Management of OSA in the Acute Care Environment

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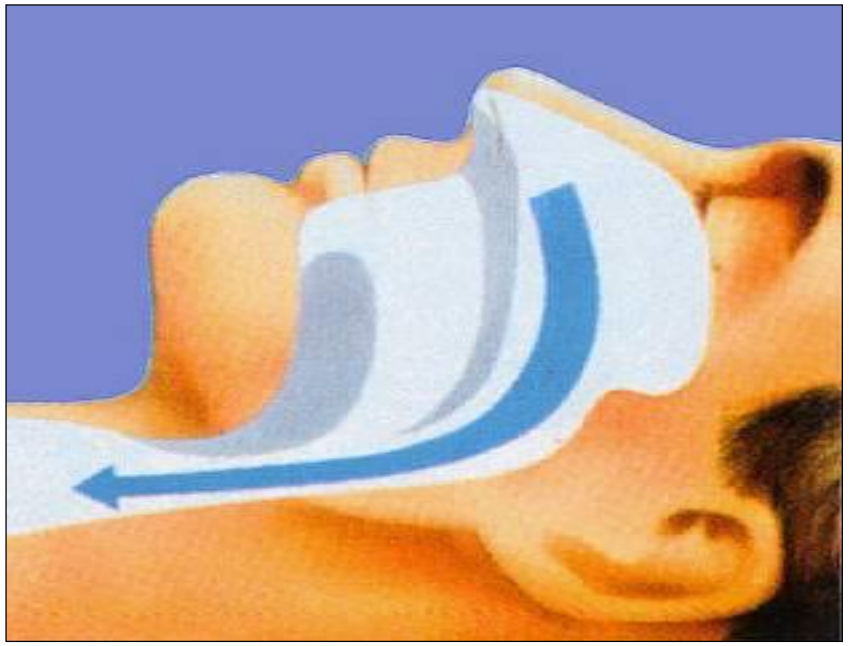
Learning Objectives

- Upon completion, the participant should be able to:
  - Understand pathology and prevalence of obstructive sleep apnea (OSA)
  - Discuss potential consequences and economic impact of untreated or under-treated OSA
  - Identify risks and co-morbidities associated with OSA
  - Recommend appropriate diagnosis and screening procedures used to identify OSA
  - Discuss various treatment options and long-term management of patients with OSA

Definition of OSA



Normal

Obstructed

OSA (Obstructive Sleep Apnea) occurs when the upper airway repeatedly collapses during sleep, causing cessation of breathing (apnea) or inadequate breathing (hypopnea) and sleep fragmentation.

OSA in Acute Care

- Prevalence of OSA
- Health Consequences and Comorbidities related to OSA
- Economics of OSA
- Logistics of OSA management in Acute Care environment

Prevalence of OSA in the US

- 5% of population is estimated to have undiagnosed OSA[1]
- Obstructive Sleep Apnea/Hypopnea (OSA/H) prevalence:
  - Wisconsin study[2,3]:
    - 24% of men, 9% of women: Apnea/Hypopnea Index (AHI) > 5
    - 9% of men, 4% of women: AHI>15
    - 4% of middle-aged men, 2% of middle-aged women: AHI > 5 *and* daytime sleepiness
  - Pennsylvania study[4]:
    - 17% of men AHI >5
    - 7% of men, 2% of women: AHI >15

[1] Young, et al., *AJRCCM* 2002
[2] Young, et al., *NEJM* 1993
[3] Redline, et al., *AJRCCM* 1997
[4] Bixler, et al., *AJRCCM* 1998 & 2001

