OSA Pathway Implementation: How to Measure Success Mayo Clinic Experience

Timothy Morgenthaler, MD, FAASM
Professor
Division of Pulmonary, Critical Care, and Sleep Medicine
Chief Patient Safety Officer
Mayo Clinic, Rochester MN

Bhargavi Gali, MD.
Assistant Professor
Department of Anesthesiology and Perioperative Medicine
Division of Critical Care
Mayo Clinic, Rochester MN

Disclosures

We have no relevant financial disclosures

Objectives

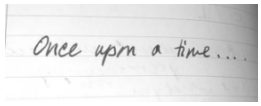
- Discuss creation and implementation of perioperative OSA patients at a single tertiary care center and spread to an enterprise
- Discuss lessons learned during this period
- Describe practice changes based on this process

What was our Driving Factor?

- Mortalities as well as morbidities in practice and reported in literature presumed OSA-related
- How do we make our environment safer?
- What criteria do we use to assess patients?

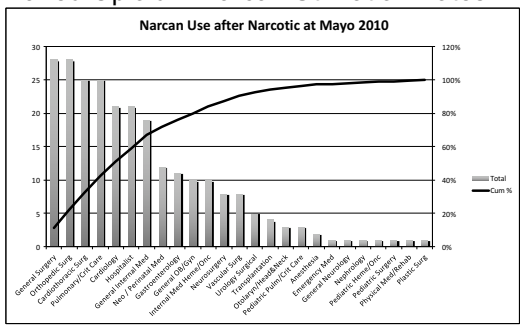
Next most important steps….

Anecdotes…

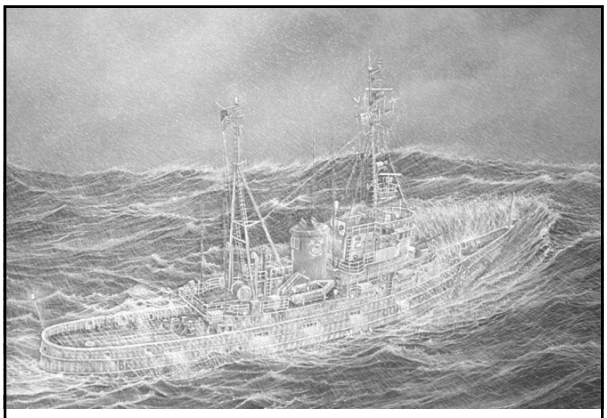


Data…

Paired Opioid + Narcan Utilization Rates



Vizient/UHC Database



The Tamaroa in the Storm by Terrence Maley

Three efforts

- Develop Just-in-time PAP management protocols
  - Address deployment issues
  - Address comfort issues
  - Assess impact of PAP interventions
- Standardize/improve Narcotic Analgesia Management
  - Lock-down PCA protocols
  - Standardize vital sign management programs
  - Resting quietly--can mean dead!
- Develop OSA Risk Management Protocols
  - Ensure detection of risk
  - Then what?

PAP naïve patient in perioperative period

- We learned that nobody owned it….
- Patients don't like it
- Not innocuous
  - Bloating
  - Balancing competing priorities
  - Effect on sleep not certain
- Unlikely to be adherent without dedicated "team" approach and nearly direct supervision
- Reserve for very high risk with monitoring, or high risk with lots of attendance

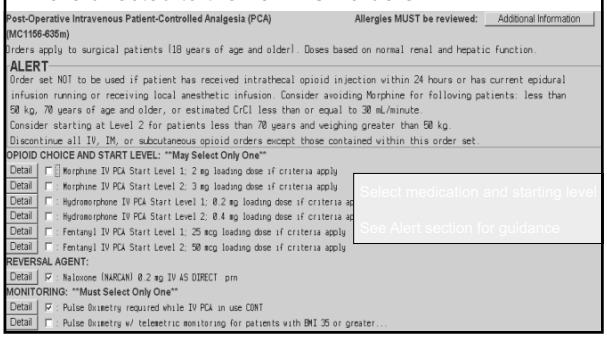
"Dream Team"

- Increased variety of PAP interfaces
- Dedicated "expert" RT for fitting, education, introduction
- Close monitoring of adherence with feedback

PCA use….

Albert Bierstadt - The Wild West

Physician uses CPOE to place post-op orders, they are directed to the new PCA orders



Less than 1 week ago….

Mayo completes Epic transition with Arizona, Florida go-lives

Written by Julie Spitzer / October 09, 2018 | Print | Email

Rochester, Minn.-based Mayo Clinic completed its "Plummer Project," the name given to its systemwide rollout of a new Epic EHR, the health system confirmed Oct. 8.

