



Indiana Patient Safety Center

of the Indiana Hospital Association



Ignore the Snore No More:
Obstructive Sleep Apnea &
STOP BANG

February 20, 2018

Indiana's Bold Aim

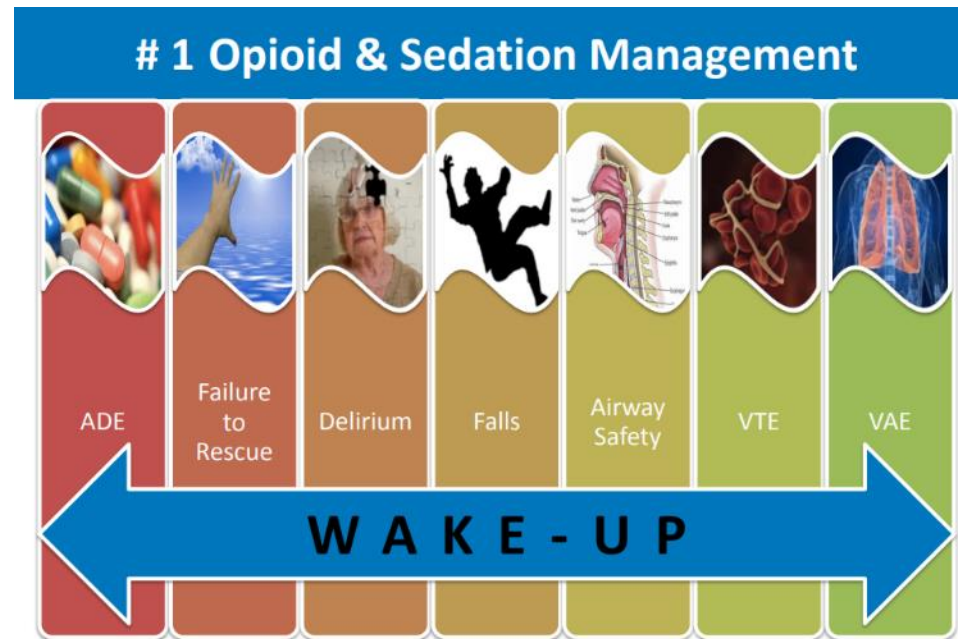


To make Indiana the safest
place to receive health care
in the United States...
if not the world

WAKE UP

WAKE UP promotes opioid and sedation management to reduce unnecessary sleepiness and sedation.

- Informational State Survey
- Educational Webinars
- Online Resources
 - Webinar recordings, resource sheet, webinar information sheet and pre-written WAKE UP social media are available here on the IHAconnect.org website:
<https://www.ihaconnect.org/patientsafety/initiatives/Pages/UP-Campaign.aspx>



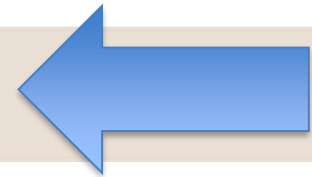
Wake Up Webinars

State of the State: State & National Opioid Stats and Emergency Department Point Program

- January 23, 3-4pm ET: Kaitlyn Boller, MHA & Krista Brucker, MD
- **Audience:** Emergency Dept personnel, LCSW, pharmacy, discharge planners, care coordinators, quality, educators

Obstructive Sleep Apnea & STOP BANG Assessment

- February 20, 3-4pm ET: Abhinav Singh, MD
- **Audience:** Medical Surgical Staff, Respiratory, Educators



Sedation Management and Opioid Practices to Minimize Harm

- March 6, 3-4pm ET: Opioid & Sedation Management Best Practices & ABCDEF Bundle
- Maryanne Whitney, Cynosure Health & Jennifer Hittle, IU Health Arnette
- **Audience:** ICU/Medical/Surgical/Procedural Staff & Managers, Pharmacy, Respiratory, Educators

Delirium Assessment, Prevention, & Treatment

- March 20, 3-4pm ET: Malaz Boustani, MD
- **Audience:** Quality, ICU/Medical/Surgical Staff & Managers, Pharmacy, Educators

Use the following to join each installment in the series:

Dial in number: (888) 390-3967

Participant link: <https://join.onstreammedia.com>

Wake-Up Resources



WAKE UP promotes opioid and sedation management with the goal of reducing unnecessary sleepiness and sedation.

Reducing unnecessary sleepiness and sedation allows for early mobilization, reduction of delirium, decreased risk of respiratory compromise and shortened length of stay. Monitoring reversal agents and maintaining a continued emphasis on minimal sedation can help prevent several harm events including ADE, FTR, delirium, falls, VAE, VTE and airway safety. Over-sedation is a common adverse drug event.



There are plenty of resources available at HRET-HIIN.org, including those listed below, to help your organization address these harm events and engage with the UP Campaign. (See backside of handout for delirium & sedation management resources.)

WAKE UP Resources	
Topic	Link
Introduction to the UP Campaign	https://www.youtube.com/watch?v=EtCQ8nQv4 or http://www.hret-hiin.org/Resources/ua_campaign/17/ua_campaign_presentation_generic.pdf
ADEs	http://www.hret-hiin.org/topics/adverse-drug-events.shtml
FTR	http://www.hret-hiin.org/resources/display/then-20-failure-to-rescue-proactively-identify-patients
Delirium	http://www.hret-hiin.org/topics/etrogenic-delirium.shtml
Falls	http://www.hret-hiin.org/topics/injuries-from-falls-immobility.shtml
VAE	http://www.hret-hiin.org/topics/ventilator-associated-event.shtml
VTE	http://www.hret-hiin.org/topics/venous-thromboembolism.shtml
Airway Safety	http://www.hret-hiin.org/topics/airway-safety.shtml

WAKE UP ↑ Reducing unnecessary sleepiness and sedation

W **WARN YOURSELF**
This is high risk.

A **ASSESS**
Use tools: STOP BANG, POSS, RASS, PA-PSA.

K **KNOW**
Your drugs, your patient.

E **ENGAGE**
Patients and families to set realistic pain expectations, use of non-sedating analgesics, risks of opioids.

U **UTILIZE**
Dose limits, layering limits, soft and hard stops.

P **PROTECT**
The patient...our ultimate job.



HRET-HIIN.ORG

- [Social Media](#)
- [Resource Sheet](#)
- [Webinar Information](#)
 - (click hyperlink above to access—also accessible on IHA website-Patient Safety Up Campaign)
- [Patient Safety Awareness Week Toolkit and](#)
 - [IPSCresources.com](#)—

2018 Patient Safety Awareness Week



March 11-17, 2018

Patient Safety Awareness
Week

Daily Topics

- Opioid Awareness
- **Wake Up: Know Your Meds**
- Get Up: Prevention of Falls
- Soap Up: Hand Hygiene
- Safe Antibiotic Usage
- Could it be Sepsis?
- Safe Infant Sleep Practices

Objectives

Following this webinar,

1. Identify signs, symptoms & pathophysiology of Obstructive Sleep Apnea (OSA)
2. Identify potential complications of OSA
3. Describe STOP BANG assessment for OSA
4. Describe Pre-acute, Acute Care & Post-Acute process improvements to reduce respiratory depression from OSA
5. Describe relationship of STOP BANG OSA Assessments in HIIN Wake-Up Campaign

Wake UP Overview

- *1. Is my patient awake enough to get up or is there a change in sedation level?*
- *At risk medicines:*
 - Opioids & Sedatives
 - Antihistamines/anticholinergics
 - Antipsychotics
 - Some antidepressants
 - Anti-emetics
 - Muscle relaxants
- *HIIN Script Up 1/30/18:*
 - <http://www.hret-hiin.org/resources/display/hret-hiin-script-up-optimizing-patient-medications-minimizing-adverse-events>

American Geriatric Society
Beers Criteria
Meds to watch in ≥ 65 yo

Beers Criteria Medications



Anticholinergics	Benadryl®, Phenergan®, Vistaril®
Antispasmodic agents	Donnatal®, Bentyl®, Librax®, Probanthine®
Sleep aids	Ambien®, Luminal®, Dalmane®, Nembutal®
Benzodiazepines	Ativan®, Valium®, Xanax®, Librium®, Klonopin®
NSAIDS	Advil®, Motrin®, Aleve®
Cardiac drugs	Digoxin > 0.125mg/day, Procardia®, Catapres®



Hospital Resources



@ ADDRESSING SUBSTANCE ABUSE




Designed to help staff provide support to all patients with special attention to substance abuse, this toolkit provides access to articles, policies, management techniques, assessment tools and more. Our [Addressing Substance Abuse Checklist](#) should be printed and shared.

