Anesthesiology Performance Improvement and Reporting Exchange (ASPIRE)

Pediatric Subcommittee Meeting Minutes – March 10, 2024

Attendance:

Wes Templeton, Atrium - Wake Forest	*Stephanie Kahntroff, University of Maryland*
Morgan Brown, Boston Children's	*Frederick Mansfield, USAP*
Robert Brustowicz Boston Children's	*Jeana Havidich, Vanderbilt*
Cathie Jones, Boston Children's	*Amanda Lorinc, Vanderbilt*
Lauren Madoff, Boston Children's	*Aaron Weinberg, Weill Cornell*
*Peggy Vogt, Children's Healthcare of Atlanta**	*Chuck Schrock, WUSTL*
*Lindsey Weidmann, CHOP**	*Meridith Wade, MPOG Pediatric Program Manager*
Kim Finch, Henry Ford Health	*Nirav Shah, MPOG Quality Director*
Rahul Koka, Johns Hopkins	*Henrietta Addo, MPOG*
Katie O'Conor, Johns Hopkins	*Nicole Barrios, MPOG*
Mo Esfahanian, Lucile Packard Children's Hospital	*Tiffany Malenfant, MPOG*
Lucy Everett, Mass General	*Kam Mirizzi, MPOG*
Olga Eydlin, NYU Langone	*Diana O'Dell, MPOG*
Vikas O'Reilly-Shah, Seattle Children's	*Rebecca Pantis, MPOG*
Jerri Heiter, Trinity Health	*Frances Guida Smiatacz, MPOG*
Marla Ferschl, UCSF Benioff Children's	*Rachel Stumpf, MPOG*
Ruchika Gupta, University of Michigan	*Leanna Delhey, MPOG*
Bishr Haydar, University of Michigan	*Kate Buehler, MPOG*
Eva Lu-Boettcher, University of Wisconsin	*Mei Calabio, MPOG*

**Denotes participant from non-active MPOG Institution*

Start: 1602

Minutes from November 4,2024 meeting approved - minutes and recording posted on the MPOG website for review

Announcements

- The 2025 meeting schedule and Measure Reviews
  - March 10th – NMB-03-Peds
  - June 23rd –TRAN-03/TRAN-04
  - December 1st
- All sustainability measures will be reviewed in May (via the Quality Committee). Pediatric reviewers for SUS-05-Peds and SUS-06-Peds are Brady Still, MD (UChicago Medicine) and Eva-Lu-Boettcher, MD (University of Wisconsin).

- Following the last pediatric committee meeting in November, updates to the PONV-04 pediatric metric were proposed. This includes success criteria requiring at least one antiemetic agent for all patients and combination therapy for patients with one or more risk factors.
- There was some interest in including patients less than three years old. Preliminary data obtained from MPOG shows that 2% of neonates and 3-7% of infants have PONV – some with PONV rates as high as 50%). This suggests the need to lower the age threshold to 28-30 days. However, concerns were raised about the lack of published data to support this change, emphasizing the need for transparency and documentation.
- A poll will be sent out to MPOG site champions conducted to gain consensus on the proposed modifications once the new 2025 guidelines are published.

Pediatric Cardiac Workgroup Update

- The new Pediatric Cardiac Workgroup last met in February. A pediatric cardiac procedure phenotype was recently published to classify cardiac cases based on cardiopulmonary bypass involvement.
- Their current focus is on Acute Kidney Injury (AKI) in cardiac surgery, with adjustments to quality measures to account for institutional variations (e.g., postoperative peritoneal dialysis as routine care rather than a sign of renal dysfunction).
- Initial data suggests that Stage 1 AKI occurs in at least 10% of cases, while Stage 3 AKI is seen in 1%, prompting further work on benchmarking AKI rates across institutions to drive quality improvements.

