Welcome!

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Perioperative Management:
Meeting the Challenge of Identifying Patients with Obstructive Sleep Apnea at RMH

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Some slides borrowed from David J. Leszcyszyn, M.D., PhD

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OSA Facts

- **OSA is common – occurs in up to 9% of women, 24% of men, or approximately 18 million total in US population (National Sleep Foundation report on Sleep Apnea)**
- **Approximately 12-15% of the surgical population has OSA**
- **Clear relationship between OSA and other morbidities such as coronary artery disease, hypertension, and stroke.**
  - Michaelson, P., Allan, P. Chaney, J. Mair, E., 2006.
- **The medical community tends to under diagnose OSA**
  - Gupta, V., Reiter, E, 2004.

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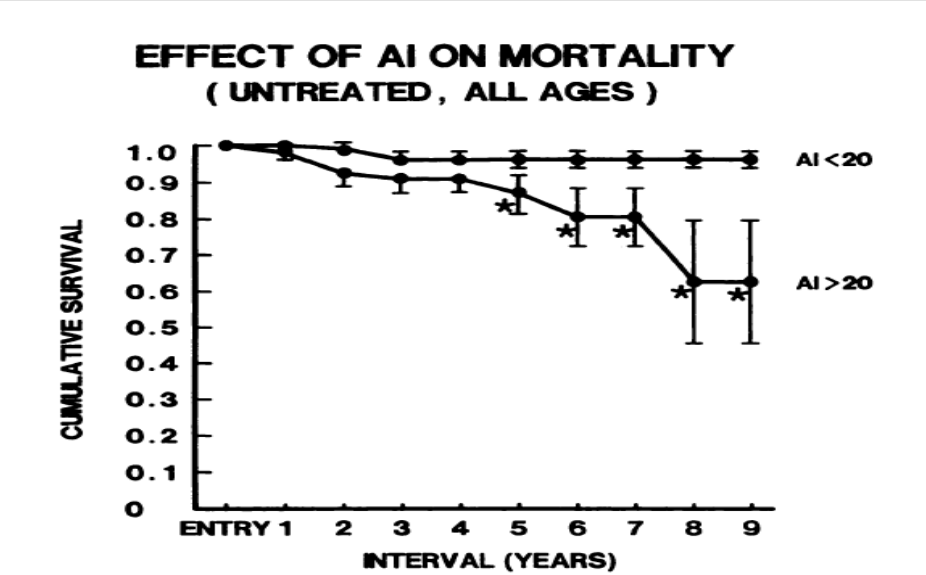
Death (aka "The Ultimate Health Consequence")

- 385 patients with OSA followed 8 years



- No deaths if treated with CPAP or trach.
  - He, J., Kryger, M., Zorick, F., et. al. (1988). Mortality and apnea index in obstructive sleep apnea. experience in 385 male patients. *Chest Journal*, *94*(1), 9-14.

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OSA in the news…

- 2004- Just seven days after his 43rd birthday, NFL hall-of-famer Reggie White passed away. While the official cause was recorded as cardiac arrhythmia, sleep apnea is thought to have contributed to his death.
- 1997- Hawaiian singer "Iz" Israel Kamakawiwo'ole died at the age of 38 from complications of morbid obesity – press statement calling it "respiratory failure." At 6'2", he weighed 750 pounds.
- 2011- John Doe, 44, of Bridgewater, passed away peacefully on January 3rd at RMH, as a result of complications from sleep apnea.

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OSA Cost – Real World

- Over 100,000 MVAs annually are sleep-related
- Risk is 7 times higher in OSA patients than controls
- Disasters – Chernobyl, Three Mile Island, Challenger, Bhopal, Exxon Valdez, and Staten Island Ferry attributed to errors induced by sleepiness or fatigue
- Reduced work productivity
- Estimated cost of $3 billion annually

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Why you need to care: Just the facts…

- Surgical patients with OSA have higher complication rates, mostly respiratory, including pulmonary edema, bronchospasm, pneumothorax, and hypercapnea.
- Increased need for reintubation, even hours after surgery.
- Anesthetic, sedative, and analgesic drugs all selectively impair upper airway activity. In patients with OSA, these drugs may further jeopardize upper airway patency, especially during sleep
  - Liao, P., Yegneswaran, B. et al, 2006;
  - Rennotte, M., Baele, P., Aubert, G., Rodenstein, D., 1995.