Prescribing and Treatment

ED Prescribing Guidelines

-  [Indiana Guidelines for Opioid Prescribing in the Emergency Department](#)

Chronic Pain Rules

-  [Indiana Pain Management Prescribing Requirements Final Rule](#)
-  [Summary | Indiana Pain Management Prescribing Final Rule | ISMA](#)
-  [Comparison of CDC Guidelines to Indiana Prescribing Rule | ISMA](#)

Acute Pain Prescribing Guidelines

-  [Indiana Guidelines for Managing Acute Pain](#)

<https://www.ihconnect.org/member/resources/Pages/Checklist.aspx>

Wake Up Checklist



WAKE UP

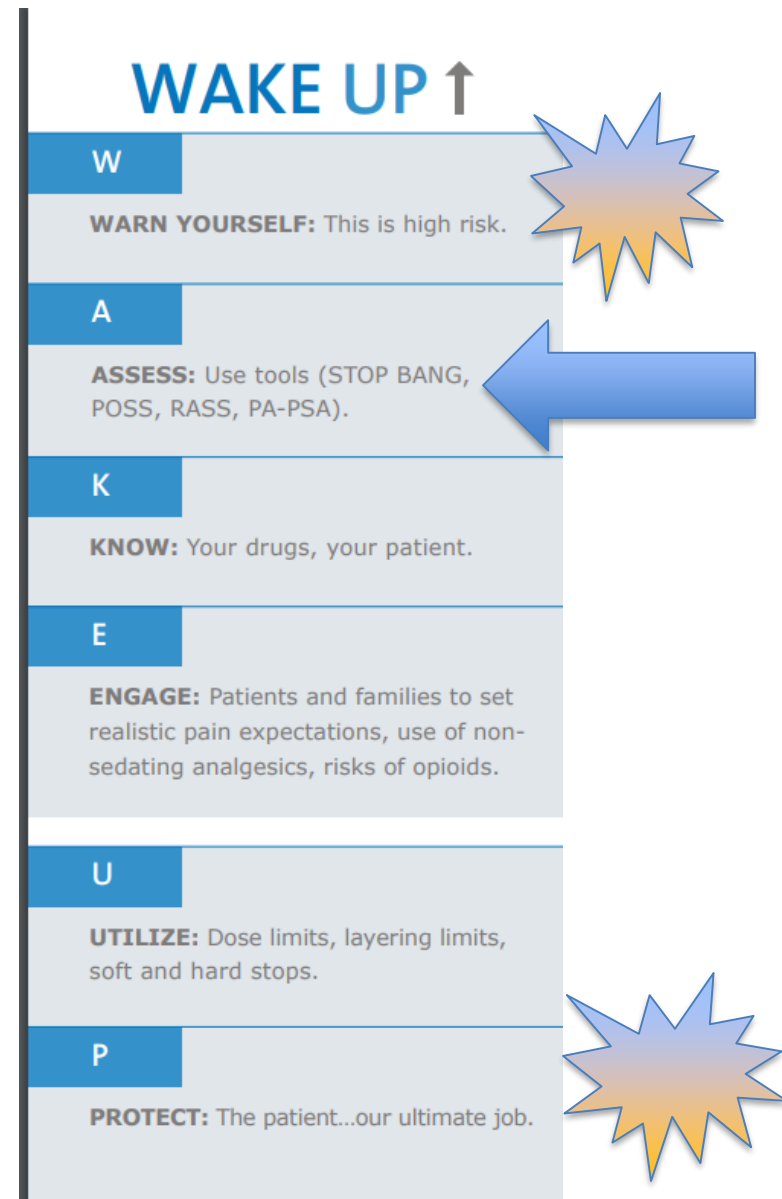
To reduce: ADE, airway safety events, delirium, falls, VAE and VTE

- Are the dangers of over sedation known?
- Is there a strong desire to keep sedation to a minimum?
- Have you selected evidence-based assessment tools such as:
 - STOP BANG (identifies patients at risk for obstructive sleep apnea)
 - PASERO OPIOID-INDUCED SEDATION SCALE (POSS)
 - RICHMOND AGITATION SEDATION SCALE (RASS)
- Have staff been educated on the use of the selected assessment tool(s) and performance expectations?
- Is there a place to document the results of the assessment(s)?
- Are assessment targets established for each patient?
- Are the results from assessment(s) used to modify sedation levels?
- Is there a protocol in place to adjust sedation levels?

<http://www.hret-hiin.org/engage/up-campaign.shtml>

Wake UP Processes

- *Patient & family awareness of dangers of opioids*
- *Use of non-opioid and non-pharmacologic pain management*
- *Safe order sets preventing high opioid doses to opioid naïve patients and prevent layering of benzos on opioids*
- *Routine nursing assessments that **pair pain & sedation tools** (e.g. Pasero Opioid Sedation Scale or Michigan Opioid Sedation Scale)*



Polling Question #1

- What is your primary role within your organization?
 - Infection Prevention
 - Nursing Professional
 - Laboratory Professional
 - Medical Staff
 - Environment Services / Housekeeping
 - Social Worker
 - Mental Health Professional

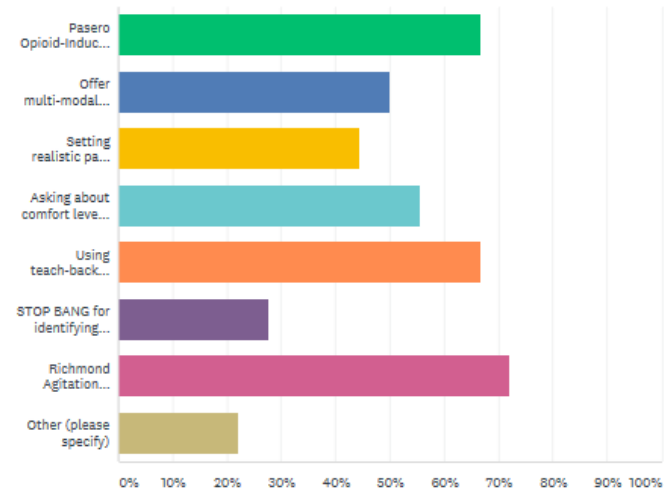
STOP BANG Use: 28%

ANSWER CHOICES	RESPONSES	
Pasero Opioid-Induced Sedation Scale (POSS) prior to an after opioid administration	66.67%	12
Offer multi-modal pain management - both pharmacologic and non-pharmacologic modalities	50.00%	9
Setting realistic pain management expectations prior to admission	44.44%	8
Asking about comfort level in addition to pain score	55.56%	10
Using teach-back methods with patients and families to enhance their knowledge and assist in setting pain management expectations	66.67%	12
STOP BANG for identifying Obstructive Sleep Apnea	27.78%	5
Richmond Agitation Sedation Scale (RASS)	72.22%	13
Other (please specify)	Responses	22.22% 4
Total Respondents: 18		

Q9

If yes, do you use or complete the following? (Check all that apply)

Answered: 18 Skipped: 2



Ignore the Snore... No More!!

A photograph of surgical instruments on a table. In the center, a blue cloth is folded, with several pairs of surgical scissors and forceps resting on it. To the left is a metal tray, and to the right is a metal bowl. The background is slightly blurred, showing what appears to be a hospital room.

SLEEP APNEA IN THE SURGICAL PATIENT

ABHINAV SINGH MD, MPH, DABIM-SM [SLEEP MEDICINE]

DEBBY HENTZ, RN, MSN, CS, CPHQ [QUALITY COORDINATOR]

JULI WHITE, MSN, APRN, FNP, NE-BC [SLEEP MEDICINE]

FEBRUARY 20, 2018 3.00 PM

What's the connexion ?

Spuyten - Duyvil Metro North
Bronx , 2013



Challenger
1986



FACES of SLEEP DISORDERS

AIR FRANCE 447
2009



Three Mile Island
1979



Road Map !