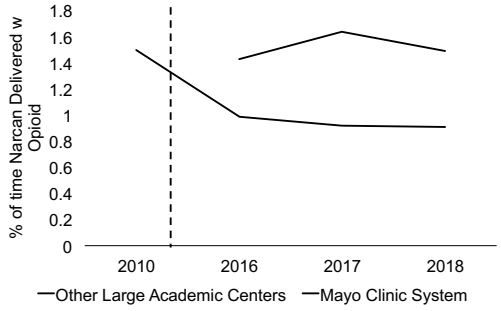
The final three sites — Mayo's campuses in Jacksonville, Fla., and Phoenix and Scottsdale, Ariz. — went live on Epic Oct. 6, placing all Mayo locations on a single integrated EHR and revenue cycle management system. About 52,000 Mayo employees are using Epic in 90 hospitals and clinics throughout the health system.

Mayo Clinic began its transition to Epic at its Wisconsin locations in July 2017, followed by some of its Minnesota locations in November 2017. Its headquarters in Rochester, Minn., implemented the EHR in May.

"The commitment and expertise of outstanding Mayo staff, Epic colleagues and implementation partners brought us to this day," said Richard Gray, MD, co-chair of the initiative. "We envision even greater collaboration among experts in delivering the patient care, research and education that are hallmarks of Mayo."

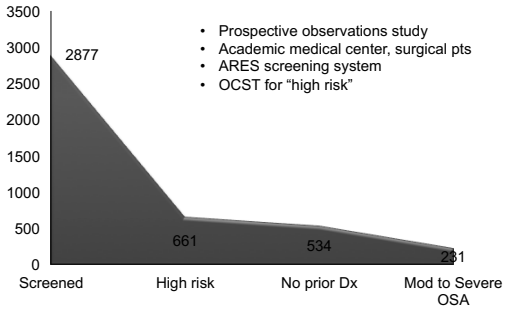
Beckers Hospital Review Oct 9, 2018

Paired Opioid + Narcan Utilization Rates



Vizient/UHC Database

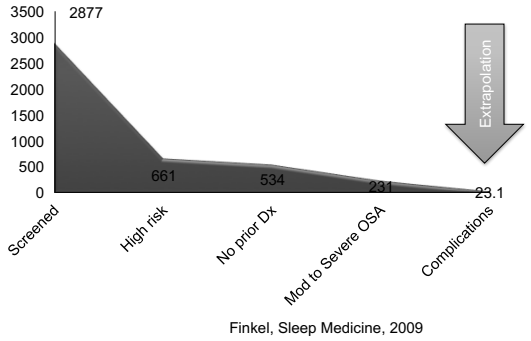
Identify those at risk for deterioration OSA



- Prospective observations study
- Academic medical center, surgical pts
- ARES screening system
- OCST for "high risk"

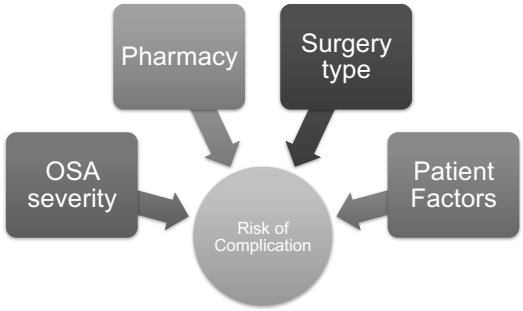
Finkel, Sleep Medicine, 2009

How well do they identify those at risk for deterioration?

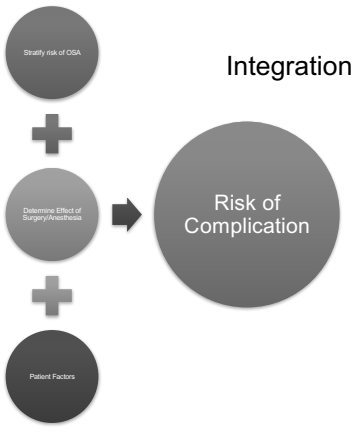


Finkel, Sleep Medicine, 2009

Additive factors



Integration model



Perioperative

- How to identify patients
- What preoperative screening tool
- What changes in management

Sleep Apnea Clinical Score

1. Do you have high blood pressure or have you been told to take medication for high blood pressure? ☐ Yes☐ No
2. People who have shared (or are sharing) my bedroom tell me that I snore. **Please pick the best response for the frequency of your snoring:**
   - ☐ Usually (3-5 times/week) [= 1 "Historical Feature"]
   - ☐ Always (every night) [= 1 "Historical Feature"]
3. I have been told by other people that I gasp, choke, or snort while sleeping. **Please pick the best response for the frequency of any of these symptoms:**
   - ☐ Usually (3-5 times/week) [= 1 "Historical Feature"]
   - ☐ Always (every night) [= 1 "Historical Feature"]
4. Neck measurement. (We will measure you.) ___ ___ cm

