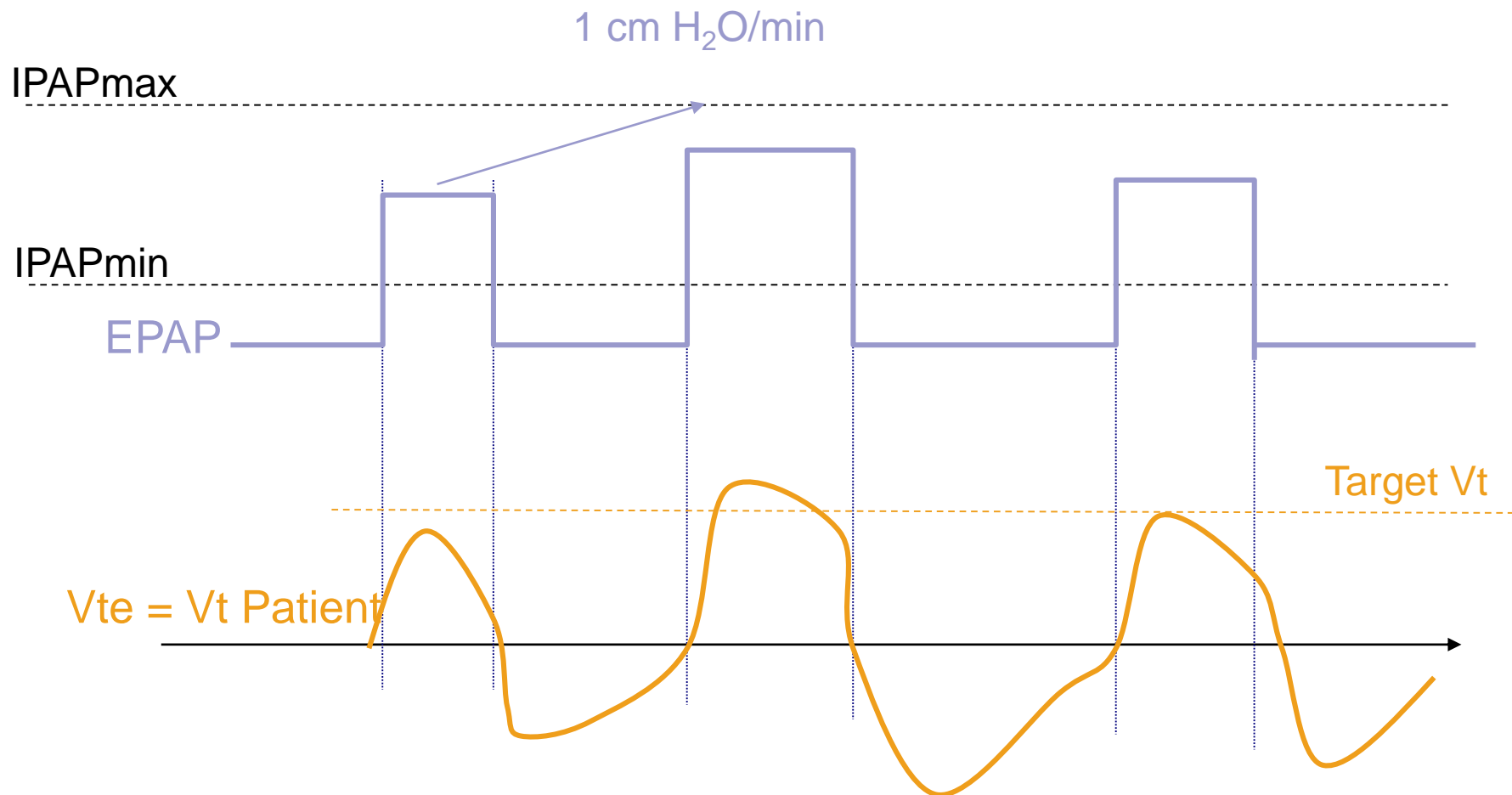
Bi-Level with (AVAPS)

- Fixed EPAP
- Vt selected – based on IBW (8-10 ml/kg)
- Adjusts pressure support (IPAP-EPAP) to maintain a consistent tidal volume
 - Able to provide a **constant tidal volume as patient ventilation changes.**
 - Allows for compensation of Intra-night and inter-night changes in breathing status

AVAPS – Who is it appropriate for?

- Individuals with anticipated variable pressure support needs
 - Neuromuscular disease
 - Obesity-hypoventilation, COPD or hypoventilation with marked deterioration in REM sleep

AVAPS auto-titration algorithm



Automatically adjusts the IPAP within a preset range to maintain a consistent tidal volume IPAP will automatically increase or decrease



AVAPS is *NOT* recommended for patients with periodic breathing

- Treatment of periodic breathing requires a rapid and variable breath by breath response system so the patients PaCO_2 stabilizes quickly
- AVAPS does not have a quick variable response to changes in tidal volume.

Titration protocol with AVAPS for respiratory insufficiency

Goal: Adjust user parameters for efficacy and adherence

- Set mode to S/T with AVAPS on
- Establish initial settings as indicated below
- Ensure proper mask fit to allow algorithm to work effectively
- Have patient breathe on bi-level device at basic settings below
- May Adjust IPAP, I-Time and Rate to patient comfort

EPAP	4 cm H ₂ O	I -Time	1.2 sec.
IPAP _{min}	10 cm H ₂ O	Rate	8-10 BPM or
IPAP _{max}	25 cm H ₂ O		2 below wake rate
Rise Time	2 or 3		

Acclimation Zone

Suggested starting point for AVAPS tidal volume

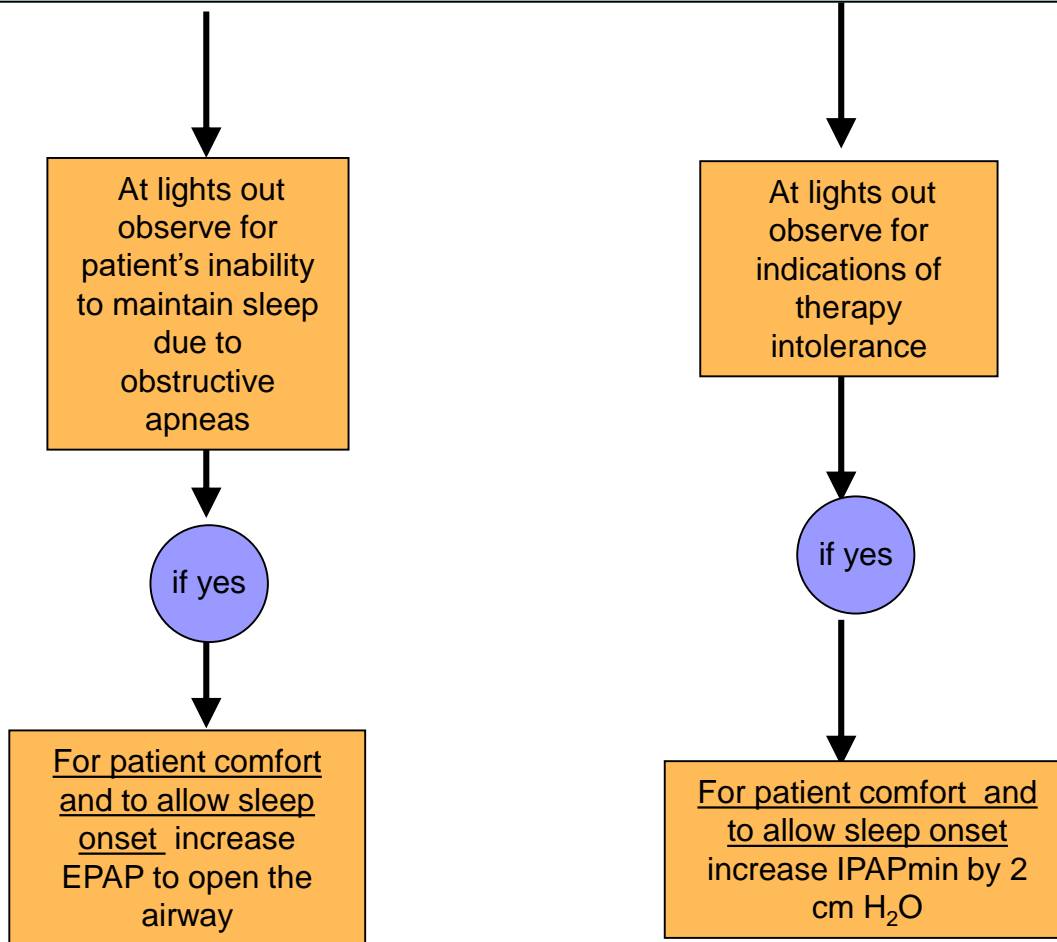
3 ways to choose a starting tidal volume with AVAPS:

