Overlap Syndrome
&
Treatment Compliance

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Objectives

- Review COPD and OSA
- Understanding Overlap Syndrome
- Identifying Patients with Overlap Syndrome
- Effective Treatment for Overlap Syndrome
- Documentation Requirements
- Compliance to therapy

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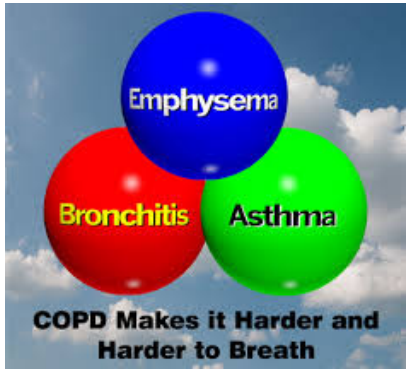
COPD

Chronic **O**bstructive **P**ulmonary **D**isease

Umbrella term to describe lung diseases characterized by shortness of breath/air flow limitation

- Emphysema and chronic bronchitis
- Refractory (non-reversible) asthma and some bronchiectasis



- Extrapulmonary effects: muscle myopathy, anemia, osteoporosis + depression
- High prevalence – high morbidity/mortality

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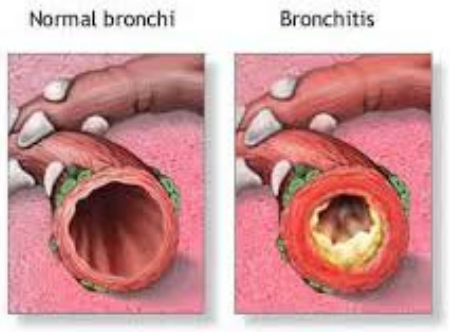
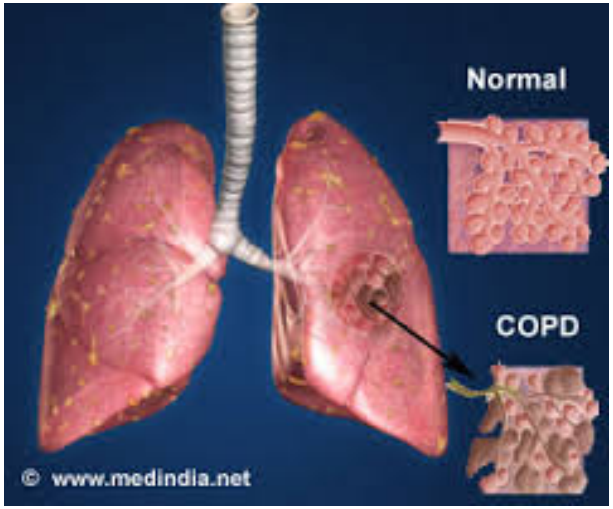
COPD

- Bronchitis (‘blue bloaters’)
  - chronic productive cough 3/12mo, 2 years
  - Hypercapnia/hypoxemia/polycythemia



- Emphysema (‘pink puffers’)

  - pathological diagnosis, permanent abnormal enlargement of airspaces (distal to bronchioles) and destruction of alveolar walls



- Bronchiectasis

  – damage causes wall of airway to become flabby and scarred (injury, disease)

Increased mucus production and airway obstruction
Hypoxia and disruption to sleep

[1]CDC; September 2014
[2]COPD Foundation; 2013

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COPD

CDC Statistics:

- 3rd leading cause of death in the U.S.[1]
- Estimated that 24 million adults are affected[2]
  - 50% with low pulmonary function were not aware
- Over 50% were women
- 22.3% reported a hospital or ED visit for COPD symptoms in previous 12 months
- >31% unable to work

2012: US HHS reported 3.38 M Medicare FFS beneficiaries had COPD

- 82% over 65/18% younger (20% increase from 2008)