Prediction of OSA based on linear regression model utilizing above factors:
Low = Sleep Apnea Clinical Score <15
High = Sleep Apnea Clinical Score ≥15

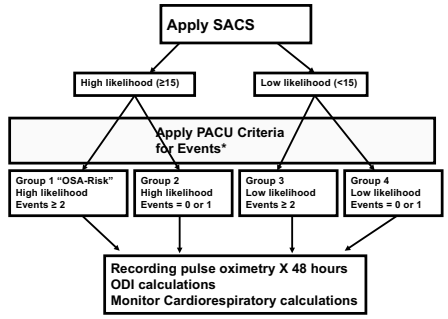
Flemons et al,Am J Resp Crit Care Med 1994;150:1279-1285

PACU Evaluation

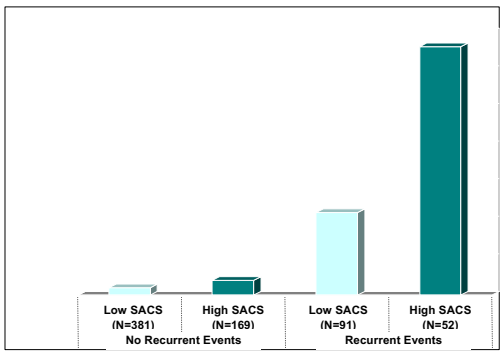
	Evaluation Period		
	Initial	2nd	3rd
Bradypnea: < 8 respirations/minute **(3 episodes needed for yes)**	30 min. after extubation or PACU admit (whichever occurs later)	30 min. after Initial eval. (60 min after extubation or PACU admit)	30 min. after 2nd eval. (90 min after extubation or PACU admit)
Apnea: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

RASS = 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 same event)

©2018 MFMER | slide-21



* Event: Hypoventilation < 8 respirations/minute, apnea ≥10 seconds, desaturations < 90% pulse oximeter on nasal cannula, Ramsay score > 3 with Visual analog score > 5



Gali B et al Anesthesiology. 2009; 110

23

Study Results

- Utilization of preoperative screening with SACS, and recurrent PACU respiratory events most useful
- Two phase process identified patients higher risk for perioperative respiratory desaturations and complications

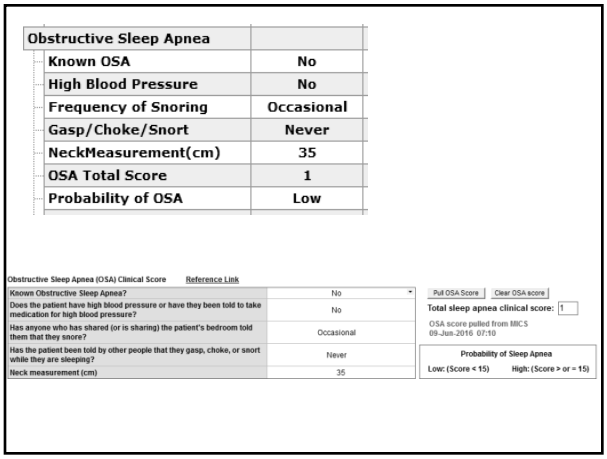
Gali B et al Anesthesiology. 2009; 110

Translation to Practice

- Stepwise implementation
  - PACU assessments
  - Pre-operative screening
  - PACU nurse initiated protocol

Stakeholders

- PACU nursing
- Floor nursing
- Surgeons
- Anesthesiologists
- Sleep physicians



Obstructive Sleep Apnea	
Known OSA	No
High Blood Pressure	No
Frequency of Snoring	Occasional
Gasp/Choke/Snort	Never
NeckMeasurement(cm)	35
OSA Total Score	1
Probability of OSA	Low

1st Assessment	1st Assess	✓
2nd Assessment	2nd Assess	
3rd Assessment	3rd Assess	
4th Assessment	4th Assess	
No Hypoventilation (>= 8 respirations/minute)	No Hypoventilati	✓
Episodes of Hypoventilation (3 episodes of < 8 respirations/minute)	EpisoHypoventila	
No Apnea	No Apnea	✓
Episodes of Apnea (1 episode of apnea for > 10 Seconds)	EpisodesApnea	
No Desaturations (SpO2 > 90%)	No Desats	✓
Episodes of Desaturation (3 episodes of SpO2 < 90% or < Pre-op saturation with or without oxygen)	EpisodesDesats	
No Pain/Sedation mismatch	NoPain/SedatMism	✓
Episodes of Pain/Sedation mismatch (RASS -2 to -5: Pain Score >5)	EpisodeMismatch	
Anesthesia notified	AnesNotified	