1. MD suggestion
2. Patient comfort
3. Ideal body weight – 8 ml/kg based on height

***AVAPS suggested tidal volume settings based on height.**

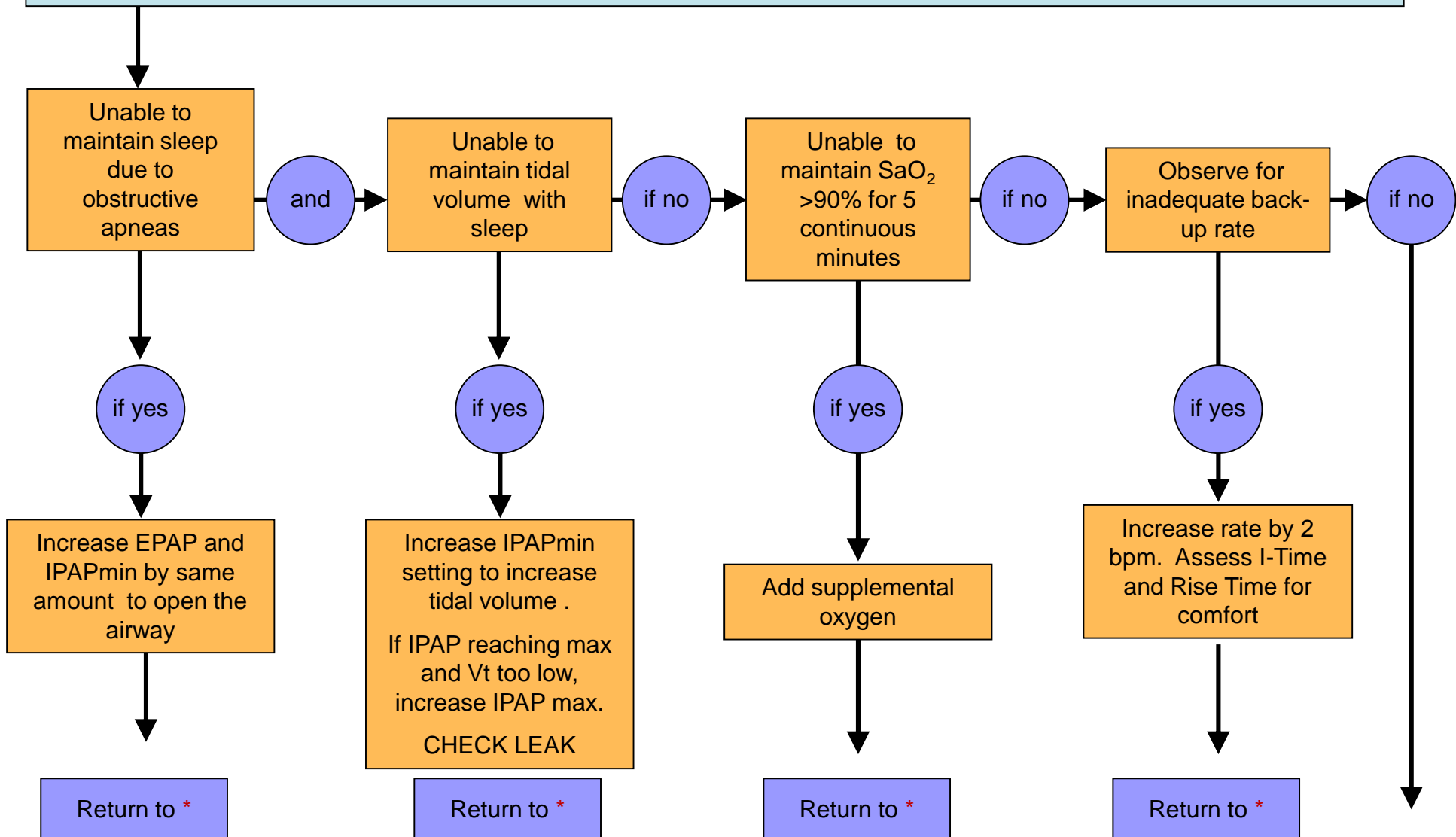
HEIGHT	59"	61"	63"	65"	67"	69"	71"	73"	75"
IDEAL WEIGHT	52.0 kg	55.5 kg	59.0 kg	62.5 kg	66.5 kg	70.5 kg	74.5 kg	78.5 kg	83.0 kg
8 ml/kg V_T	420 ml	440 ml	470 ml	500 ml	530 ml	560 ml	600 ml	630 ml	660 ml

Monitoring patient response at lights out



* Monitor patient PSG
Wait... Observe... Think
Patience is the *key* to successful titration