[1]CDC; September 2014 (results from 2011 BRFFS)
[2]COPD Foundation; 2013

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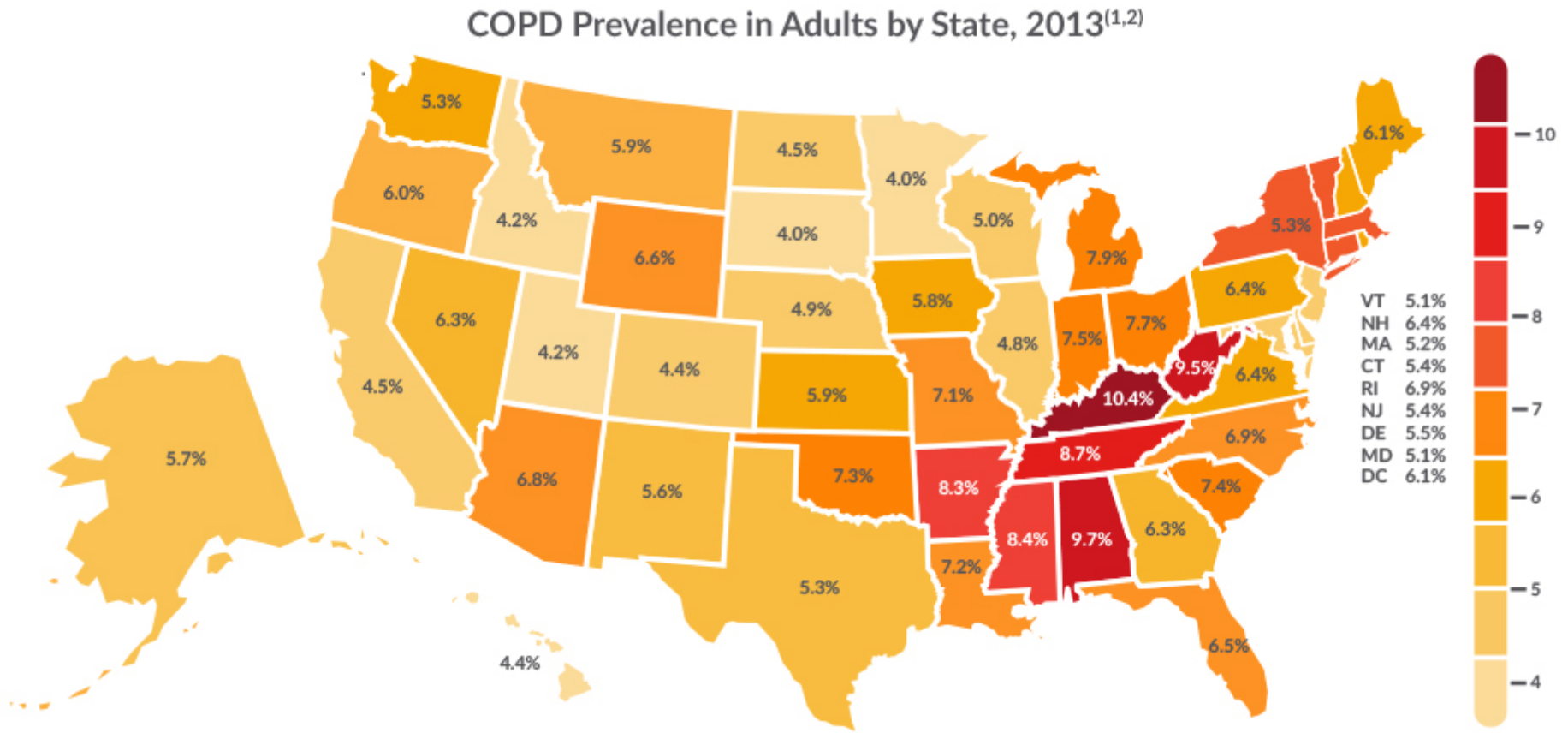
COPD Prevalence



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Obstructive Sleep Apnea

OSA is one of the most common sleep disorders

- Characterized by partial or complete collapse of the upper airway during sleep

Unobstructed Airway | Snoring | Obstructed Airway

- Effects more than 18 million Americans according to NSF
- Estimated that up to 9% of the adult population suffer from OSA[1]
- Approximately 70-80% of patients are not diagnosed[2]
- Increase in childhood OSA due to obesity epidemic