Measure Review: NMB-03-Peds (Review Document)

Dr. Charles Schrock, St. Louis Children's

- The discussion focused on neuromuscular blockade (NMB) dosing in pediatric patients, particularly under five years old. Data analysis showed significant overdosing in infants, with dosing varying widely across institutions. Monitoring practices were found to be inadequate, with low compliance rates and a reliance on neuromuscular blockade reversal agents (e.g., sugammadex) rather than careful dosing and monitoring.
- The trend suggests that increasing sugammadex use is encouraging higher NMB doses, raising concerns about postoperative respiratory complications, reintubation, and pneumonia.
- Dr. Schrock proposed better age stratification, updating exclusion criteria, and normalizing dosing per hour instead of total mg/kg.
- A poll confirmed the majority supports modifying the measure, with specific changes to be discussed in Basecamp.

Hyperglycemia Management in Pediatrics

Dr. Ruchika Gupta, University of Michigan

- The current GLU-11 measure requires intervention for glucose levels above 180 mg/dL in patients older than 12 years. However, pediatric cases often present transient hyperglycemia without clinical consequences, making the 180 mg/dL threshold too aggressive for non-diabetic

children. Institutional findings showed glucose levels dropping from 180 to 70 mg/dL within an hour under current protocols, suggesting potential overtreatment.

- Given the lack of consensus or strong evidence on intraoperative hyperglycemia management in pediatrics, the group debated whether to exclude pediatric patients from GLU-11 and develop a pediatric-specific measure.
- A poll confirmed majority support for excluding pediatric patients from GLU-11, with a new measure to be developed.

Meeting Concluded: 1702

Full Transcript

Announcements

0:36 *Vikas O'Reilly-Shah (Seattle Children's)*: Our 2025 meeting schedule includes March 10th, June 23rd and December 1st. Hopefully, this schedule will help avoid the summer rush and allow us some time to recover after the fall meetings. We also have a structured schedule for reviewing QI measures this year. Today, we will be reviewing NMB-03. Then, at the June meeting, we will be reviewing the transfusion vigilance and over-transfusion measures. All Sustainability measures will be reviewed at the May Quality Committee meeting. The two pediatric reviewers for SUS-05-Peds and SUS-06-Peds are Brady Still, MD (UChicago Medicine) and Eva-Lu-Boettcher, MD (University of Wisconsin)

Morgan Brown (Boston Children's): I can provide the peds cardiac workgroup update. We last met in February are a brand-new subgroup of this group, so if anyone is interested, please let Meredith know, and she can add you to the email list. Our first major task was to create a pediatric cardiac procedure phenotype. The adult group had developed a similar classification, but we decided to separate cases into those that involve cardiopulmonary bypass and those that do not. This distinction is critical for improving how we build our quality measures. Now, we are shifting our focus to acute kidney injury (AKI) in cardiac surgery. This metric already exists, but we need to make adjustments to account for differences in pediatric patients. For example, some institutions routinely use peritoneal dialysis postoperatively—not necessarily because of renal dysfunction, but as part of their standard care protocol. This distinction affects how AKI is measured, so we will be refining the criteria accordingly. More updates on that at our next meeting.

03:06 This slide is an example of the initial data we've reviewed. Meredith pulled this for us, and it highlights the prevalence of AKI in pediatric cardiac surgery. We often assume renal dysfunction isn't common in pediatrics, but in cardiac surgery, that's not the case. The rate of stage 1 AKI—which is relatively mild—is at least 10%, and stage 3 AKI occurs in about 1% of cases. Our goal is to refine these metrics further to establish benchmarks, allowing programs to compare their performance against others and implement local improvements to reduce AKI rates. We're excited about this initiative, and we'll share more at the next meeting. Thanks!

- *Vikas O'Reilly-Shah (Seattle Children's)*: Yeah, I'm really looking forward to that. This is something we've been examining at Seattle Children's as well, so thank you for all of your efforts.

04:03 *Vikas O'Reilly-Shah (Seattle Children's)*: To recap our last meeting in November—one of the key topics we spent time discussing was the PONV-04 pediatric metric. As a result of that discussion, we discussed making several modifications to the success criteria - to require at least a single antiemetic agent for any patient, even those with zero risk factors. For patients with one or more risk factors, combination therapy is required. We also examined the opioid risk factor and decided to add hydrocortisone and cholinesterase inhibitors as relevant medications that could contribute to prolonged mechanical ventilation (PMV).