- ▶ **Introduction and Timeline.**
- ▶ Epidemiology. [Overall vs Surgical pts]
- ▶ Definition, Diagnosis and Treatment.
- ▶ Screening Tools.
- ▶ Risks of Untreated OSA in the perioperative Population.
- ▶ Perioperative Protocols & Challenges.
- ▶ Future Direction.

Why Sleep ?

(NREM)
75%

Stage 1
Stage 2
Stage 3
Stage 4

Body's rest, recovery &
Metabolic restoration,
regulation, Immunity

(REM)
25 %

Phasic eye
movements
Loss of muscle tone
EEG neutral

Active state of brain
→ learning , memory

Time Ticks Away

1837

- 1837 – Pickwick Papers, Charles Dickens
- 1918 – Osler Coins Pickwickian
- 1929 – EEG discovery

1950

- **1952 Discovery of REM sleep - University of Chicago**

1970

- 1970s - Obstructive Sleep Apnea
- Only Cure - **Tracheostomy**

1980

- 1981 – Invention of CPAP, Australia
- 1990-2000 – Development of Bi Level PAP, ENT Surgery ; UPPP

2000

- 1990-2000 – CPAP , Bi Level PAP, Oral Appliances,
- 2000-2010 – Auto PAP, Humidity, Adaptive Servo Ventilation, Masks

NOW

- CPAP , Bi-level PAP with adaptive breathing, Portable Ventilators, Povent, Hypoglossal Nerve stimulator, More interfaces

Road Map !

- ▶ Introduction and timeline
- ▶ **Epidemiology. (Overall vs Surgical pts)**
- ▶ Pathophysiology, Definition, Diagnosis & Rx
- ▶ Risks of Untreated OSA (Overall vs Surgical Pts)
- ▶ Screening tools
- ▶ Perioperative Protocols and Challenges.
- ▶ Future Direction

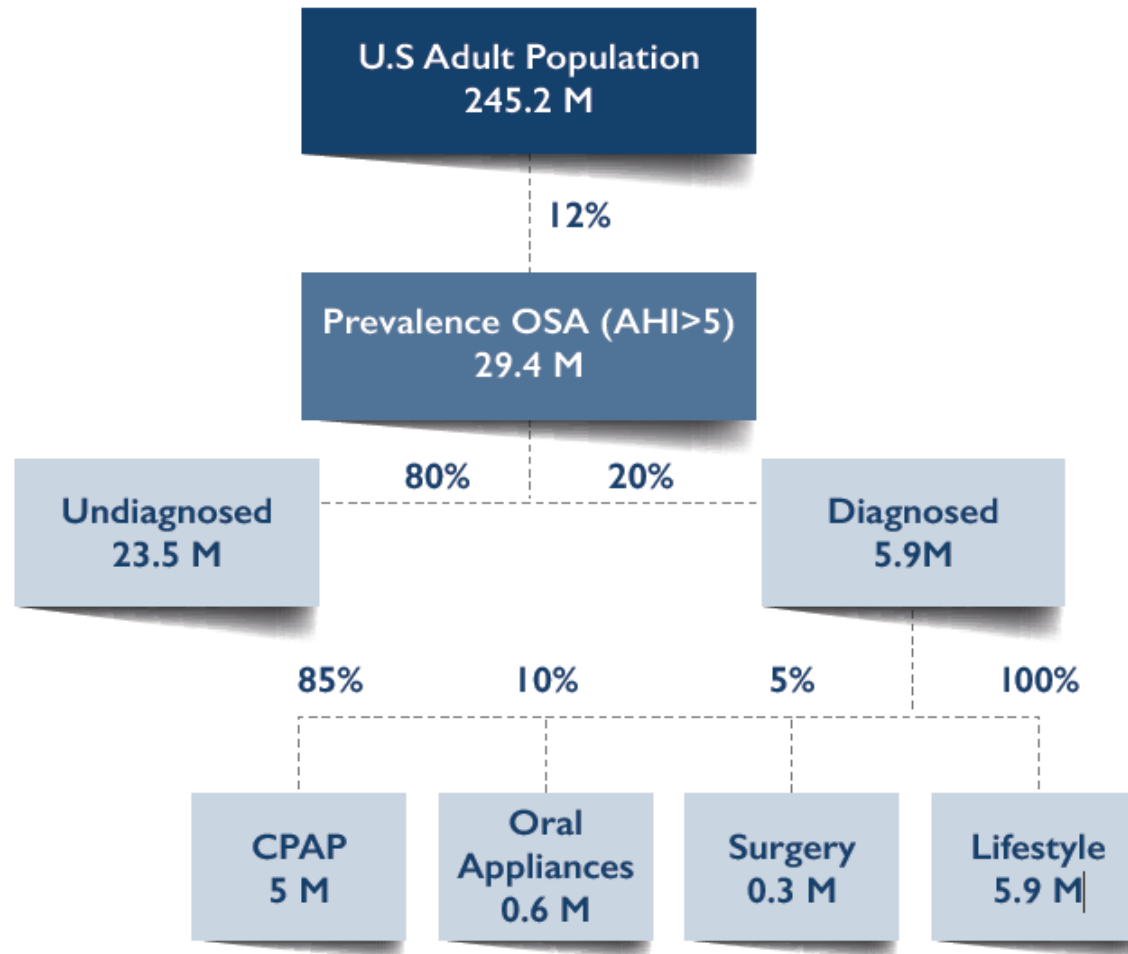
Epidemiology Of OSA



- ▶ Snoring → 40% of men & 20% of women. ? Habitual Snoring
- ▶ ~ **9% of the adult population has OSA.** [*NEJM 1993; 328: 1230-35 , WI Cohort*]
- ▶ Recent studies ~ OSA rates as high as **26 % of adults between 30-70 yrs** of the U.S. population. **2013.**
- ▶ **Untreated OSA Cost** : Medical, Mental Health, Work Productivity loss, Motor Vehicle Accidents > **\$ 150billion / yr.**

Frost and Sullivan 2014

Epidemiology



Source: Primary research with experts, U.S. Census (2014), Peppard "Increased Prevalence of Sleep-disordered Breathing in Adults." American Journal of Epidemiology (2013)

OSA - Surgical Population Prevalence

- ▶ **General Surgery** (~ 25 %) *Chung et al J Clin Anesth 2007;19:130-4.*
- ▶ **Bariatric Surgery** (~70 %) *Frey et al Obes Surg 2004;14:23-6*
- ▶ **Elective Surgery** (41 %) *Doghramji et al. Arch Otolaryngol Head Neck Surg 2010;136:1020-4.*
- ▶ **Epilepsy Surgery** (33 %) *Malow et al Neurology 2000;55:1002-7.*

Bottom Line – Surgical population prevalence HIGHER !

80 % pts unaware prior to undergoing surgery

Road Map !

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Patho-Fizz !