[1]Al Lawati et al 2009; [2]Punjabi et al 2008

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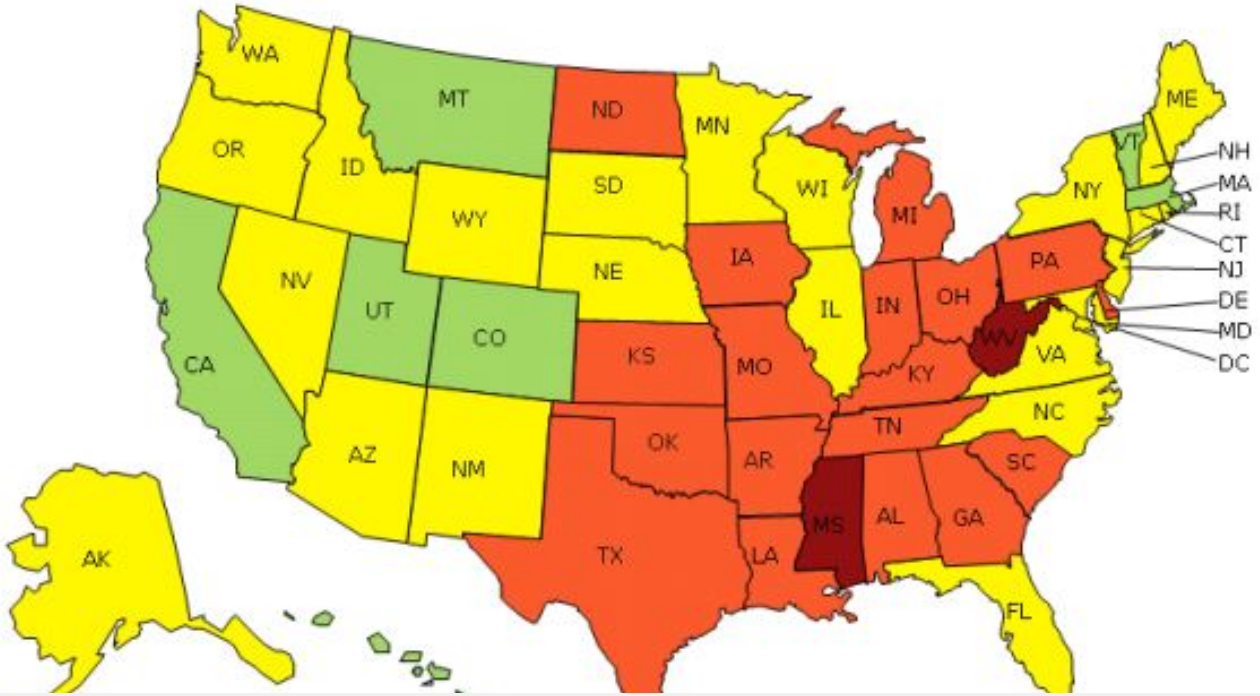
Obesity a Major Factor



- 65% overweight (BMI >25)
- 29% obese (BMI >30)
- 26.4 adults reported that during past month, they had not participated in physical activity

Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory,
Source, Behavioral Risk Factor Surveillance Team, CDC 2013

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What is Overlap Syndrome?

Refers to diseases that overlap one another - combined effect of multiple diseases or conditions are worse than either one alone

Overlap Syndrome

- Combination of COPD and OSA which results in nocturnal hypoventilation and hypoxemia
- First introduced in 1985 by Professor David Flenley (University of Edinburgh)
- Additive effect ‘1+1=3’
- More by chance than pathophysiological link
    - Chance alone suggests that one disorder has 10% chance of the other

Overlap Syndrome

A great number of patients have both COPD and OSA

- causes more severe nocturnal hypoxemia than either disease alone
- Have a substantially greater risk of morbidity and mortality, compared to those with either COPD or OSA alone
- 11% of OSA patients have some degree of COPD
- 20-40% of COPD patients have OSA

» *COPD closely related to cigarette smoking or airway contagions*
» *OSA closely related to obesity and snoring*

Both experience a reduction in energy/activity, which further contributes to poor health

Douglas, Sleep Disorders 1998

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Physiological Consequences

- Majority of patients with OSA are eucapnic during wakefulness
- Daytime hypercapnia attests to mechanical impairment
  - Obesity [1]
  - COPD [2]