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Houston, we've had a problem…

- The problem has been under our nose, unrecognized
- Dawning of recognition
- Rude awakening as dramatic and unfortunate cases present

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When did it dawn on us as a community of practitioners?

- Case at World Congress of Sleep Medicine 2005, Montreal
- A woman in Wyoming National Park had orthopedic injury
- Invasive surgery
- Died of OSA's while unmonitored and given opiates

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The "Aha!" Moment

American Society of Anesthesiologists (ASA) Obstructive Sleep Apnea Guidelines 2006

- 50+ pages, consensus opinion and recommendations
- Recognition that OSA affects up to 18,000,000 people in US, most (80-90%) OSA is undiagnosed
- 60-90% Obese people have some degree of OSA, obesity is epidemic in US
- Anesthesia providers have unique opportunity to diagnose and refer for treatment
- OSA associated with difficult airway management
- OSA associated with postoperative airway obstruction in the presence of narcotics, which can result in **DEATH**

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Big brother is watching you…

Why you need to care…

- Proposed JCAHO 2008 National Patient Safety Goals & Requirements, December 2006:
- Goal 17: To reduce the risk of post operative complications for patients with obstructive sleep apnea
- Not implemented in 2008; Was the scope of the problem too large?

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Why you need to care: Potential Medicolegal Consequences

- "Some hospitals have faced multi-million dollar lawsuits in which an undiagnosed sleep apnea patient goes in for routine surgery, is discharged with patient-administered painkillers and they die in their sleep."
  - Hillary Theakston, director of communications, ResMed, Poway, California.

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Why you need to care: Case in point…

- Massachusetts, 2004
- 48-year old woman as a result of an anoxic brain injury following non-emergent eye surgery.
- Defendants: two surgeons, three anesthesiologists, a certified registered nurse anesthetist, and a staff nurse.
- Plaintiffs claimed the decedent was improperly cared for postoperatively when providers failed to prescribe CPAP and proper monitoring devices and when they administered multiple sedating drugs to a patient at high risk for respiratory crisis after surgery.
- None of the providers performed a thorough respiratory assessment prior to the start of the procedure or took steps to ensure proper postoperative management of the patient's sleep apnea and acute respiratory infection.
- Plaintiff's awarded $1.5 million.

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Why you need to care: Medicolegal Consequences

- There are 19 cases of patients with OSA in the ASA closed claims database. In 18 out of the 19 cases, the patient sustained brain damage or death related to adverse respiratory events.
- There is a recent report in the Anesthesia Patient Safety Foundation Newsletter (Lofsky APSF Newsletter 2002; 17:24-5) describing 8 cases of "unexplained" postoperative cardiopulmonary arrests. All patients received parenteral narcotics and were ultimately diagnosed with OSA
- Since 2002, there have been an ever-increasing number of cases

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Why you need to care: Show me the money…

- The presence of OSA in patients who are admitted for other diagnoses, increases hospital charges and length of stay
- Retrospective database review conducted at VCU Medical Center revealed length of stay for patients with OSA, 5.38 days vs. 4.95 in controls. Charges for OSA patient were $16,562 vs $13,928 for controls.
  - Petersen, E., Reiter, E., 2004.

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Why you need to care: Patient Safety!

