

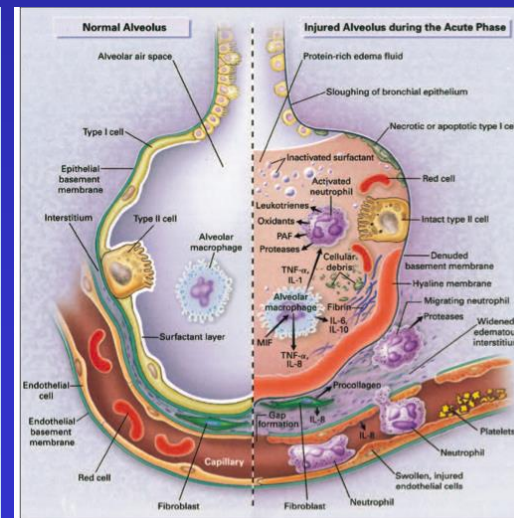
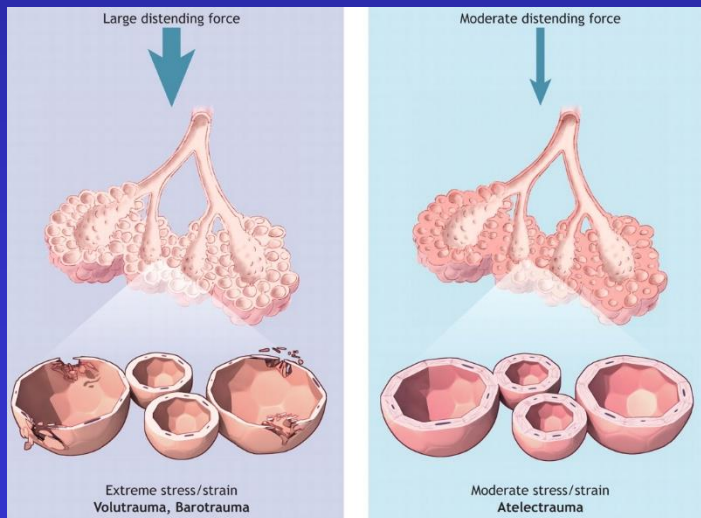
MPOG Data Informs *“Protective”* Ventilation Strategies

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Background

- Mechanical Ventilation can lead to clinically significant lung injury
 - *Volutrauma* → low tidal volume (V_T)
 - *Barotrauma* → low driving pressures (ΔP)
→ low peak inspiratory pressure (PIP)
 - *Atelectrauma* → positive end expiratory pressure (PEEP)
 - *Oxygen toxicity* → Minimize FiO_2



OR Ventilation Strategies -- Limitations

- Extrapolated from ICU literature (non-representative population)
 - Prolonged ventilation
 - Pre-existing lung disease
 - Different pathology
- Does not resolve contribution of individual components (dichotomized to “protective” or “non-protective”)
- Unique stresses based upon surgical procedure
 - Laparoscopic insufflation
 - Cardiopulmonary bypass
 - Single lung isolation
- Intraoperative complications exceedingly low → limits ability to adequately power studies
- Incomplete adoption (up to 14% of patients do NOT receive protective ventilation)



Data YOU generate helps overcome these Limitations

- MPOG: Informs optimal protective ventilation strategy through research

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- ASPIRE: Promotes adoption of best practices informed by research

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- **MISSION**: *improve the care of patients undergoing anesthesia by reducing unexplained variation in practice and collaborating with anesthesia providers across Michigan, the U.S., and globally*



Limitation: Unique stresses based upon surgical procedure

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Intraoperative Mechanical

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Management of 1-Lung Ventilation—Variation and Trends in Clinical Practice: A Report From the Multicenter Perioperative Outcomes Group