- Higher breathing frequency and lower tidal volume
- Increased nocturnal desaturation [3]
- Increases risk for:
  - Hypercapnia
  - Pulmonary hypertension
  - Polycythemia
- Increase risk of cardiac morbidity and mortality

[1] Guilleminault et al, Ann Rev Med 1976;27:465-84
[2] Leech et al, Chest 1987; 92:807-13
[3] Owens et al, Resp Care 2010; 55(10):1333-1346

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Identifying Patients with Overlap Syndrome

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Signs and Symptoms

OSA

- Snoring, choking or gasping during night
- Sleepiness during the day
- Morning headaches
- Memory, learning problems, lack of concentration
- Irritable, depressed, or moodiness
- Nocturia
- Dry mouth or sc
  awakening

COPD

- Increase in sputum
- Increase in SOB, cough and/or wheezing
- Forgetfulness, confusion
- Trouble sleeping
- Using more pillows or sleeping in a chair instead of a bed to avoid
  h
- f fatigue and lack of
  istent
- s, dizzy spells,

Overlap:

- Hypoxemia + hypercapnia
- Increased pulmonary artery pressure
- Older
- Similar BMI

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Diagnosis

Awareness of that Overlap Syndrome might be a possibility…

- Patient history + physical exam
- PFT
- Patients with a mild to moderate COPD – nocturnal oximetry study
- Based on clinical findings
- Confirmed by full-night PSG – lab based *not* HST

Increased awareness is first line of defense

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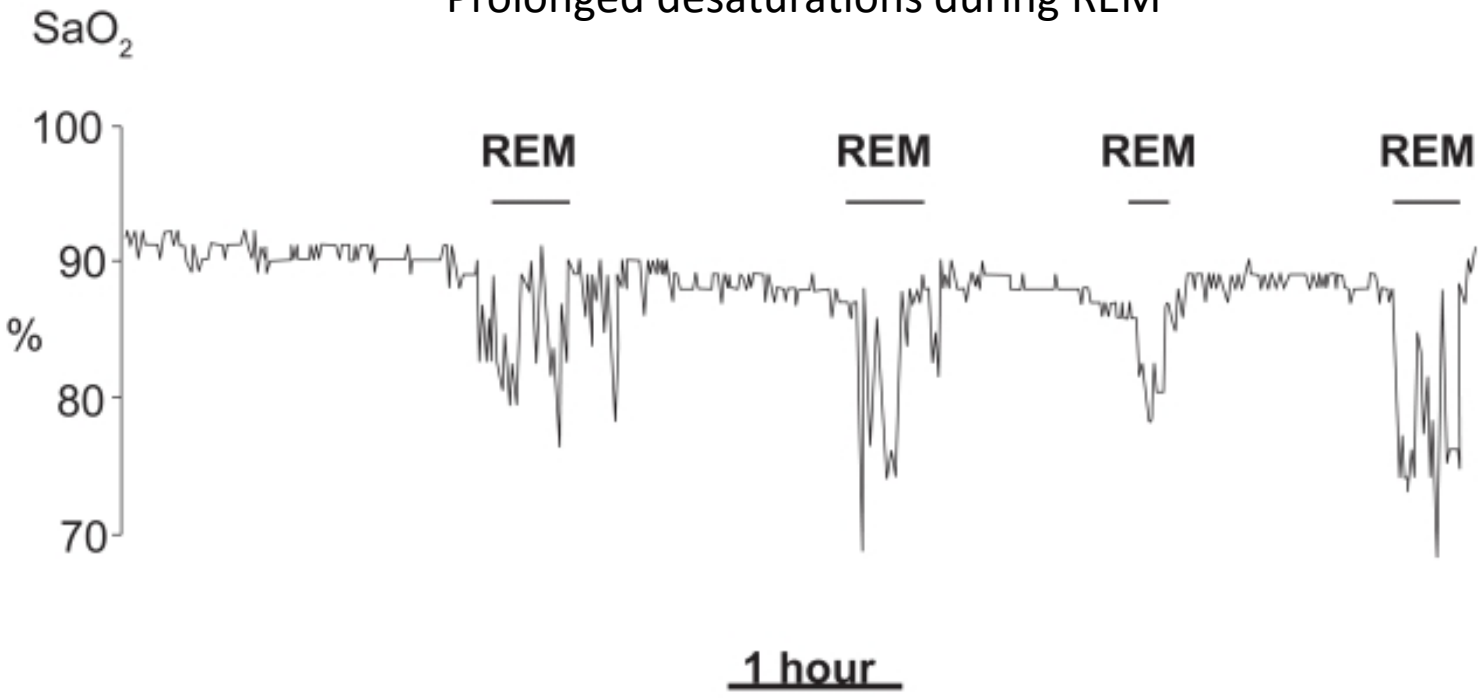
Nocturnal Oximetry