- From a safety standpoint we are placing our patients at risk by not recognizing and managing their OSA

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RMH Task Force

Purpose

- To assure patient safety and optimal perioperative care of patients with Obstructive Sleep Apnea (OSA)

Objective

- To bring awareness of OSA in all facets of perioperative care and to encourage practitioners to develop a consensus and standardize care within their disciplines to better manage Obstructive Sleep Apnea (OSA) in the perisurgical setting

- "At VCUHS we are managing OSA patients whether we acknowledge it or not…how good of a job we are doing, is the question."
  - Task Force Member (VCU/MCV)

I have appropriated MCV's purpose and objectives as our own

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Desired outcomes of OSA Task Force Initiative

- RMH community that is educated on taking care of patients with OSA
- Improvement in identifying perisurgical patients with OSA
- System wide recognition of how to manage OSA within the disciplines
- Reduced respiratory complication rates in perisurgical patients with OSA
- Decreased length of stay for patients with OSA
- Improved care and safety for patients with OSA

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Working Group A

- **William Cale,** MD, FCCP, FAASM, Diplomate ABIM in (Sleep)
  Medical Director RMH Pulmonary Associates
  and
  RMH Center for Sleep Medicine
- **Robert Li,** MD
- **Lisa Spruhan,** RN
- **Donnie Bennett,** CRT, RPSGT, RST
- **Madge Trobaugh,** RN
- **Brian Flock,** CRT, RPSGT, RST

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RMH OSA Quality Management Program

- We decided to start with pre-op screening and post-op monitoring of elective surgeries

What it is not

- A mandate
- A legal decree
- Based on total presumption
- The end all be all

What it is

- Promotion of quality care
- Promotion of standard of care
- Evidence based (although more research is needed)
- A start towards quality management of OSA patients

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Ultimate Goal

- To screen all surgical patients
- To screen all hospital patients
- Too ambitious? You bet!
- The journey of a thousand miles begins within a single step
  - Ancient Chinese proverb

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Looking for the "Best Practice"

- Memorial Health System, Colorado Springs, CO. Pilot program: identified patients preoperatively, special orders
- Other institutions:
- Johns Hopkins
- Beth Israel
- Sentara

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The “Best Practice”

- We don’t have to reinvent the wheel
- Profit where others have failed
- “No matter how good we think we are, we aren’t that good! We aren’t as bad as we think we are at our worst either.”
  - William Cale

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VCUHS OSA Quality Management Six Step Program

Step 1- Preoperative Screening

Step 2- Preoperative Management

Step 3- Intraoperative Management

Step 4- Postoperative Management

Step 5- Discharge Management

Step 6- OSA Aftercare

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Step 1 Pre-operative Screening

- When should patients be screened?
- Where should they be screened?
- How should they be screened?
  - What is the best screening tool for our institution?
  - What testing methods should be used and when/for whom?
  - Is it feasible or important to obtain sleep studies without delaying surgery?
  - What do we do with this information?

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Step 1- Pre-operative Screening

- A- PACU Interview
- B- Other possible screening venues:
  - Primary Care Provider
  - Self Screening
  - Home
  - Other Providers

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Special screening at RMH

- Cardiopulmonary Rehab
- Bariatric Surgery

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Selection of tool to screen

- Ease of use
- Validity of use
- Sensitivity
  - Too sensitive -will it clog the system?

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Items Used in Different OSA Questionnaires:

Questionnaire	Age	BMI	Male	Blood Pressure	Neck Size	Snoring	Loud Snoring	Apnea During Sleep	Tiredness During Day	Anatomical Airway
Berlin				√		√	√	√	√	
STOP				√			√	√	√	
STOP-BANG	√	√	√	√	√	√	√	√	√	
ASA checklist		√			√		√	√	√	√
Haridsson						√		√	√	√

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Sleep Center preparation for sleep apnea screening

1. Reserve 2 beds a week for pre-op evals.
2. Part-time tech available for 2-4 additional studies a week.
3. New tech starting
4. Divert schedule of non-sleep related diagnostic testing to central scheduling.
5. How to deal with increased physician evaluation volume. This is the most problematic.
    1. Eliminating the return visit between the initial eval and titration.
    2. Increase the number of sleep evaluation by available sleep-certified practitioners.