Implementation Issues

- Adding work to preoperative process
- Education of involved care teams
- Adherence to protocol

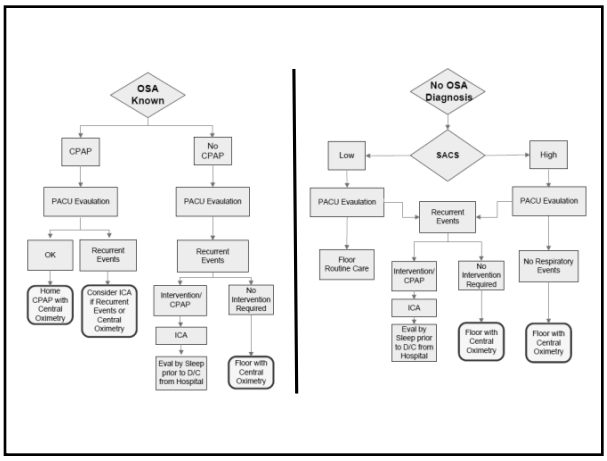
Automated Vs Manual Pulse Oximetry

- 5 patient units
- Compared manual oximetry data to automated continuous oximetry
- Manual data higher oxygen saturations (6.5%)
- Continuous electronic monitoring more effective

Taenzer A et al. Anes Analg 2014;118:326-331

Remotely monitored oximetry

- Limited availability
- Expand units
- Expand resources



Unanticipated Issues

- Who would perform pre-screening
- Floor nursing
- Anesthesiologists

MAYO CLINIC *Remote Pulse Oximetry Monitoring*
Protocol applies to postoperative patients 18 years of age and older.

(Mayo Clinic Number, Name and Room Number Above)

INCLUSION CRITERIA:

☐ Patient at high-risk of obstructive sleep apnea (Obstructive Sleep Apnea Clinical Score greater than or equal to 15; Source: OSA Total Score within the Preoperative Checklist Flowsheet).
☐ Patient has had 2 or more positive respiratory specific assessment periods within the Post-Anesthesia Care Unit (PACU).
☐ Diagnosis of obstructive sleep apnea (Source: Preoperative Checklist Flowsheet).
If one or more boxes are checked, proceed to Exclusion Criteria Section. Otherwise, protocol does not apply.

EXCLUSION CRITERION:

☐ Patient admitted to either a progressive care unit (PCU) or intensive care unit (ICU) for the first 48 hours post-operatively.
If box not checked, proceed to Intervention Section. Otherwise, protocol does not apply.

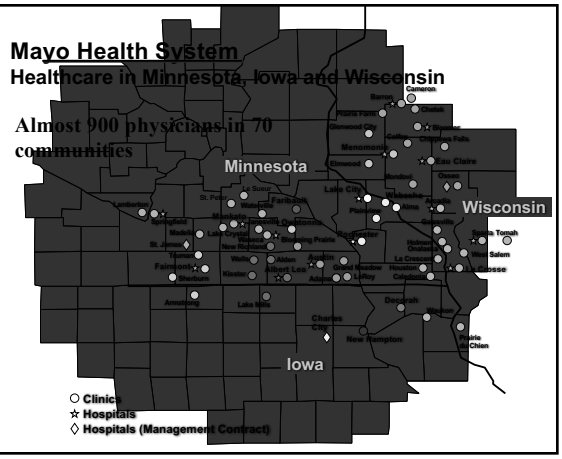
INTERVENTION:

Note: This protocol may be discontinued if the patient is discharged from the hospital before the 48 hours monitoring interval has expired.
- Initiate continuous pulse oximetry for 48 hours upon arrival on the patient care area. Continuous pulse oximetry may be suspended while patient is out of bed.

How to Ensure Continuity

- Sleep physicians not available in hospital
- Inability to address need for follow-up on weekends
- Now pager/consult accessible

Mayo Clinic practice sites



What about Initiation of CPAP from preop assessment?

