# MPOG Pediatric Cardiac Subcommittee

Meeting Minutes – November 4, 2024

**Attendance:**

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| *Morgan Brown, Boston Children's* | *Meridith Wade, MPOG* |
| *Viviane Nasr, Boston Children's* | *Ruchika Sharma, University of Virginia* |
| *Michael Kuntz, Vanderbilt* | *Bishr Haydar, University of Michigan* |
| *Bevan Londergan, Vanderbilt* | *Faith Ross, Seattle Children's* |
| *Thomas Long, Vanderbilt* | *Juliana Clark-Wronski, University of Chicago* |
| *Kirsten Groody, University of Michigan* | *Kate Buehler, MPOG* |

*\*Denotes participant from non-active MPOG Institution*

**Start: 1530**

The pediatric cardiac subgroup first met in February, where they identified the need to develop a cardiac procedure phenotype specific to pediatrics, as the current adult cardiac phenotype is not suitable for pediatric cases.

**Phenotype Refinement and Categorization:**

- Aligning with STS procedure categories for cardiovascular and non-cardiovascular surgery with/without bypass.
- Meridith and MPOG programmers have been focusing development efforts on identifying cardiopulmonary bypass cases which is proving more difficult than anticipated.
- Sites are advised to ensure their data is correctly mapped to the primary bypass concepts for accurate algorithm performance:
    - 50410 Cardiopulmonary bypass initiated (full).
    - 50412 Cardiopulmonary bypass -- perfusion start.
    - 50346 Vascular - Aortic cross clamp on

**Metric Prioritization and Feasibility:**

- Aim is to build specific Quality Improvement (QI) metrics using a uniform cohort for accurate measure building.
- Acknowledgement of practical limitations in data availability and accuracy.
- Suggestion to start with metrics similar to adult cardiac measures for ease of implementation.
- Importance of understanding process and structure before defining outcomes.
- Potential metrics of interest discussed:
    - Early extubation rates in the OR
    - Reintubation rates in the OR
    - % of peds cardiac patients extubated early and received multimodal pain management

- o   CPB cases: Opioid equivalence, block usage
- o   % of peds cardiac bypass vs. non-bypass cases with AKI
- o   Glycemic management
- o   Hyperthermia avoidance

**Action Items:**
1. Work on refining the pediatric cardiopulmonary bypass start phenotype.
2. Apply CPB logic to the pediatric cardiac procedure type phenotype; publish.
3. Conduct data variation analysis to identify potential metrics using the new phenotypes.
    - o   Consider starting with metrics such as pain management, AKI, early extubation to see how clean the data is.
4. Morgan and Meredith to coordinate offline and set up a meeting for the whole group in January 2025 to review the data variation.
    - o   Finalize selected metrics in January to begin development in February 2025

**Meeting Concluded: 1601**

*Morgan Brown (Boston Children's)*: We had our first meeting last February and tried to come up with a few short-term goals. One of the things we realized was that the way the adult cardiac group has set up their overall phenotypes didn't really work well for how we generally think about our cases, for example, how groups like the STS sort of group our cases.

Meredith has done a lot of work on developing a pediatric-specific cardiac phenotype. We then realized that we needed to figure out what defines a cardiopulmonary bypass (CPB) case, as that had not specifically been done before. She is working on that and we're still tweaking it a little but are much better at identifying which cases that were on cardiopulmonary bypass, using a combination of factors, including large doses of heparin, protamine and other indicators to determine whether it was a case on bypass.

*Meridith Wade (MPOG):* Going through the data, there are a handful of cases that are missing these key timestamps. So, if you know your site's variable mapper, it's worth double-checking that these are mapped so that they come over to MPOG to help with the algorithm.

*Morgan Brown (Boston Children's)*: The STS description of the phenotypes include a combination of cardiac vs. non-cardiac procedures with and without CPB. As mentioned, we've been working on refining the CPB phenotype. This should allow us to refine the other procedure categories into cardiovascular without bypass, which would include things like coarc repairs, PDA ligations, those kinds of things, and non-cardiovascular surgery with cardiopulmonary bypass use, which is a very small group of patients. The idea is to build specific QI metrics for these cohorts. If we have a big, messy population, it's hard to build any measure to look at. With the current MPOG data, you might find cases that just don't apply. So we're aiming for a uniform cohort.

**QI Measure Development**
*Morgan Brown (Boston Children's)*: As part of the CCAS Quality and Safety Committee, we tried to come up with thoughts about important quality metrics for cardiac anesthesia in pediatrics. We developed these five items after reviewing all available data, with authors voting to determine what could be a considered quality metric—a vague concept since there's much more data in adults and some in pediatrics, but very little specifically in pediatric cardiac surgery.