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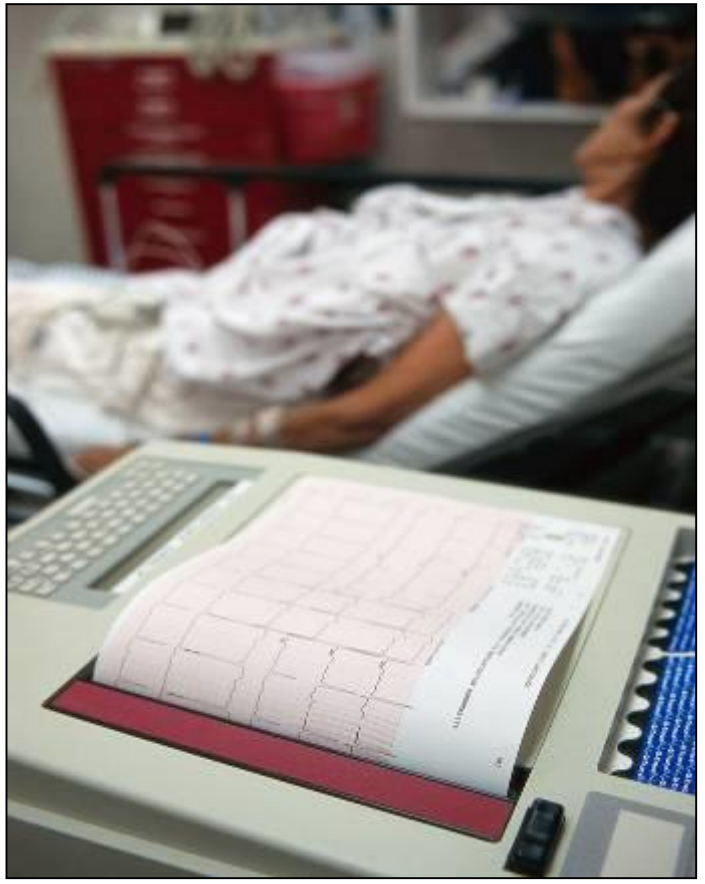
Health consequences of untreated OSA

Short-Term

- Automotive accidents
- Excessive sleepiness
- Decreased quality of life
- Neurocognitive and performance deficits

Long-Term

- Hypertension
- Heart disease
- Heart attack
- Arrhythmias
- Stroke
- Impaired glucose tolerance



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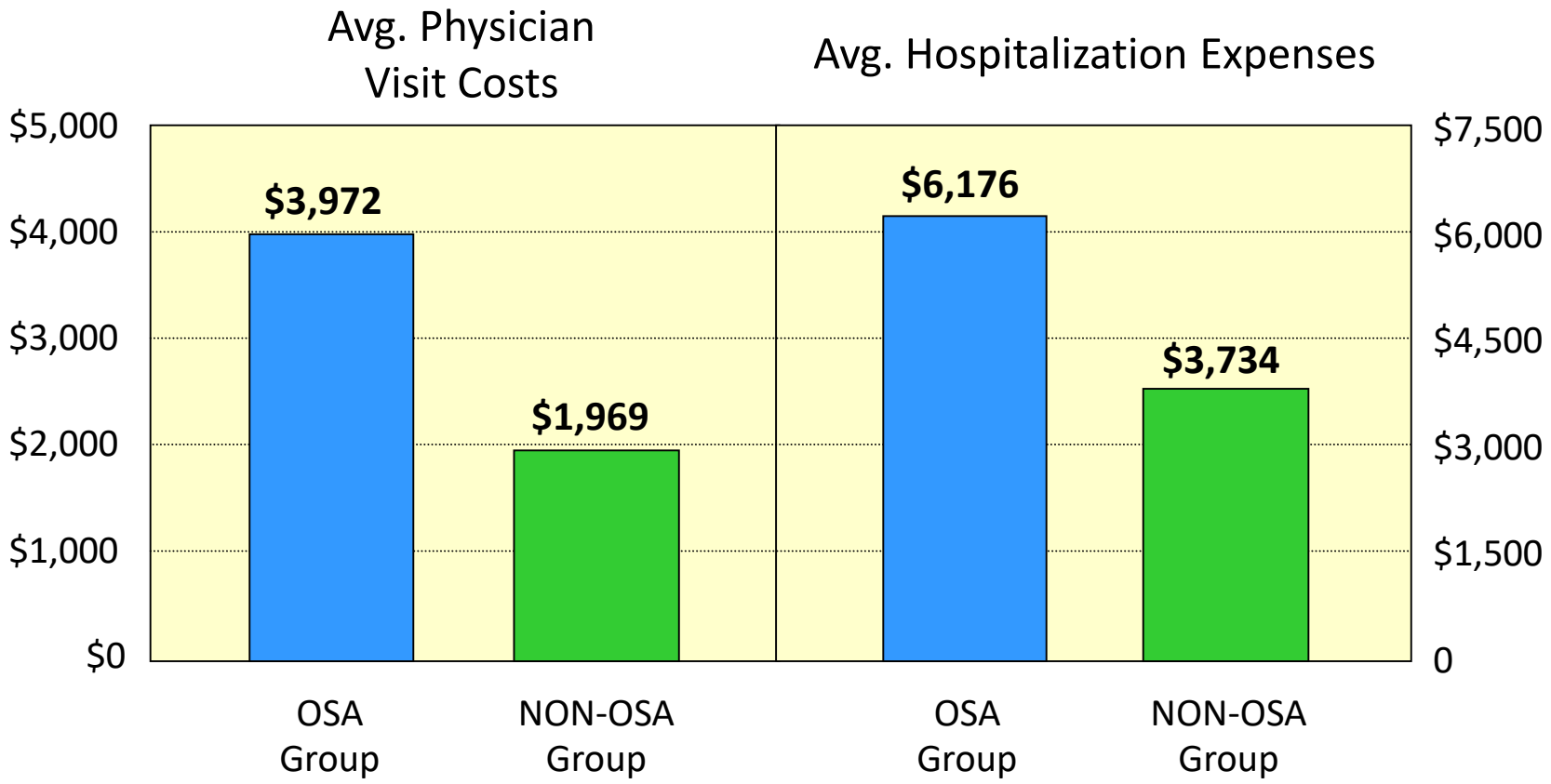
The impact of OSA on utilization costs