- High risk patients offered PAP preop
  - 431 referred, 211 underwent PSG
  - Mean adherence 2.5 hrs/night
- Low interest in pursuing PSG
- Low adherence

Guralnick AS et al. JCSM 2012;8(5):501-506

Postoperative PAP Initiation

- High risk
  - Standard care vs initiation auto-titrating PAP (APAP):43 each group
  - No benefit in postoperative complications
  - Multiple obstacles to adherence
  - Poor enrollment

O'Gorman SM et al. Chest 2013;144(1):72-78

Alternatives to PAP

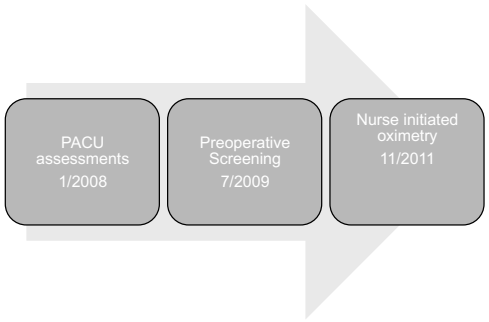
- Nasal high flow therapy
  - Single blinded randomized
  - Recruitment preoperative clinic
  - Nasal high flow 30 LPM vs 1 LPM
  - 42 completed
  - ODI 4% higher in nasal high flow
    - Median 7.4 (IQR 3.5-13.3) vs 3.1 (IQR 1.5-6.7)

Selim B et al Chest 2018

Assessing Impact

- Pre Implementation
  - 2003-2007
- Post Implementation
  - 2008
  - Stepwise changes following this
- Codes, RRTs, transfers to ICU

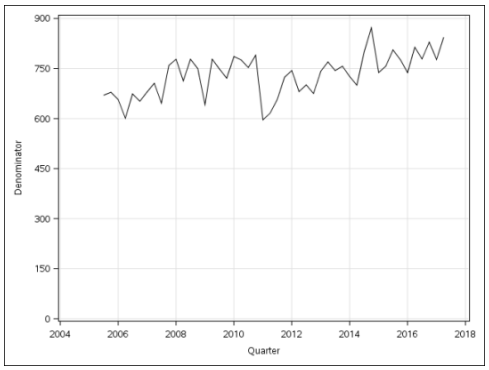
Protocol Process



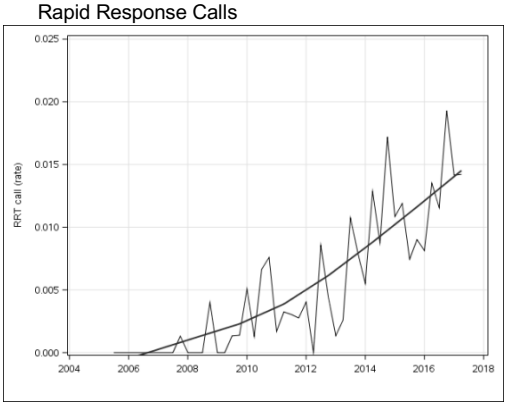
What have we found?

- Retrospective
  - Patients high risk
    - Utilization of RRT
    - Admission to ICU from floor

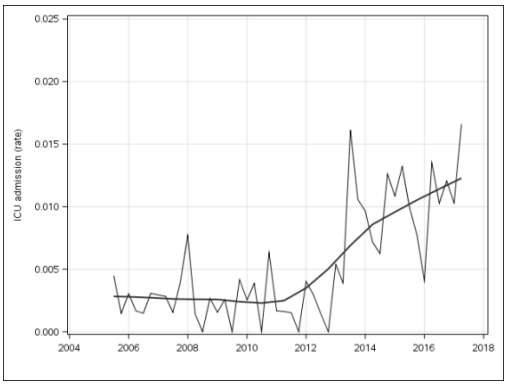
High Risk OSA Patients

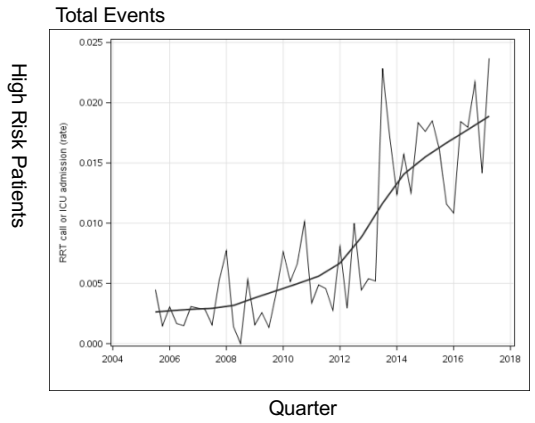


Rapid Response Calls



Transfer to ICU





Further Assessment of Initial Results

- Did use of increased monitoring lead to increased RRT/ICU transfer?
- What is our success rate with use of CPAP?
- Has our education led to changes in views of perioperative management?

Future Assessment

- Is this cost effective?
- How well do we comply with protocols?
- What happens when patients are missed?
- Outcomes in high risk sedation areas