Normal Breathing

- Airway is open
- Air flows freely to lungs

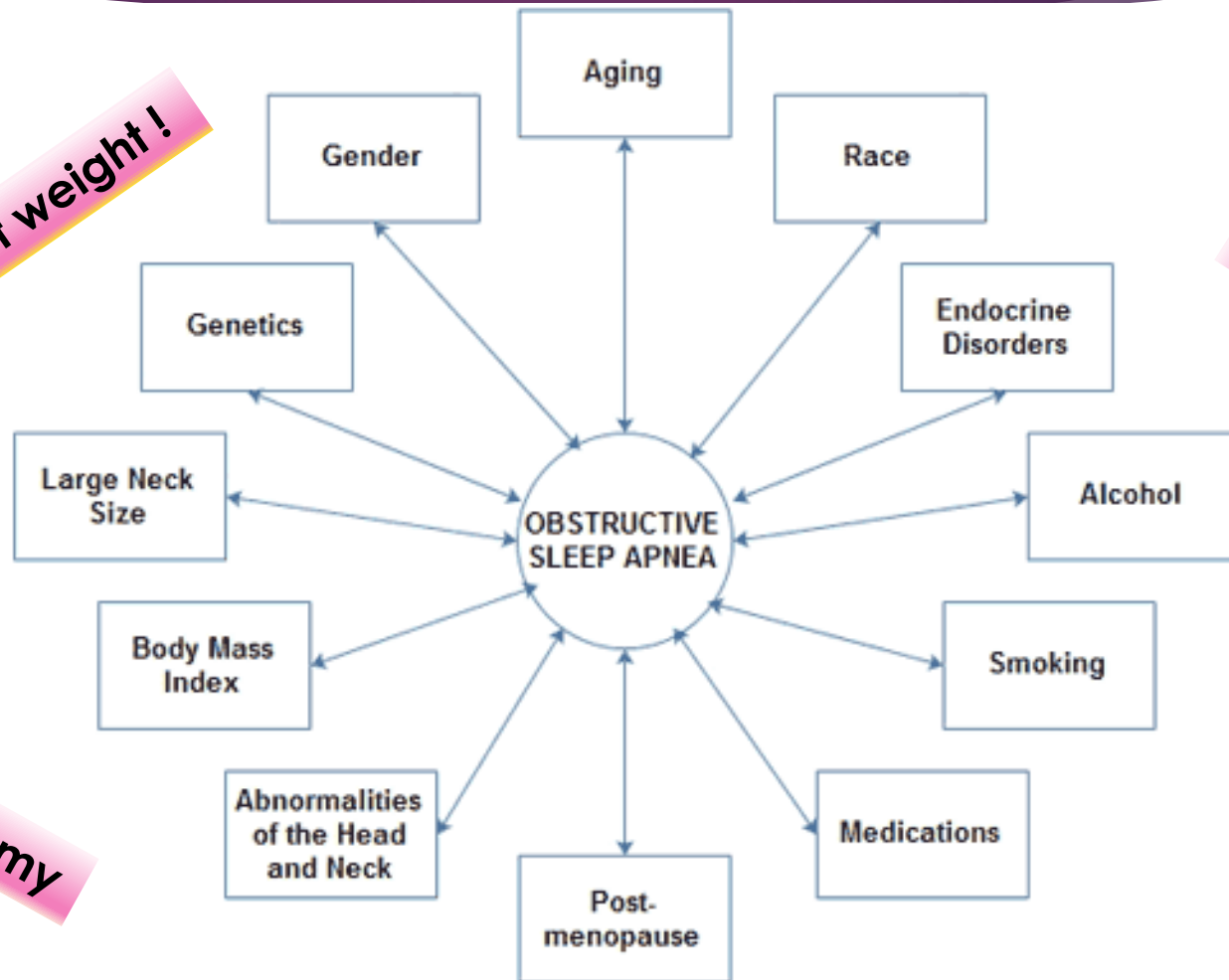


Obstructive Sleep Apnea

- Airway collapses
- Blocked air flow to lungs



OSA – playing the odds !

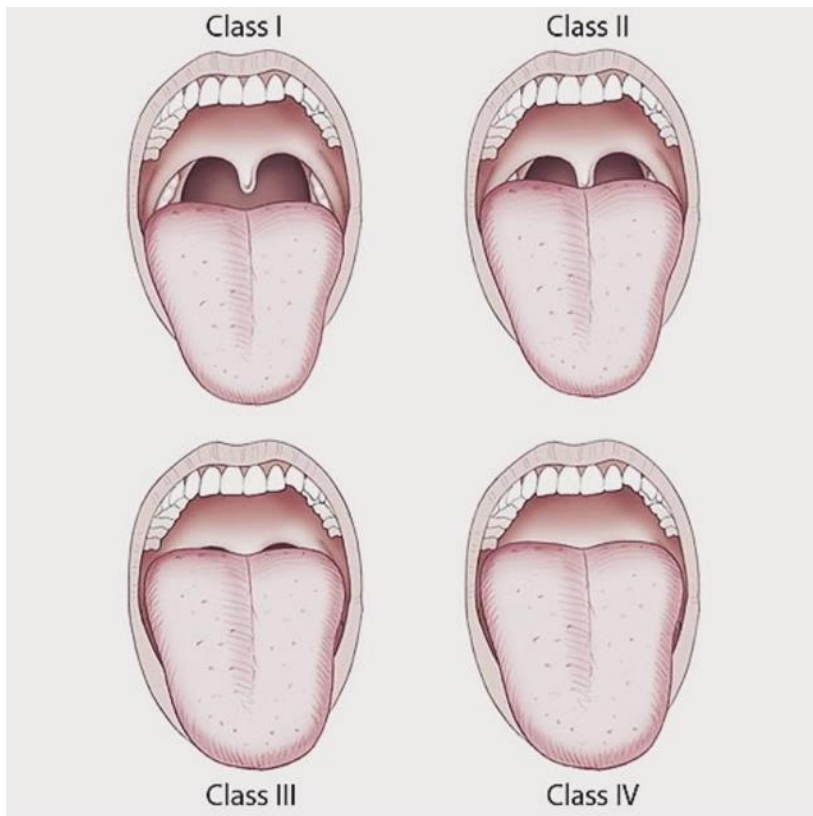


Not only about weight !

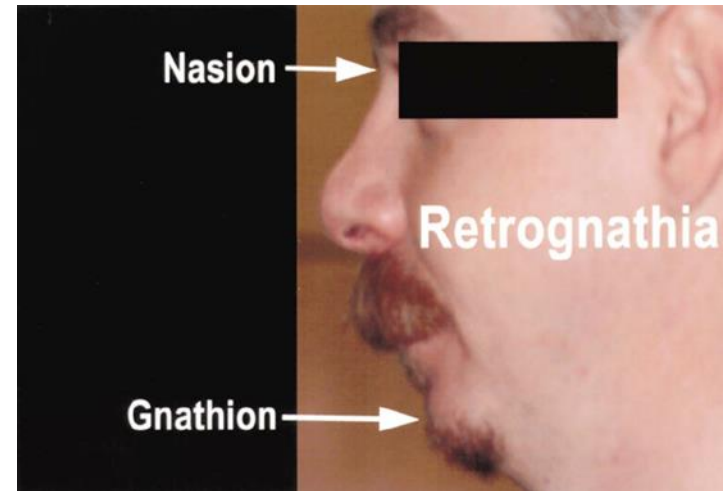
Genetics

Anatomy

Visual Cues



Mallampati Score



Why do men have more OSA ?

Pear vs Apple

Diagnosis

Polysomnography – In lab



Home Sleep Apnea Test



Definition

COUNTING APNEAS & HYPOPNEAS / Hour of Sleep

Snoring – Posterior airway vibration (60-70 db)

Whisper 20 db , Conversation 30 db, Vacuum Cleaner 70db

Mild OSA →	AHI = 5-15 /hr. of Sleep.
Moderate OSA→	AHI = 15-30 /hr. of Sleep.
Severe OSA →	AHI = 30/hr of Sleep.

RDI > 20 /hr > 40/hr (Apnea + Hypopnea + RERA)

REI Respiratory Event Index

Treatments

Bypass Surgery, Stents, Pacemakers

Mild – Moderate OSA

- ▶ CPAP
- ▶ Auto – **PAP**
- ▶ Bi level – **PAP**
- ▶ Oral Appliance
- ▶ Postural therapy
- ▶ Weight loss

Moderate – Severe OSA

- ▶ **CPAP** (Gold standard)
- ▶ Auto - **PAP**
- ▶ Bi Level **PAP**
- ▶ Surgical (ENT, UPPP, DNS)
- ▶ Surgical (Mandibular advancement)
- ▶ Hypoglossal nerve stimulator
- ▶ Tracheostomy (rarely done)

PAP therapy - Mainstay

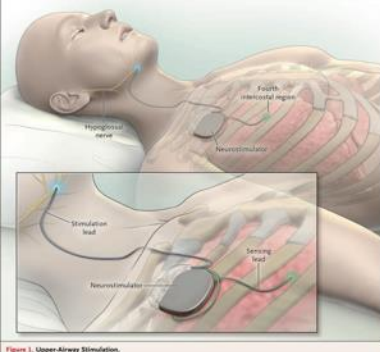
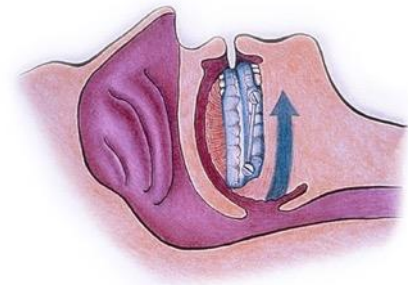
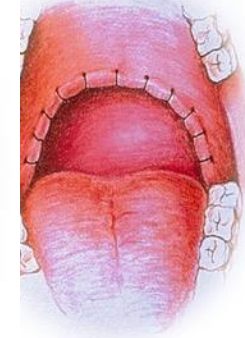
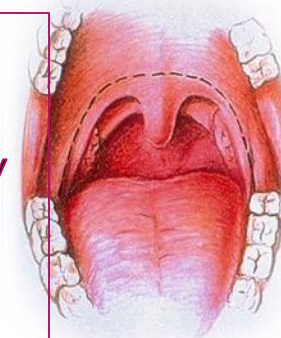


Figure 1. Upper-Airway Stimulation.