[1] Kryger, et al. OSA Patients Use More Health Care Resources Ten Years Prior to Diagnosis. *Sleep Research Online* 1998:1(1):71-74

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Screening and Diagnosing OSA

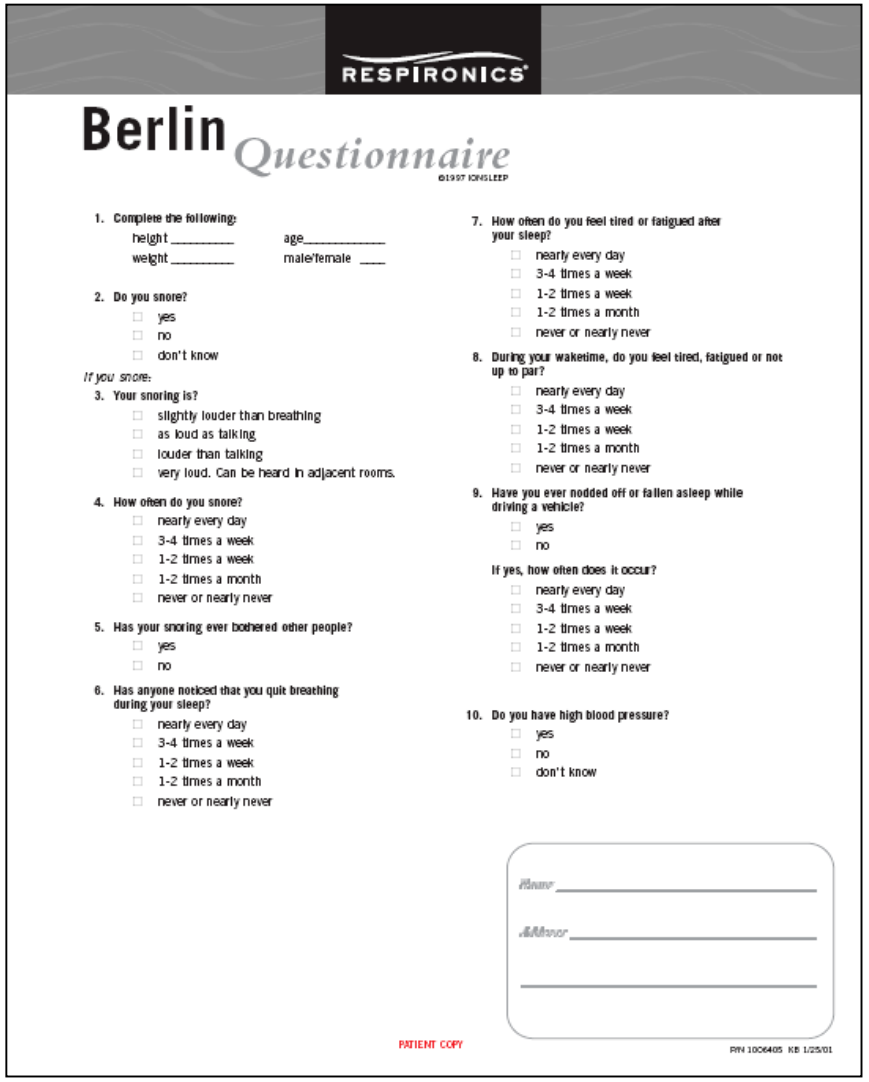
- Questionnaires and screening tools
  - Epworth sleepiness scale
  - Berlin Questionnaire
  - STOP and STOP-BANG Questionnaire
- Monitoring and testing for OSA