Prolonged desaturations during REM



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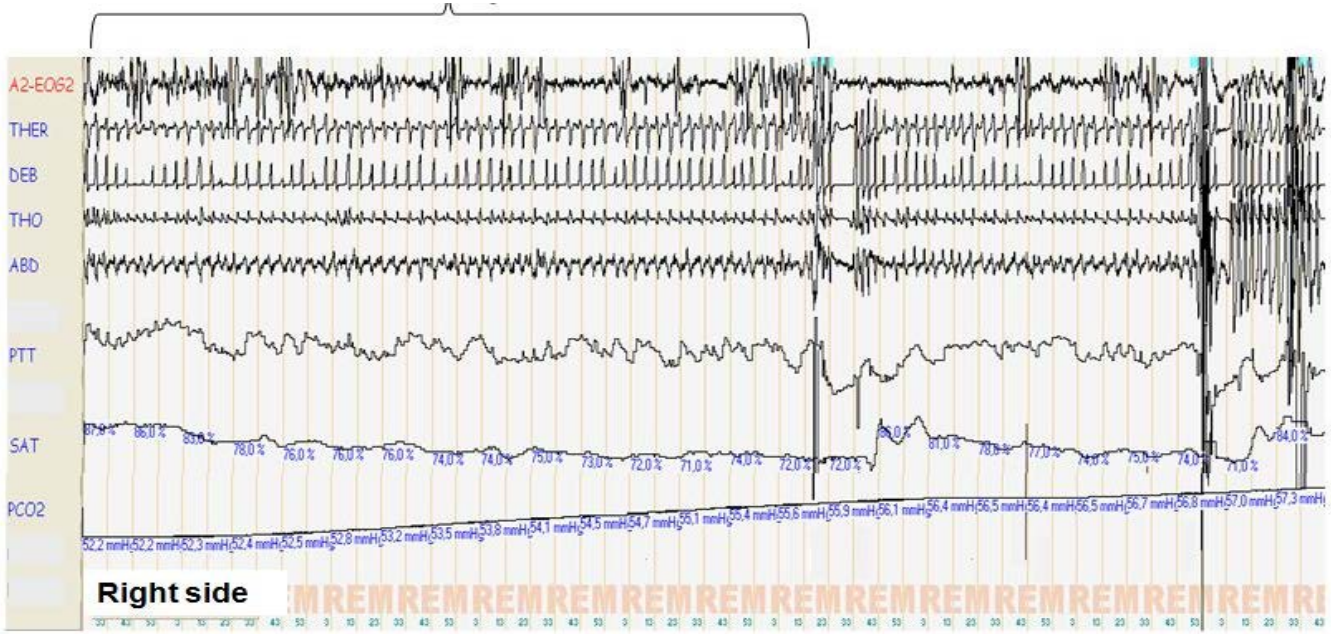
PSG of Overlap Patient

- Alveolar hypoventilation during REM
- Fragmented sleep
- Hypercapnia



Legend:

THER – Thermistor
DEB – Nasal pressure
THO – Thoracic movement
ABD – Abdominal movement
PTT – Pulse Transit
SAT – 02 Saturation
PC02 – Transcutaneous PaC02

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Screening your Patients

Patient assessment for Sleep

- Persistent cough
- Inhaler use/pulmonary medications
- Home oxygen use
  - Continued desaturations with proper use
- Accessory muscle use
- Inability to lie flat
- Mobility - SOB with activity

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Treatment Options for the Overlap Patient

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Treatment Options

- Weight loss
- Oxygen therapy
- Bronchodilator therapy – manage exacerbations with anitbiotics/steroids