Additionally, we analyzed neonates and infants separately. Meredith shared preliminary data, and we found that neonates with at least one risk factor have about a 2% failure rate according to the current criteria. Among those who failed, we observed high PONV rates. For infants, failure rates ranged from 3% to 7%, unadjusted for exclusions. Looking at cases where failure was reported, PONV rates were as high as 50%. This suggests we should take a deeper dive into the data. Given these findings, I believe it's reasonable to extend the age inclusion criteria down. This is something we will be pursuing further with the PCRC group.

- *Morgan Brown (Boston Children's)*: I think additional data will be helpful, but given the many available options for PONV prophylaxis, I don't have a strong objection to lowering the age threshold to 28 days or 30 days. Personally, I find low-dose steroids beneficial in this age group, especially since we frequently use low-dose fentanyl in cardiac cases.
- *Vikas O'Reilly-Shah (Seattle Children's)*: Yeah, I agree. I follow a similar approach. The risk-benefit ratio here seems to favor intervention since these are low-risk measures. Any other discussion? Feel free to unmute or raise your hand.
- *Ruchika Gupta (University of Michigan)*: I just have a quick question. This reminds me of an issue I'll bring up later regarding the glucose measure. While I agree with these PONV modifications in principle, I think we need to provide more background and evidence to participating groups. Otherwise, people might question why we changed the metric without published data. We all agree that the risk-benefit ratio here is minimal, but if we're adjusting a measure, we need to support it with documentation—just as we should have done with the glucose metric.
    - *Vikas O'Reilly-Shah (Seattle Children's)*: Absolutely. We need to ensure that the evidence base and justification are clear for each measure. That's how we build trust in these benchmarks. We'll be sure to include relevant data as it becomes available, especially from ongoing PCRC research.

As Meridith mentioned earlier, we'll send out a poll to gauge consensus on whether to move forward with these proposed modifications. Okay, let's move on. Dr. Schrock, over to you.

NMB-03-Peds Measure Review

13:07 **-** *Dr. Charles Schrock (St. Louis Children's)*

Thank you. This topic caught my attention because, at first, it seems like a small detail—focusing on neuromuscular blockade (NMB) dosing—but it actually speaks to a broader issue: mindfulness in medication dosing. We frequently administer these drugs, yet we may not always scrutinize their usage closely.

I took a deep dive into the data from MPOG's database, and I was also able to access adult-side data for comparison. Interestingly, there hasn't been much new literature on this topic, but I'll touch briefly on a couple of key studies. I'll also share insights from my own institution's local data, which has driven discussions within our team. In reviewing this, I'd love to hear from institutions with high success rates on this measure—what strategies have worked for them? If any sites have achieved strong results through deliberate practice, I'd love to discuss their approaches.

14:27: This slide outlines how this measure was originally conceived. The idea was based on the premise that children under five are more vulnerable to residual neuromuscular blockade. The three main questions we sought to answer were:

1. Do smaller patients need a higher dose than larger patients?
2. Do higher doses lead to worse outcomes in infants and children?
3. Are current dosing practices excessive?

The weak data available suggests that higher doses aren't necessary for infants. However, it's still unclear whether larger doses in infants lead to significantly worse outcomes—but it's possible.

For inclusion, this measure focuses on patients under age five who were extubated in the operating room. Patients who remained intubated postoperatively were excluded. At my institution, we primarily use rocuronium, with very little use of vecuronium or cisatracurium, which is only given when organ-independent clearance is necessary. The literature on pediatric NMB usage almost exclusively focuses on rocuronium, so this discussion primarily applies to that drug.

16:11: Here's what I was able to glean from MPOG's data. The red dots represent excluded patients (those who remained intubated), while the blue dots are included patients who were extubated postoperatively.

16:33: This slide focuses specifically on infants under 12 months. The gray box at the bottom represents the target dosing range of 0.5 mg/kg. You can see that nearly everyone is above that dose, and the youngest patients are receiving the highest doses per kilogram.