Epworth sleepiness scale

Situation	Chance of Dozing (0 – 3)
Sitting and reading	0 - 1 - 2 - 3
Watching television	0 - 1 - 2 - 3
Sitting, inactive in a public place, for example, a theater or meeting	0 - 1 - 2 - 3
As a passenger in a car for an hour without a break	0 - 1 - 2 - 3
Lying down to rest in the afternoon when circumstances permit	0 - 1 - 2 - 3
Sitting and talking to someone	0 - 1 - 2 - 3
Sitting quietly after lunch without alcohol	0 - 1 - 2 - 3
In a car, while stopped for a few minutes in traffic	0 - 1 - 2 - 3
Total Score	

The Berlin questionnaire

- Simple, self-administered patient questionnaire
- Asks patients to report their symptoms
- Questionnaire is specific to OSA
- Identifies patients at high risk for OSA who are likely to benefit from diagnosis



RESPIRONICS

Berlin *Questionnaire*

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1. **Complete the following:**
   height _____ age_____
   weight _____ male/female ____

2. **Do you snore?**
   - ☐ yes
   - ☐ no
   - ☐ don't know

If you snore:

3. **Your snoring is?**
   - ☐ slightly louder than breathing
   - ☐ as loud as talking
   - ☐ louder than talking
   - ☐ very loud. Can be heard in adjacent rooms.

4. **How often do you snore?**
   - ☐ nearly every day
   - ☐ 3-4 times a week
   - ☐ 1-2 times a week
   - ☐ 1-2 times a month
   - ☐ never or nearly never

5. **Has your snoring ever bothered other people?**
   - ☐ yes
   - ☐ no

6. **Has anyone noticed that you quit breathing during your sleep?**
   - ☐ nearly every day
   - ☐ 3-4 times a week
   - ☐ 1-2 times a week
   - ☐ 1-2 times a month
   - ☐ never or nearly never

7. **How often do you feel tired or fatigued after your sleep?**
   - ☐ nearly every day
   - ☐ 3-4 times a week
   - ☐ 1-2 times a week
   - ☐ 1-2 times a month
   - ☐ never or nearly never

8. **During your waketime, do you feel tired, fatigued or not up to par?**
   - ☐ nearly every day
   - ☐ 3-4 times a week
   - ☐ 1-2 times a week
   - ☐ 1-2 times a month
   - ☐ never or nearly never

9. **Have you ever nodded off or fallen asleep while driving a vehicle?**
   - ☐ yes
   - ☐ no

   If yes, how often does it occur?
   - ☐ nearly every day
   - ☐ 3-4 times a week
   - ☐ 1-2 times a week
   - ☐ 1-2 times a month
   - ☐ never or nearly never

10. **Do you have high blood pressure?**
    - ☐ yes
    - ☐ no
    - ☐ don't know

Name: _____

Minor: _____

_____

PATIENT COPY

P/N 1006405 KB 1/25/01

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STOP-BANG Questionaire

- **S** Snoring: Do you snore loudly (louder than talking or loud enough to be heard through closed doors)? Y N
- **T** Tired: Do you often feel tired, fatigued or sleepy during the daytime? Y N
- **O** Observed: Has anyone observed you stop breathing during your sleep? Y N
- **P** Blood pressure: Do you have or are you being treated for high blood pressure? Y N
- **B** BMI: BMI more than 35 kg/m2 Y N
- **A** Age: Age over 50 years Y N
- **N** Neck circumference: Neck circumference greater than 40 cm Y N
- **G** Gender: Male Y N

Anesthesiology.2008;108:812-21.

