Sleep Labs Are Obsolete for Peri-operative Assessment of Sleep Disordered Breathing - **CON**

Society of Anesthesia and Sleep Medicine

2017 Annual Meeting

October 19th, 2017

Susheel Patil, MD, PhD

Johns Hopkins School of Medicine

Clinical Director, Johns Hopkins Sleep Medicine

Conflicts of interest

- Consultant – Medical Advisory Board for Somnomed, Inc (ended in early 2017)

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Current guidelines for sleep testing

- Patients at high risk for moderate to severe OSA should be considered for HSAT
- Patients with significant cardiopulmonary comorbidities, neuromuscular disorders, or other sleep disorders should be considered for in-lab sleep testing
- Failed or negative HSAT in a patient with high pre-test probability should have in-lab sleep testing to rule out OSA.

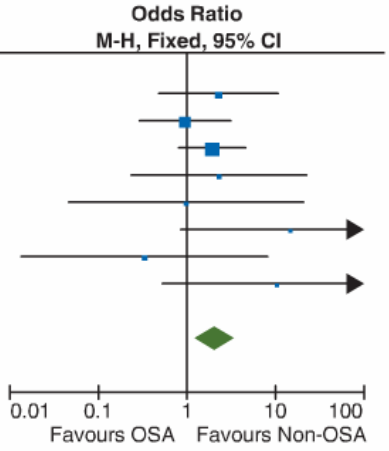
Kapur V, et al. JCSM 2017: 13: 479 – 504.

Consequences of OSA on post-operative outcomes

A Any cardiac events

Study or Subgroup	OSA Events	OSA Total	Non-OSA Events	Non-OSA Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Ahmad 2008	0	31	0	9		Not estimable
Chung 2008	10	147	2	64	12.9%	2.26 [0.48, 10.63]
Gali 2009	4	221	9	472	27.9%	0.95 [0.29, 3.11]
Gupta 2001	16	101	9	101	37.5%	1.92 [0.81, 4.58]
Hwang 2008	3	98	1	74	5.5%	2.31 [0.23, 22.62]
Kaw 2006	0	37	2	185	4.1%	0.98 [0.05, 20.80]
Kaw 2009	9	270	0	202	2.7%	14.71 [0.85, 254.29]
Sabers 2003	0	234	1	234	7.4%	0.33 [0.01, 8.19]
Vasu 2010	3	56	0	79	1.9%	10.40 [0.53, 205.48]
Total (95% CI)		**1195**		**1420**	**100.0%**	**2.07 [1.23, 3.50]**
Total events	45		24			

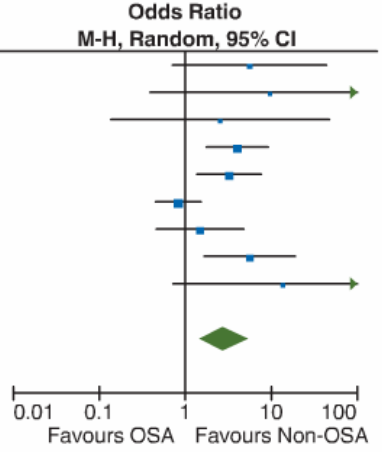
Heterogeneity: Chi² = 6.14, df = 7 (P = 0.52); I² = 0%
Test for overall effect: Z = 2.72 (P = 0.007)



E Postoperative ICU transfer

Study or Subgroup	OSA Events	OSA Total	Non-OSA Events	Non-OSA Total	Weight	Odds Ratio M-H, Random, 95% CI
Chung 2008	12	147	1	64	7.1%	5.60 [0.71, 44.02]
Finkel 2009	1	661	0	2117	3.6%	9.62 [0.39, 236.37]
Gali 2007	5	115	0	25	4.2%	2.54 [0.14, 47.39]
Gali 2009	16	221	9	472	17.3%	4.02 [1.75, 9.24]
Gupta 2001	22	101	8	101	17.0%	3.24 [1.37, 7.67]
Hallowell 2007	20	454	23	436	19.9%	0.83 [0.45, 1.53]
Kaw 2006	4	37	14	185	13.6%	1.48 [0.46, 4.78]
Kaw 2009	21	270	3	202	13.1%	5.59 [1.65, 19.02]
Vasu 2010	4	56	0	79	4.1%	13.63 [0.72, 258.43]
Total (95% CI)		**2062**		**3681**	**100.0%**	**2.81 [1.46, 5.43]**
Total events	105		58			

Heterogeneity: Tau² = 0.47; Chi² = 18.40, df = 8 (P = 0.02); I² = 57%
Test for overall effect: Z = 3.08 (P = 0.002)

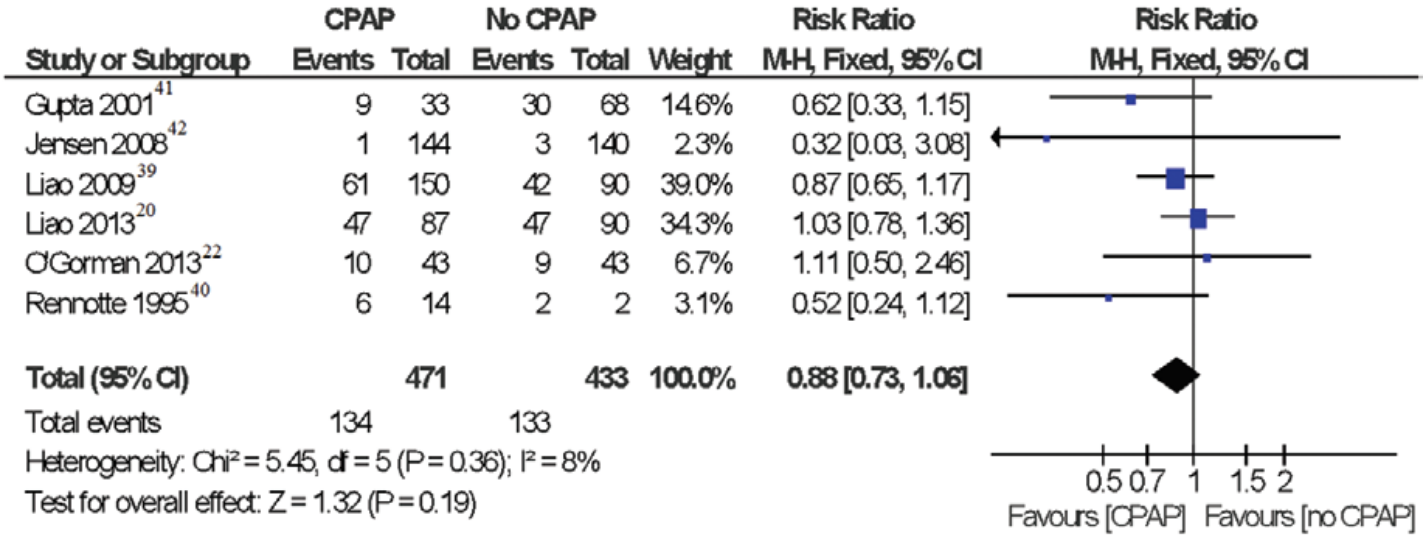


Dx of OSA based on questionnaire, oximetry, or PSG. ICD-9 only based dx excluded.

