

# MPOG Pediatric Subcommittee Meeting

December 15, 2021



# Agenda

## **MPOG Peds Update**

*Dr. Bishr Haydar, Mott Children's*

## **Postoperative Mortality Rate in Pediatrics across MPOG**

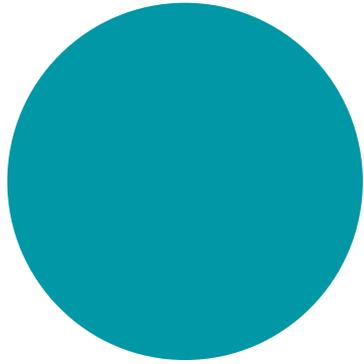
*Dr. Ruchika Sharma, University of Virginia Children's*

## **PONV Prophylaxis Guideline Discussion**

*Dr. Lucy Everett, Massachusetts General Children's*

## **Normothermia QI Measure Review**

*Dr. Vikas O'Reilly-Shah, Seattle Children's*

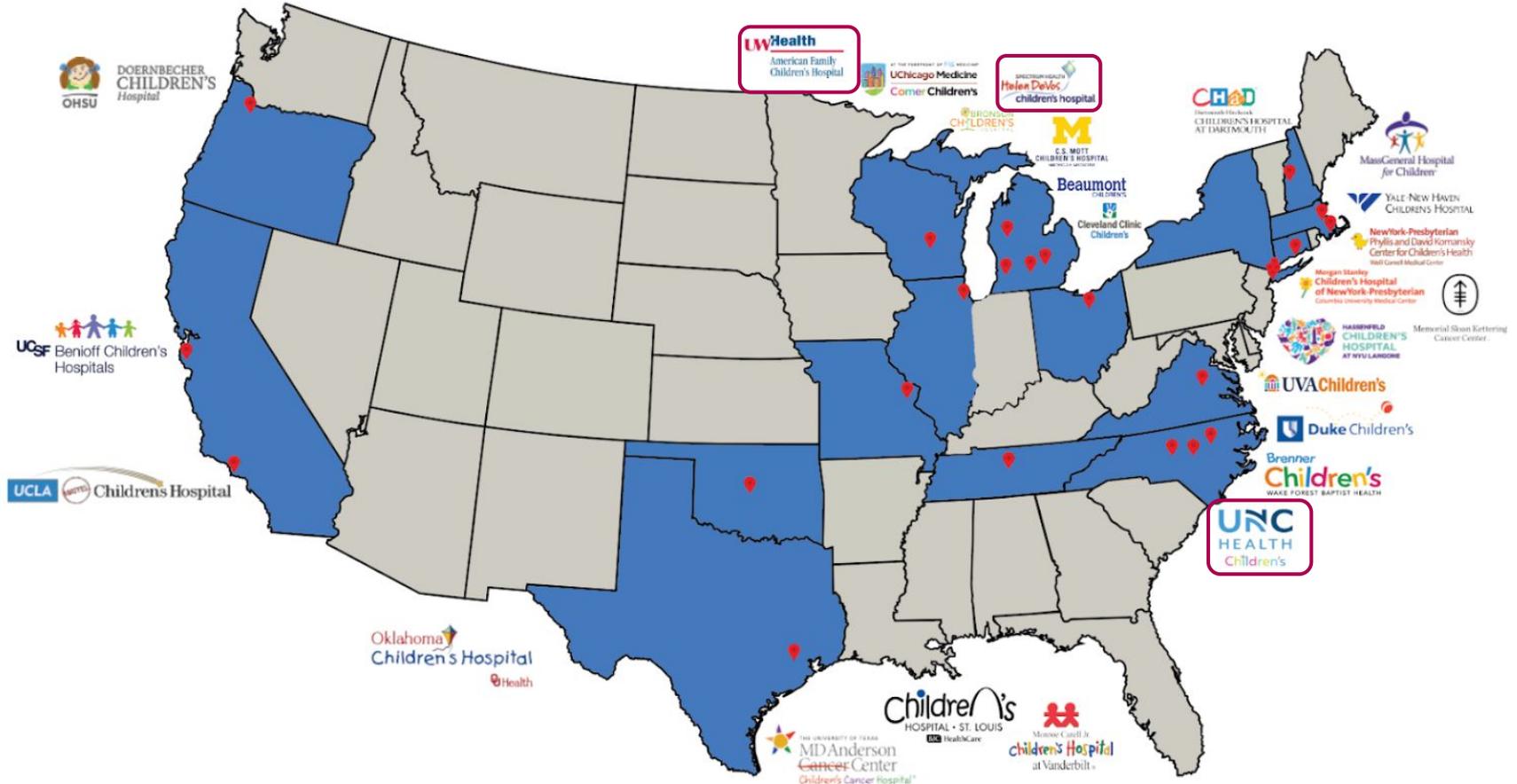


2021 Year in Review

*MPOG Peds*



# MPOG Membership Update



**Pediatric Cases in MPOG**  
**1,936,607**

<b>Cases Submitted by Pediatric Hospitals (&lt; 18y)</b>		
	<b>2021</b>	<b>All</b>
Vanderbilt	26,015	50,797
Univ. Michigan	17,980	255,046
St. Louis Children's	15,753	117,084
UNC	10,776	18,207
Spectrum Health	10,379	10,379
Duke	9,546	38,133
Yale	9,438	19,069
Wake Forest	8,892	50,513
NYU Langone	8,364	76,033
UCSF	8,288	33,172
OHSU	7,993	65,119
Univ. Wisconsin	7,896	13,712
Univ. Oklahoma	7,581	125,400
Mass General	6,426	30,620
Beaumont Royal Oak	5,487	42,157
Univ. Virginia	5,483	68,753
Cleveland Clinic	5,411	65,139
Bronson Health	4,008	88,080
Dartmouth	3,999	22,962
Univ. Chicago	3,919	10,720
MSKCC	3,638	42,861
MD Anderson	2,876	11,914
UCLA	1,820	143,864
<b>Total</b>	<b>191,968</b>	<b>1,399,734</b>