Titration Zone





Complex and Central Sleep Apnea

- Definition
- Treatment approaches

■ 3 main forms of Central Sleep Apnea

□ Idiopathic Central Sleep Apnea

- Brain issue with control of respiration
- Narcotics

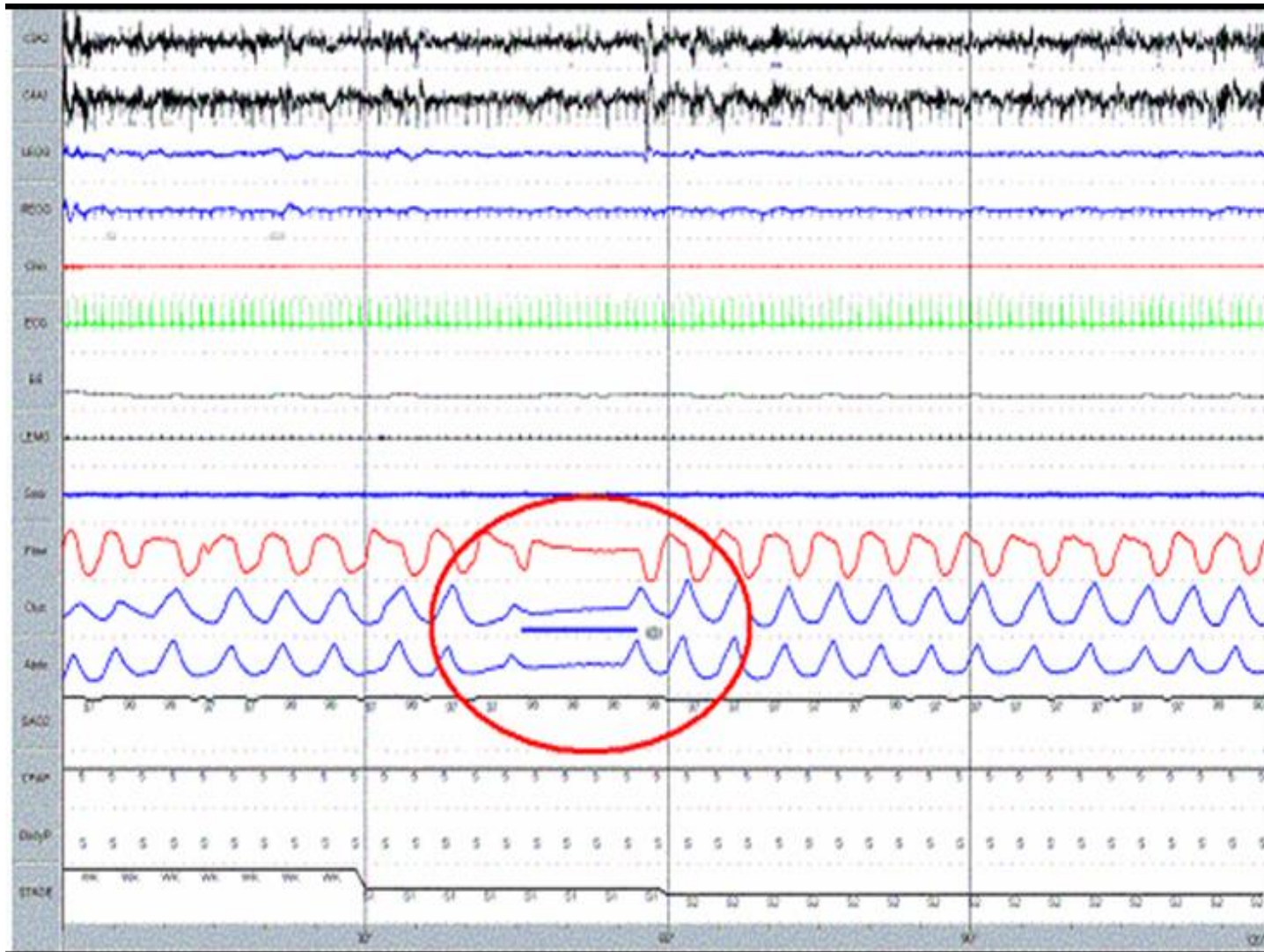
□ Periodic breathing

- Heart failure
- Chemoreceptor issue/ CO_2 issue
- Narcotics

□ Complex Sleep Apnea

- “CPAP Emergent central events”
- Chemoreceptor issue

Idiopathic central sleep apnea – PSG view

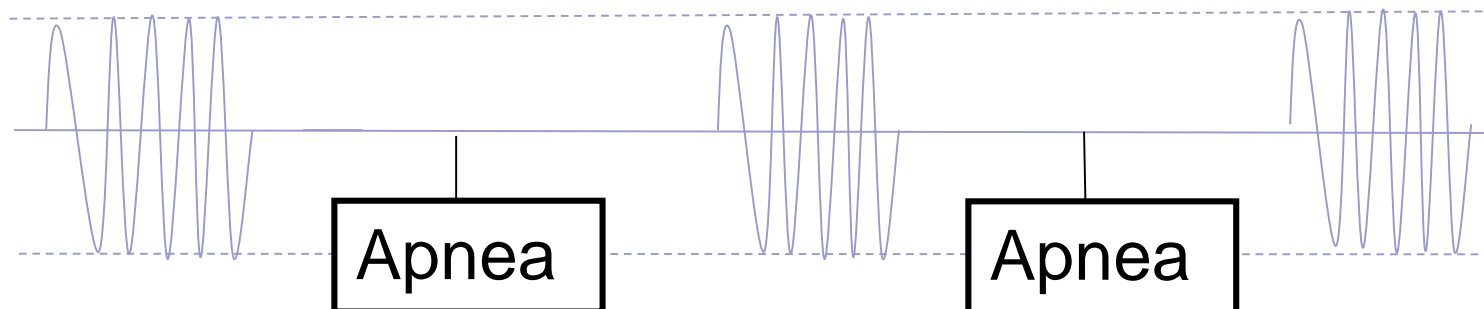


- No output from respiratory center of the brain causing lack of movement of the thorax.
- No movement of thorax & abdomen causes apnea

Idiopathic central sleep apnea

■ ***Cause of Idiopathic Central Apnea:***

- The respiratory center of the *brain does not fire* during sleep causing periodic apnea (see below)
 - Seen during the *diagnostic night* and titration night
 - Generally seen in non REM sleep clears during REM sleep
 - Generally seen in younger populations
- May appear as part of a neurological disease process or injury
 - Relationship between chronic opioid therapy and central sleep apnea¹
 - Impacts very small population of people



Treatment recommendations for idiopathic central sleep apnea

■ Oxygen therapy**

- Must have desaturation $\leq 88\%$ for 5 minutes or longer to qualify for oxygen therapy (CMS guidelines) OR $\leq 88\%$ for 5 minutes with history of either CHF, Pulm. HTN, Cor Pulmonale or increased RBC count

■ Medications:

- Theophylline ^{1, 3}
- Acetazolamide ^{2, 3}
- Gradual reduction of opioid medications may improve narcotic-induced CSA³

■ BiPAP S/T or ASV

Remember:
<2% of SDB

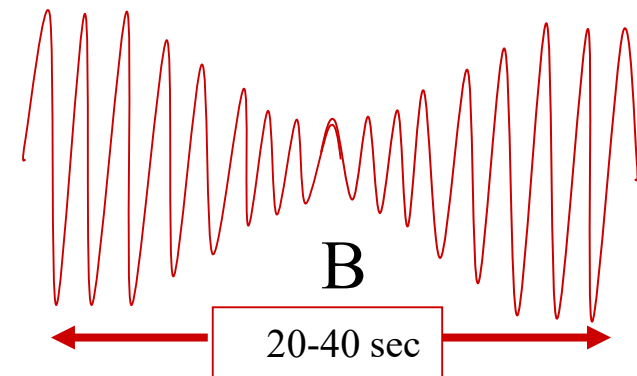
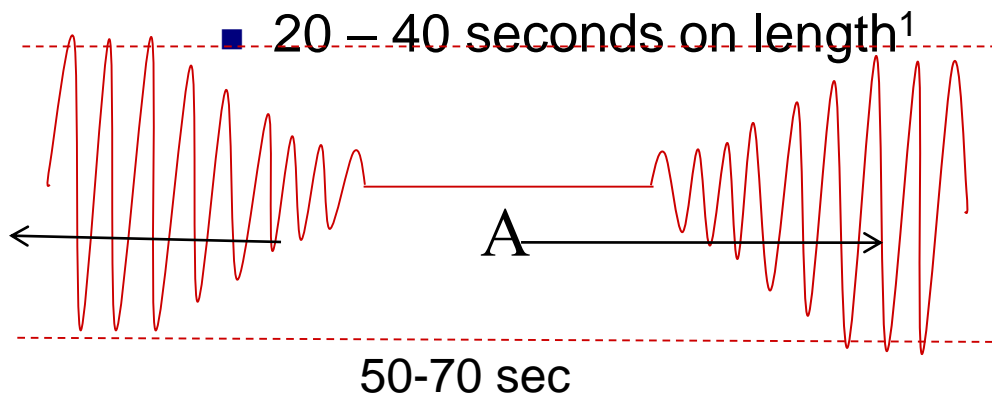
1 Orth, et al. Resp. Med. 2005;99:471-476

2 Javahari, S. AJRCCM: 2006;173(2) 234-237

3 Eckert, et al. Chest. 2007; 131:595-607

Periodic breathing

- Characteristics: waxing and waning breathing pattern
- Length of cycle is based on disease process causing the breathing pattern
 - Longer events for patients in heart failure¹
 - 50-70 second events of CSR then followed by normal respiration (waxing and waning of respiration) in patients with heart failure¹
 - Shorter events in those at altitude/neurological disorder/renal failure¹ (picture B)