Kaw R, et al. Br J Anaesth; 2012; 109:897-906.

Potential effects of CPAP on post-operative outcomes

Post-Op Adverse Events



Study or Subgroup	CPAP Events	CPAP Total	No CPAP Events	No CPAP Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Gupta 2001[41]	9	33	30	68	14.6%	0.62 [0.33, 1.15]
Jensen 2008[42]	1	144	3	140	2.3%	0.32 [0.03, 3.08]
Liao 2009[39]	61	150	42	90	39.0%	0.87 [0.65, 1.17]
Liao 2013[20]	47	87	47	90	34.3%	1.03 [0.78, 1.36]
O'Gorman 2013[22]	10	43	9	43	6.7%	1.11 [0.50, 2.46]
Rennotte 1995[40]	6	14	2	2	3.1%	0.52 [0.24, 1.12]
Total (95% CI)		**471**		**433**	**100.0%**	**0.88 [0.73, 1.06]**
Total events	134		133			

Heterogeneity: Chi² = 5.45, df = 5 (P = 0.36); I² = 8%

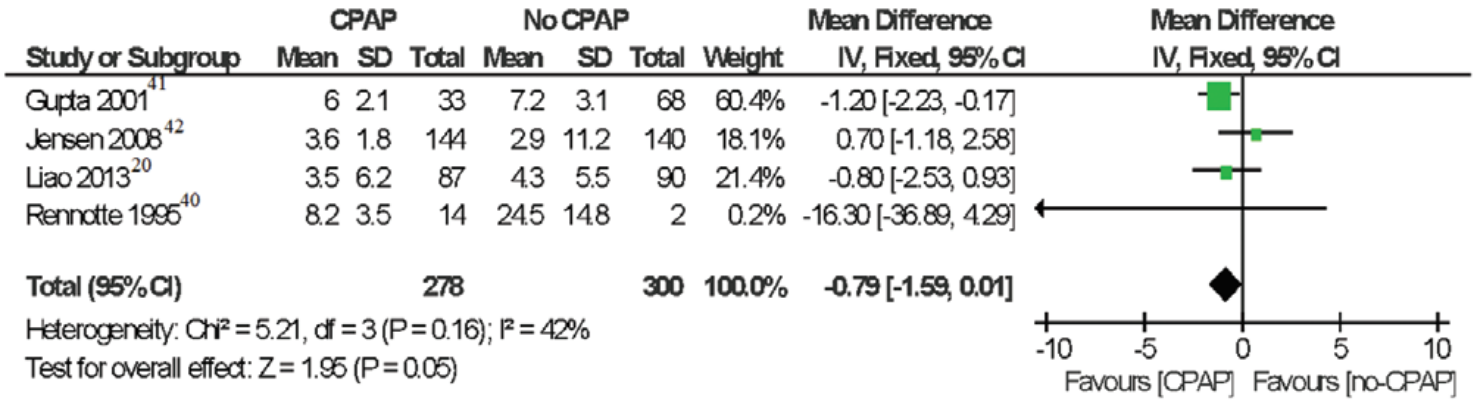
Test for overall effect: Z = 1.32 (P = 0.19)

Risk Ratio M-H, Fixed, 95% CI

0.5 0.7 1 1.5 2

Favours [CPAP] Favours [no CPAP]

LOS



Study or Subgroup	CPAP Mean	CPAP SD	CPAP Total	No CPAP Mean	No CPAP SD	No CPAP Total	Weight	Mean Difference IV, Fixed, 95% CI
Gupta 2001[41]	6	2.1	33	7.2	3.1	68	60.4%	-1.20 [-2.23, -0.17]
Jensen 2008[42]	3.6	1.8	144	2.9	11.2	140	18.1%	0.70 [-1.18, 2.58]
Liao 2013[20]	3.5	6.2	87	4.3	5.5	90	21.4%	-0.80 [-2.53, 0.93]
Rennotte 1995[40]	8.2	3.5	14	24.5	14.8	2	0.2%	-16.30 [-36.89, 4.29]
Total (95% CI)			**278**			**300**	**100.0%**	**-0.79 [-1.59, 0.01]**

Heterogeneity: Chi² = 5.21, df = 3 (P = 0.16); I² = 42%

Test for overall effect: Z = 1.95 (P = 0.05)

Mean Difference IV, Fixed, 95% CI

-10 -5 0 5 10

Favours [CPAP] Favours [no-CPAP]

CPAP vs no CPAP = 4.0±4 vs. 4.4±8 days

Nagappa et al. Anesth Analg 2015;120:1013–23.

Unique aspects of peri-operative assessment of OSA

- Time sensitivity – do not want to delay surgeries unnecessarily
- Planning of resource utilization
  - Is the patient at high risk for an adverse outcome after planned surgery?
  - Can this be same day surgery or is an inpatient admission needed?
  - If an inpatient admission needed – is an ICU bed, monitored bed, or floor bed needed?

Emergent surgeries

- There is little that a Sleep Center can offer when emergent surgeries must be done

- Managing risk of post-op complications in high risk OSA patients:
  - Inpatient pulmonary/anesthesia pre-op consultations
  - Availability of monitored bed with oximetry and CO2 monitoring
  - Protocols for managing patients recognized at high risk for OSA

Emergent surgeries

SASM 2016 Guidelines:

- **Weak For:** There is insufficient evidence to support canceling or delaying surgery to perform more advanced screening techniques or sleep testing to diagnose OSA in those patients identified as being at high risk of OSA preoperatively, unless there is evidence of an associated significant or uncontrolled systemic disease or additional problems with ventilation or gas exchange (Level of Evidence: Low)

ASA 2014 Guidelines:

- If any characteristics noted during the preoperative evaluation suggest that the patient has OSA, the anesthesiologist and surgeon should jointly decide whether to (1) manage the patient perioperatively based on clinical criteria alone or (2) obtain sleep studies, conduct a more extensive airway examination, and initiate OSA treatment in advance of surgery
- If the preoperative evaluation does not occur until the day of surgery, the surgeon and anesthesiologist together may elect for presumptive management based on clinical criteria or a last-minute delay of surgery.