1. CPAP therapy - high humidification to mobilize secretions (+ supplemental 02)[1]
2. Bi-level ventilatory support
3. Volume preset ventilation
    - Most commonly used for individuals where bi-level support has failed to control sleep hypoventilation, where tracheostomy ventilation is needed

- Newer technology might include Nasal High Flow (NHF) with a high level of humidity

[1] Sampol et al 1996

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Weight Loss

- Weight loss can clearly be of benefit for those with OSA and obesity

- In COPD, weight loss has generally been associated with increased mortality, since cachexia (malnutrition) sets in with increasing disease severity

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Oxygen Therapy

- Oxygen is a common treatment
- Shown to improve overall mortality *if* used for more than 18 hours per day, including during sleep

Data is lacking for improvement with oxygen therapy alone in OSA[1]

- nocturnal oxygen desaturations are improved, ***BUT*** …not
  - sleep architecture
  - arousals
  - blood pressure (which is improved after 2 weeks of CPAP therapy)
  - subjective daytime sleepiness

Alford Study

- 4 lpm 02 administered to 20 men with Overlap Syndrome
  - Obstructive events increased in duration (25.7 to 31.4)
  - PC02 increased (52.8 to 62.3)
- 02 should not be used alone for treatment

[1]Effect of continuous positive airway pressure versus supplemental oxygen on sleep quality in obstructive sleep apnea: a placebo-CPAP-controlled study.
Loredo JS, Ancoli-Israel S, Kim EJ, Lim WJ, Dimsdale JE, Sleep. 2006 Apr; 29(4):564-71.

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CPAP Therapy

CPAP remains the accepted standard treatment for OSA ***and*** is also the accepted standard for overlap syndrome.

- But CPAP alone may not fully correct hypoxemia, so supplemental oxygen may be required
- By using CPAP there could potentially be an unloading of the respiratory muscles which could lead to:
  - decrease hypoventilation, oxygen consumption, or carbon dioxide production by the respiratory muscles.
- These muscles may be rested by CPAP use, since it prevents the increase in upper-airway resistance that occurs during sleep.
- Alternatively, CPAP may offset intrinsic PEEP in severe COPD.

Machado *et al*, Brazil 2010

- Evaluated the impact of OSAS treatment with CPAP on the survival of hypoxemic COPD patients between January 1996 and July 2006.
- CPAP therapy was associated with a higher survival in patients with moderate-to-severe OSAS and hypoxemic COPD.
- Of 603 hypoxemic COPD patients receiving LTOT, 95 were diagnosed with moderate-to-severe OSAS.

95 Patients	Treatment	Control	
CPAP adherence	61 (64%)	34	
5 year survival	71%	26%	

Toraldo *et al*, Spain 2010

- Supports early treatment with nasal CPAP in overlap patients.
- Included patients with both severe OSA and mild-to-moderate COPD

- After 3 months of CPAP therapy:
  - arterial blood gases and mean pulmonary artery pressure (MPAP) improved and stabilized
  - patients reported improvements in daytime sleepiness utilizing Epworth Sleepiness Score (ESS),

- The improvement in these parameters remained stable over 12 months' follow-up.

Non-Invasive Ventilation

- A subset of patients with stable COPD who may benefit from NIPPV includes
  - those with daytime hypercapnia and super-imposed nocturnal hypoventilation [1]

- Bi-level
  - The effects of b-level PAP have not been specifically evaluated[2]
  - Difference between IPAP and EPAP maintaining alveolar ventilation and reducing PaC02

Benefits vs. Quality of Life?

[1] Nick Hill Noninvasive ventilation for chronic obstructive pulmonary disease. Respir Care 2004; 49:72–87

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Other Considerations

- Reduce alcohol consumption
  - Worsens hypoxemia[1]
  - leads to hypercapnic respiratory failure[2]
- Smoking cessation
  - Dangers when on 02 therapy

[1] Easton et al Sleep 1987; 10:224-33

[2] Chan et al American Rev Respiratory Dis 1990; 141:861-5

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Therapy Compliance

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History

"Keep watch also on the faults of the patients which often make them lie about the taking of things prescribed."