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Measures of sleep apnea frequency

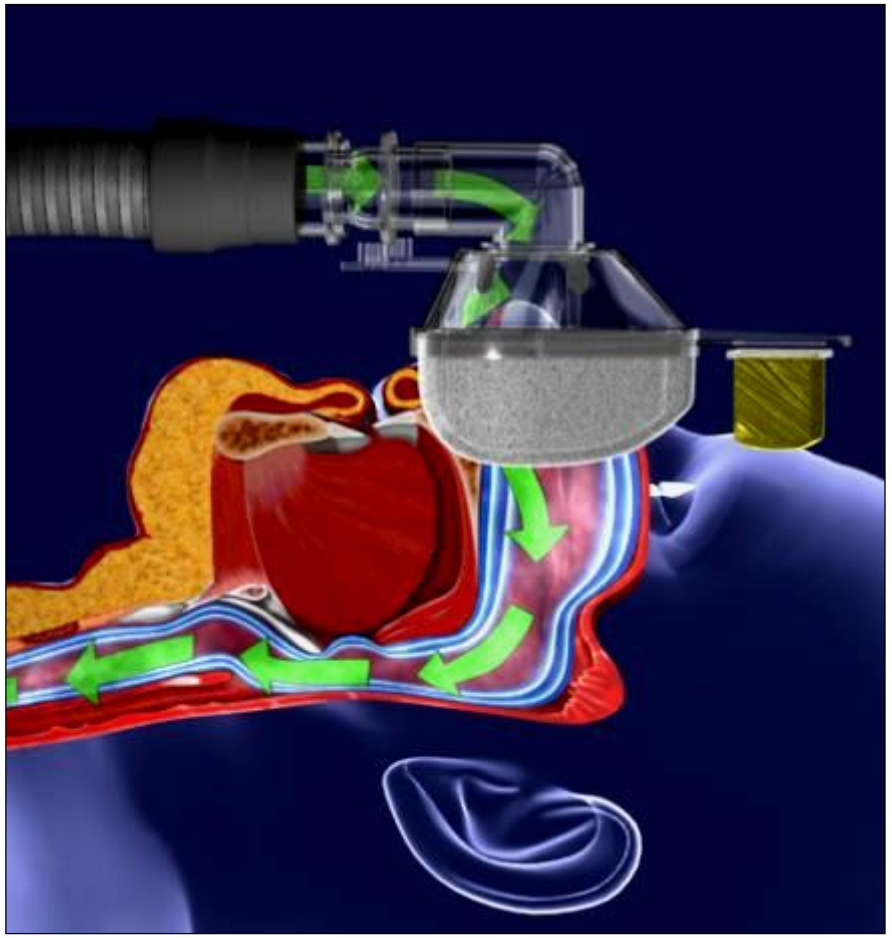
- **Apnea Index -** # apneas per hour of sleep
- **Hypopnea Index -** # of reduction in patient flow per hour of sleep
- **Apnea / Hypopnea Index (AHI) -** # apneas/hypopneas per hour of sleep
- **Arousal Index (AI)**
  - When the patient arouses from sleep or changes sleep staging that does not normally occur at night
  - Number of arousals in EEG activity per hour of sleep
  - Associated with apnea/hypopnea/desaturation events

Classification of respiratory events

- Mild sleep apnea
  - AHI is 5 to 15 with excessive daytime sleepiness (EDS)
- Moderate sleep apnea
  - AHI >15 to 30 with EDS
- Severe sleep apnea
  - AHI > 30 with EDS

OSA therapy

- Of those patients being treated for OSA, 70 - 80% utilize CPAP therapy with a nasal mask[1]
- CPAP provides positive pressure to provide a pneumatic splint for the patient's airway



