



MSRC 46th Annual Conference
Tan-Tara-A Resort
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Preventing Post-op Pulmonary Complications:
An Important Patient Safety Initiative



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Disclosure

Professional relationship with

- ♦ Monaghan Medical Corporation

Career-long member/supporter of

- ♦ AARC
- ♦ State affiliates – Missouri Society

Objectives

- ♦ Describe the prevalence/impact of avoidable medical mistakes on the US health care system;
- ♦ State reasons why RTs should actively support and participate in the growing focus on improving patient safety;
- ♦ List the assorted risk factors for the development of post operative pulmonary complications (PPCs), and
- ♦ Discuss the emerging role for OPEP in the prevention and treatment of PPCs.

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C-Suites Worst Nightmare!

Los Angeles Times Wednesday, November 28, 2012

UCLA Medical Center gets failing grade on patient safety

Leapfrog, a healthcare quality rating group, gives an F to UCLA Medical Center for performing poorly on several measures. UCLA officials dispute the failing grade.

Patient Safety

Today

REVIEW ARTICLE

A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care

John T. James, PhD

- ✦ Literature search 2008 – 2011
- ✦ 210,000 to 400,000 preventable deaths per year
- ✦ Non-lethal harm 10-to-20 fold higher
- ✦ Near misses/non-reported incidents unknown
- ✦ Preventable patient harm/injury an epidemic

Journal of Patient Safety. Vol 9; No 3: September 2013

Patient Safety
An Emerging Issue in All Care Settings

Medical error—the third leading cause of death in the US
 Medical error is not included on death certificates or in rankings of cause of death. **Martin Makary** and **Michael Daniel** assess its contribution to mortality and call for better reporting

Martin A Makary professor, Michael Daniel research fellow *BMJ*; May 2016
 Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD 21287, USA

Patient Safety in Respiratory Care
Post-operative Pulmonary Complications (PPCs)

Clinical and economic burden of postoperative pulmonary complications: Patient safety summit on definition, risk-reducing interventions, and preventive strategies*

Shander, Aryeh MD, FCCP, FCCM; Fleisher, Lee A. MD; Barie, Philip S. MD, MBA, FIDSA, FACS, FCCM; Bigatello, Luca M. MD; Sladen, Robert N. MD; Watson, Charles B. MD

Over 1 million PPCs occur each year resulting in 46,200 deaths and 4.8 million hospitalization days.

Critical Care Medicine. September 2011

Patient Safety in Respiratory Care
Post-operative Pulmonary Complications (PPCs)

Prevention of Postoperative Pulmonary Complications

Amber Taylor, MD, Zachary DeBoard, MD, Jeffrey M. Gauvin, MD, MS

Post-operative pulmonary complications are more of a financial burden than cardiovascular or infectious complications after surgery, costing the US \$3.4 billion annually

Surg Clinics N Am. Volume 95: April 2015

Patient Safety in Respiratory Care

Post-operative Pulmonary Complications (PPCs)

JAMA Surgery | Original Investigation | February 1, 2017

Postoperative Pulmonary Complications, Early Mortality, and Hospital Stay Following Noncardiothoracic Surgery: A Multicenter Study by the Perioperative Research Network Investigators

The development of at least 1 PPC, even those presumed mild (e.g. atelectasis, need for prolonged oxygen therapy) was associated with significantly increased early post-operative mortality, ICU admission and prolonged LOS

Fernandez-Bustamante, A; et.al. JAMA Surg. Feb 2017

Postoperative Pulmonary Complications (PPCs)

- ✦ Relatively recent area of independent investigation
 - ◊ Typically We Treat it when detected
- ✦ Prevalence following general surgery/anesthesia
 - ◊ Overall range: 2% to 40%
 - 2% (low risk patient/low risk procedure)
 - 40% (high risk patient/high risk procedure)
- ✦ 10-fold higher risk in abdominal procedures
 - ◊ Risk intensifies closer to diaphragm