Hippocrates, Father of Medicine, warned physicians of non-adherence

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Compliance…Adherence

- **Compliance** – degree a patient follows or completes a prescribed diagnostic, treatment, or preventive procedure

- **Adherence** – extent a patient follows a prescribed treatment regimen and physician advice as an ***active participant in their own care and in collaboration with the healthcare providers***

The 4A’s of Adherence

Acceptance	• breaking down psychological barriers of diagnosis and treatment
Acquiring	• the device and mask
Acclimating	• to therapy
Adapting	• long term

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Acceptance (1)

- Acceptance must occur before adherence can be achieved
- Perceived need for CPAP therapy
- Not uncommon for patient to doubt their severity of OSA
  - First night affect
- Concerns about side effects

Acceptance

- Research has shown that educated patients are more compliant[1,2] and spousal feelings are important[3]

- Education should encompass discussion about co-morbidities and long term health consequences . Provide encouragement and involve the family

- Various methods of education can be inexpensive & effective:
  - Phone calls[1]
  - Literature[1]
  - Attendance in group clinic[2]

[1]Chervin et al 1997; 2Likar et al 1997; 3Weaver et al 2003

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Acquiring the Medical Device (2)

This is the time when Psychological barriers kick in.

OSA Diagnosis & Initiation of Therapy

- Perception
- Emotion
- Cognition

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Psychological Adaptation Barriers

Psychological Perception	Patients develop their own beliefs/expectations before they try CPAP based upon perception of disease severity. The imposed behavior changes versus their own role in regulating health practices.
Emotional Context	Often relates to patient- doctor rapport however in OSA/CPAP devices is relevant to Aesthetics (ugly versus beautiful), sounds (buzzard versus Chime), tone qualities (authoritative – empathetic), and grammatical structure (command versus request)
Cognitive Context	The clarity of the message linked to usage and AHI – able to notice they have achieved something.

Source: M.R. Wild et al Eur Respir J 2004 24:461-465
S. Olsen et al Eur Respir J 2008 32:710-717

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Acclimating

- There are a number of studies that report that the first 2 weeks of CPAP initiation are most important
  - Correlate to what the 30th day of usage may be
- Budhiraja et al reported in a study (N100)
    - 84% of patients who used CPAP for more than 4 hours/day at day 3 used CPAP for an average of more than 4 hours a day at day 30
    - Compared with only 26% of those who used CPAP for less than 4 hours/day at day 3
    - Minority of patients who used CPAP for less than 4 hours/night at day 3 and at day 7, used it for more than 4 hours a night when assessed at day 30

1) SLEEP, Vol. 30, No. 3, 2007 324 1997;20:278-83.) (Early CPAP Use Identifies Subsequent Adherence to CPAP, MD et al)

Adapting

- Patients experiences are different and unique to them

- Psychological and Social Factors
  - Risk perception of disease
  - Treatment outcome expectancies
  - Self efficacy
  - Coping mechanisms
  - Facilitators/barriers with treatment

Stepnowsky et al 2002, Weaver et al 2003, Aloia et al 2005

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Facilitators/Barriers with Treatment

- Social Support
  - CPAP users living with someone had higher use than those who lived alone[1]
  - Older adherent men were more likely to attend a CPAP education support group[2]
  - Spousal pressure to use CPAP was negatively influential on three-month CPAP use[3]

- Common treatment related experiences
  - nasal stuffiness, claustrophobia, and disturbance of their bed partner

[1]Lewis et al 2004, [2]Russo-Magno et al 2001, [3]Baron et al 2010

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Intervention Strategies and Tools

- Educational
- Technological
- Psychosocial
- Pharmacological
- Multidimensional