Treatment of OSA



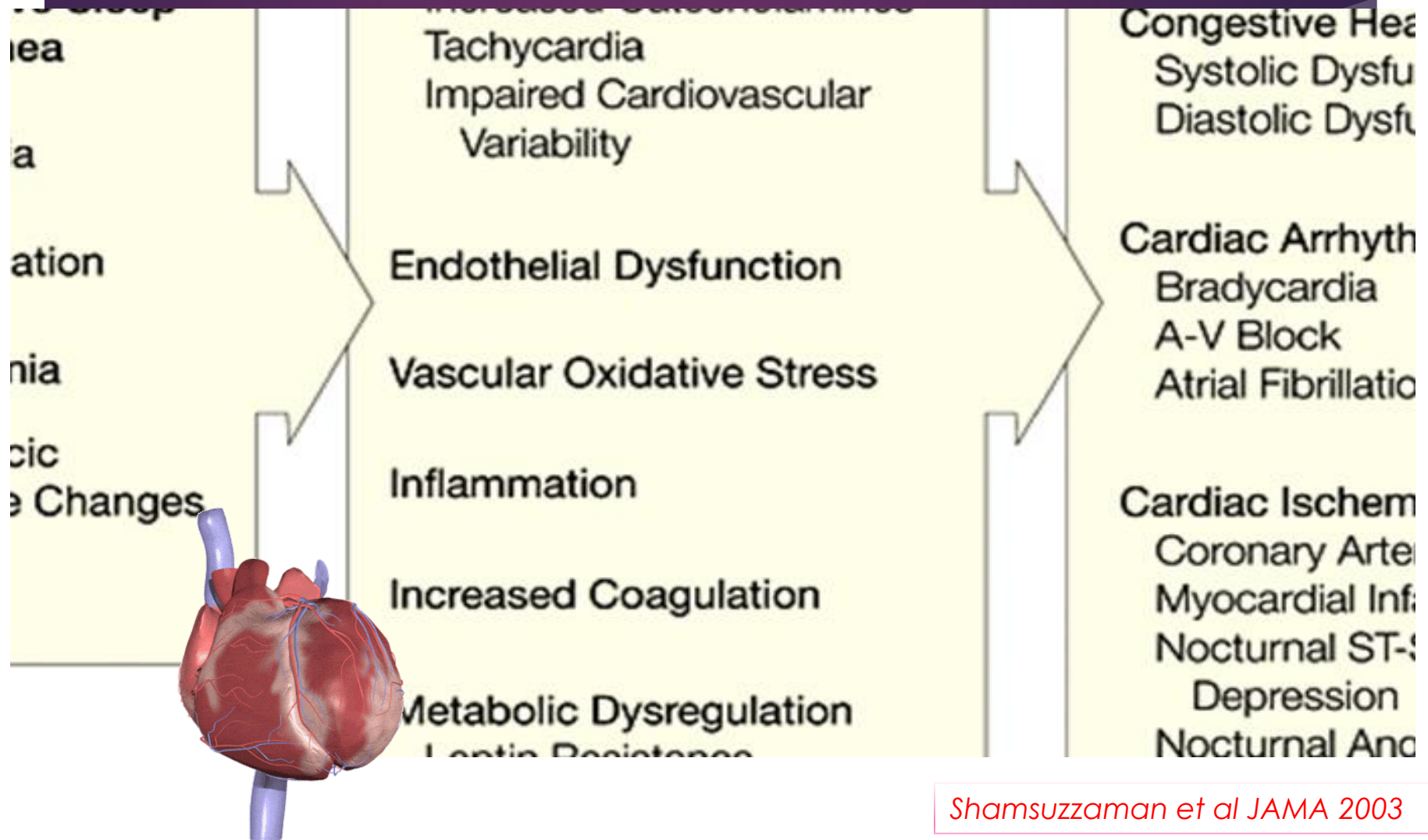
- 100 interfaces
- Downloadable
- Auto PAP /Humidity
- 35 yrs since invention



Road Map !

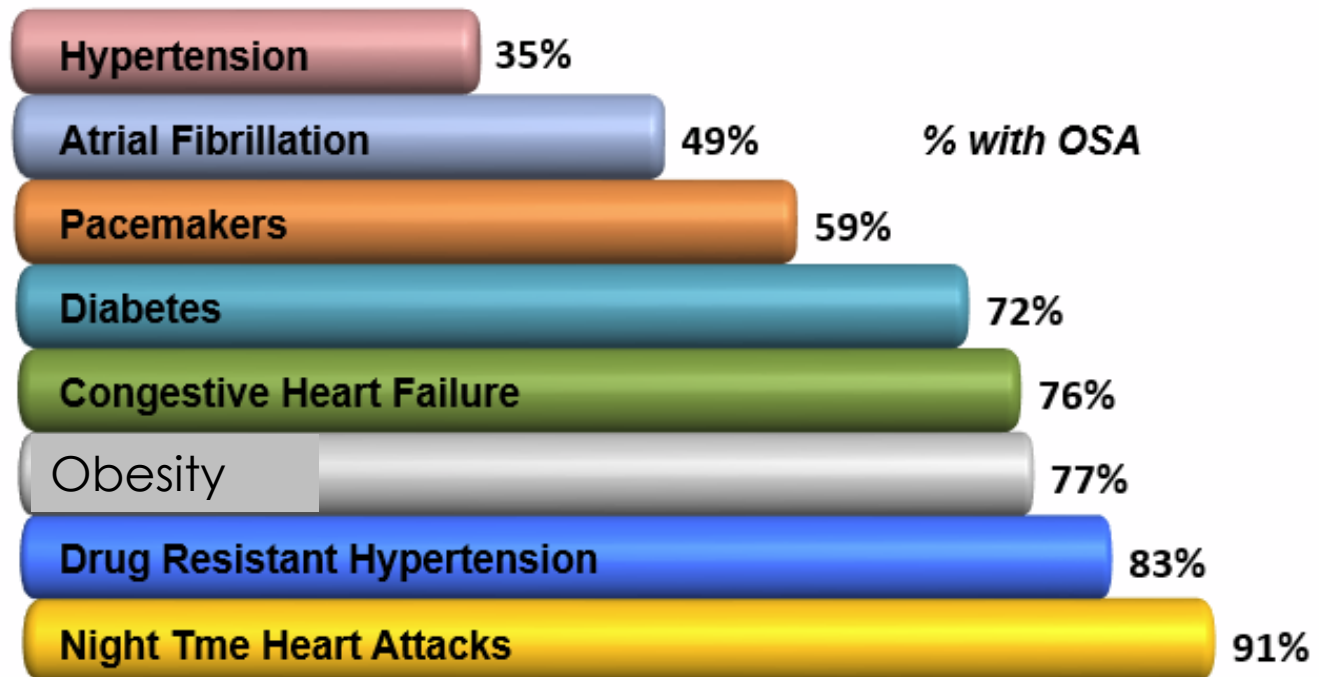
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- ▶ Future Direction.

Untreated OSA- more than meets the eye



Bad Company !!

Diseases Associated with OSA



- 85% or 30-40 million patients are undiagnosed.
- Comorbidities make treatment a must.

Surgical Pt. + Untreated OSA = *Perfect Storm*

- ❧ **Perioperative medications** (eg, **sedatives**, general anesthetic agents, opioids, neuromuscular blocking agents) may
 - ❧ **Reduce** upper airway dilator tone
 - ❧ Inhibit **protective** airway reflexes
 - ❧ **Inhibit** Central ventilatory drive, & **blunt protective arousal** mechanisms
 - ❧ **Inhibit** peripheral chemo-responsiveness to hypoxic & hypercapnic stimuli
 - ❧ Exacerbate repetitive upper airway collapse in **pts with OSA**.