Chung F et al. Anesth Analg 2016;123:452-473.
ASA Guidelines. Anesthesiology 2014; 120: 1-19.

A Good Plan

"The plan is nothing.

Planning is everything.“

General Eisenhower

A case to consider . . .

- 52 year old male with HTN and T2DM and plans for elective AAA repair.
  - BMI 21 kg/m2, neck circumference 14 cm
  - Snores per his wife
  - Has some fatigue
  - PCP had sent him for a sleep study

A case to consider . . .

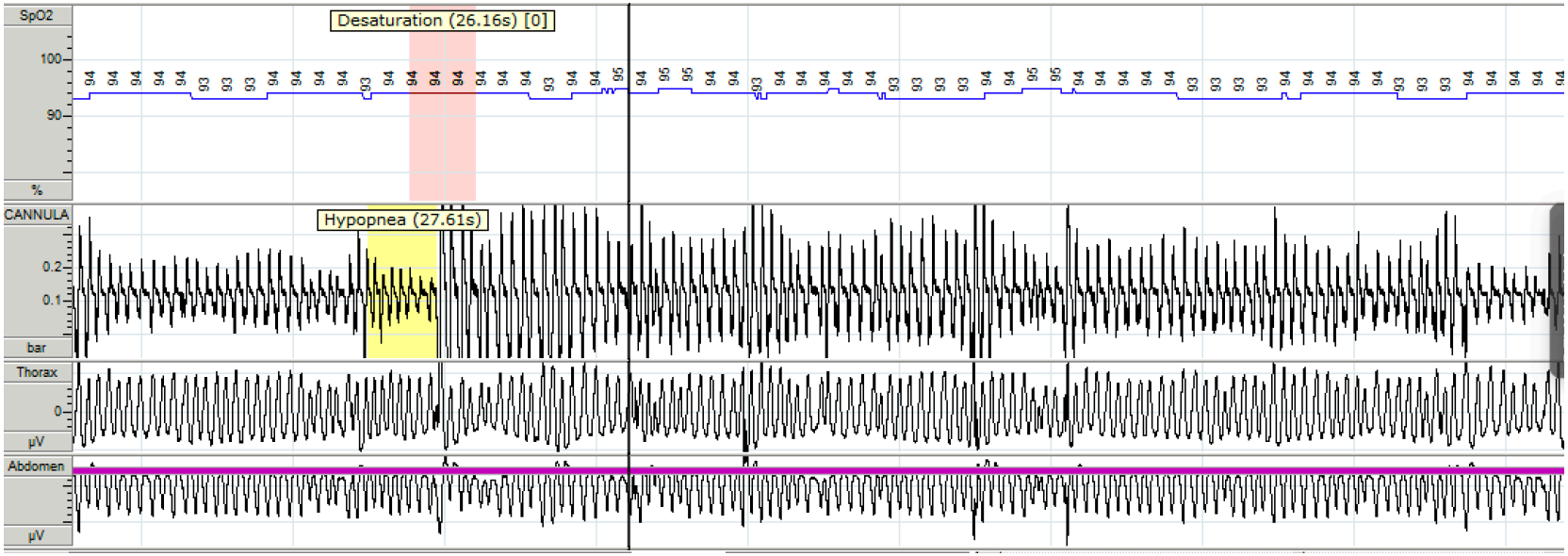
- Sleep study report
  - TST 345 minutes; TIB 412 minutes; SE 84%
  - N1 – 21%; N2 – 53%, N3 – 8%; R – 18%

  - AHI – 8/h
  - RDI – 11/h

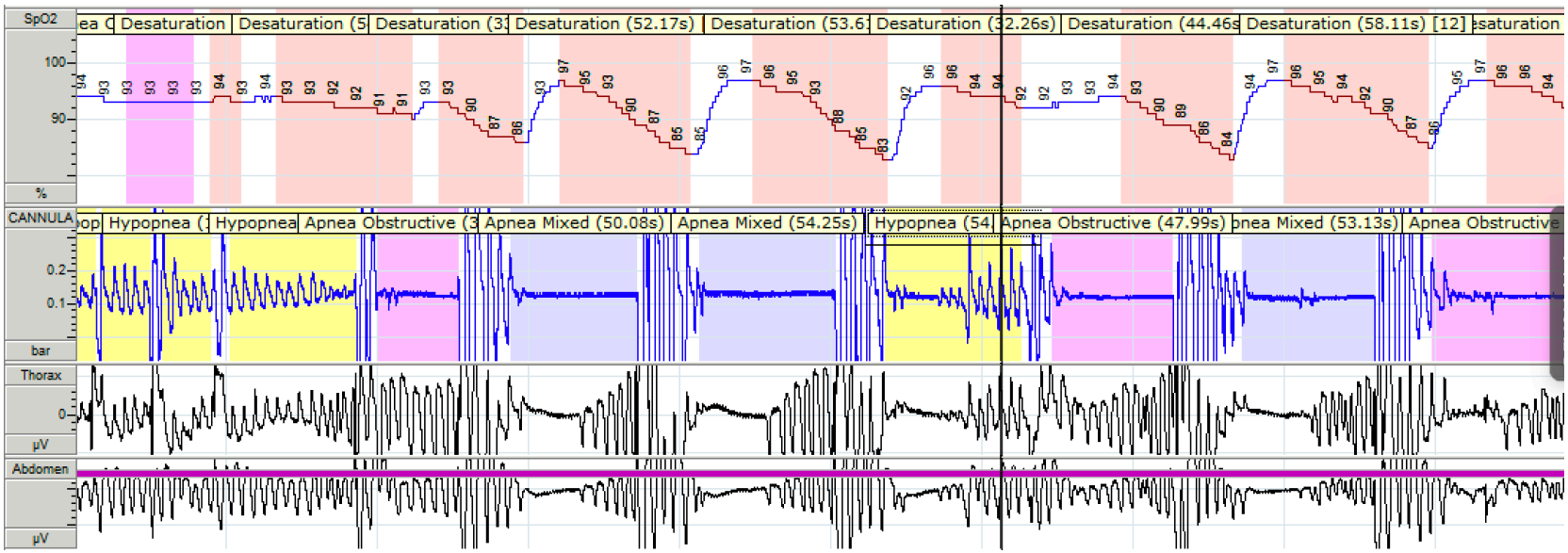
  - **Interpretation: The patient's sleep is consistent with mild sleep apnea**.