# Congratulations to Dr. Wes Templeton and team on their recent publication in Anesthesiology!

## PERIOPERATIVE MEDICINE

### ANESTHESIOLOGY

#### Hypoxemia in Young Children Undergoing One-lung Ventilation: A Retrospective Cohort Study

T. Wesley Templeton, M.D., Scott A. Miller, M.D., Lisa K. Lee, M.D., M.S., Sachin Kheterpal, M.D., M.B.A., Michael R. Mathis, M.D., Eduardo J. Goñiaga-Diaz, M.D., Leah B. Templeton, M.D., Amrit K. Sahni, Ph.D., for the Multicenter Perioperative Outcomes Group Investigators\*

*Anesthesiology* 2021; 135:842–53

#### EDITOR'S PERSPECTIVE

##### What We Already Know about This Topic

- Current approaches to one-lung ventilation in children involve selective endobronchial intubation or use of a bronchial blocker

##### What This Article Tells Us That Is New

- In a retrospective multisite cohort study in children aged 2 months to 3 yr having one-lung ventilation for thoracic surgery, hypoxemia was common
- Bronchial blocker use as well as left-sided surgeries were associated with a lower risk of hypoxemia during one-lung ventilation

One-lung ventilation in children undergoing noncardiac surgery presents unique challenges that frequently require specialized equipment and creative solutions to achieve success. At this time, the infrequency of these cases at any one institution has limited our ability to perform prospective trials to compare the efficacy and risks of different devices and approaches. As a result, most of the primary literature on this topic is based on individual experience and single-center case series.<sup>1–4</sup> Further, there are little, if any, multicenter data to guide clinicians in terms of best practices.

#### ABSTRACT

**Background:** One-lung ventilation in children remains a specialized practice with low case numbers even at tertiary centers, preventing an assessment of best practices. The authors hypothesized that certain case factors may be associated with a higher risk of intraoperative hypoxemia in children undergoing thoracic surgery and one-lung ventilation.

**Methods:** The Multicenter Perioperative Outcomes database and a local quality improvement database were queried for documentation of one-lung ventilation in children 2 months to 3 yr of age inclusive between 2010 and 2020. Patients undergoing vascular or other cardiac procedures were excluded. All records were reviewed electronically for the presence of hypoxemia, oxygen saturation measured by pulse oximetry (Sp<sub>o</sub><sub>2</sub>) less than 90% for 3 min or more continuously, and severe hypoxemia, Sp<sub>o</sub><sub>2</sub> less than 90% for 5 min or more continuously during one-lung ventilation. Records were also assessed for hypercarbia, end-tidal CO<sub>2</sub> greater than 60 mmHg for 5 min or more or a P<sub>a</sub>co<sub>2</sub> greater than 60 on arterial blood gas. Covariates assessed for association with these outcomes included age, weight, American Society of Anesthesiologists (Schaumburg, Illinois) Physical Status 3 or greater, duration of one-lung ventilation, preoperative Sp<sub>o</sub><sub>2</sub> less than 98%, bronchial blocker versus endobronchial intubation, left operative side, video-assisted thoracoscopic surgery, lower tidal volume ventilation (tidal volume less than or equal to 6 ml/kg plus positive end expiratory pressure greater than or equal to 4 cm H<sub>2</sub>O for more than 80% of the duration of one-lung ventilation), and type of procedure.

**Results:** Three hundred six cases from 15 institutions were included for analysis. Hypoxemia and severe hypoxemia occurred in 81 of 306 (26%) patients and 56 of 306 (18%), respectively. Hypercarbia occurred in 153 of 306 (50%). Factors associated with lower risk of hypoxemia in multivariable analysis included left operative side (odds ratio, 0.45 [95% CI, 0.251 to 0.78]) and bronchial blocker use (odds ratio, 0.351 [95% CI, 0.177 to 0.67]). Additionally, use of a bronchial blocker was associated with a reduced risk of severe hypoxemia (odds ratio, 0.290 [95% CI, 0.125 to 0.62]).

**Conclusions:** Use of a bronchial blocker was associated with a lower risk of hypoxemia in young children undergoing one-lung ventilation.

(*Anesthesiology* 2021; 135:842–53)

Current approaches to one-lung ventilation in this age group involve endobronchial intubation or use of a bronchial blocker.<sup>4</sup> Currently, there exist almost no data to support the use of one approach or the other in terms of reducing the risk of hypoxemia or other long-term outcomes. In most cases, the approach to one-lung ventilation is based on local preference or technical expertise rather than a choice based on an assessment of the risks and benefits of

#### Hypoxemia in Young Children Undergoing One-lung Ventilation

Multicenter retrospective cohort study of 306 children ages 2 months to 3 yr from 2010 to 2020



**Primary aim:** Assess the incidence of and risk factors for hypoxemia in young children

**Primary outcome:**

- Hypoxemia defined as SpO<sub>2</sub> < 90% for ≥ 5 min



Prevalence of Hypoxemia during One-lung Ventilation



Risk factors associated with **lower risk** of hypoxemia:

- Left operative side (Odds ratio 0.45; 95% CI, 0.25 to 0.78)
- Bronchial blocker (Odds ratio 0.35; 95% CI, 0.18 to 0.67)

Bronchial blockers and left-sided surgeries were associated with reduced odds of hypoxemia during one-lung ventilation in young children

Templeton TW, et al. *ANESTHESIOLOGY*, 2021.