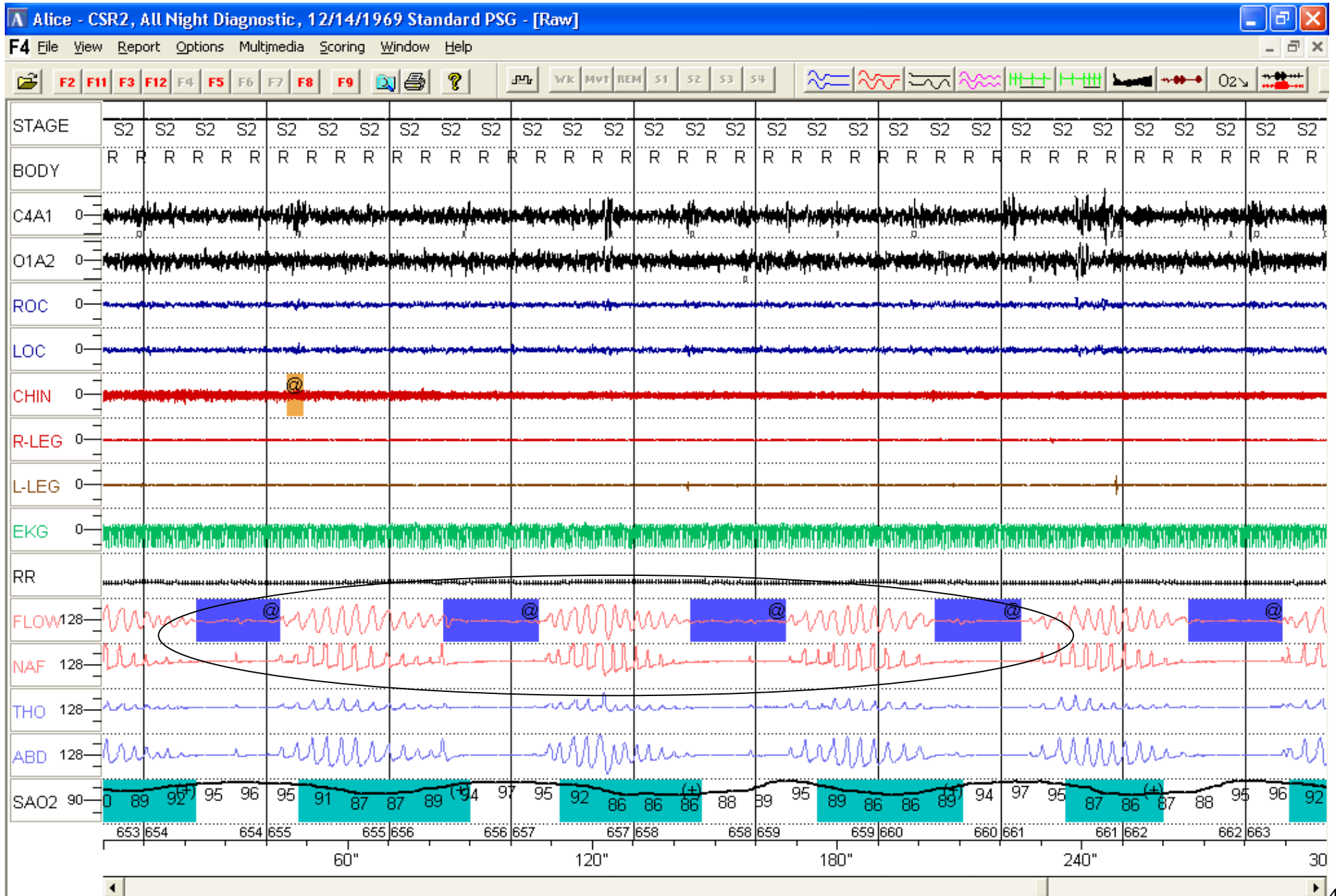
Periodic breathing

- Prevalence: ~5% of patients
- Higher prevalence of PB found in the following populations:
 - Heart failure (~ 40 - 50%)^{1,2}
 - Neurological disorders or disease (dementia, stroke, etc.)
 - Altitude
 - Renal failure/dialysis patients
 - Opioid therapy
- Characteristics
 - Emerges in non-REM sleep → resolve with REM sleep
 - Seen with smaller, thinner patients with slight desaturation events
 - May not be present throughout the entire PSG

1 Javaheri, et. al.

2 Thomas, et.al Curr Opin Pulm. Med. 2005;11(6); 485-483

Periodic breathing sample



Treatment of periodic breathing (PB)

- Medical management of underlying disease
 - Medical Management of Heart Failure is KEY in treatment of PB¹
- Mainly PB, (PB > 50%), CSA > 5, AHI or RDI > 5
 - CPAP Therapy¹
 - Auto Servo Ventilation³
 - Bi-Level Therapy with back up rate²
- Mainly OSA (< 50% PB), CPAP or BiPAP S should be prescribed and patient followed for signs of emerging or non-resolving PB

1 Javaheri, et. al. Curr Treatment Option in CV Med: 2005;7:295-306

2 Kasi, et. al. Circ. J.; 2005;69:913-921

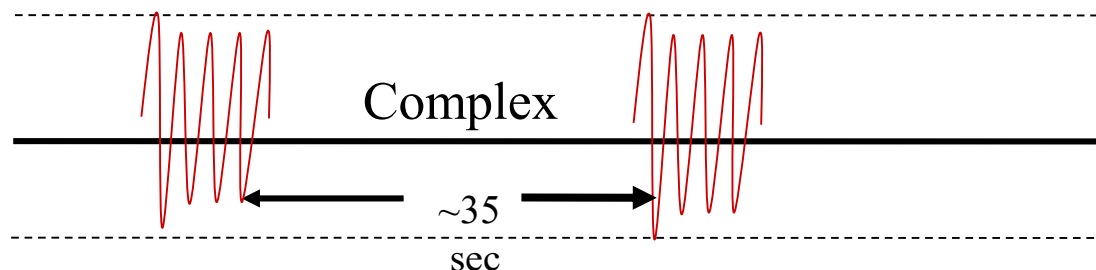
3 Teschler et al, AJRCCM, 164:614-419, 2001

Complex sleep apnea

- OSA which converts to central apnea with CPAP application
 - Typically emerges during titration
 - Not obvious during diagnostic PSG
 - Often occurs at ~ 30 second intervals vs. 60-90 second intervals with CSR
- Minimal data available
 - Estimated prevalence 1/7 or ~15% of the SDB population

Complex sleep apnea

- Due to a combination of upper airway resistance and abnormal respiratory drive^{1,2}
 - OSA eliminated with CPAP → allows for normal RR.
 - The change of the RR changes CO_2
 - Brain reads the change in CO_2 as “hyperventilation” → central apneas during the CPAP titration
 - Central apnea → CO_2 rises → re-establishes drive to breathe
 - Chemoreceptor issues are unmasked when OSA is eliminated
 - Often an temporary abnormality of ventilatory control



1 Interview with Dr. Younes & Dr. Sanders
2 Morgenthaler, et.al. Sleep 2006



Not all Central apnea on CPAP is Complex Apnea

- 1. Inadequate PAP (“false” centrals”)
- 2. Unstable sleep (centrals of sleep transition)
- 3. Excessive CPAP pressure
- Often a transient phenomenon. Resolves with correction of obstruction over time.

Treatment options for complex sleep apnea

- CPAP + Time on Therapy to reset chemoreceptors¹
 - 30-day trial on CPAP → follow up patient re: EDS and compliance data AHI, if improved keep on CPAP

- No improvement in daytime sleepiness after 30 days, try alternatives
 - Auto Servo Ventilation
 - Bi-Level therapy with backup rate

■ 1 Dernaika T et.al; Chest 2006 s;130(4)129

■ 2 Adult Sleep Apnea Task Force, AASM, ; *Journal of Clinical Sleep Medicine* 2009; 5(3)