Mild Obstructive Sleep Apnea

So would this be a reason to be concerned for greater monitoring post-op?



NREM Sleep on his side
NREM RDI 7/h



REM Sleep on his back
REM RDI 58/h

A case to consider . . .

- Would he still be considered lower risk?
- Would precautions might be taken knowing this information?
  - Presume post-op he has to lay supine?
  - Might be at risk for REM-sleep rebound after receiving general anesthesia and possible opiates for pain control?
  - If not on therapy at home, should PAP be started in house?

Why are sleep centers even needed for peri-operative assessments?

- Questionnaires are imperfect
- Pre-treatment of OSA may be associated with better outcomes than in-hospital initiation.
- Optimize adherence prior to surgery
- Complex Patients - Assist in determining causes of unexplained hypoxemia or hypercarbia.
- CPAP can be a surrogate for compliance with post-op care (e.g. post-bariatric surgery diet)
- To ensure appropriate post-surgery evaluation and care

Questionnaires are imperfect

Table 6. Comparison of OSA Screening Tools in Surgical Patients

	STOP-Bang Questionnaire[116] (n = 177)	Berlin Questionnaire[62] (n = 177)	ASA Checklist[62] (n = 177)	P-SAP Score[142] (n = 511)
Sensitivity	83.6 (75.8–89.7)	68.9 (59.8–76.9)	72.1 (63.3–79.9)	93.9 (91.8–96.6)
Specificity	56.3 (42.3–69.6)	56.4 (42.3–69.7)	38.2 (25.4–52.3)	32.3 (23.2–46.7)
PPV[a]	81.0 (73.0–87.4)	77.9 (68.8–85.2)	72.1 (63.3–79.9)	10.0 (9.0–24.0)
NPV[a]	60.7 (46.1–74.1)	44.9 (32.9–57.4)	38.2 (25.4–52.3)	99.0 (98.0–99.0)
LR+	1.9 (1.40–2.61)	1.57 (1.17–2.36)	1.16 (0.94–1.51)	1.38 (1.37–1.39)
LR–	0.29 (0.18–0.46)	0.55 (0.39–0.79)	0.73 (0.47–1.13)	0.18 (0.16–0.21)
DOR	6.58 (3.03–14.36)	2.85 (1.48–5.50)	1.59 (0.81–3.13)	7.40 (6.48–8.45)
ROC	0.80	0.69	0.78	0.82

Abbreviations: ASA, American Society of Anesthesiologists; DOR, diagnostic odds ratio; LR+, positive likelihood ratio; LR–, negative likelihood ratio; NPV, negative predictive value; OSA, obstructive sleep apnea; PPV, positive predictive value; ROC, area under receiver operating characteristic curve.

[a]Predictive values are highly dependent on the prevalence of OSA, which was 69% in the evaluation of STOP-Bang, Berlin, and ASA checklist, and 7.1% for the P-SAP score.

- False positive rates can range from 44 – 68%
- False negative rate can range from 7 – 32%
- Will vary based on sensitivity/specificity thresholds chosen for a particular OSA threshold
- Implications
  - More resource use and costs depending on threshold chosen
  - Costs associated with potential missed diagnosis and subsequent complications

Chung F, et al. Anesth Analg 2016;123: 452-473..

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Same day assessment of OSA may have worse outcomes than diagnosed OSA

- Setting: Academic Center and 2 community practices
- Retrospective, data extraction from EMR
- Previously diagnosed OSA (D-OSA) – pre-existing in medical record or self report by patient on date of surgery
- Pre-operative suspected OSA (S-OSA) - if classified by anesthesia providers and had STOP-Bang > 3.
  - STOP-Bang missing data on "STO" – considered negative:
    - Snoring (44%)
    - Tiredness (83%)
    - Observed apneas (82%)

- 57% of those with reported OSA self-identified as being compliant with CPAP.

Fernandez-Bustamente. Anesth Analg 2017;125: 593-602.

Same day assessment of OSA may have worse outcomes than diagnosed OSA

Table 2. Perioperative AREs in Patients With Previously Diagnosed OSA, Day-of-Surgery S-OSA, and No-OSA

Variables	D-OSA (n = 3432)		S-OSA (n = 1546)		No-OSA (n = 23,934)			*P* Value (S-OSA Versus D-OSA)	*P* Value (S-OSA Versus No-OSA)	*P* Value (D-OSA Versus No-OSA)
	N for analysis	N (%)	N for analysis	N (%)	N for analysis	N (%)	*P* Value			
≥1 AREs[a]	3429	2435 (71.0)	1545	1051 (68.0)	23,832	12,413 (52.1)	<.001	.03	<.001	<.001
Individual AREs										
Hypoxemic event (≥1)										
Intraoperative										
Lowest Spo_2 86%–89%	3413	728 (21.3)	1535	273 (17.8)	23,209	2847 (12.3)	<.001	.004	<.001	<.001
Lowest Spo_2 ≤85%	3413	460 (13.5)	1535	201 (13.1)	23,209	1873 (8.1)	<.001	.71	<.001	<.001
PACU										
Lowest Spo_2 86%–89%	3423	305 (8.9)	1540	118 (7.7)	23,713	1306 (5.5)	<.001	.15	<.001	<.001
Lowest Spo_2 ≤85%	3423	156 (4.6)	1540	48 (3.1)	23,713	698 (2.9)	<.001	.02	.70	<.001
Postoperative										
Lowest Spo_2 86%–89%	3341	494 (14.8)	1503	219 (14.6)	23,409	2948 (12.6)	<.001	.85	.03	<.001
Lowest Spo_2 ≤85%	3341	1319 (39.5)	1503	600 (39.9)	23,409	6339 (27.1)	<.001	.77	<.001	<.001
Difficult airway management										
Difficult mask ventilation	3432	82 (2.4)	1546	58 (3.8)	23,934	154 (0.6)	<.001	<.01	<.001	<.001
Difficult intubation	3432	175 (5.1)	1546	75 (4.9)	23,934	543 (2.3)	<.001	.71	<.001	<.001

Fernandez-Bustamente. Anesth Analg 2017;125: 593-602.