ANESTHESIOLOGY

Trusted Evidence: Discovery to Practice®

Copyright © 2021, the American Society of Anesthesiologists. All Rights Reserved.



# QI Measures Vetted for Pediatrics - THANK YOU!!



## Reviewed Measures

- TOF Monitoring (NMB-01)
- Neuromuscular Blockade Reversal (NMB-02)
- Transfusion Vigilance (TRAN-01)
- Overtransfusion (TRAN-02)



## NEW Measures

- Multimodal Analgesia (PAIN-01)
- PONV Prophylaxis (PONV-04)



# OME Pediatric Dashboard

## Opioid Equivalency: Tonsil/Adenoid (Peds)

Average administration by weight per 1 hour case

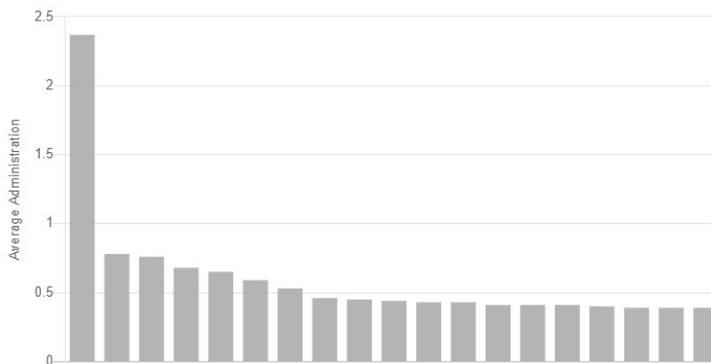
### Average Dose

 **0.32** mg/kg

MPOG Average 0.35 mg/kg

### Equivalencies

Equivalencies	Average Dose
mg/kg PO	0.32 mg/kg
mg/kg morphine IV	0.11 mg/kg
mcg/kg fentanyl IV	1.07 mcg/kg
mg/kg morphine PO	0.32 mg/kg



Home Dashboards Measure Summary Provider List Case List

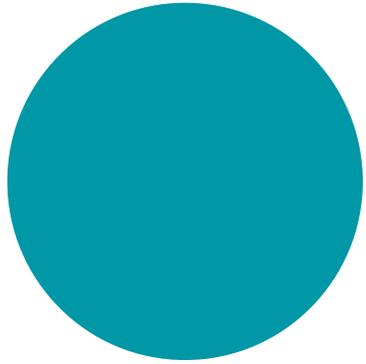
## Case List, Opioid Equivalency, Tonsil/Adenoid (Peds) [More Info](#)

Show  entries

View Case	Date of Service	Operating Room	Surgical Service	Procedure	Primary Anesthesia CPT	Anesthesia duration (hours)	Opioid Equivalency (mg/kg)
<a href="#">View Case</a>	12/1/2020 7:30	B-OR 03	Otolaryngology	(Actual)BILATERAL TONSILLECTOMY AND ADENOIDECTOMY	00170	0.9	0.475
<a href="#">View Case</a>	12/1/2020 10:30	M-OR 12	Otolaryngology	(Actual)BILATERAL TONSILLECTOMY AND ADENOIDECTOMY MIDLINE SLEEP ENDOSCOPY IN OR BOTOX INJECTION	00320	1.9	0.115
<a href="#">View Case</a>	12/1/2020 11:15	M-PR 04	Otolaryngology	(Actual)BILATERAL TONSILLECTOMY AND ADENOIDECTOMY MIDLINE SLEEP ENDOSCOPY	00170	1.2	0.164
<a href="#">View Case</a>	12/2/2020 7:30	M-OR 14	Otolaryngology	(Actual)BILATERAL TONSILLECTOMY AND ADENOIDECTOMY	00170	1.3	0.329

Nov 21





Plans for 2022

*MPOG Peds*



## 2022 Pediatric Measure Build Goals

- Neuromuscular Blocker Dosing in Infants [NMB-03-peds](#)
- Antibiotic Timing [ABX-02-peds](#)
- Transfusion Vigilance [TRAN-03-peds](#)
- Overtransfusion [TRAN-04-peds](#)
- Minimizing Colloid Use [FLUID-02-peds](#)

# New Peds Specific Phenotypes Available

- [Age \(groups\)](#)
- [BMI Percentile \(Pediatric\)](#)
- [BMI Classification \(Pediatric\)](#)
- [Pediatric Hospital Affiliation](#)

Value	Definition
Preterm Neonate	The period at birth when child is born before the full gestational period
Term-Neonate	0 - 27 days (0 - 3 weeks)
Infant	28 days to 12 months (4 - 48 weeks)
Toddler	13 months - 23 months
Child (early)	2 to 5 years
Child (middle)	6 to 11 years
Adolescent (early)	12 to 18 years
Adolescent (late)	19 to 21 years
Adult	> 21 years

[Williams et.al, Pediatrics, 2012](#)

# Surgical Site Infection Toolkit

- Plans to update current toolkit with recent literature
- Develop pediatric specific toolkit and publish by end of 2022
- Contact Meridith if interested in collaborating on this project!