BiPAP autoSV ADVANCED

Overview

Pressure max

EPAPmax

A A **AUTO EPAP**

Looks like Auto CPAP! EPAP only changes every 2 min

EPAPmin

Pressure max

EPAPmax

S S S

H

A

A

H

SV works 'on top' of Auto EPAP

EPAPmin

Pressure Max

30cm H₂O

Default Settings

20cm H₂O

15cm H₂O *PSmax*

15cm H₂O

EPAPmax

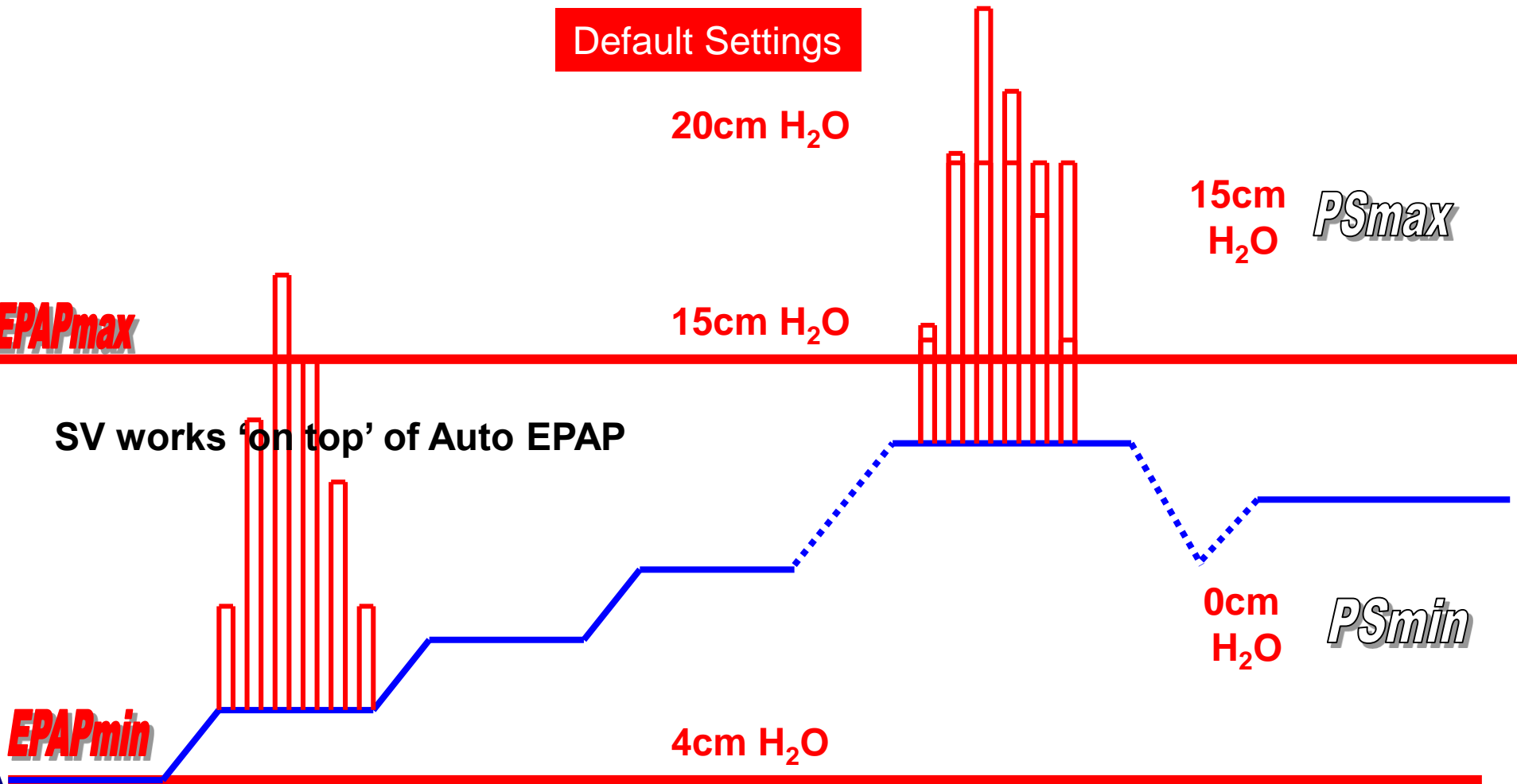
SV works 'on top' of Auto EPAP

0cm H₂O *PSmin*

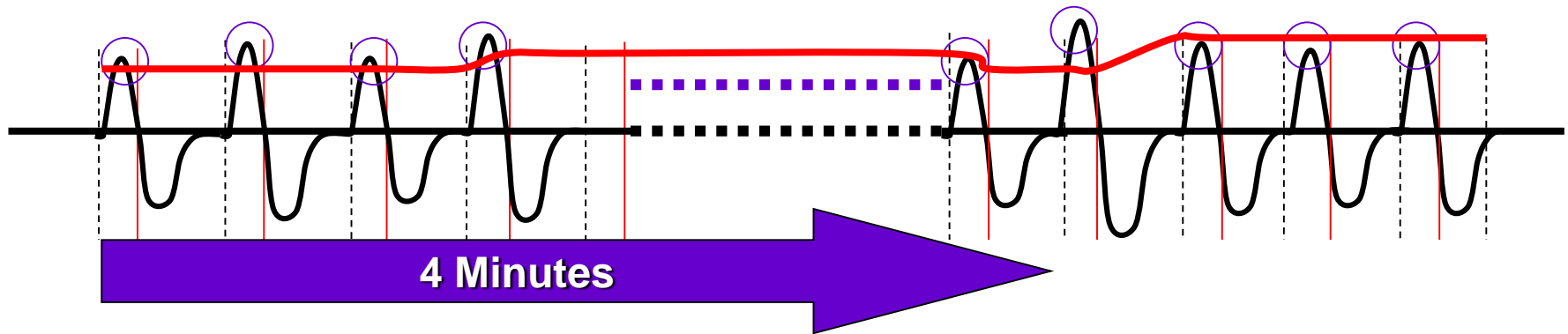
EPAPmin

4cm H₂O

Auto-EPAP Looks like Auto CPAP! EPAP only changes every 2 min



Servo Ventilation Algorithm



On a breath by breath basis peak flow is captured

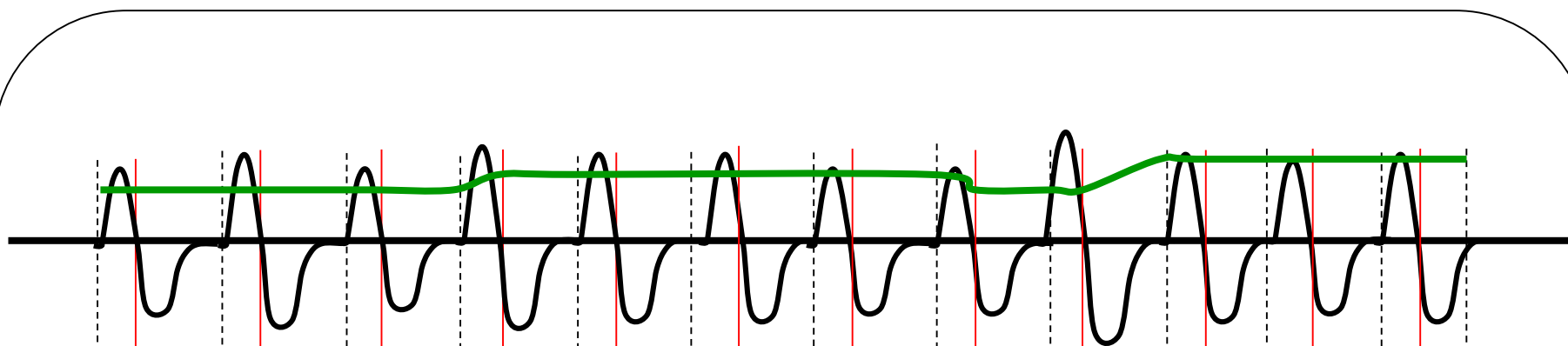
Peak flow is monitored over a moving 4 minute window

As 1 breath is added, the initial breath falls off

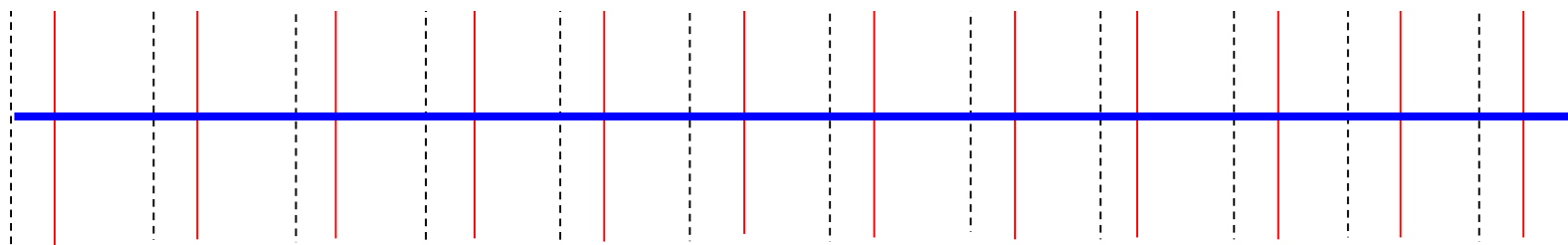
At every point within this 4 minute period an Average Peak Flow is calculated

The Peak flow target is established around that average and is based on the patient's needs

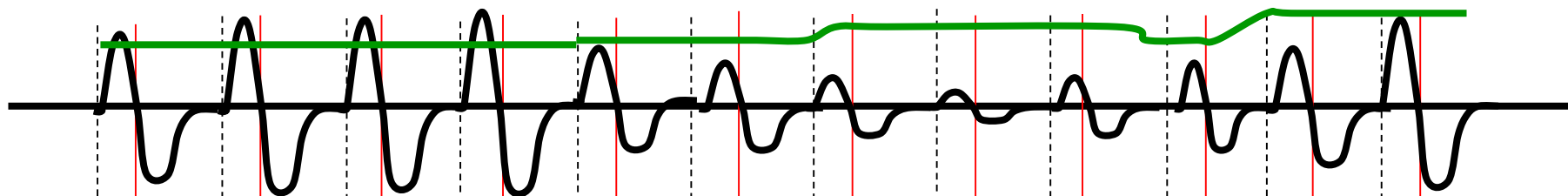
Servo Ventilation Algorithm – Normal Breathing