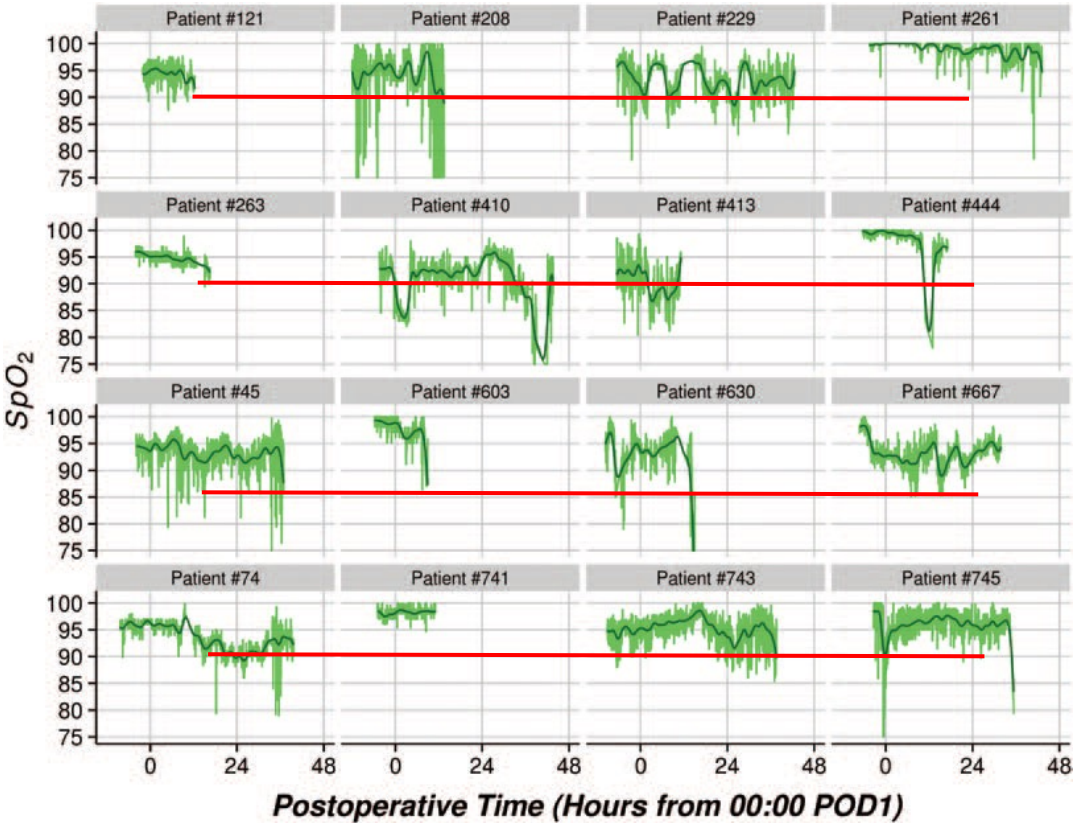
Same day assessment of OSA may have worse outcomes than diagnosed OSA

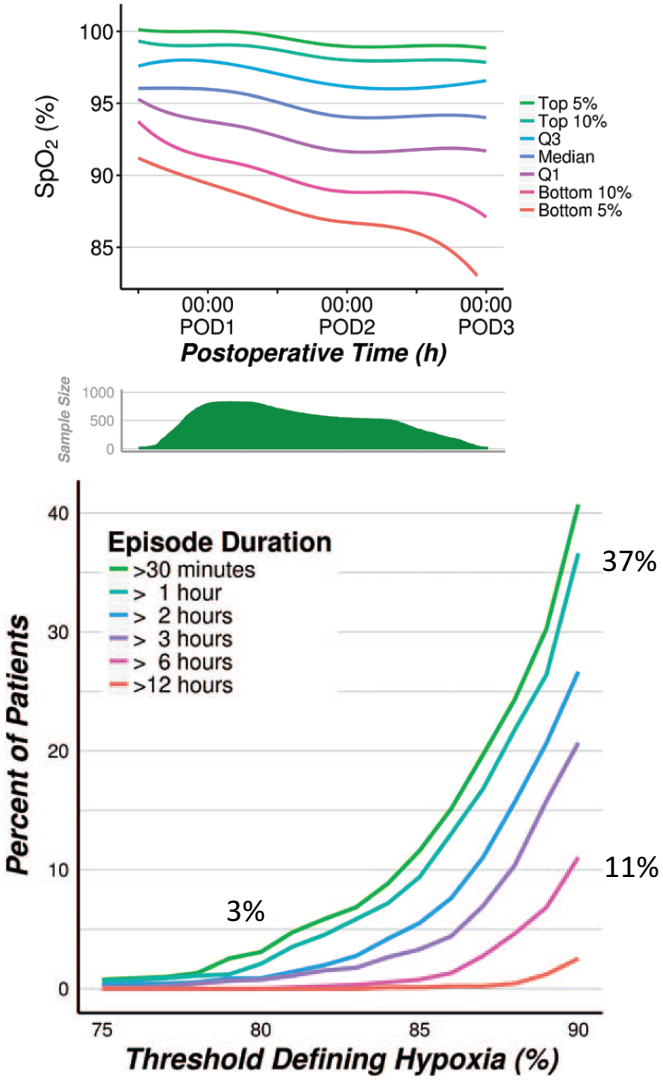
Table 4. Logistic Regression Analyses for the Secondary Outcomes

	Bivariable Analysis Results				Pairwise Comparisons			Multiple Logistic and Linear Regression Results		
								S-OSA Versus D-OSA		
Secondary Outcomes	D-OSA (n = 3432) N (%) or median (IQR)	S-OSA (n = 1546) N (%) or median (IQR)	No-OSA (n = 23,934) N (%) or median (IQR)	*P* Value	S-OSA Versus D-OSA	S-OSA Versus No-OSA *P* Value	D-OSA Versus No-OSA *P* Value	Adjusted OR or Parameter Estimate (99% CI)[a]	*P* Value	c Statistic
Need of postoperative O_2 therapy	3375 (98.3)	1513 (97.8)	22,041 (92.1)	<.001	.25	<.001	<.001	0.77 (0.38–1.60)	.34	0.85
Duration of postoperative O_2 therapy (d) for those who received it[b]	2.5 (1.2, 4.6)	2.4 (0.9, 4.9)	1.7 (0.5, 4.1)	<.001	.33	<.001	<.001	0.98 (0.87–1.09)	.63	Adj r^2 = 0.25
Postoperative NIV	1722 (50.2)	335 (21.7)	1835 (7.7)	<.001	<.001	<.001	<.001	0.21 (0.17–0.26)	<.001	0.88
Postoperative reintubation	204 (5.9)	131 (8.5)	1363 (5.7)	<.001	.001	<.001	.56	1.54 (1.08–2.02)	.002	0.89
Postoperative ventilation in ICU[c]	285 (8.3)	179 (11.6)	1834 (7.7)	<.001	<.001	<.001	.19	1.57 (1.12–2.19)	.001	0.90
Duration of postoperative mechanical ventilation in ICU (h) for those that received it[b]	12.8 (4.2, 43.1)	15.1 (3.9, 76.1)	22.9 (6.7, 160.5)	<.001	.42	.001	<.001	1.17 (0.71–1.62)	.67	Adj r^2 = 0.30
ICU direct admission	333 (9.7)	199 (12.9)	1865 (7.8)	<.001	<.001	<.001	<.001	1.49 (1.08–2.04)	.001	0.89
ICU unplanned admission	481 (14.0)	214 (13.8)	3528 (14.7)	.36	.87	.33	.26	0.99 (0.76–1.29)	.93	0.82
Hospital length of stay (d)[b]	3.0 (2.0, 5.0)	3.0 (2.0, 6.0)	3.0 (2.0, 6.0)	<.001	<.001	.15	<.001	1.08 (1.02–1.15)	.001	Adj r^2 = 0.26
Death within 30 d after surgery	23 (0.7)	23 (1.5)	234 (1.0)	.02	.005	.05	.08	2.33 (1.05–5.19)	<.01	0.86
Death within 1 y after surgery	76 (2.2)	53 (3.4)	626 (2.6)	.05	.01	.05	.17	1.66 (0.97–2.63)	.01	0.83