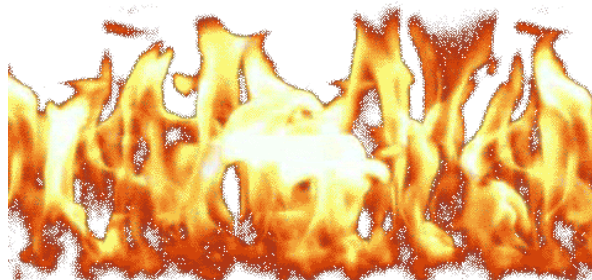
Nightmare continued..

- ▶ Surgical patients are at **risk for fluid and salt retention.** (Rostral fluid shifts legs to neck) (Peri Op IVF s)

- ▶ **Supine posture**



- ▶ Perioperative discontinuation of continuous positive airway pressure (CPAP) - **More Fuel to the fire !**



REM Sleep Rebound

- ▶ **NORMAL REM physiology** - 25 % of the night, increased instability of heart rate, respiration, and blood pressure
 - ▶ In OSA pts → REM related hypoxic episodes 2 - 3 times increased
 - ▶ Pharyngeal tone is further diminished; with hypoxic sympathetic tone increased
- ▶ Surgical trauma **releases inflammatory cytokines**
 - ▶ (TNF- α), interleukin 1 (IL-1), & IL-6. = REM SUPPRESSION
- ▶ REM sleep frequently absent on 1-3 post-op days, then **REM rebound occurs.**
- ▶ REM sleep is also associated with **increased sympathetic discharge** leading to tachycardia, hemodynamic instability, and myocardial ischemia.



Chest 2006;129:198-205

Post – Op Morbidity

- ▶ Majority of unexpected & unexplained postoperative deaths occur **at night** and within **7 days of surgery**.
- ▶ In MI survivors, OSA found in **36%** vs **3.8%** of matched controls
- ▶ After correcting for known risk factors, OSA with AHI>5.3 was independently predictive of MI with an odds ratio of 23.3 (p<0.001)

Chest 2006;129:198-205

*Tough ?Unethical to do a study ;Sham CPAP group to prove increased morbidity
Difficult to replicate perioperative scenario in Animal models. Unique OSA*

Author	Type of Study	# of Patients	Dx of OSA	Type of Surgeries	Complications	Results
Gupta et al.98 2001	Case control study	101 Pts. with OSA & 101 matched controls	PSG	Orthopedic (hip or knee replacement)	Reintubation, hypoxemia, acute hypercapnia, MI, arrhythmia, delirium, & ICU transfer	Pts with OSA had higher rate of postoperative complications (39% vs 18%). These pts also had increased hospital length of stay.
Auckley et al.105 2003	Historical cohort study	81 pts with completed Berlin Q	Berlin Q	Elective surgery (type of surgeries is not included in the abstract)	Hypoxemia, hypercapnia, reintubation, atelectasis, pneumonia, arrhythmia, thromboembolism	Pts. with high-risk of sleep apnea based on the Berlin Q had a higher rate of postoperative complications (20% vs 4.5%).
Kaw et al.100 2006	Case control study	37 pts with OSA & 185 matched controls	PSG	Cardiac	Encephalopathy, postoperative infections, and ICU length of stay	Pts. with OSA had higher rate of encephalopathy, postoperative infections (mediastinitis), & increased ICU length of stay.
Hwang et al.102 2008	Historical cohort study	172 Pts underwent NOSS	Home NOSS	Abdominal, ENT, Thoracic, Vascular, Gyn, Neurosurgical, Urologic, Cardiothoracic, and Orthopedic	Arrhythmia, hypoxemia, atelectasis, GI bleed, pneumonia, PE,	Pts with ODI 4% \geq 5/h had a higher rate of postop complications than those with ODI4% < 5/h (15.3% vs 2.7%).

Liao et al.99 2009	Retrospective matched cohort study	240 Pts with OSA & 240 matched controls	(ICD-9) codes	Cardiac, ENT, Orthopedic, Spine, Urologic, General, Gyn, & Plastic	Hypoxemia, pulmonary edema, bronchospasm, arrhythmia, confusion	Pts with OSA had a higher incidence of postop complications (48% vs 36%)
Vasu et al.16 2010	Historical cohort study	135 pts. completed STOP BANG Q	STOP BANG Q	Orthopedic Abdominal Head & Neck, ENT, Gyn, Vascular, Cardiothoracic	Hypoxemia, pneumonia, PE, atelectasis, hypotension, A-Fib	Pts with high-risk of OSA based on STOP BANG Q had a higher rate of postop complications (19.6% vs 1.3%) and hospital length of stay.
Memtsoudis et al.101 2011	Case control study	58358 orthopedic pts with OSA & 45547 G Surg pts with OSA were matched for controls in 1:3 manner	(ICD-9) codes	Orthopedic & G surgery	Aspiration pneumonia, pulmonary embolism, need for intubation and mechanical ventilation, ARDS	Patients with OSA undergoing orthopedic & general surgeries were at a higher risk of aspiration pneumonia, ARDS, and the need for intubation & mechanical ventilation.
Kaw et al.103 2011	Cohort study	471 pts who underwent non-cardiac surgery within 3 yrs of PSG	Pts with an (AHI) \geq 5/h = OSA, and <5/hr Controls	Non-cardiac surgery	A Fib, respiratory failure, hypoxemia, delirium, transfer to ICU, CHF, MI, hospital length of stay	Pts with OSA had a higher rate of postop hypoxemia (12.4% vs 2.1%), transfer to ICU (6.7% vs 1.6%), any complication (14.2% vs 2.6%), & hospital length of stay.

Respiratory Complications

- ▶ Profound oxyhemoglobin desaturation
- ▶ Aspiration pneumonia & ARDS
- ▶ Post-obstructive pulmonary edema (from breathing against an obstructed upper airway)
- ▶ Emergent non Invasive Ventilation. Bi Level PAP. ICU tx
- ▶ Acute respiratory Failure, Arrest & Re intubation



Cardiovascular Complications

- ▶ Large BP fluctuations.
- ▶ Myocardial ischemia.
- ▶ Cardiac arrhythmias. (Watch me fib watch me ne ne)
- ▶ Increased Length of Stay.
- ▶ Sudden Cardiac death.
- ▶ Post op delirium. (X 6 fold in Cardiac Surgeries)
- ▶ Elective Hips & Knee Sx – X 2 fold hospital death.



Road Map !

- ▶ Introduction and timeline.
- ▶ Epidemiology. [Overall vs Surgical pts]
- ▶ Pathophysiology, Definition , Diagnosis & Rx.
- ▶ Risks of Untreated OSA (Overall vs Surgical Pts)
- ▶ **Screening tools.**
- ▶ Perioperative Protocols and Challenges.
- ▶ Take Home points & Future Direction.



Screening Tools

- ▶ STOP BANG (8 point simple questionnaire)
- ▶ PSG. (polysomnography ie. Sleep study)
- ▶ Home Sleep Apnea Testing. (Portable, at home)
- ▶ BERLIN Questionnaire
- ▶ ASA Check list

- ▶ Established OSA – Compliant

- ▶ Established OSA - Non Compliant



STOP - BANG

STOP		
Do you SNORE loudly (louder than talking or loud enough to be heard through closed doors)?	Yes	No
Do you often feel TIRED , fatigued, or sleepy during daytime?	Yes	No
Has anyone OBSERVED you stop breathing during your sleep?	Yes	No
Do you have or are you being treated for high blood PRESSURE ?	Yes	No
BANG		
BMI more than 35kg/m ² ?	Yes	No
AGE over 50 years old?	Yes	No
NECK circumference > 16 inches (40cm)?	Yes	No
GENDER : Male?	Yes	No

High risk of OSA: Yes 5 - 8

Intermediate risk of OSA: Yes 3 - 4

Low risk of OSA: Yes 0 - 2

STOP BANG - Performance

- ▶ + STOP-BANG score ≥ 3 (any 3 positive items),
 - ▶ **Sensitivity** for identifying moderate-severe OSA was **87%**
 - ▶ **Specificity** for identifying moderate-severe OSA was **31%**
- ▶ Ideal screening tool with high sensitivity.
- ▶ **Specificity:** (for identifying moderate-severe OSA)
 - ▶ **2 positive items from the 4 STOP questions + BMI > 35 kg/m², = 85%,**
 - ▶ 2 positive items from the 4 STOP questions + male gender, = **77%,**
 - ▶ 2 positive items from the 4 STOP questions + neck circumference > 40 cm = **79%,**
- ▶ **What about NOSS** ? oxygen desaturation index by nocturnal oximetry had a sensitivity of 75-95% and a specificity of 67-97% as compared to AHI. (Apnea Hypopnea Index) NOSS → No CPAP !