16:46: Here's a modified version of the graph, excluding patients who remained intubated. The trend is clear: **dosing varies widely, and some doses are inexplicably high. The youngest patients receive significantly more per kilogram than older infants or school-aged children.**

17:22: This slide displays the true success rate for this metric. Interestingly, Meredith and I initially discovered a mapping error in how infants were categorized. We had mistakenly applied the 1.2 mg/kg goal across all cases, which initially made our institution look better than it actually was. Once we

corrected the error, we saw that our dosing practices were heavier-handed than expected—especially in infants.

18:25: Here's a look at the aggregate data across all institutions. We see a consistent trend of overdosing in infants. The next question is: Are we even good at monitoring neuromuscular blockade? The answer appears to be no. Meridith pulled some additional data to evaluate trends in neuromuscular blockade monitoring. Unfortunately, in infants, the rate of neuromuscular monitoring is extremely low. Despite high variability in dosing, reversal rates are relatively high. This suggests that we are relying on neuromuscular blockade reversal rather than consistent monitoring practices.

20:15: Now, looking at local data from my institution, we examined whether there's a correlation between high-dose NMB administration and proper monitoring. Ideally, clinicians who use higher doses should also monitor more carefully. This scatter plot shows the percentile rank for monitoring versus dosing. Ideally, we would see a strong positive correlation—meaning higher doses would be paired with increased vigilance. But the opposite trend is emerging. Clinicians who use higher doses tend to monitor less rigorously. This is concerning and suggests that our dosing decisions may lack standardization and oversight.

21:42: Another key question: Are we effectively monitoring neonates? New devices are emerging that claim to offer **quantitative neuromuscular monitoring for infants**, but adoption is slow. I'm working locally to bring these devices into our ORs to test feasibility. An observational study on this topic revealed that infants given high doses of NMB agents had significantly prolonged recovery times—even when spontaneous recovery was allowed. This underscores the risk of excessive NMB dosing, even in cases where reversal agents are used.

23:56: Here's another concerning finding: heavy-handed dosing is increasing over time. This is based on data from my institution, where I tracked monthly average NMB dosing. This trend aligns with the increased use of sugammadex, which is being used as a safety net. The concern is that instead of optimizing dosing, we are using sugammadex as a "get out of jail free" card. Does dose matter? Data suggests that higher doses correlate with increased risks of postoperative respiratory complications, including reintubation and pneumonia. Even with sugammadex, we are likely overdosing reversal agents as well. We often exceed the necessary dose, which could contribute to issues postop.

27:50: Here's what I propose:

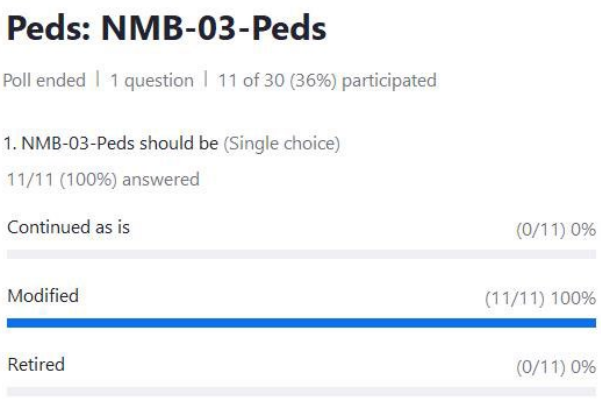
1. The calculation for pass/fail on this measure has now been updated. If you check your institution's performance now, you may see a significant change.
2. It may be beneficial to toggle between neonates and children when analyzing the data. Right now, it's difficult to differentiate age-specific trends, but given the importance of dosing differences in infants, we should push for better age stratification.

Now, I'd love to hear from the group. Are any institutions using other neuromuscular blockade drugs regularly?