Fernandez-Bustamente. Anesth Analg 2017;125: 593-602.

Post-op desaturation events are common in the first 48h





- 66% received supplemental oxygen
- 4-5% received PAP therapy
- Only 5% had a single desaturation < 90% documented

Sun, et al. Anesth Analg 2015;121: 709-715.

Could home institution of CPAP reduce adverse outcomes?

Table 3. **Postoperative Outcomes***

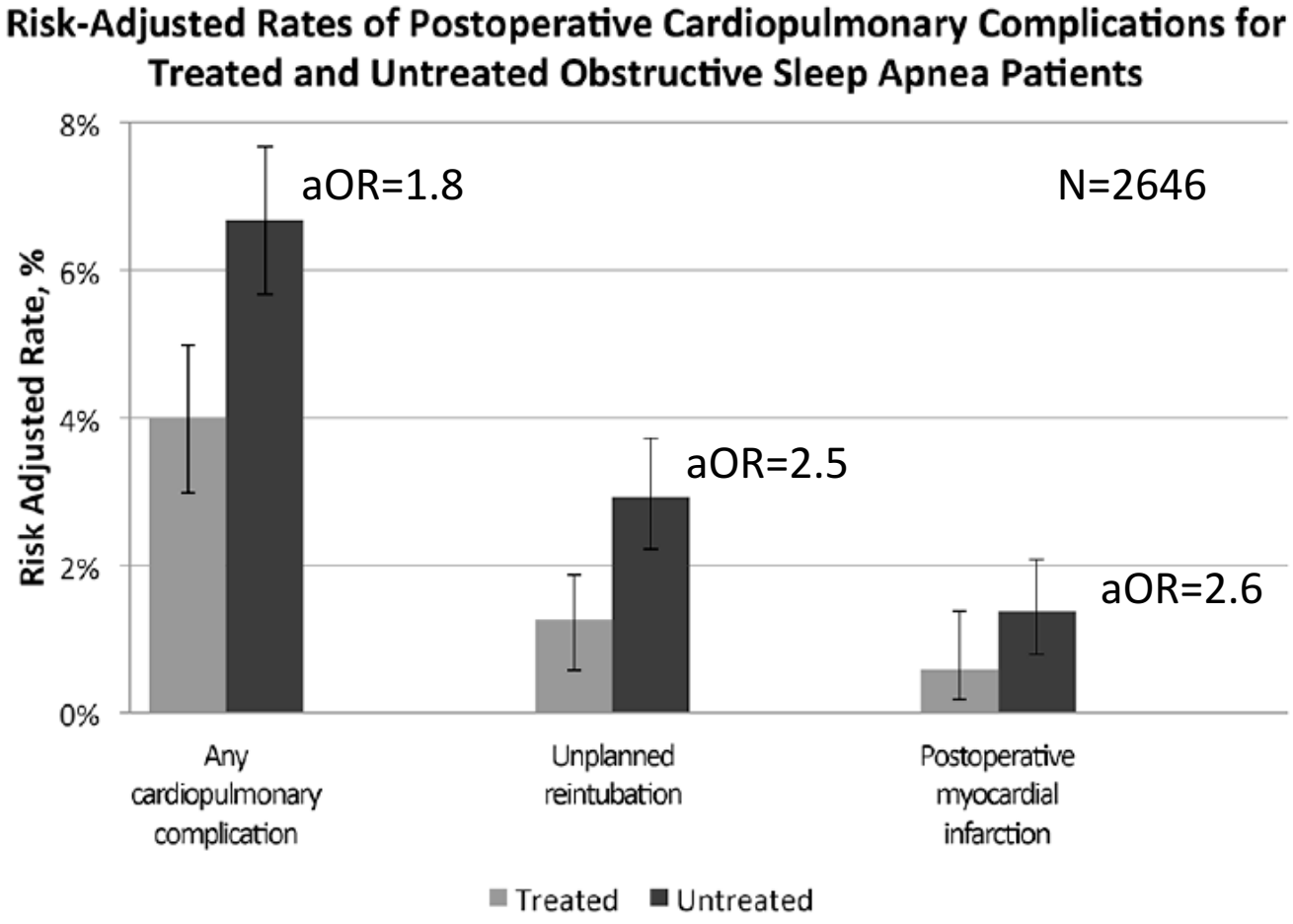
	Group 1 (OSAS)					
		1B (n=65)				
	1A (n=36)	No home CPAP (n=32)	Home CPAP (n=33)	Total (n=101)	Group 2 (control) (n=101)	*P* value†
Any complication	18 (50)	12 (37.5)	9 (27.3)	39 (39)	18 (18)	.001
Serious complication‡	12 (33.3)	9 (28.1)	3 (9.1)	24 (24)	9 (9)	.004
Total ICU	14 (38.9)	8 (25.0)	1 (3.0)	23 (23)	8 (8)	.003
Unplanned ICU	12 (33.3)	7 (21.9)	1 (3.0)	20 (20)	6 (6)	.003
Hospital stay (d)	7.4±2.9	6.9±3.3	6.0±2.1	6.8±2.8	5.1±4.1	.007

	No home CPAP (n=68)	Home CPAP (n=33)	*P* value§
Any complication	30 (44.1)	9 (27.3)	.10
Serious complication‡	21 (30.9)	3 (9.1)	.02
Total ICU	22 (32.3)	1 (3)	.001
Unplanned ICU	19 (27.9)	1 (3)	.003
Hospital stay (d)	7.2±3.1	6.0±2.1	.03

- Less than ½ of patients with home CPAP received routine CPAP therapy in the hospital - ?carryover protection for the 1st post-op day

Gupta R, et al. Mayo Clin Proceed 2001; 76:897.