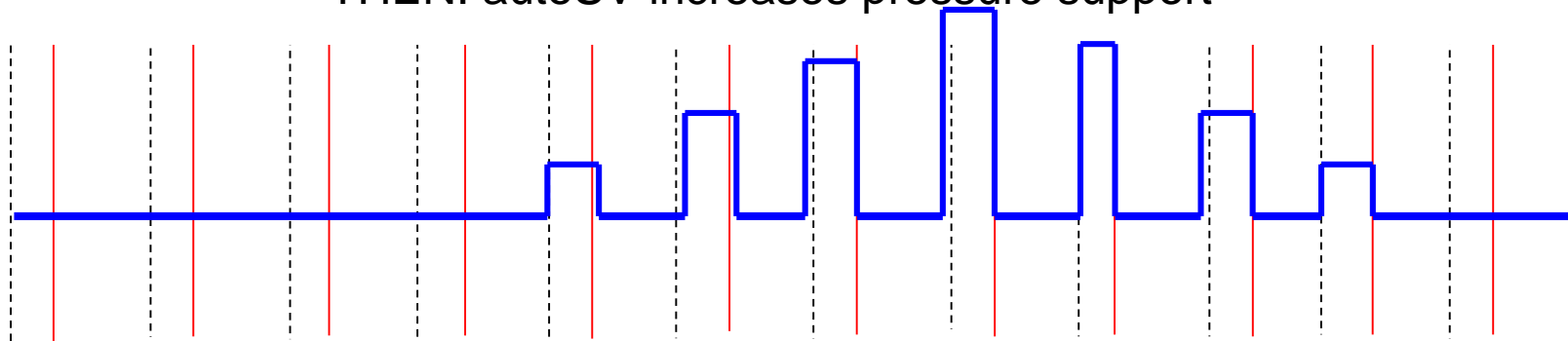
IF: Peak flow is at target
THEN: autoSV delivers CPAP pressure



Servo Ventilation Algorithm – Decreased Flow



IF: Peak flow falls below target
THEN: autoSV increases pressure support





BiPAP autoSV *Titration Protocol*

Titration protocol for BiPAP autoSV Advanced for periodic and complex breathing

Goal: Adjust user parameters for efficacy and adherence

- Establish initial settings as indicated below
- Ensure proper mask fit to allow algorithm to work effectively
- Have patient breathe on autoSV Advanced at basic settings below
- Adjust EPAPmin, Bi-Flex and PSmin settings to patient comfort

Acclimation Zone

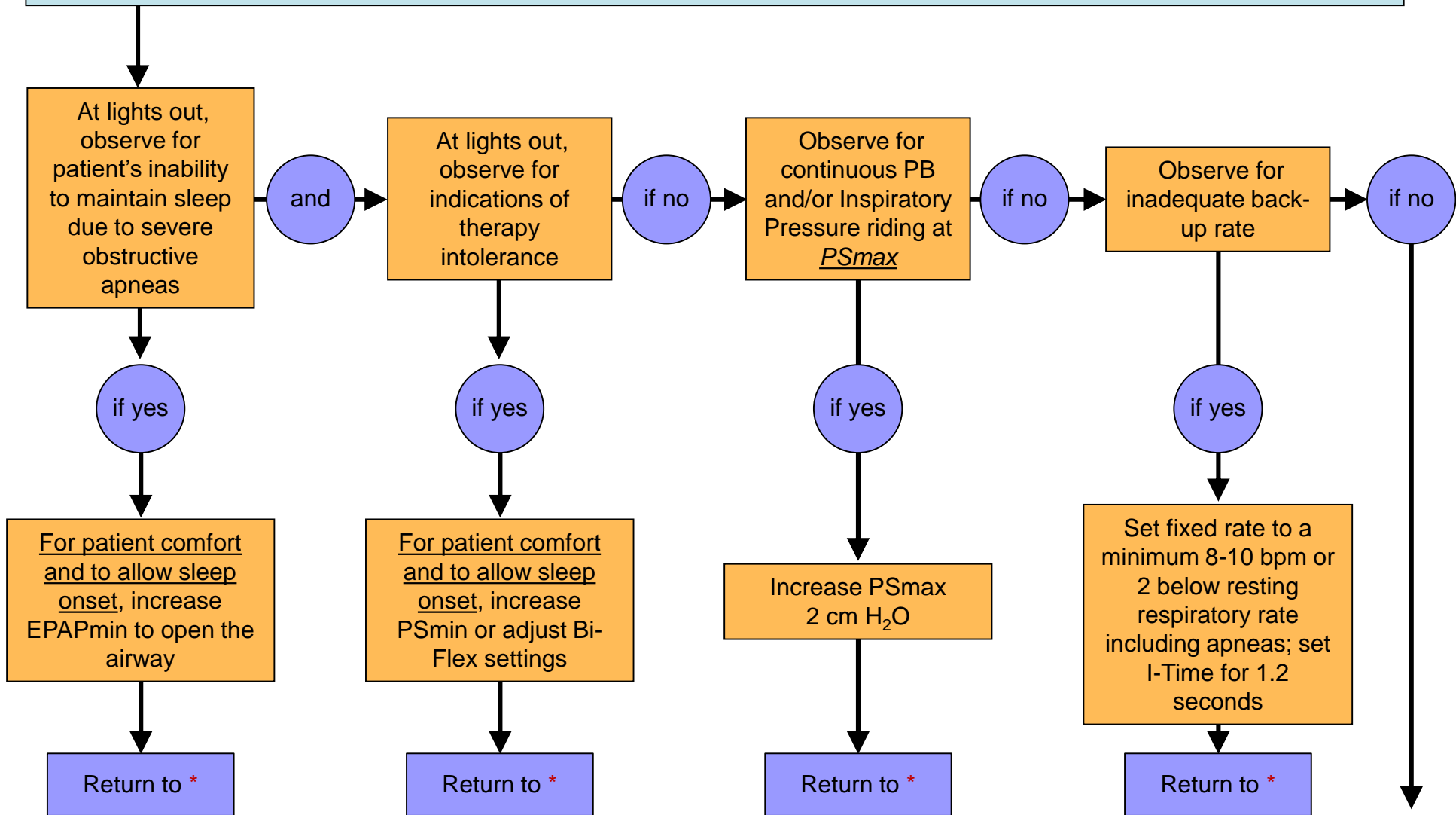
EPAP _{min}	4 cm H ₂ O*	Max pressure	30 cm H ₂ O
EPAP _{max}	15 cm H ₂ O	Rate	Auto
PS _{min}	0 cm H ₂ O	Bi-Flex	2 or 3
PS _{max}	15 cm H ₂ O		

*If pt has known CPAP pressure of <10 set EPAPmin at 4 cm H₂O or patient comfort

*If pt has known CPAP pressure of >10 set EPAPmin at 6-8 cm H₂O or patient comfort

* Monitor patient PSG
Wait... Watch... Observe... Think
Patience is the *key* to successful titration