## Surgical Site Infection

Addresses ASPIRE  
Measures TEMP 01, 02, 03  
& GLU 01

[Click Here](#)

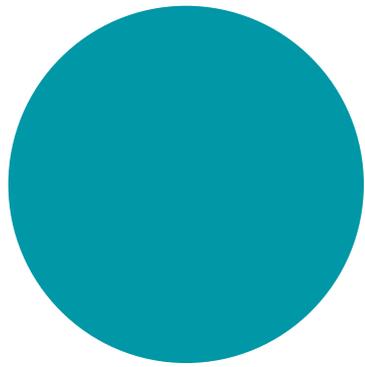
## 2022 Meetings

- **Pediatric Subcommittee Meetings**  
(Wednesdays @ 1pm Eastern)
  - February 16
  - May 18
  - August 17
- **MPOG Updates at SPA Q&S**
  - April 2 (Tampa, FL)
  - October 22 (New Orleans, LA)
- **MPOG Annual Retreat 2022**
  - October (New Orleans, LA)



# Formation of MPOG Peds Interest Groups

- Member driven component of the MPOG peds subcommittee
- Feature 1-2 projects per meeting
- Goal of fostering collaboration among pediatric anesthesiologists and sparking ideas of how MPOG data can be useful in projects of interest
- Projects of Interest thus far:
  - Postoperative Mortality Rate
  - PONV Guideline Validation
  - SSI Prevention
  - Minimizing Colloid Use
  - One Lung Ventilation



Perioperative mortality in the pediatric  
population at the University of Virginia:  
A 4-year analysis (2018-2021)

*Hollie Humphrey*  
*Eugene McGahren\*(Department of Surgery)*  
*George Politis*  
*Ruchik Sharma*



# Why this study?

- Inspired by the congenital heart surgeons database

## Operative and Adjusted Operative Mortality, Last 4 Years (January 2015 - December 2018)

Population: Neonates, Infants, Children & Adults	# / Eligible	Observed	Expected	O/E Ratio (95% CI)	Adj. Rate (95% CI)
Overall	5 / 309	1.6%	2%	0.82 (0.27, 1.89)	2.3 (0.7, 5.3)
STAT Mortality Category 1	0 / 143	0%	0.3%	0 (0, 8.07)	0 (0, 3.2)
STAT Mortality Category 2	0 / 74	0%	1.4%	0 (0, 3.52)	0 (0, 5.3)
STAT Mortality Category 3	1 / 40	2.5%	1.5%	1.71 (0.04, 9.01)	3.7 (0.1, 19.3)
STAT Mortality Category 4	1 / 39	2.6%	4.8%	0.54 (0.01, 2.82)	3.4 (0.1, 17.7)
STAT Mortality Category 5	3 / 13	23.1%	16.8%	1.38 (0.3, 3.21)	19.2 (4.2, 44.8)

2000 2001 2002 **2003** **2004** **2005** **2006** **2007** **2008** 2009 2010 2011 2012 2013 **2014** **2015**

ANZICS 30-day  
mortality  
**101,885** anesthetics  
**0.35%** overall(0-18 yr)  
**3.7%** neonates

Wilhelmina 30-day  
mortality  
**45,182** anesthetics  
**0.42%** overall(0-18 yr)  
**3.9%** neonates

NSQIP 30-day  
mortality  
**103,444** surgeries  
**0.7%** overall

**2016** **2017** 2018 2019 2020  
2021

**APRICOT** 30-day  
mortality  
**31,127**  
anesthetics(0-18y)  
**1%** overall

**NECTARINE** 30-day mortality  
**6,542** anesthetics(60 wk  
PMA)  
**2%** overall

# Perioperative hospital mortality at a tertiary paediatric institution: BJA<sub>115(4):608-15</sub> (2015)

- 45,182 anesthetics over 7 years (Jan 2006-Dec 2012)
- 188 deaths within 30 days (59 deaths within 24h, 10 died in OR)
- **Attributability (2 surgeons + 3 anesth)**
  - 165/188 : preoperative condition (congenital anomaly/oncology/infection/coagulopathy)
  - 14/188 : preoperative trauma
  - 5/188 : Anesthesia management + child condition (descriptive analysis)
  - 4/188. : Surgical procedure + child condition (descriptive analysis)

23 references: only 1 other was similar: Anesth Analg 2011;112:1440-7 van der Griend

Postoperative mortality in children after 101,885 anesthetics at a tertiary pediatric hospital  
(Handwritten records)

# 24-hour and 30-day perioperative mortality in pediatric surgery

Journal of Pediatric Surgery 54(2019)628-630

- ACS NSQIP P ( excludes cardiac/trauma/transplant)
- 103,444 patients, 732 deaths.
- 2012-2015
- Overall 30 day mortality: 0.7%

NEC highest 30-day mortality of 19%

CDH came second at 5.2%

- 13 references: 4 were CHD based, rest were NEC-surgical and medical literature.

# NECTARINE

Morbidity and mortality after anaesthesia in early life: results of the European prospective multicentre observational study, neonate and children audit of anaesthesia practice in Europe (NECTARINE) BJA2021

- 6542 anesthetics in infants less than 60wk PMA
- 3.2 % overall mortality (90 day. 2% 30-day mortality)

# APRICOT

Incidence of severe critical events in paediatric anaesthesia (APRICOT): a prospective multicentre observational study in 261 hospitals in Europe [Lancet Respir Med 2017; 5: 412–25](#)

- 31,127 anesthetics from birth to 15 years
- 1% overall mortality

## **MPOG-P**

- Intraoperative database
- 21 participants
- Date of start
- Anesthesia encounter specific  
(all inclusive!)