Impact of PPCs

- ✦ Increased LOS
 - ◊ 12 days vs. 3 days
- ✦ No additional provider payments
- ✦ Increases 30-day readmissions
- ✦ Major contributor to surgical morbidity, mortality
 - ◊ Especially in growing elderly population
- ✦ Part of Hospital Acquired Condition Reduction Program

The Spectrum of PPCs

- | | |
|--|--|
| <ul style="list-style-type: none"> ✦ Pneumonia <ul style="list-style-type: none"> ✦ Lung inflammation ✦ Atelectasis <ul style="list-style-type: none"> ✦ Alveolar collapse ✦ Respiratory infection <ul style="list-style-type: none"> ✦ Fever, congestion ✦ Bronchospasm <ul style="list-style-type: none"> ✦ Reaction to anesthetic | <ul style="list-style-type: none"> ✦ Pleural effusion <ul style="list-style-type: none"> ✦ Fluid in pleural cavity ✦ Pneumothorax <ul style="list-style-type: none"> ✦ Air in pleural cavity ✦ Respiratory failure <ul style="list-style-type: none"> ✦ Mechanical ventilation |
|--|--|

Predictive Factors for PPCs

Smetana GW. Ann Intern Med. 2006

- ✦ **Patient Related**
 - ✦ Age (≥ 65 yrs.)
 - ✦ Low SpO₂ (≤ 90%)
 - ✦ Recent respiratory infection (2-3 weeks)
 - ✦ Anemia
- ✦ **Procedure Related**
 - ✦ Surgical site/procedure (Abdomen, Thorax)
 - ✦ Length of surgery (≥ 2.5 hrs.)
 - ✦ Emergency vs. elective

Additional Risk Factors for PPCs

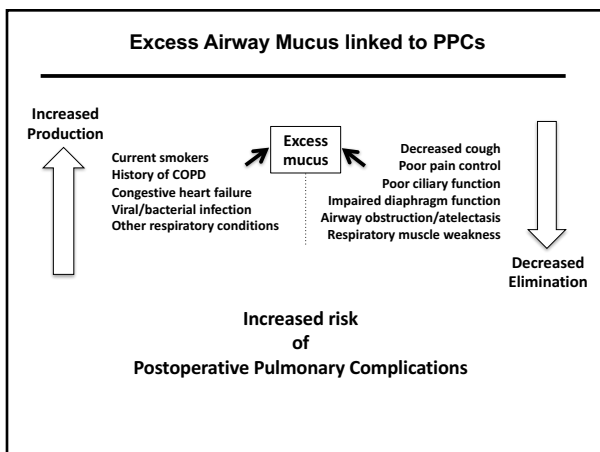
Branson R. Respir Care; November 2013

- | | |
|---|--|
| <ul style="list-style-type: none"> ✦ COPD ✦ CHF ✦ OSA (esp. undiagnosed/untreated) ✦ Cigarette smoker ✦ Other chronic conditions (i.e. diabetes) ✦ Functional dependence ✦ Impaired sensorium ✦ Drug/alcohol dependence | <p><u>Adding insult to injury</u></p> <ul style="list-style-type: none"> ✦ Pain control ✦ Sedation ✦ Diminished cough ✦ Immobility |
|---|--|

ASA's Physical Status Classification System		
ASA.org		
ASA CLASS	MEDICAL STATUS	MORTALITY
I	Healthy fit patient without any disease	0.06 - 0.08%
II	Mild systemic disease with no limitations (e.g. mild diabetes, controlled hypertension)	0.27 - 0.4%
III	Moderate systemic disease limiting activity (e.g. angina, moderate-severe COPD, prior MI)	0.6 - 0.9%
IV	Severe systemic disease limiting activity (e.g. CHF, renal failure, respiratory failure requiring mechanical ventilation)	1.4 - 2.6%
V	Moribund patient not expected to survive 24 hours (e.g. ruptured aortic aneurysm)	9.4 - 51%
VI	Brain dead; Awaiting organ harvesting	n/a

The purpose of the grading system is to evaluate the degree of a patient's "sickness" or physical state, **BEFORE** selecting anesthetic or performing surgery. The grading system is NOT intended to predict operative or post-operative risk.