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Stop Bang

1. **Snoring**
Do you *snore* loudly (louder than talking or loud enough to be heard through closed doors)?
Yes No

2. **Tired**
Do you often feel *tired*, fatigued or sleepy during daytime?
Yes No

3. **Observed**
Has anyone **o**bserve you *stopping* breathing during your sleep?
Yes No

4. **Blood pressure**
Do you have or are you being treated for high blood *pressure*?
Yes No

5. **BMI** -
BMI more than 35kg/m2?
Yes No

6. **Age** -
age over 50 years old?
Yes No

7. **Neck Cimrcumferce**
- *neck* circumference greater than 40?
Yes No

8. **Gender**
– *g*ender-male?
Yes No

High Risk of OSA- 'Yes' to three or more items.
Low Risk of OSA- 'Yes' to less than three items.

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STOP BANG problem

- Problem- On the face of it, too sensitive. We and others that have done screening have found a huge percent positive. Surgeons rightly fear the system would get backed up.
- MCV 43.3% Screen positive workable? What do you think?
  - Chung et al. Anesthesia 2008.

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STOP BANG Model

1. **Snoring**
Do you ***s**nore* loudly (**louder than talking or loud enough to be heard through closed doors**) Do not select yes if snoring is not loud?
Yes No

2. **Tired**
Do you **often** feel ***t**ired*, fatigued or sleepy during your **normal waking hours?** Do not select yes if the tiredness/sleepiness is not **often**.
Yes No

3. **Observed**
Has anyone **observed** you ***stop*** breathing during your sleep?
Yes No

4. **Blood pressure**
Do you have or are you being treated for high blood ***p**ressure*?
Yes No

5. **BMI** -
BMI greater than 35 (BMI = Pounds (lb) x 703 ÷ (Height in inches)^2)?
Yes No

6. **Age** -
***a**ge* over 50 years old?
Yes No

7. **Neck Cimrcumferce**
- ***n**eck* circumference greater than 15.75 inches (measured around the base of neck)?
Yes No

8. **Gender**
– ***g**ender*-male?
Yes No

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STOP BANG continued

High risk of OSA – 'yes' to four or more items or 'yes' to three items if one of those items are either numbers 1, 3, 5, or 7

Low risk of OSA – 'yes' to less than three items

If you are at a high risk of having obstructive sleep apnea (OSA), it is important that you consider talking to your healthcare professional regarding the possibility of a sleep related breathing disorder. You may also self-refer to RMH Sleep Center to be evaluated by a board certified sleep physician at 540-437-8230.

If you would rather RMH Sleep Center call you regarding your self-referral, we would be happy to do so and we would be happy to answer any questions you may have regarding sleep disorder breathing. Please print your name and sign below, if you would like RMH Sleep Center to contact you.

The RMH solution that others have also modified.

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What difference will it make? To screen/not to screen evidence

1. Improvement in post operative oxygenation.
2. Pulmonary complication
3. Mortality

–Lawrence VA et al, Ann Intem Med 2006; 144 (8): 596- 608

–Squatrune V et al. IAMA 2005; 293(5): 589-596

–Ferregn GP et al. Ann Serg 2008; 247(4): 617-626

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Automated Notification of Suspected Obstructive Sleep Apnea Patients to the Perioperative Respiratory Therapist: A Pilot Study

- Methods – University of Michigan Study
- (Retrospective analysis) 5 deaths attributable to OSA in 5 years and 31 ICU admissions with sudden respiratory or cardiopulmonary arrest
- Pre-op surgical assessment
  - OSA vs. OSA risk factors
- Dedicated RT paged based on data triggers
  - PAP vs. no PAP
- (After protocol) There were **no episodes** of sudden-onset postoperative acute respiratory compromise after institution of the OSA alert system

  - Ramachandran et. al, Resp Care 2010; 55(4) 414-418

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What we propose to do

- **Policy: Perioperative Management of Patients with Diagnosed or Suspected Obstructive Sleep Apnea (OSA)**

- **Purpose:** To provide direction to care providers in the management of patients with established or suspected sleep apnea during the peri-operative period. This policy is specifically addressing the management of adult patients admitted for elective impatient or outpatient surgery.