Screening

- ▶ Who to screen ? (Every one presenting for a surgery or being discharged from the hospital)
- ▶ When to screen ?
 - ▶ At the initial appointment using **STOP BANG**.
 - ▶ If 3-5 – heightened Vigilance, monitoring, Empiric PAP therapy.
 - ▶ If 6-8 - Consider deferring Sx - OSA diagnostics & Rx

American Society of Anesthesiologists Checklist

High risk of OSA if 2 or more categories scored as positive.
Low risk of OSA if 1 or no categories scored as positive

Category 1: Predisposing physical characteristics	Category result
<ul style="list-style-type: none">a. BMI \geq 35b. Neck circumference > 45 cm/17 cm (men) or 40 cm/16 (women)c. Craniofacial abnormalities affecting the airwayd. Anatomical nasal obstructione. Tonsils nearly touching or touching the midline	If 2 or more items in this category are present, then this category is positive
Category 2: History of apparent airway obstruction during sleep	Category result
<ul style="list-style-type: none">a. Snoring loud enough to be heard through closed doorsb. Frequent snoringc. Observed pauses in breathing during sleepd. Awakens from sleep with a choking sensatione. Frequent arousals from sleep	If 2 or more items are present (or 1 item if patient lives alone), then this category is positive
Category 3: Somnolence	Category result
<ul style="list-style-type: none">a. Frequent somnolence or fatigue despite adequate "sleep"b. Falls asleep easily in a nonstimulating environment (eg, watching TV, reading, riding in or driving a car) despite adequate sleepc. Parent or teacher comments that child appears sleepy during the day, is easily distracted, is overly aggressive or has difficulty concentratingd. Child often difficult to arouse at usual awakening time	If 1 or more items in this category are present, then this category is positive

Road Map !

- ▶ Introduction and timeline
- ▶ Epidemiology (Overall vs Surgical pts)
- ▶ Pathophysiology, Definition , Diagnosis & Rx
- ▶ Risks of Untreated OSA (Overall vs Surgical Pts)
- ▶ Screening tools
- ▶ **Perioperative Protocols and Challenges**
- ▶ Take Home points & Future Direction

Peri-Operative Day -1 to Day 0

- ▶ Anticipate the difficult airway.
- ▶ Most pts may be obese & appropriate care should be taken to prevent desaturation.
- ▶ Short-acting anesthetics, less soluble inhalational agents, titrate opioids, & minimize sedation.
- ▶ Awake extubation may be needed ;(30° to 45°)head-up position or lateral
- ▶ Modifications of anesthetic technique , e.g. avoidance of general anesthesia in favor of a central neuraxial or a peripheral nerve block.

Post Operative Day 2 ..3...4

▶ **Immediate Post OP – PACU**

▶ HOB, Extubate to PAP, Minimize sedatives, multitmodal analgesia

▶ **PACU → Home** (counsel, PAP compliance, testing, minimize narcotics & muscle relaxers)

▶ **PACU → Ward**(End-tidals, O2, HOB elevation , **Witnessed apneas**, Empiric PAP)

▶ **Ward → Home** (counsel, PAP compliance, Encourage testing, minimize narcotics & muscle relaxers)

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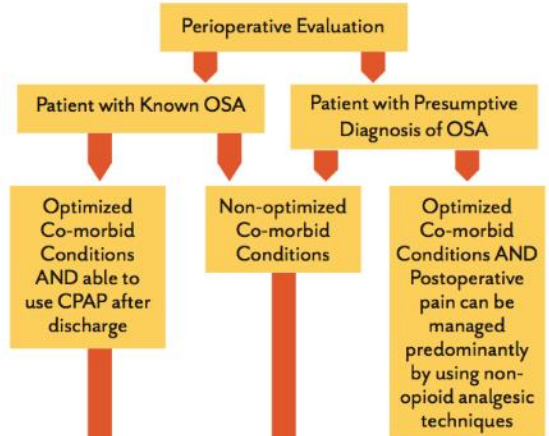
Carmel



Mooresville

PERI-OPERATIVE TOOL KIT

Preoperative Considerations



Intraoperative Considerations



Postoperative Considerations

Exercise caution with OSA patients who develop prolonged and frequent severe respiratory events in the postoperative period.



Pre-operatively

- All patients entering through the preadmission testing will be assessed for OSA
- All patients with a STOP BANG score ≥ 3 will have an OSA sticker placed on chart
- STOP BANG score of 3 or 4/"Suspected OSA" will proceed with surgery and have an appointment for a sleep consultation post-operatively
- STOP BANG score ≥ 5 will be scheduled for an internal medicine consult for risk identification, stratification and potential sleep study
- STOP BANG score ≥ 5 with one of the following: BMI ≥ 50 , Difficulty airway/mallampati 3 or 4, history of difficult or slow to wake up after surgery, or one comorbidity such as:
 - arrhythmias
 - cerebrovascular disease
 - CHF
 - metabolic syndrome
- Will cause delay in surgery for additional workup and optimization/sleep study for all elective surgeries
- STOPBANG score 7 or 8 elective surgery will be canceled until additional workup/sleep study is completed
- Patient and family education provided

Intra-Operative Phase

- Consider non-opioid multimodal analgesia approach (local/regional/ analgesia, non-steroidal anti-inflammatory drugs and IV acetaminophen)
- Local or regional anesthesia is preferred and should be used whenever possible
- If moderate sedation is required, continuous capnography should be used during the procedure
- If general anesthesia is planned, providers should preferably use a technique that allows early emergence
- If opioids are required, use short-acting ones when possible
- CPAP is advised during procedural sedation

PACU Phase

- In addition to the routine PACU discharge criteria of the Aldrete score, Patients with a suspected/ diagnosis of OSA are monitored for:
 - Apnea ≥ 10 seconds
 - Desaturation on 4 liters on O_2
 - Inability to wean from nasal cannula O_2
 - Bradypnea ≤ 8 respiratory rate/minute
 - Pain sedation score mismatch
- Place patients in a semi-upright position
- Observe patients for oxygen desaturation and /or apneic episodes patients to have EtCO₂ monitoring

PACU Phase (continued)

- If oxygen desaturation occurs while on supplemental oxygen therapy, use non-invasive ventilation, i.e., CPAP or Bi Level PAP (If patients use CPAP at home, they should use it in the PACU while drowsy)
- Minimize systemic opioids, if possible. If necessary, titrate to the lowest dose that works for the long acting opioids (e.g. morphine and hydromorphone)
- Contact anesthesiologist if problems are identified and continue

Outpatient Surgery (ASD) Recovery

- Place patients in a semi-upright position
- Observe patients for oxygen desaturation and /or apneic episodes. Patients to have EtCO₂ monitoring
- If oxygen desaturation occurs, will use CPAP or Bi Level PAP
- Minimize/limit systemic opioids, if possible
- Patients who are noted to easily obstruct their airway when drowsy should receive extra vigilance with longer Phase II recovery time, as needed
- Use CPAP while sleeping even during the daytime
- Reinforce patient and family education
- Contact anesthesiologist if problems are new or reoccur

Outpatient Surgery (ASD) to Home

- Follow-up phone call
 - To include CPAP compliance while sleeping day or night at the time of discharge follow-up phone call
 - Patients encouraged to follow-up with their primary care physician
 - Reinforce follow-up sleep consultation and patient/family education during hospitalization and at discharge

Inpatient Nursing Unit to Home

- Contact internal medicine physician if problems are new or reoccur
- PCA and monitoring End Tidal CO₂
- Place patients in a semi-upright position, lateral and/or prone. Avoid flat bed and supine position
- Observe patients for oxygen desaturation and /or apneic episodes
- If oxygen desaturation occurs while on supplemental oxygen therapy, use non-invasive ventilation, i.e., CPAP or Bi Level PAP (If patient uses CPAP at home patient should use on nursing unit) If new order and unstable may require additional monitoring in PCU or AICU
- Minimize/limit systemic opioids, if possible
- Patients who are noted to easily obstruct their airway when drowsy should receive extra vigilance/monitoring
- Use CPAP while sleeping, even during the daytime
- Rapid Response Team evaluation and assessment when needed
- Reinforce follow-up sleep consultation and patient/family education during hospitalization and at discharge

Challenges & Opportunities

Sleep testing & follow up delays,

PAP device delivery delays

Pt education and awareness

PAP acclimation / Compliance

Insurance Authorizations

Sleep Medicine Providers

Easier Screening.