Reduced post-op complications: PAP use compared to untreated OSA



- 10% of 26,842 pre-op patients with diagnosed or suspected OSA
- 55% Untreated

Abdelsattar et al, SLEEP 2015;38(8):1205–1210.

Initiating PAP in hospital is not always easy . . .

- High risk group identified with SACS >=15
- Randomized to standard care (n=43) vs. standard care + APAP (n=43)
- Median APAP use was 184.5 min (IQR: 64 – 451 min)
- 64% used APAP 100% of post-op nights
- 36% reported APAP to be too uncomfortable
- 14/38 with an AHI < 10/h per APAP card
- No reduction in LOS in APAP vs no APAP groups

Gorman S, et al. Chest 2013; 144:72-78.

Potential reasons why prior CPAP use may improve outcomes

- Possible carryover effect resulting in:
  - Decreased upper airway inflmamtion
  - Decreased upper airway edema
  - Increased upper airway stability
- Those who use PAP at home may be more likely to use in the hospital

Abdelsattar et al, SLEEP 2015;38(8):1205–1210.

Why are sleep centers even needed for peri-operative assessments?

- Questionnaires are imperfect
- Pre-treatment of OSA may be associated with better outcomes than in-hospital initiation.
- Optimize adherence prior to surgery
- Complex Patients - Assist in determining causes of unexplained hypoxemia or hypercarbia.
- CPAP can be a surrogate for compliance with post-op care (e.g. post-bariatric surgery diet)
- To ensure appropriate post-surgery evaluation and care

Complex patients

SASM 2016 Guidelines (similar statements for those at high risk for OSA or poorly adherent or refuse therapy for OSA):

- **Weak For:** We suggest that additional evaluation for pre-operative cardiopulmonary optimization be considered in patients who have a known diagnosis of OSA and non-adherent or poorly adherent to PAP therapy and where there is indication of uncontrolled systemic conditions or additional problems with ventilation or gas exchange. These conditions include but are not limited to: i) hypoventilation syndromes, ii) severe pulmonary hypertension, iii) resting hypoxemia not attributable to other cardiopulmonary disease (Level of Evidence: Low)
- **Weak For:** We suggest that untreated OSA patients with optimized comorbid conditions may proceed to surgery provided strategies for mitigation of postoperative complications are implemented. The risks and benefits of the decision should include consultation and discussion with the surgeon and patient (Level of Evidence: Low)

Chung F et al. Anesth Analg 2016;123:452-473.

Considerations

- Such patients are more likely to develop post-op complications

- These comorbidities often co-exist with forms of sleep disordered breathing

Considerations

- Sleep centers affiliated with hospitals can support the peri-operative team through urgent inpatient respiratory polygraphy testing
- Sleep center providers can provide needed consultation support to optimize cardiopulmonary status prior to after testing
- Can investigate reasons for treatment refusal or non-compliance

Table 3—*Significant Predictors From a Fully Adjusted Multiple Linear Regression Model Predicting Mean CPAP Adherence Over the First 30 Days of Therapy in Minutes*

	Regression Coefficient	95% CI	*P* Value
Physician specialty: sleep specialist	58.2	(20.9, 95.6)	.002
Race: African American	−56.0	(−91.0, −21.0)	.002

Nonsignificant covariates in this model were age, sex, BMI, education, AHI, ESS, CES-D, and Medicaid insurance status. Because of missing values, the sample size in the regression model was decreased to 379 patients. See Table 1 and 2 legends for expansion of abbreviations.

Sleep medicine trained providers had higher adherence with patients than non-sleep medicine providers

Pamidi S, et al. Chest 2012;141:51-57.

Why are sleep centers even needed for peri-operative assessments?

- Questionnaires are imperfect
- Pre-treatment of OSA may be associated with better outcomes than in-hospital initiation.
- Optimize adherence prior to surgery
- Complex Patients - Assist in determining causes of unexplained hypoxemia or hypercarbia.
- CPAP can be a surrogate for compliance with post-op care (e.g. post-bariatric surgery diet)
- To ensure appropriate post-surgery evaluation and care

CPAP as a surrogate for compliance with other therapies

- 330 veterans on lipid lowering medications and newly prescribed CPAP.
- Those adherent to anti-hyperlipidemic medications are more adherent to CPAP
- 40.1% probability of CPAP adherence in those with < 80% adherence to medications compared to 55.2% CPAP adherence in those with ≥ 80% medication adherence

Table 3—*Adjusted Odds Ratios for Adequate Initial Adherence to CPAP (n = 117)*

Variable	Adjusted OR (95% CI)	*P* Value
Lipid medication adherence ≥ 80% (vs < 80%)[a]	1.8 (1.0-3.3)	.04
Age (per 10-y increase)	1.3 (0.9-1.6)	.13
Race, black (vs white/other)[b]	0.8 (0.5-1.5)	.55
BMI (per SD change)	0.8 (0.6-1.0)	.10
Epworth Sleepiness Score (per SD change)	1.1 (0.9-1.5)	.41
Apnea-hypopnea index (per SD change)	1.0 (0.8-1.3)	.91
Diagnostic sleep study, unattended (vs in-laboratory)	1.2 (0.7-2.1)	.44
First night of CPAP use (vs subsequent nights)	0.4 (0.3-0.6)	< .001