Discussion

- *Meridith Wade (MPOG):* I don't have the de-anonymized graphs available right now, but I think it would be useful to review this data unblinded in a future meeting, as we've done before.
- *Vikas O'Reilly-Shah (Seattle Children's)*: I can tell you that our rates are abysmal at Seattle Children's. We've started to analyze this measure internally, and I think more discussions like this will help persuade clinicians to rethink their dosing practices. Our initial compliance rate for NMB monitoring was only 18%. We have since increased it to over 80% through focused efforts, but there's still room for improvement.
- *Morgan Brown (Boston Children's)*: I just pulled our numbers at Boston Children's, and we actually did better on this metric than I expected. However, I still have concerns about the rationale behind this measure. I think quantitative monitoring devices in infants are still unreliable. We've tested multiple devices, and for patients who don't respond well to qualitative monitoring, the quantitative methods haven't been significantly better.
    - *Vikas O'Reilly-Shah (Seattle Children's)*: I agree. These devices can be finicky, and I don't always trust the values they display. That said, I do think they have a place in encouraging better monitoring habits, even if the absolute numbers aren't perfect.
- *Morgan Brown (Boston Children's)*: Right, and to the point made earlier—package insert dosing for sugammadex is often inadequate in neonates and infants. I frequently find myself giving a higher dose than recommended to ensure effective reversal.
- *Charles Schrock (St. Louis Children's):* I had one more recommendation regarding exclusion criteria. Currently, patients who remain on sedative infusions post-extubation are excluded, but I question whether that's appropriate. For example, at my institution, we have a significant number of patients on dexmedetomidine post-extubation, especially for cases like neurosurgery or post-cardiac catheterization, where surgeons want patients to remain calm and avoid stress on sutures or puncture sites. Should these patients really be excluded? If they are extubated, we should assume they were appropriately dosed and monitored, regardless of whether they're still receiving sedation.
    - *Meridith Wade (MPOG)*: That's a great point. Right now, our best algorithm for excluding patients who remain intubated relies on sedative infusions, but we're actively working on a phenotype to better capture these cases. Once that's developed, we can replace the current exclusion method with something more accurate. I'll update the committee when that's ready.
- *Charles Schrock (St. Louis Children's):* That makes sense. Since this measure evaluates the first action of anesthesia, it's not critical if a few patients remain intubated post-op, but we should avoid unintentionally excluding extubated patients who received sedation.
- *Nirav Shah (MPOG Director):* I had a question about dose adjustments for longer cases. Morgan, you mentioned earlier that if a case is expected to last longer, you may intentionally use a higher initial dose. Would it make sense to exclude long cases from failing the measure, given that higher dosing might be justified?
    - *Morgan Brown (Boston Children's)*: Personally, I think that's reasonable. If I know a case is going to be three hours or longer, I'll typically give a higher dose upfront rather than having to redose frequently.

- *Wes Templeton (Wake Forest):* I completely agree. I think it would be more useful to **normalize dosing per hour**, rather than focusing on total milligrams per kilogram. We actually used that method in one of our published studies on residual neuromuscular blockade, where we measured mg/kg/hour instead of total dose. Here is the reference for the manuscript we published looking at risk factors for residual neuromuscular blockade following neostigmine for primary reversal where we normalized Roc dose by time. https://pubmed.ncbi.nlm.nih.gov/35438816/
- *Morgan Brown (Boston Children's)*: Yes, and just to clarify—I have no problem with a 1.2 mg/kg dose in neonates or infants. That's a reasonable amount, especially for long cases. The real issue is whether we're using thoughtful, case-specific dosing instead of just relying on reversal agents.
- *Cathie Jones (Boston Children's):* I feel similarly. Sometimes I give a larger initial dose because I want to avoid trainees giving an intubating dose again later, which happens surprisingly often. I also think that overdosing on repeat doses is a bigger concern than a single slightly higher induction dose.
    - *Vikas O'Reilly-Shah (Seattle Children's)*: That's a great point, and I think it reinforces the idea of dosing per hour rather than total mg/kg. Did your review, Dr. Schrock, find any literature supporting a specific mg/kg/hour target?
    - *Charles Schrock (St. Louis Children's):* Not really. That's one of the challenges with this metric—it's based on limited data. The study we used for justification suggests that higher doses correlate with worse respiratory outcomes, but there's no clear cutoff point for safe dosing over time.
    - *Wes Templeton (Wake Forest):* In our study, we found that doses over 0.5 mg/kg/hour were associated with higher rates of residual blockade, based on failure of neostigmine reversal.
- *Vikas O'Reilly-Shah (Seattle Children's)*: That's really interesting. Since we're at time, let's move this discussion to Basecamp. It sounds like there's interest in modifying this measure, but we need to agree on the best approach.
- *Meridith Wade (MPOG)*: Should we do a quick vote to get a sense of where people stand? Okay, I've launched the poll. Please vote.
    - Continue as is
    - Modify the measure (specific changes TBD)
    - Retire the measure
- **Next Steps** Results are in—the majority want to modify the measure. So we'll follow up in Basecamp to discuss specific adjustments.