Pulmonary Effects of General Anesthesia	
Related to Endotracheal Intubation	
✦ Mechanical disruption to <i>delicate</i> muco-ciliary escalator	✧ Contributes to retained secretions
✦ Bronchoconstriction due to release of <i>circulating</i> mediators	✧ Lungs normal response to inhaled noxious gases
✦ Decrease of surfactant production	✧ Undermines alveolar stability/patency
✦ Inhibition of alveolar macrophages	✧ <i>Dust cells</i> unable to scavenge



Effect of OPEP on Lung Function

- ✦ PEP counteracts weak or collapsed airways by providing positive pressure *stenting*
 - ❖ Improves gas distribution to previously unventilated areas
 - ❖ Decreases gas trapping
 - ❖ Opens airways blocked by mucus plugs
- ✦ Oscillations enhance mucus mobilization & removal
 - ❖ Helps shear, thin and dislodge mucus
 - ❖ Oscillation frequencies correspond with natural cilia movement
 - Mimics and complements normal function
- ✦ OPEP Therapy - Safe, drug free, non-invasive & patient-friendly
 - ❖ Part of a PPC bundle?

OPEP Therapy for PPCs

Recent Studies^{1,2}

- ✦ Postoperative OPEP in thoracic and upper abdominal surgery patients (Zhang, et al)
 - ❖ Decreased risk of fever (statistically and clinically relevant)
 - ❖ 2.6 days shorter hospital stay
 - ❖ Well tolerated; accepted by patients; no adverse events
- ✦ PEP in postoperative coronary artery bypass graft (CABG) patients (Haeflener, et al)
 - ❖ Reduced rates of pulmonary complications (pneumonia)
 - ❖ Improved pulmonary function
 - ❖ Better 6 minute walk distances

1. Zhang X, Wang Q, et al. Journal of Physiotherapy; 2014. 2. Haeflener MP, Ferreira GM, et al. American Heart Journal; Nov 2008

Another Opportunity

CMS Alternate Payment Model - - Bundling for CJR



- ❖ 400,000/yr. at \$7 billion
- ❖ Payment variation \$16,000 to \$33,000
- ❖ April 1, 2016: Single *bundled payment* in 800 hospitals nationwide in 67 MSAs (Model 2)
- ❖ 90-day episode of care for ALL Part A & B services
- ❖ Controlling costs requires care that is: *timely, effective, collaborative, preventative and safe*

Risk Factors for PPCs ?

Original Investigation | August 2016

A Preoperative Scale for Determining Surgical Readmission Risk After Total Hip Replacement

Brianne L. Stracuse, BS^{1,2}; Ronald S. Chamberlain, MD, MPA^{1,3,4}

[+ Author Affiliations]

JAMA Surg. 2016;151(8):701-709. doi:10.1001/jamasurg.2016.0020.

- ♦ ≥ 71 years of age
- ♦ African American
- ♦ Repeat procedure
- ♦ Hypertension, obesity, diabetes
- ♦ CHF, COPD, RA
- ♦ Liver/renal disease, anemia
- ♦ Low socio-economic status

Summary

Post-op Pulmonary Complications

♦ Post-op pulmonary complications are:

- ❖ Prevalent, harmful & costly
 - Growing patient safety concern
- ❖ Major contributor to surgical morbidity, mortality
- ❖ Largely preventable
 - Esp. post-op opioid-induced respiratory depression
 - Continuous oxygenation/ventilation monitoring
- ❖ Effectively treatable with OPEP therapy
 - Part of a Post-op pulmonary recovery protocol?