## **NSQIP-P**

- Preop variables(18) and Postop outcomes(9)
- 127 participants
- Date of Start
- Surgery specific (excludes trauma/transplant)

# Predicting postoperative Physiologic decline after elective surgery *Pediatrics* (2019) 143 (4)

- Predicting Mortality after Pediatric surgery (non cardiac surgery): **PRAM score from NSQIP 2012/2013/2014**(derivation and validation cohorts)

- [Development of a Pediatric Risk Assessment Score to Predict Perioperative Mortality in Children Undergoing Noncardiac Surgery.](#)

Nasr VG, DiNardo JA, Faraoni D • *Anesth Analg.* 2017 May;124(5):1514-1519

- [Prospective External Validation of the Pediatric Risk Assessment Score in Predicting Perioperative Mortality in Children Undergoing Noncardiac Surgery.](#) Valencia E, Staffa SJ, Faraoni D, DiNardo JA, Nasr VG. *Anesth Analg.* 2019 Oct;129(4):1014-1020

# PRELIMINARY DATA

April 2018- June 2021

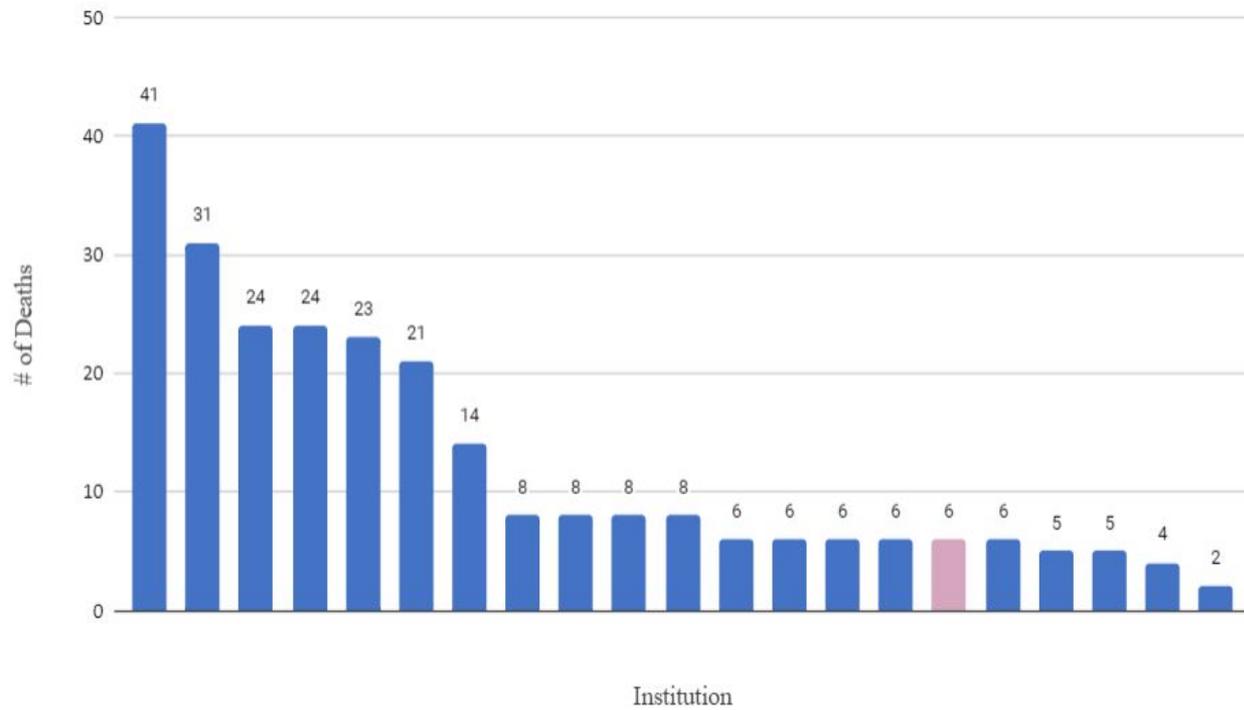
Total Annual Peds Cases by Age Group					
Year / Age Group:	0-1 month	1-12 months	1-12 years	12-18 years	All Peds
2018	162	717	3121	1484	5484
2019	164	673	3282	1602	5721
2020	131	643	2778	1433	4985
2021 thru-June 30th	69	347	1460	844	2720
Total	526	2380	10641	5363	18910

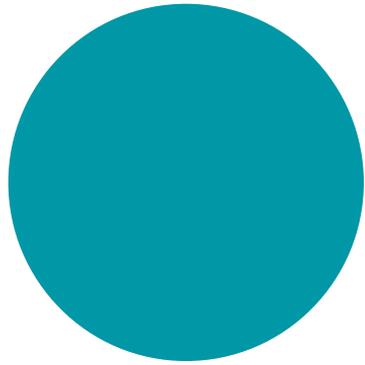
\*6 total 24hr deaths; 3 of which are cardiac

Total Annual Peds Deaths by Age Group						
Year / Age Group:	0-1 month	1-12 months	1-12 years	12-18 years	All Peds	Excluding Cardiac
2018	1	7	0	0	8	3
2019	3	2	7	1	13	8
2020	4	3	4	2	13	7
2021 thru-June 30th	1	2	0	1	4	2
Total	9	14	11	4	38	20

# Pediatric 30-day in Hospital Mortality

MPOG Pediatric Institutions (9/1/2020 - 9/1/2021)