- *Vikas O'Reilly-Shah (Seattle Children's)*: Sounds good. Now, let's move on to glucose management in pediatrics. Dr. Gupta, you have the floor.

Hyperglycemia Management in Pediatrics
Dr. Ruchika Gupta (University of Michigan)

48:40**:** Thanks! I wanted to bring up the hyperglycemia management measure in pediatrics because we've noticed a lot of confusion about how it applies to kids.

Currently, GLU-11 applies to all patients over 12 years old, and it requires intervention if a glucose reading is over 180 mg/dL and remains high on repeat testing. At our institution, we realized that there's no real consensus on what to do for non-diabetic pediatric patients with transient hyperglycemia.

We all agree that hyperglycemia isn't ideal, but when we see a single reading of 180 in a non-diabetic child, there's no clear guidance on whether we should treat it or just monitor. For example, in a cardiac patient, following our standard protocol resulted in their glucose dropping from 180 to 70 within an hour, which seemed overly aggressive.

I couldn't find any high-quality evidence on how to manage non-diabetic intraoperative hyperglycemia in pediatrics. There's a lot of data on postoperative hyperglycemia and ICU outcomes, but that's not necessarily relevant to a single intraoperative reading.

So, my question is: **Should we revisit whether pediatric patients should be included in Glucose 11? Should we create a pediatric-specific hyperglycemia measure instead?**
Discussion:

- *Morgan Brown (Boston Children's)*: I think there was an effort at some point to align pediatric and adult metrics, which is probably why this got included. But I agree that the intraoperative context is different, and the current threshold of 180 may not be appropriate for children.
    - *Ruchika Gupta (University of Michigan)*: Exactly. In my own practice, if I see a glucose of 180, I recheck it. If it's 200 or higher, then I start thinking about intervention. But requiring treatment at 180 seems too aggressive, especially in a non-diabetic patient.

    - *Bishr Haydar (University of Michigan):* If memory serves, there's a PCCM article from last year linking hyperglycemia with worse outcomes, though I think it's related to residual confounding (high glucose resulting from organ injury, not causing it). Not intraop data.
- *Vikas O'Reilly-Shah (Seattle Children's)*: Would it be reasonable to exclude pediatric patients from GLU-11 and work on a separate pediatric-specific measure?
- *Kimberly Finch (Henry Ford Health):* Do we even routinely check glucose in all pediatric patients?
    - *Ruchika Gupta (University of Michigan)*: No, only in specific cases—cardiac, long procedures, neuro cases, and some bowel surgeries.
- *Morgan Brown (Boston Children's)*: I think the issue isn't just a lack of a protocol—it's that each case is so different. We may need to consult endocrinology intraoperatively instead of applying a one-size-fits-all rule.
- *Vikas O'Reilly-Shah (Seattle Children's)*: Let's do a quick vote—should we exclude pediatric patients from Glucose 11 and develop a separate pediatric hyperglycemia measure?
- *Meridith Wade (MPOG)*: Poll results are in—the majority (11/11) **support excluding pediatrics from GLU-11 and instead build a new pediatric-specific hyperglycemia measure.** We'll implement that and update the group.

Wrap Up:

- 61:00: *Vikas O'Reilly-Shah (Seattle Children's)*: Thanks, everyone! Our next meeting is June 23rd at 4 PM Eastern / 1 PM Pacific. See you then!

Meeting Concluded @ 1702