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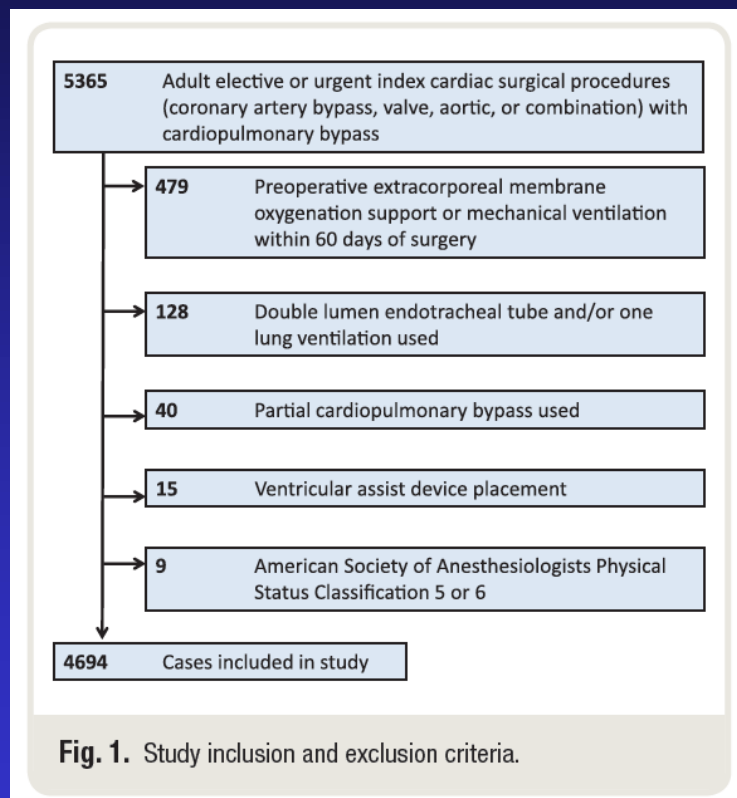
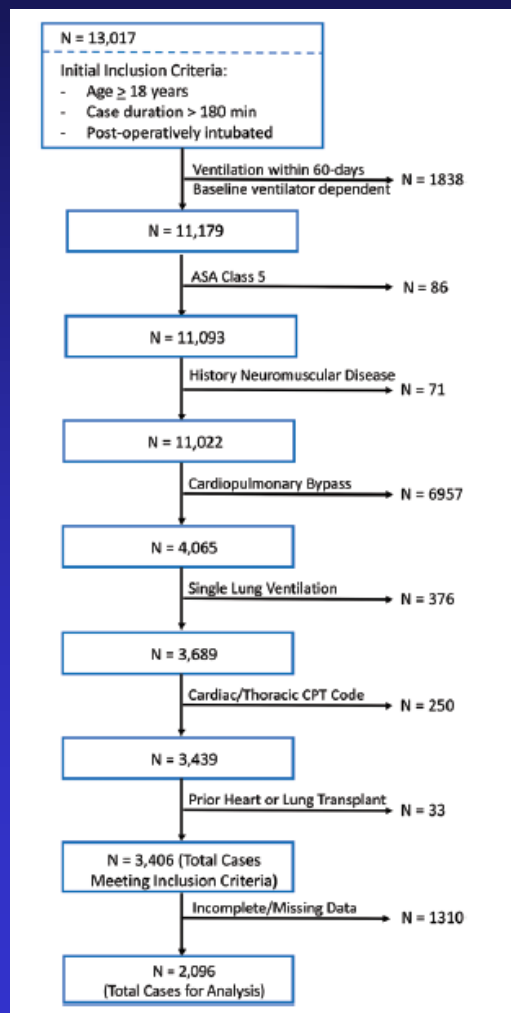


Limitation: Does Not Resolve Individual Contributions

- Earlier studies dichotomized ventilation
 - lung-protective ventilation
 - non protective ventilation
- MPOG collects a more rich set of intraoperative parameters.
 - V_T
 - V_T (predicted body weight)
 - ΔP
 - PIP
 - PEEP
 - FiO_2
 - SpO_2
- Permitting broader array of descriptive statistics
 - Time thresholds, extremes (5%, 25%, 75%, 95%)



Limitation: Intraoperative complications exceedingly low therefore unable to adequately power studies