Hospital based DME

Experienced Personnel





T- Rex ! (Take Home Reccs)

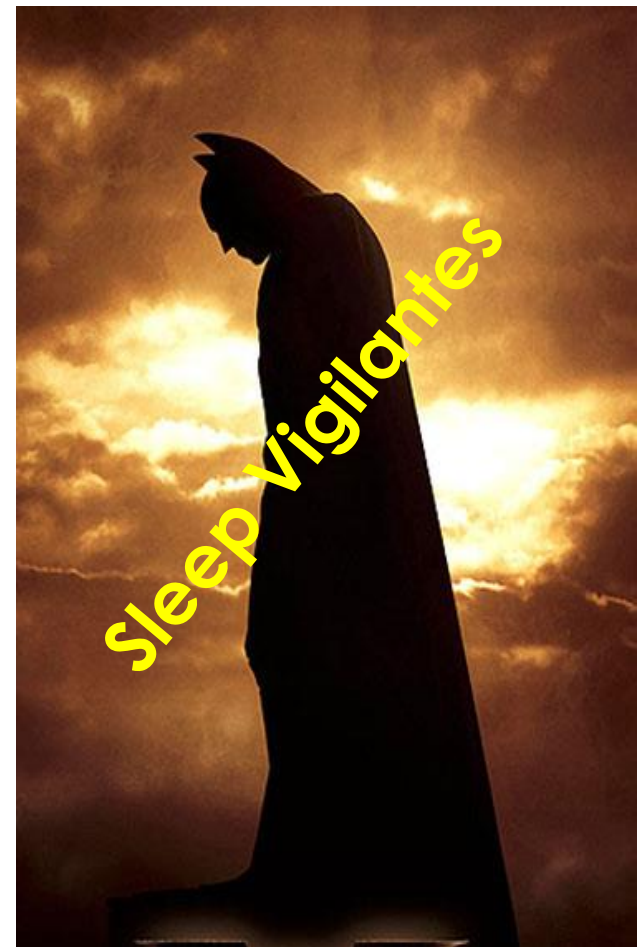
- ▶ OSA **prevalent** (25 %) in Surgical Population as obesity grows.
- ▶ Frequently **not identified before surgery**.
- ▶ Identify, treat & reduce perioperative risk. Simple screening tools
- ▶ If pt. remains untreated, document additional risk & notify family.
- ▶ Minimize opioids / muscle relaxers , alternative analgesic modalities.
- ▶ Non Supine positions. Increased vigilance and Monitoring.
- ▶ **360 degrees of awareness. (All involved)**



A stitch in time saves nine as well as ninety nine ! (both short & long term gains)

Team Effort ! – 360 Degrees

- ▶ Surgical Colleagues.
- ▶ Anesthesia Team.
- ▶ Educating Patients and Families
- ▶ PACU / Nursing Team.
- ▶ Sleep Medicine Team.
- ▶ Pulmonary Critical Care Team.
- ▶ Respiratory Therapy Team
- ▶ Home Medical Equipment Companies
- ▶ Hospital Administration.





- ▶ **Risk Stratify. Screen Early**
- ▶ Sleepy vs Not sleepy Phenotypes ?
- ▶ Could we do salivary genetic metabolic tests to choose & dose medications better ?
- ▶ Programs can be implemented cost effectively to improve patient safety & **surgical outcomes** as well as improve **Long term pt outcomes**
- ▶ Death & Near Miss Registry.
- ▶ Sleep Medicine Telemedicine Service.
- ▶ IN SLEEP WE TRUST !

Thank you for your Wakefulness

Q & A

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Fix the Snore , improve yo \$core !

Elective Surgery delayed surgery survived !

Ignore the snore no more !

Avoid the Perfect SnORM !

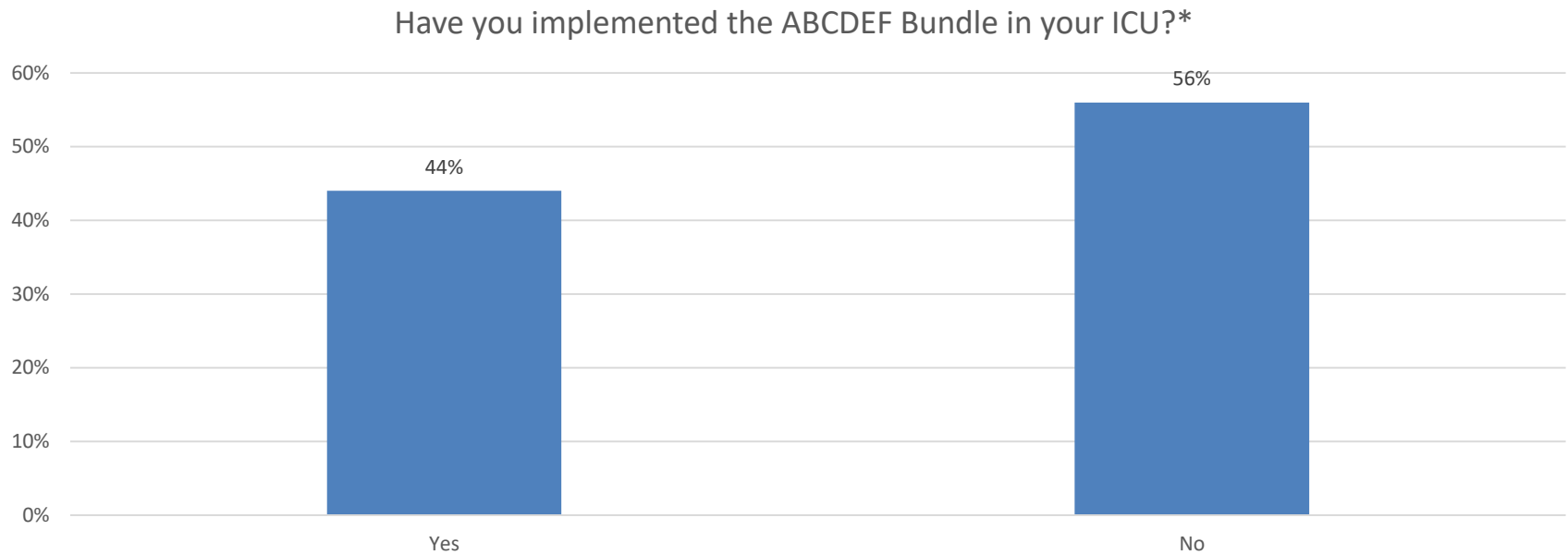


Objectives

Following this webinar,

1. Identify signs, symptoms & pathophysiology of Obstructive Sleep Apnea (OSA)
2. Identify potential complications of OSA
3. Describe STOP BANG assessment for OSA
4. Describe Pre-acute, Acute Care & Post-Acute process improvements to reduce respiratory depression from OSA

ABCDEF Bundle



*excludes response of not applicable

Quote

Grant me the serenity to prioritize the things I cannot delegate, the courage to say no when I need to, and the wisdom to know when to go home....

- Anonymous

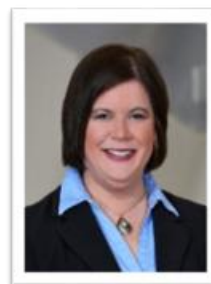
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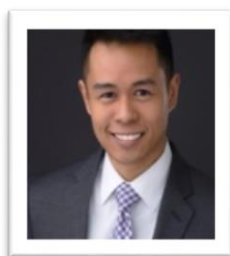
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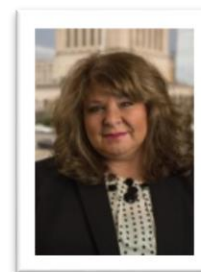
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