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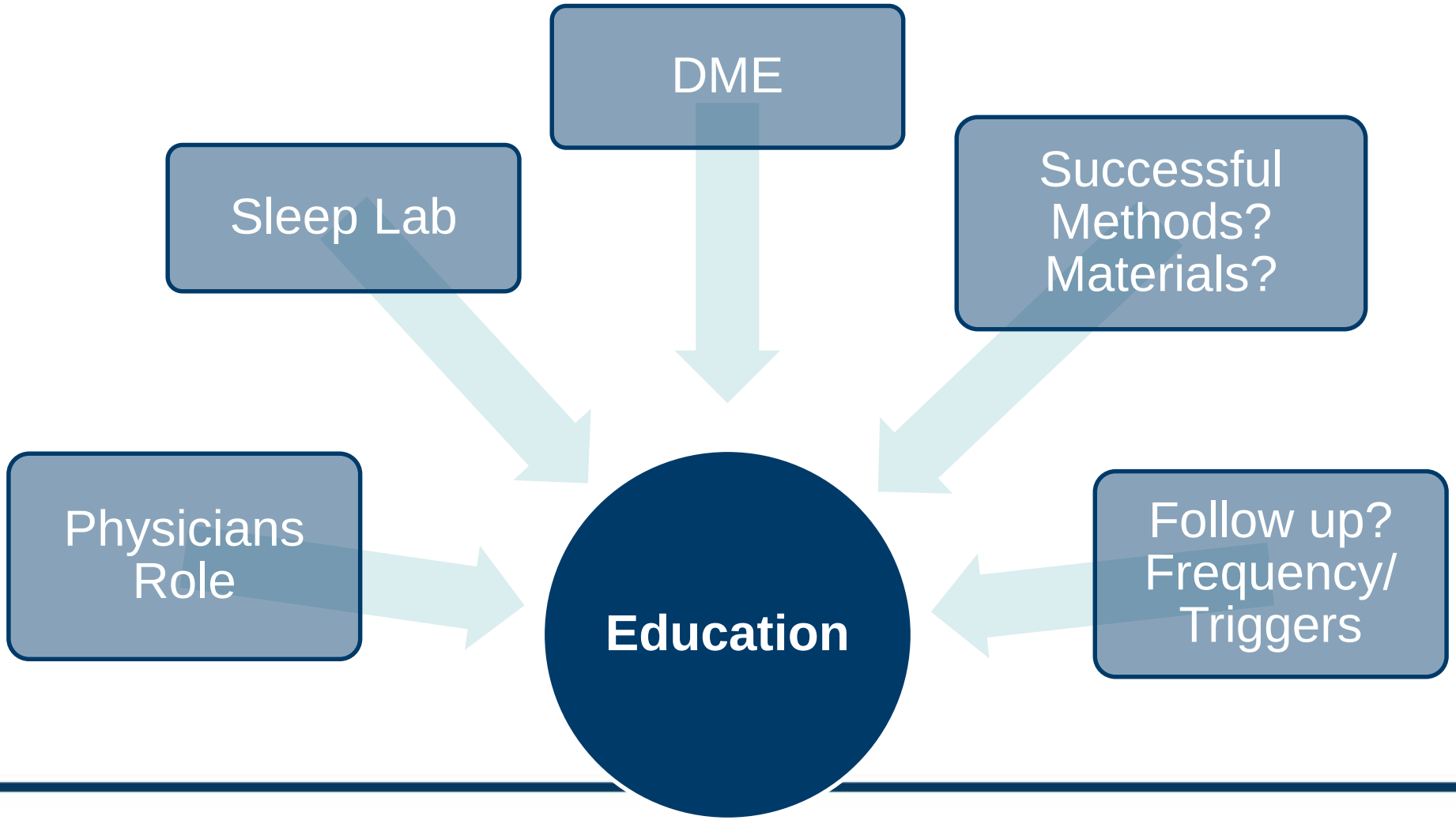
Drivers of Adherence



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What if PAP doesn't work?

Alternate therapies might be considered:

- Oral devices
- Surgery
- Nasal Valves

Therapy as an adjunct to CPAP or for mild cases of OSA:

- Nasal High Flow with high humidification
  - Washes out C02
  - Promotes deeper, slower breaths – improved gas exchange
  - Flow creates PAP
  - High humidification aids in mobilizing secretions
  - Has shown improvement with lung function

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Summary

- Overlap Syndrome is when COPD and OSA coexists
- Because both are so common, overlap syndrome is also common
- CPAP is gold standard for OSA
- Oxygen as needed, to reduce hypoxemia, is also commonly used with the PAP devices
- Heated Humidification (optimal levels) may enhance the adherence to CPAP treatment and is especially important for the COPD patient to mobilize secretions, reducing risk of exacerbations

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