# PONV Prophylaxis Measure Discussion

*Lucy Everett, MD*

*Massachusetts General Hospital*



# PONV Measures

Outcome measure (PONV-03) applies to both adults and peds

## Prophylaxis measures

- Being revised to match update PONV consensus guidelines
- PONV 01/05 - Adult measure uses Apfel criteria
- PONV 02/04 - Pediatric measure uses age, hx PONV in pt/parents/sib, certain procedures

# Pediatric POV/PONV Management <sup>Rx</sup>



## Preoperative

- Age  $\geq$  3 years
- History of POV/PONV/motion sickness
- Family history of POV/PONV
- Post-pubertal female



## Intraoperative

- Strabismus surgery
- Adenotonsillectomy
- Otoplasty
- Surgery  $\geq$  30 mins
- Volatile anesthetics
- Anticholinesterases

## 1 RISK FACTORS

### Postoperative

- Long-acting opioids



## 2 RISK STRATIFICATION

*\*Consider multimodal analgesia to minimize opioid use*

No Risk Factors



LOW RISK

1-2 Risk Factors



MEDIUM RISK

$\geq$  3 Risk Factors



HIGH RISK

## 3 PROPHYLAXIS

LOW RISK

•••••  
None or 5HT3 antagonist or dexamethasone

MEDIUM RISK

•••••  
5HT3 antagonist + dexamethasone

HIGH RISK

•••••  
5HT3 antagonist + dexamethasone + consider TIVA

## 4 RESCUE TREATMENT

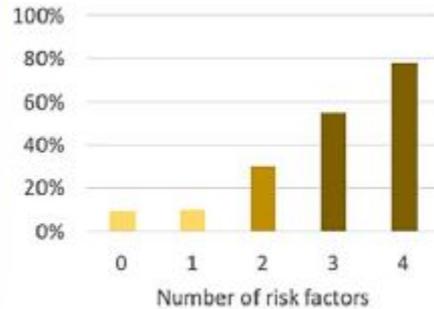
Use anti-emetic from different class than prophylactic drug - droperidol, promethazine, dimenhydrinate, metoclopramide; May also consider acupuncture/acupressure



	PONV-02 (March 2018)	PONV-04 (August 2021)
<b>Inclusion</b>	Ages 3-17 GA with volatile maintenance 2+ risk factors for POV	Ages 3 - 17 Patients with 1+ risk factors for PONV
<b>Risk Factors</b>	Age $\geq$ 3 years Hx POV or PONV in patient, parent, sibling Strabismus surgery Procedure $\geq$ 30 minutes	Age $\geq$ 3 years Female $\geq$ 12 years Hx POV or PONV in patient, parent, sibling Strabismus, T&A, tympanoplasty Volatile $\geq$ 30 minutes Administration of long-acting opioid intraop
<b>Exclusion</b>	- ICU admit, lung/liver transplant, neck, intrathoracic, lower abdominal procedures, endoscopy, labor epidural - Cases where volatile used only for induction	ICU admit Labor epidural Radiology procedures ECT
<b>Success</b>	Patient receives at least 2 antiemetics of different classes	Antiemetic matched to number of risks (1, 2, or 3 if >2 risks). Propofol infusion is an antiemetic.

# Pediatric PONV Prophylaxis: Source Reference

Risk Factors	Points
Surgery ≥ 30 minutes	1
Age ≥ 3 years	1
Strabismus surgery	1
History of POV or family history of PONV	1
Sum of points	0-4



**Figure 5.** Risk score for POV in children. Simplified risk score from Eberhart et al<sup>62</sup> to predict the risk for POV in children. 0, 1, 2, 3, or 4 risk factors correspond to POV risks of approximately 10%, 10%, 30%, 50%, or 70%, respectively. PONV indicates postoperative nausea and vomiting; POV, postoperative vomiting. The Figure reused with permission from the American Society for Enhanced Recovery. For permission requests, contact info@aserhq.org.

Graphic from revised guidelines; based on Eberhart Anesth Analg 2004; 99:1630–7

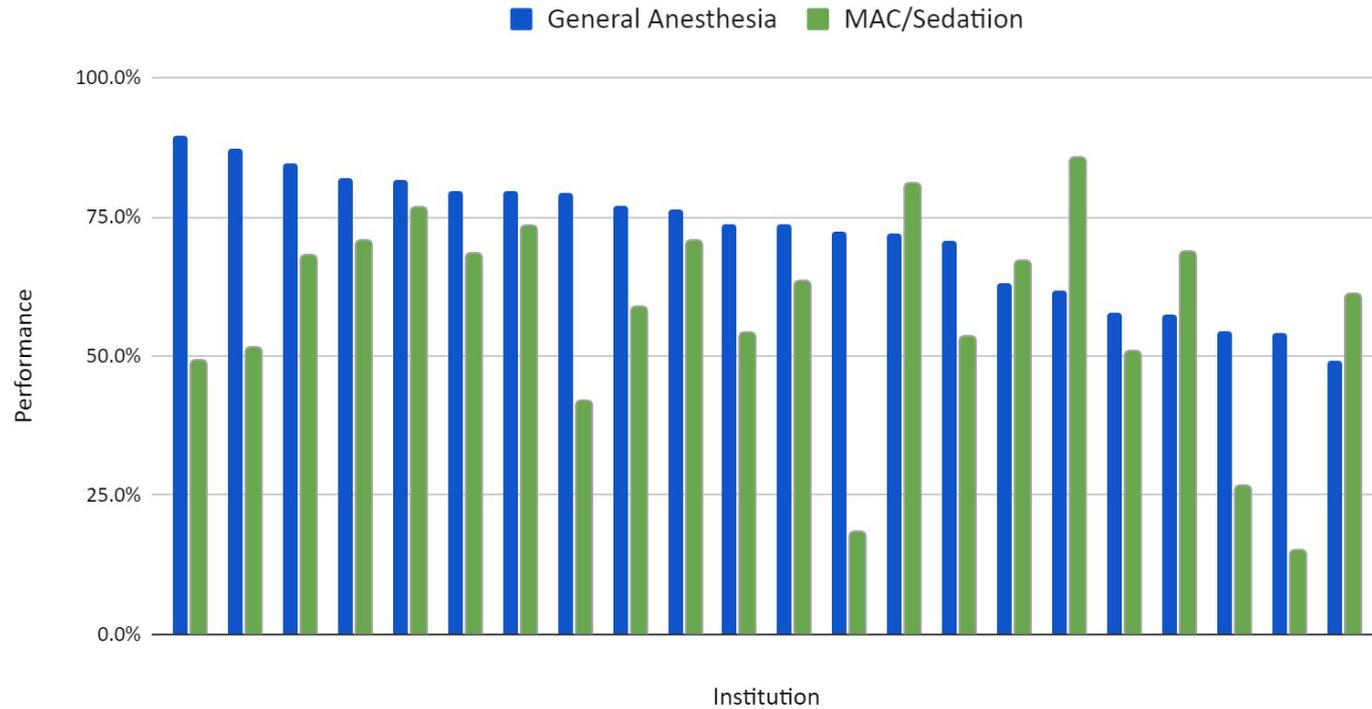
## Summary of population/anesthetic technique:

- 1250 pediatric patients having surgery (only 43 had “diagnostic” procedures and no endoscopy noted).
- All received oral midazolam.
- 77% of their patients had an IV induction and nearly half of those had thiopental.
- 55% received a non-depolarizer but there is no data regarding reversal agents used (publication is from 2004 so pre-sugammadex)
- Only 20% had propofol maintenance

Prospective validation by same group in 673 surgical patients - oral midaz, sevo or propofol induction, volatile/opioid maintenance

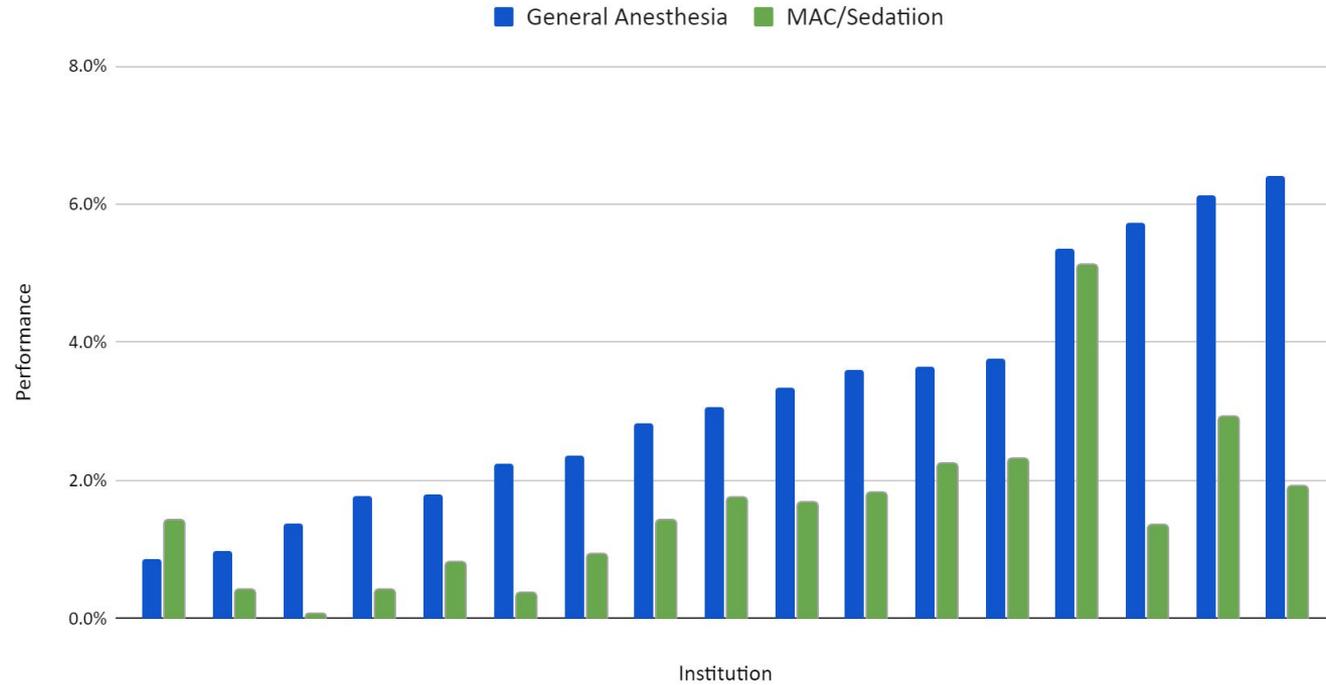
# PONV Process Measure Performance - PONV04

PONV-04-peds ; Anesthesia Technique



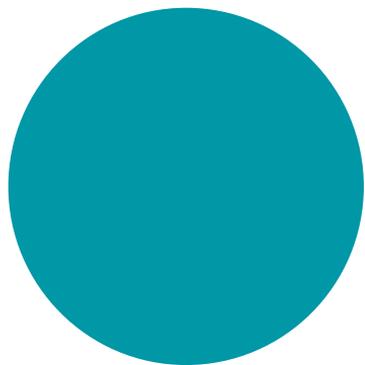
# PONV Outcome Measure Performance - PONV03b