- **Background:** Obstructive Seep Apnea (OSA) is characterized by loud snoring, recurrent apnea during sleep resulting in frequent arausal, an daytime somnolence. These episodes may result in significant nighttime hypoxemia and hypercarbia. If left untreated, irreversible changes to the pulmonary vasculature and hear may occur. Patients with OSA present challenges during the Peri-operative period including increased risk for difficult intubation. In addition, anesthesia and analgesic medications may lead to increased airway obstruction/ apnea and a higher potential for post-operative complications. OSA is under-diagnosed and the overall incidence is likely increasing. Hospitals will likely encounter increasing numbers of patients with OSA presenting for surgery. This policy addresses the identification and care of these patients during the peri-operative period.

- **Process:** Pre- Admission Testing: Patients with diagnosed or suspected OSA will be identified. Sleep studies/pulmonary consults will be offered with the potential institutions of Positive Airway Pressure (PAP) treatment.

1. Patients with diagnosed OSA will be identified during the Pre-Admission Testing (PAT) appointment. The diagnosis of OSA will be noted in the allergy field of the patient's medical record. For patients using PAP treatment, the patient's setting on their PAP machine will be documented and the patient will be instructed to bring their equipment the day of surgery.
2. Patients without diagnosed OSA will be screened for OSA during the PAT appointment using the STOP BANG tool. The PAT staff will be educated on eh appropriate use of this tool. For patients who received a phone interview rather than a face-to-face PAT interview, the PAT RN will utilize the STOP BANG tool and the patient will be asked to estimate neck circumference to the best of their ability.

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What we propose to do

- Identify patients with diagnosed or suspected OSA at pre-admission testing (PAT).
- Diagnosed OSA patients identified
  - Noted in allergy field of patient record
  - PAP settings documented
  - Bring equipment on the day of surgery
- No diagnosis of OSA'S but screen positive with modified STOP BANG.

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STOP BANG Positive

- PAT RN counsel re-surgical risks
- Documents/Brochures
- Offered self referral for pre-op sleep study/ sleep consultation.
  - Surgeon contacted if patient chooses to pursue sleep study.
  - Surgeon chooses to proceed with sleep study because of need for prompt surgery. Do not expect this will need to happen (see previous sleep center accommodations.)
  - OSA work up done in sleep center; sleep MD to notify surgeon if the evaluation cannot be accomplished before surgery.
  - Patients who refuse evaluation will be noted high risk in allergy field.

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Day of surgery

- Wrist band ID with OSA if established diagnosis.
- PAP machine inspected.
- Anesthesiologist notifies PACU RN of diagnosed or high risk of OSA's.
- Anesthesiologist may order OASIS tool (Obstructive Sleep Apnea Intervention Strategy)

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PACU tool taken from MAYO Clinic Rochester

	Evaluation Period		
	Initial	**2nd**	**3rd**
Bradypnea: <8 respirations per minute. (3 episodes needed for yes)	30 min. after extubation or PACU admit (whichever occurs later)	30 min after initial evaluation (60 min. after entubation or PACU admit)	30 min. after 2nd eval. (90 Min after evaluation or PACU admit)
Apnea: ≥ 10 seconds (Only 1 episode needed for yes)			
Desaturations: Pulse Ox < 90% with nasal cannula (3 episodes needed for a yes)			
Pain/ Sedation Mismatch: RASS score of -3 thru -5 **and** pain score >5 (Only 1 episode needed for yes)			

PASS= Richmond Agitation-Sedation Scale
Pain Score= Visual Analog Score
Recurrent events if any event occurs at more than one eval. period (not necessary to be the same event)