Titration Zone

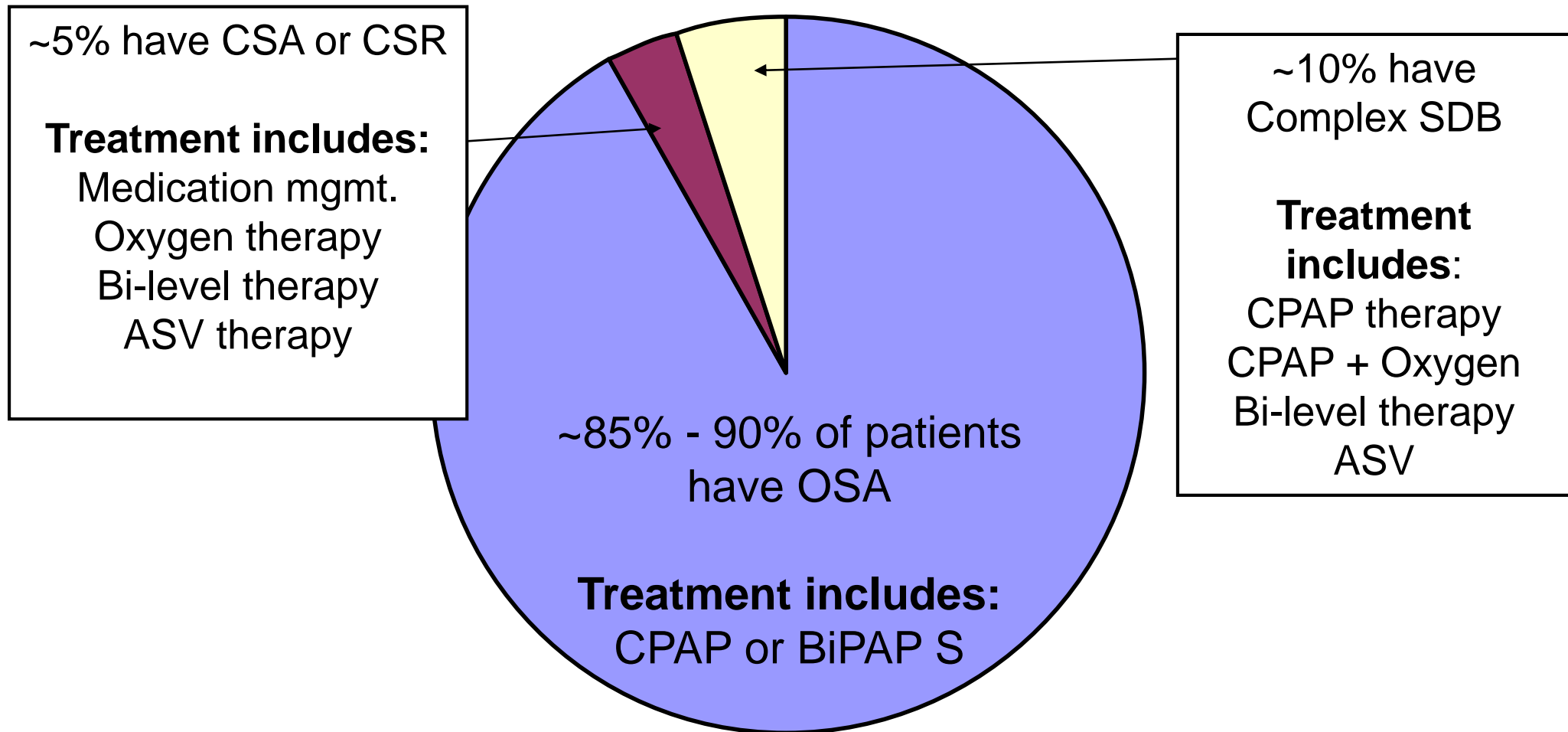




Complex Sleep Apnea

- CSA patients may challenge even the most experienced, skilled sleep technologist
- Helpful hints for CSA titrations
- If changes are needed-Watch, Wait and Observe

Summary of treatment strategies for SDB patients





Medicare RAD policy requirements for central or complex sleep apnea

Medicare Definition of Complex Sleep Apnea

Persistence or emergence of central events upon exposure to CPAP/BiPAP when obstructive events have disappeared

- Mainly obstructive or mixed apneas on diagnostic sleep study, ≥ 5 events / hour, OA>CA
- On CPAP/BiPAP → patterns of central apnea that meet the definition of Central Sleep Apnea



Medicare definition of central sleep apnea

Central sleep apnea

- Apnea index > 5
- Central apnea $> 50\%$ of the total apneas
- Central apneas ≥ 5 times per hour



Respiratory Assist Device (RAD)

- Coverage-The treating physician must fully document in the patients medical record symptoms characteristic of sleep-associated hypoventilation.

E0470-E0471 RAD

- Coverage is for patients with clinical disorder groups characterized as:
 - ☐ (I) restrictive thoracic disorders
 - ☐ (II) severe COPD
 - ☐ (III) central sleep apnea
 - ☐ (IV) hypoventilation

Definitions

- **Respiratory assist device without backup rate (E0470)** – delivers adjustable, variable levels (within a single respiratory cycle) of positive air pressure by way of tubing and a noninvasive interface to assist spontaneous respiratory efforts and supplement the volume of inspired air into the lungs.

Definitions

- **Respiratory assist device with backup rate (E0471)** – delivers adjustable, variable levels (within a single respiratory cycle) of positive air pressure by way of tubing and a noninvasive interface to assist spontaneous respiratory efforts and supplement the volume of air into the lungs. Back up rate



Definitions

- **FIO₂** – the fractional concentration of oxygen delivered to the patient for inspiration. A patient's prescribed FIO₂ refers to the oxygen concentration the patient normally breathes when not undergoing testing to qualify for a RAD.



Definitions

- **FEV1** – the forced expired volume in 1 second
- **FVC** – the forced vital capacity
- **FRC** - forced residual volume
- **ABG's** – Arterial Blood Gas



Restrictive Thoracic Disorders

- Documentation of neuromuscular disease or severe thoracic cage abnormality in the patient's medical record

Restrictive Thoracic Disorders

- Perform **one** of the following
 - ABG's(done while awake and on prescribed FiO_2) $\text{PaCO}_2 \geq 45$ mm Hg OR
 - Sleep oximetry- O_2 saturation $\leq 88\%$ for ≥ 5 minutes, minimum 2 hours of recording time OR
 - For neuromuscular-Either $\text{FVC} < 50\%$ of predicted or $\text{MIP} < 60$ cm H₂O

COPD


- ABG's done while awake on prescribed FiO_2 with a $PaCO_2 \geq 52 \text{ mmHg}$
- Sleep oximetry- O_2 sats $\leq 88\%$ for \geq for 5 continuous minutes
- Qualify for E0470 (no back up rate)

COPD-Situation 1

- After initial use of E0470
- ABG's-shows PaCO₂ worsens ≥ 7 mm Hg compared to original ABG
- Facility-based PSG-demonstrates oxygen saturation $\leq 88\%$ for \geq a cumulative 5 minutes, minimum 2 hours nocturnal recording time

COPD-Situation 2

- 61 days after initial issue of E0470
- ABG-done while awake and on prescribed FiO_2) shows $\text{PaCO}_2 \geq 52$ mm Hg;
- Sleep Oximetry-demonstrates oxygen saturation $\leq 88\%$ for \geq a cumulative 5 minutes, minimum 2 hours nocturnal recording time



Central Sleep Apnea/Complex Sleep Apnea

- Completed facility-based attended PSG documents the following
- Diagnosis of CSA/Comp SA
- Improvement of sleep-association hypoventilation with the use of E0470 or E0471 on settings that will be prescribed for initial home use

Central Sleep Apnea

- AHI ≥ 5 AND
- Total of CA $\geq 50\%$ AND
- Central AHI ≥ 5 per hour AND
- Presence of sleep symptoms AND
- No evidence of daytime or nocturnal hypoventilation

Complex Sleep Apnea

- PSG demonstrates persistence or emergence of central apneas or central hypopneas AND
- Resolution of obstructive events central apneas $> 50\%$ AND
- Resolution of obstructive events CAHI ≥ 5

Hypoventilation (E04070)

- ABG's done while awake and on prescribed FiO_2 with the $\text{PaCO}_2 \geq 45$ mmHg AND
- Spirometry FEV_1/FVC 70% AND
- ABG's during sleep or immediate awakening worsen PaCO_2 OR
- PSG/HST

Hypoventilation (E0471)

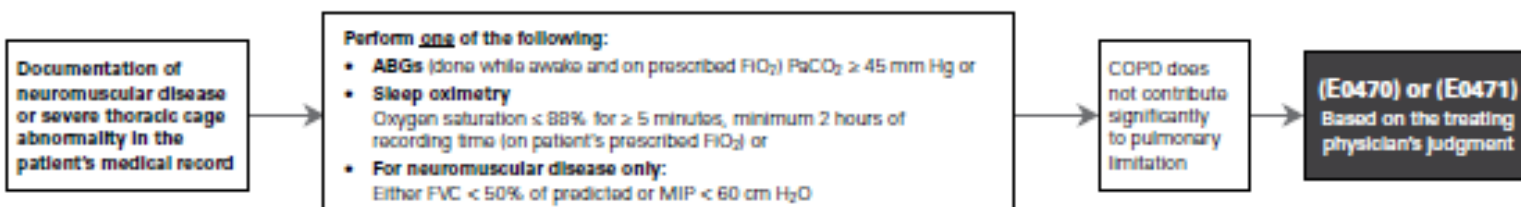
- Covered E0470 is being used AND
- Spirometry FEV1/FVC \geq 70% AND
- ABG's done while awake and on prescribed FiO2 worsens \geq 7mm Hg compared to ABG result used for E0470 OR
- PSG or HST



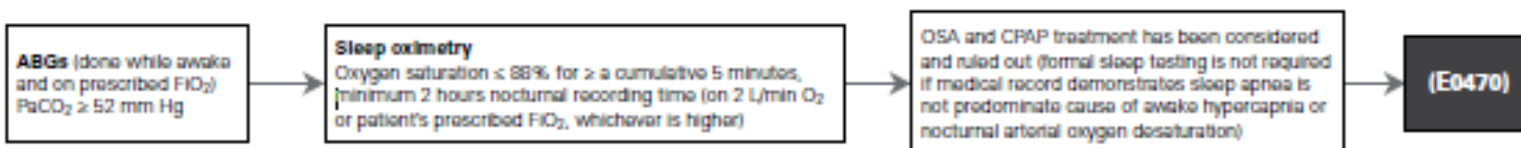
Respiratory Assist Device (RAD) Qualifying Guidelines

CMS revision effective date: December 2014

I. Restrictive Thoracic Disorders



II. COPD



For COPD patients to qualify for a RAD with backup rate (E0471):

Situation 1 After period of initial use of an E0470; ABG (done while awake and on prescribed FIO₂) shows PaCO₂ worsens ≥ 7 mm Hg compared to original ABG result; facility-based PSG demonstrates oxygen saturation < 88% for ≥ a cumulative 5 minutes, minimum 2 hours nocturnal recording time while on an E0470 and not caused by obstructive upper airway events (ie, AHI < 5).