Patients < 18y ; Anesthesia Technique



# PONV 04 - PONV Prophylaxis in Pediatrics

- At November ASPIRE meeting, revised adult PONV prophylaxis measure (PONV-05) was discussed. It was decided to include only patients who meet the MPOG general anesthesia phenotype.
- Should PONV-04 be similarly limited until better evidence is available?
- Additional Revisions/Discussion points
  - Exclude LP/Chemo/rad onc patients
    - Surgical CPT 96450; Radiation oncology room tag
  - How to handle cases w/o IV? \*question during last quality committee meeting



# Normothermia Measure Review

*Vikas O'Reilly-Shah, MD*  
*Seattle Children's Hospital*



# TEMP-01: Thermoregulation Vigilance (Active Warming)

**Description:** Percentage of cases where active warming was applied **OR** at least one temperature  $\geq 36$  C within 30 minutes of case end.

## **Active Warming includes:**

- Convective warming: forced air
- Conductive warming: water mattress
- Endovascular warming: heat exchange catheter
- Radiant Heaters

## **Exclusions:**

- ASA 5 & 6
- Cases with a duration < 60min
- Procedure Types
  - Diagnostic
  - Obstetric
  - Radiology



# TEMP-02: Core Temperature Monitoring

**Description:** *Percentage of cases with at least one core temperature documented between Anesthesia Start → Patient out of room.*

## **Core or Near Core Temperature Monitoring Includes:**

- Pulmonary Artery
- Distal Esophageal
- Nasopharyngeal
- Tympanic Membrane
- Bladder
- Rectal
- Axillary
- Oral
- Zero-Flux Thermometer

## **Exclusions:**

- ASA 5 & 6
- Cases with neuraxial or regional anesthesia as the primary technique
- MRI Procedures
- Cases with duration  $\leq 30$  min
- Labor Epidurals



# TEMP-04-Peds: Intraoperative Hypothermia

**Description:** Percentage of patients <18yo who undergo a procedure >30 min and have a **median** core/near core body temperature >36 C (96.8F)

**Measure Period:** Patient in Room → Patient out of Room

**Exclusions:**

- ASA 5 & 6
- Patients  $\geq$  18yo
- Procedure Types
  - Obstetric non-operative
  - Cardiac
  - MRI/Radiology
- Cases without a temperature route documented

# TEMP-03: Postoperative Hypothermia

**Description:** *Percentage of general and/or neuraxial cases with at least one body temperature  $\leq 36$  C within 30 minutes immediately before or 15 minutes after Anesthesia End.*

**Success:** *Documentation of a TOF*

**Exclusions:**

- *ASA 5 & 6*
- *Cases with a duration < 60min*
- *MAC cases*
- *Procedure Types*
  - *Cardiac*
  - *Obstetric non-operative*
  - *Emergent cases*
- *Cases with Intentional hypothermia*

# TEMP-03: Possible updates

Modify temperature target? (36.0 vs 36.5 for neonates and infants; in May 2019 target was raised for all comers from 35.5 to 36.0)

- WHO Definition for neonates (age < 1mo) is 36.5
  - World Health Organization. Thermal protection of the newborn: a practical guide. Report No.: WHO/RHT/MSM/97.2. Geneva, Switzerland: World Health Organization; 1997.
- 2015 guideline of care for prevention of perioperative hypothermia targets 36.5. Evidence IIb: normal core temp age < 5yr is 36.5 to 38.0. Evidence IIb, Grade A recommendation: up to age 2, core temp recommended.
  - Torossian A, Bräuer A, Höcker J, Bein B, Wulf H, Horn E-P. Preventing inadvertent perioperative hypothermia. Dtsch Arztebl Int [Internet]. 2015 Mar 6;112(10):166–72.
- 36.5 as a threshold for neonates
  - Trevisanuto D, Testoni D, de Almeida MFB. Maintaining normothermia: Why and how? Semin Fetal Neonatal Med [Internet]. 2018 Oct;23(5):333–9.
- STEPP-IN (Safe Transitions & Euthermia in the Perioperative Period in Infants & Neonates - wide multicenter QI effort) used 36.0
  - Brozanski BS, Piazza AJ, Chuo J, Natarajan G, Grover TR, Smith JR, et al. STEPP IN: Working Together to Keep Infants Warm in the Perioperative Period. Pediatrics [Internet]. 2020 Apr;145(4).
  - <https://app.ihl.org/extranetng/content/7fb00eb3-84ae-4097-bec5-9a453c15ee6a/d3267c79-33ad-45c3-a0ec-1fdbcfdd5471/STEPP%20IN%20Project%20Overview.pdf>

# TEMP-03: Possible updates

## Temperature - site of measurement?

- In general, approach has been to reject skin temps
  - Sahin SH, Duran R, Sut N, Colak A, Acunas B, Aksu B. Comparison of temporal artery, nasopharyngeal, and axillary temperature measurement during anesthesia in children. J Clin Anesth [Internet]. 2012 Dec;24(8):647–51.
  - Summary: Small study examining temperature measurement site during anesthesia. Axillary temperature was significantly lower and less well correlated with core temperature than temporal artery or nasopharyngeal temperature.
- Handling of temps with no site recorded? (EMR issue)
- Failure to measure?

A dark blue, irregularly shaped graphic with a splatter effect, containing the text "Thank You!" in white. The graphic has a rough, hand-painted appearance with various shades of blue and white splatters around its edges. The text is centered within the dark blue area.

Thank You!