[1] Frost & Sullivan, Sleep Apnea Models, 2001

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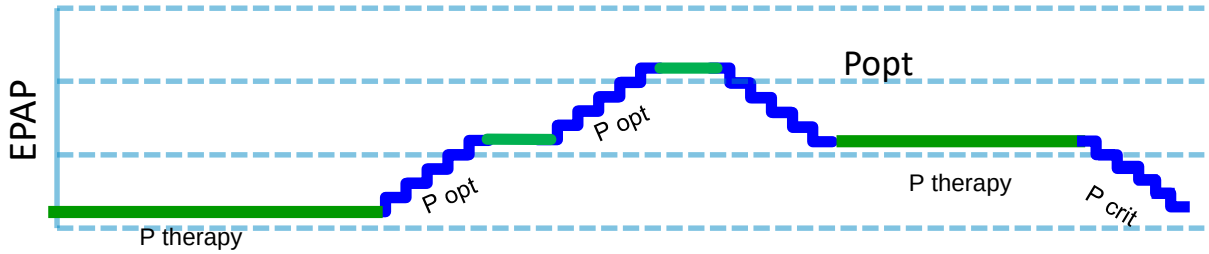
PAP therapy for OSA Patients

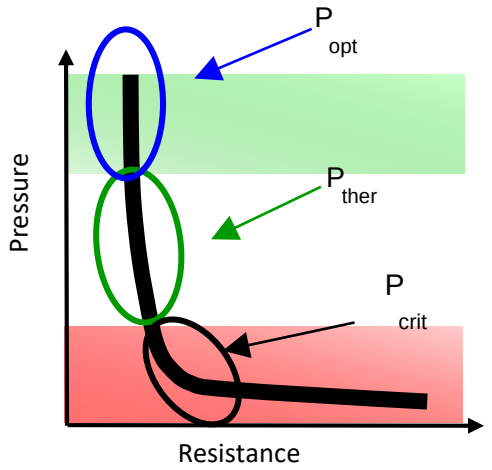
- **CPAP**
  - One level of pressure on inspiration and exhalation
  - Device may have the option to provide pressure relief in early exhalation
- **Bi-level therapy**
  - One level of pressure on inspiration and lower level of pressure on expiration
  - Device may have the option to provide pressure relief in early exhalation
- **Auto titration therapy**
  - Device pressure is adjusted based on airway dynamics and device algorithm

Auto EPAP proactive analysis

Popt – Optimal Pressure Search

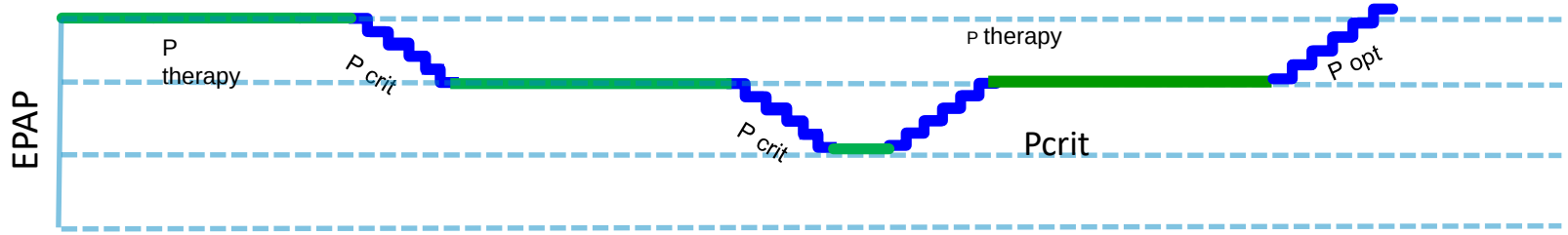
(High Pressure Search)





Critical Pressure Searches

(Low Pressure Search)



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Goals of treating OSA with PAP

Short Term

- Maintain open airway
- Improve quality of sleep
- Alleviate daytime symptoms
  - Sleepiness
  - Moodiness/Impaired concentration/Memory loss
  - Morning headache

Long Term

- Reduce mortality and morbidity
  - Decrease cardiovascular consequences
  - Reduce sleepiness
- Improve quality of life

Marin, JM et. al Lancet 2005: 365:1046 - 1053

Therapy Considerations for In-Hospital OSA

- Device Selection
- Mode Selection
- Settings and feature selection
- Interface Selection
- Adjunctive devices and therapy to improve compliance/acceptance

Conclusions

- Pathology and prevalence of OSA
- Potential consequences and economic impact of untreated or under-treated OSA
- Risks and co-morbidities associated with OSA
- Diagnosis and screening procedures used to identify OSA
- Various treatment options and long-term management of patients with OSA

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