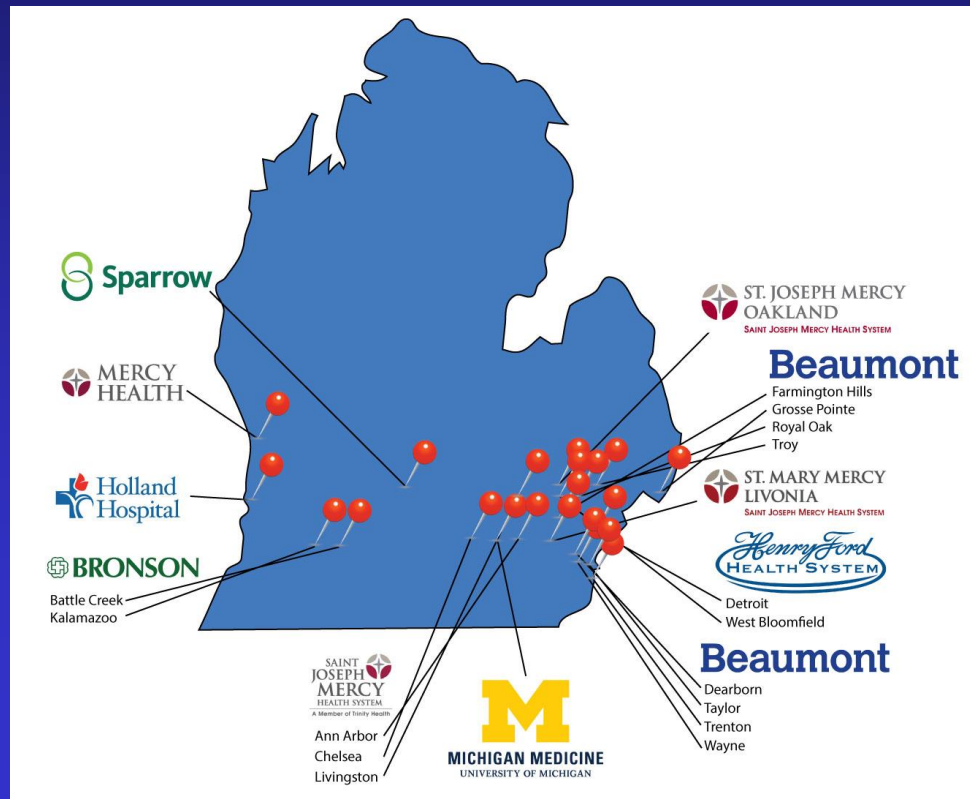


RESULTS

Data from 5609 patients across the 4 institutions were included in the analysis. The 2 data periods (overall versus initial) were compared. The median period of 1LV was 117 minutes (inter-

Limitation: Poor Compliance Nationally with Practice Recommendations

Solution: Education and Quality Improvement



Results: Non-cardiac/Non-Thoracic Surgical Population

- **Primary Outcome:** *minimum postoperative PaO_2/FiO_2*
 - Using multivariable linear regression, we found that:
 - Each additional hour with driving pressure >16 cm H_2O
 - Higher PEEP
 - Each additional hour with intraoperative $SpO_2 <90\%$
 - were all independently associated with lower minimum postoperative PaO_2/FiO_2



Results: Non-cardiac/Non-Thoracic Surgical Population

- **Secondary Outcomes: 30-Day Mortality**
 - each 100 mmHg increase in minimum postoperative $\text{PaO}_2/\text{FiO}_2$ was independently associated with a halving of the odds of death
 - Age, reduced cardiac ejection fraction on preoperative echocardiography, comorbidities, and intraoperative transfusion of packed red blood cells were also independently associated with mortality
 - No ventilation parameter was independently associated with mortality.



Results: Non-cardiac/Non-Thoracic Surgical Population

- **Secondary Outcomes: Composite Postoperative Pulmonary Complications**
 - each 100 mm Hg higher minimum $\text{PaO}_2/\text{FiO}_2$ was associated with a lower likelihood of developing pulmonary complications
 - Time (hours) with $V_T > 500$ mL, prior history of cardiac arrhythmia, intraoperative NO use, low cardiac ejection fraction on preoperative echocardiography, and earlier year of surgery were associated with a higher likelihood of developing a class 1 pulmonary complication



Conclusions

- Lower postoperative $\text{PaO}_2/\text{FiO}_2$ was associated with increased postoperative pulmonary complications and mortality after noncardiac surgery.
- Time with $V_T > 500$ mL and higher median FiO_2 were also associated with postoperative pulmonary complications, and their effects may be assessed using postoperative $\text{PaO}_2/\text{FiO}_2$.
- Among intraoperative parameters, median PEEP, median FiO_2 , time with driving pressure > 16 cm H_2O , and time with $\text{SpO}_2 < 90\%$ were associated with decreased postoperative $\text{PaO}_2/\text{FiO}_2$.
- The use of the intermediate outcome, $\text{PaO}_2/\text{FiO}_2$, offers a promising target for future prospective studies







Measure Abbreviation: PUL 02

Measure Description: Percentage of cases with median tidal volumes equal to or less than 8 ml/kg.

NQS Domain: Patient Safety

Measure Type: Process

Measure Summary: PUL 02 measures will measure the median tidal volume this measure will exclude time before when patients are not under positive 6).

Inclusions:

Patients undergoing endotracheal intubation.



Measure Abbreviation: PUL 03

Description: Percentage of cases in which Positive End Expiratory Pressure (PEEP) is used for patients undergoing mechanical ventilation during anesthesia.

Measure Type: Process

Measure Summary: PUL 03 is an informational measure that analyzes PEEP usage across patients undergoing mechanical ventilation during anesthesia. PUL 03 will determine if PEEP was administered (as defined by median PEEP ≥ 2) and also analyze distribution of PEEP levels:

- No PEEP (<2 cm H₂O)
- Low PEEP (2-4 cm H₂O)
- Moderate PEEP (≥ 4 to < 8 cm H₂O)
- High PEEP (≥ 8 cm H₂O)

Inclusions:

Patients undergoing endotracheal intubation.

Summary

- Your hard work enables clinician-scientists to study complex problems that cannot be explored with traditional datasets
- These discoveries are used to assist clinicians in delivering safer, evidence-based anesthesia to our patients
- There are opportunities for both QI and research projects
 - **THANK YOU!!!**