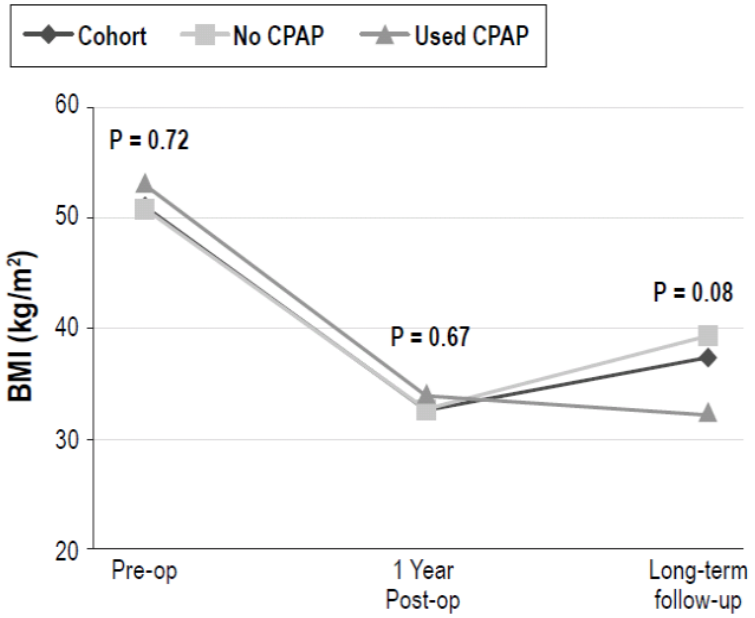
OR = odds ratio. See Table 1 for expansion of other abbreviation.
[a]Pharmacy refill adherence is measured as the percent of d covered with a lipid-lowering medication, calculated as the number of d covered divided by the total number of d on drug therapy during the exposure window in the year before CPAP initiation.
[b]Other race category consists of Pacific Islander, Asian, and Indian American (n = 5), and race classification missing (n = 4).

Platt AB et al. Chest 2010;137:102-108

CPAP adherence predicted weight loss trajectory

- Study of 24 subject that underwent gastric banding
- Age: 48.5 ± 9.4 years; 73% were female;
- **Pre**:
  - **BMI**: 51.1 ± 10.9 kg/m2
  - **Mean AHI**: 48.2/h ± 32.8/h
- **Post:**
  - **Weight loss**: 121.1 ± 50.2 lb; BMI: -18.6 kg/m2.
  - **Mean AHI**: 24.5 ± 18.8 events/h
- n = 8 were using CPAP

Figure 1—Comparison of change in BMI over long-term follow-up.



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- **Weak For:** SASM 2016 Guideline: Patients should be advised to notify their primary medical provider that they were found to have a high probability of having OSA, thus allowing for appropriate referral for further evaluation (Level of Evidence: Low)

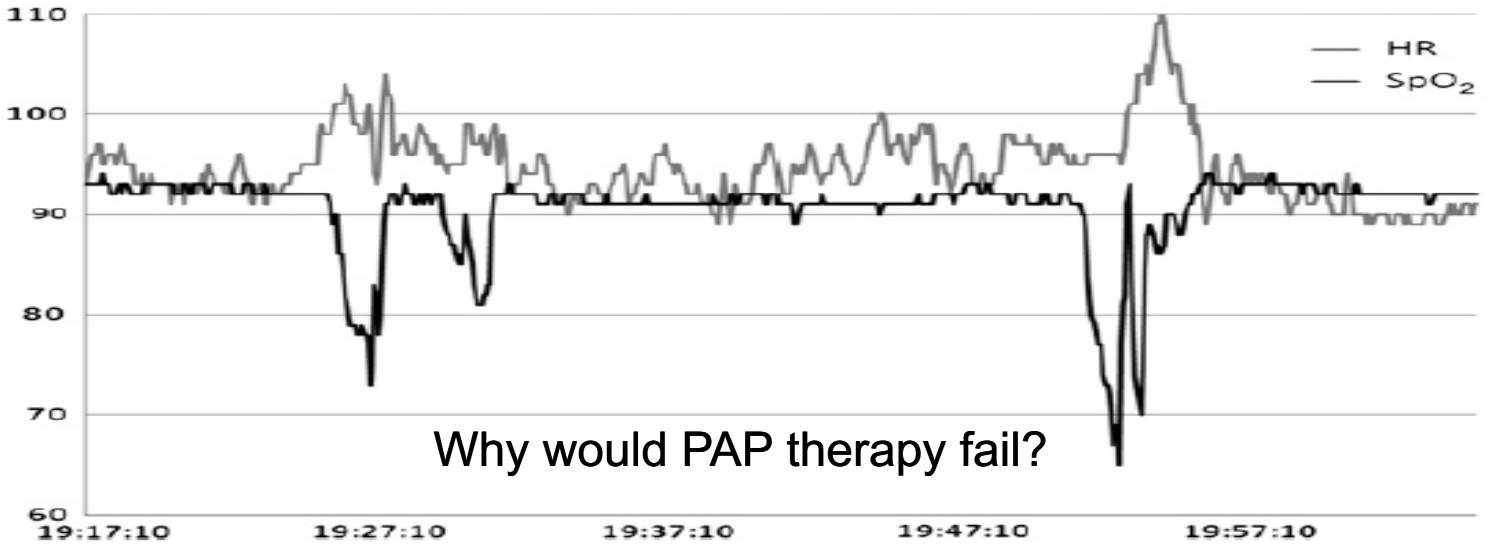
- 80% of patients with OSA are undiagnosed and untreated
- Pre-operative evaluation can be a time to increase patient awareness of potential importance of addressing sleep issues

Value added of Sleep Centers?

- Sleep Centers provide expertise to complement pre-operative evaluations
  - Sleep testing
  - Implications of sleep testing results
  - Consultations to understand complex breathing issue
  - Optimization of treatment prior to operative care


ANY
QUESTIONS
?

Missing Periods of Hypoxemia



- In this study post op gastric bypass patients were monitored with pulse oximetry.
- Even the use of CPAP therapy did not completely resolve desaturation events
- However, timing of PAP use was not known

- 8 patients – every one had at least on event not detected by routine monitoring
- T90 was 165 +/- 49 minutes
- Mean total number of events with SpO2<90% for > 30s: 62 +/- 16 events
- No patient experienced cardiopulmonary arrest/instability.

Gallagher et al JOURNAL OF SURGICAL RESEARCH: VOL. 159, NO. 2, APRIL 2010

OSA and post-operative complications in orthopaedic procedures

- 101 OSA and 101 controls matched on age, sex, operation type, side, surgeon, year, anesthesia.
- Group 1A: surgery 3 years prior to diagnosis of OSA
- Group 1B: confirmed OSA at time of surgery
- Complication or intervention
  - Complication - Reintubation, acute hypercapnia, episodic desaturations, acute cardiac ischemia or arrhythmia, delirium
  - Serious complication – ICU transfer, acute cardiac ischemia or arrhythmia, or urgent need for respiratory support.
  - Intervention - performed in response to the historically reported complication was defined as administration of a new treatment (such as supplemental oxygen) or implementation of additional monitoring (such as pulse oximetry).

Gupta R, et al. Mayo Clin Proceed 2001; 76:897.