Situation 2 No sooner than 61 days after initial issue of E0470; ABG (done while awake and on prescribed FIO₂) shows PaCO₂ ≥ 52 mm Hg; Sleep oximetry on an E0470 demonstrates oxygen saturation < 88% for ≥ a cumulative 5 minutes, minimum 2 hours nocturnal recording time (on 2 L/min O₂ or patient's prescribed FIO₂, whichever is higher).

Respiratory Assist Device (RAD) Documentation Requirements for Continued Coverage Beyond First 3 Months

Patients on an E0470 or E0471 device must be reevaluated no sooner than 61 days after initiating therapy.

Required Documentation

- Progress of relevant symptoms
- Signed and dated statement by treating physician declaring patient using average 4 hours per 24-hour period and patient benefiting from use

ResMed E0470 and E0471 Devices

E0470-Bilevel without a backup rate:

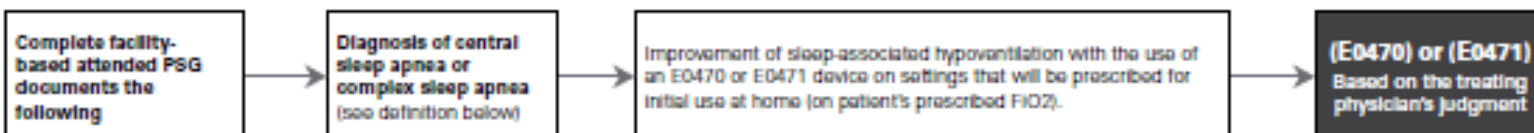
- AirCurve™ 10 VAuto
- AirCurve™ 10 S
- VPAP™ COPD

E0471-Bilevel with a backup rate:

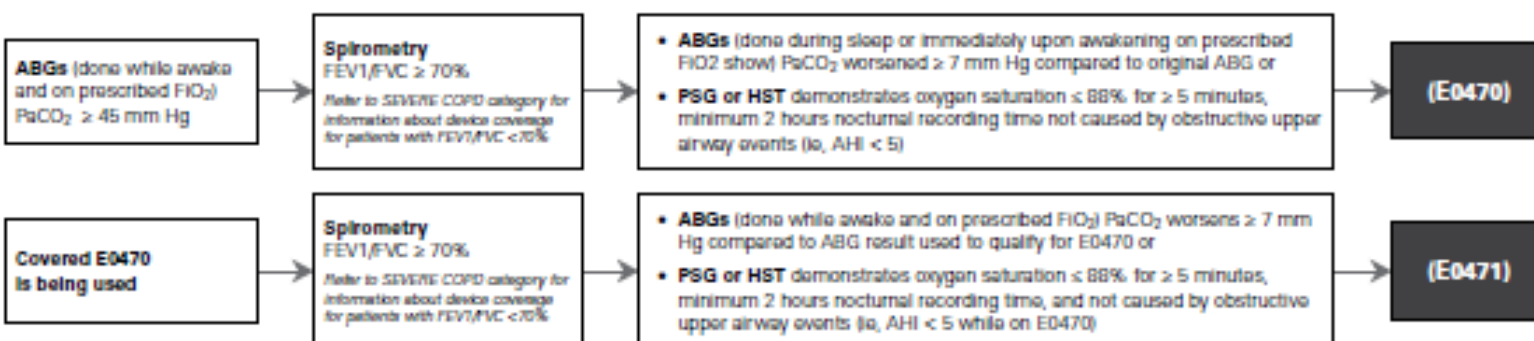
- AirCurve 10 ST
- AirCurve 10 ASV
- VPAP ST-A
- Stellar™*

* For invasive use, code E0472

III. Central Sleep Apnea or Complex Sleep Apnea



IV. Hypoventilation



A diagnosis of **central sleep apnea (CSA)** requires all of the following:

1. An apnea-hypopnea index ≥ 5; and
2. Sum total of central apneas plus central hypopneas > 50% of the total apneas and hypopneas; and
3. CAHI* ≥ 5 per hour; and
4. Presence of either sleepiness, difficulty initiating or maintaining sleep, frequent awakenings, or non restorative sleep, awakening short of breath, snoring, or witnessed apneas; and
5. No evidence of daytime or nocturnal hypoventilation

Note: Not all types of HST are appropriate for the evaluation of CSA or CompSA as necessary parameters are not monitored.

*For CSA diagnosis, central apnea-central hypopnea index (CAHI) is defined as the average number of episodes of central apnea and central hypopnea per hour of sleep without the use of a PAP device.

**For CompSA, the CAHI is determined during the use of a PAP device after obstructive events have disappeared.

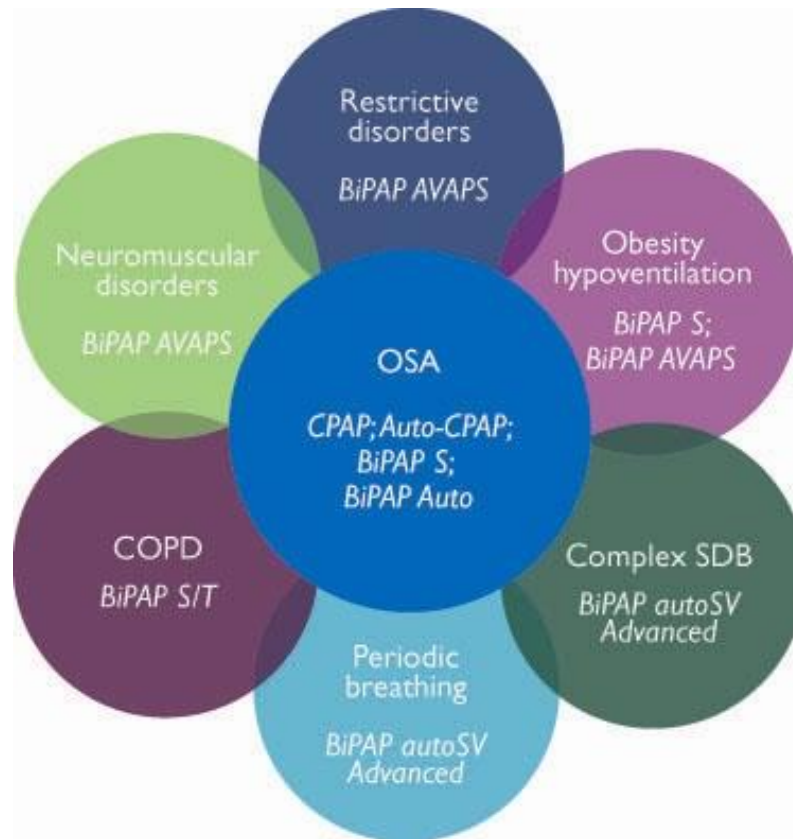
Complex sleep apnea (CompSA) is a form of central apnea identified by all of the following:

1. PSG demonstrates the persistence or emergence of central apneas or central hypopneas upon exposure to CPAP or an E0470 device when titrated to the point where obstructive events have been effectively treated (AHI < 5 per hour); and
2. After resolution of the obstructive events, the sum total of central apneas plus central hypopneas is > 50% of the total apneas plus hypopneas; and
3. After resolution of the obstructive events, CAHI** ≥ 5 per hour

Ventilator with Non-Invasive Interfaces: Please reference ResMed's Ventilator Reimbursement Fast Facts: PN 1017230.

This information is provided as of the date listed, and all coding and reimbursement information is subject to change without notice. It is the provider's responsibility to verify coding and coverage with payors directly. For a full description of the policy go to www.cms.hhs.gov. ResMed reimbursement hotline, dial 1-800-424-8737 and select option 4.

Today's improvements



New technology targeting specific diseases



Thank you