Evaluation Period (See criteria definition below)	**Initial Eval. Period** 30 min. after extubation or PACU admit (whichever occurs later)	**2nd Eval. Period** 30 min. after initial eval. (30 min after extubation or PACU admit)	**3rd Eval. Period** 30 min after 2nd eval. (30 min after extubation or PACU admit)
Time of evaluation	__ __:__ __	__ __:__ __	__ __:__ __
Hypoventilation <8 respirations/minute (3 episodes needed for yes)	__ 0=No 1=Yes	__ 0=No 1=Yes	__ 0=No 1=Yes
Apnea ≥10 seconds (only 1 episode needed for yes)	__ 0=No 1=Yes	__ 0=No 1=Yes	__ 0=No 1=Yes
Desaturations Pulse Ox<30% with nasal cannula **If unable to wean pt. to nasal cannula counts as and event* (3 episodes needed for yes)	__ 0=No 1=Yes	__ 0=No 1=Yes	__ 0=No 1=Yes
Pain/ Sedation mismatch PASS score -3 through -5 and Pain scale score >5 (only 1 episode needed for yes)	__ 0=No 1=Yes ___RASS __Pain	__ 0=No 1=Yes ___RASS __Pain	__ 0=No 1=Yes ___RASS __Pain
Highest FiO2 requirement each period	_____	_____	_____
PACU Instructions	If any of the above occur, inform anesthesiologist of possible need for monitored admission.	If any of the above occur, keep in PACU another 30 min. inform anesthesiology and ICU of possible admit.	If any of the above continue inform the anesthesiologist and ICU of monitored admission.

Ramsay Score

1. Patient anxious, irritated, or restless.
2. Cooperative, oriented, or tranquil.
3. Responds to commands only.
4. Brisk response to light tap or loud noise.
5. Sluggish response to light tap or loud noise.
6. No response to light tap or loud noise.

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PACU Tool - Inpatient

- No events during the consecutive thirty minute periods.
  - Discharge to room if inpatient pulse ox.
  - If diagnosed with OSA's PAP treatment to continue, respiratory therapist ensures PAP treatment is available.
  - Discharge to telemetry or ICU bed at the discretion of any physician involved in care.

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PACU Tool - Outpatient

- Discharge to Phase II surgical unit for eventual discharge home.
- Continuous pulse ox.
- Observe minimum of three hours after last IV narcotic, last desaturation, or last witnessed apnea.
- Anesthesiologist can discharge via direct order.
- With any observed desaturation during this phase of the recovery, anesthesiologist notified for further orders.

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If failure of discharge criteria

- Prolonged stay?
- Pulmonary consult/ PAP therapy instituted empirically or non-formally diagnosed but suspected OSA patients.
- Disposition
  - Floor with pulse ox.
  - Monitored bed
  - CCU

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Reasons to consider PAP Therapy

- Bad overnight oximetry
  - Oscillatory desats and 4% desat index > 20
  - Sat $\leq$75% **OR**
  - Mean Sat $\leq$88% **OR**
  - Sat <90%, $\geq$15% of study
- CAD+
- CHF+
- Arrhythmia
- Reason to delay PSG

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Guidelines for PAP Therapy

- Those already identified with OSA, set up using home settings
- New CPAP introduction
  - **Auto-titrary device (APAP) (min/max 4/20)**
    - Heated humidification (1-2 setting)
    - Repeat ON Oximetry on APAP
    - If initial oximetry on O_2, then APAP with O_2
    - If initial oximetry on RA, then APAP with RA
  - **Bi-level titrary device (BiPAP) for PaCO2 >50 or pH <7.35**
    - Heated humidification (1-2 setting)
    - Oxygen decided as above
    - Settings per ICU or previous use

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General Strategies- Good Medicine

- High index of suspension
  - 82% of Men Undiagnosed
  - 93% of Women Undiagnosed
- Anesthesia sedative and opiates results in
  - Decreased pharyngeal tone
  - Depressed ventilatory response to hypoxia and hypercapnea
  - Increase cardio pulmonary arrest first 24 -48 hours of surgery
  - Risk extends out to one week with REM rebound phenomenon.
  - Complications = higher intubation rate, cardiac arrhythmia, myocardial injury, delirium, ICU transfers, longer hospitalizations, and death.
    - Abeola et. al., perioperative management of obstructive sleep apnea. Chest 138, 6: 1489.

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General treatment strategy

- Wake ‘em up.
- Sit ‘em up.
- Don’t give ‘em IV opiates.
- Send ‘em to CCU with acute safety concerns.
- PAP ‘em.
- Re-tube ‘em.

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Questions?

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