- Use of a structured handover in the intensive care unit
- Use of an infection prevention bundle
- Use of Blood conservation strategies
- Early extubation of cardiopulmonary bypass cases
- Cardiac arrest under the care of a cardiac anesthesiologist

We realized there are many other possible metrics, although not all supported by data. There are structural metrics

- Structural
    - Duration of anesthesia-ready time
    - On time case starts
- Process
    - Antibiotic Choice and timing
    - Use of ultrasound for line placement
    - Glycemic Control
    - Thermoregulation
- Outcomes
    - Intraop Cardiac Arrest
    - Early extubation
    - Reintubation
    - Hospital Readmission

If we look at what the adult cardiac group has developed, they have a list of metrics and are deciding on their next one to build. They've focused on antibiotics, acute kidney injury, colloid use, glycemic control, and temperature management. These could also be potential targets for our pediatric group, although we may need to refine these metrics for pediatric use.

- ABX-02-C: Documentation of antibiotics administered before surgery start
- ABX-03-C: antibiotic redose initiated within four hours after initial antibiotic administration (cephalosporins only)
- ABX-04-C: Vancomycin, Cephalosporin or Aminoglycoside administered preop or intraop
- ABX-05-C: Composite Case must pass ABX-02/03/04
- AKI-02-C: more than a 1.5x increase in baseline creatinine within 7 postoperative days or the baseline creatinine level increases by ≥ 0.3 mg/dL within 48 hours postoperatively
- GLU-06-C: Hyperglycemia The highest blood glucose was maintained at ≤ 180 mg/dL, or Glucose >180mg/dL that was rechecked within 30-minutes and found to be ≤ 180mg/dL.
- GLU-07-C: Hypoglycemia The lowest blood glucose was maintained at ≥ 70 mg/dL, or Glucose <70mg/dL that was rechecked within 15 minutes and found to be ≥ 70mg/dL.
- GLU-08-C: Hyperglycemia Treatment any blood glucose measure ≥ 180mg/dL was either treated with insulin or rechecked and found to be <180mg/dL within 30 minutes.
- TEMP-06-C: Core temperature at the end of the case < 35.5° C (or 95.9° F).
- TEMP-07-C: Core temperature >37.5° C (99.5° F) for more than 5 consecutive minutes while on CPB

Meridith created this slide to help us understand what we can and can't do with the data, and how easy or challenging it might be. First, there's the programming effort required to identify cases. Our documentation isn't always clear and varies between institutions, making it a challenge to combine all the data accurately. Then there's the reliability of the data itself. Some data are recorded consistently, while others, like the amount of crystalloid used in bypass cases, may be unreliable, making it hard to build a metric. So while it's good to aim high, we need to be practical about what data is actually available and recorded well when considering what metrics to build. So basically, we wanted to have some discussion with everyone about what you all think about potential targets for metrics. Meredith suggests MPOG can build one or two metrics in 2025. So the question is, considering our phenotype for

pediatric cases undergoing cardiopulmonary bypass, what metrics would be helpful or of interest to you?

*Michael Kuntz (Vanderbilt):* I'm chewing on a couple of things. I'm leaning towards **extubation**, particularly early. I feel like that's a very hot topic, probably low-hanging fruit, relatively speaking, in an IT build-out. I don't want to speak to the folks that actually do that behind the scenes. I kind of wonder what the utility of that is because I feel like it's a very kicked-around topic right now. But I also feel like, you know, what is the true benefit of that? I always ponder about **renal injury** because I see a lot of my MPOG reports always laden with some amount of post-operative renal injury information, and I never know how to conceptualize that, given our patient population and what they go through.

*Morgan Brown (Boston Children's)*: Yeah, I agree with you. The extubation, the benefit really, in my mind in some of these, is we'd be able to get benchmark data from all these other institutions that are participating, right? So things like renal injury would be potentially very interesting, Because at least we'd be able to compare our rates of renal injury to everyone else within this small population. It's still not perfectly adjusted since, you know, cases at one institution may not be the same as another, but at least it would make you start to look at your own patients. If you're a group that has a much higher rate than another one.

*Bishr Haydar (University of Michigan):* In regards to renal injury you have to control for peritoneal dialysis, since ours is not a site that uses peritoneal dialysis. Certainly, it can have a big impact and then modified ultrafiltration can pull off more volume than creatinine, so it can cause a slight creatinine bump depending on how it's run. But anyway, you know, I think about outcomes that are most closely tied to real-world patient experience outcomes things that they care about would be most relevant. So **antibiotic choice and timing**, although it is boring, is certainly tied to things like SSI. We've all had patients with SSI CLABSI, some of which, you know may be attributable to our care directly if we're sloppy around lines. So **things that directly impact patient experience** are most interesting to me. If we're capturing **reintubation in the OR**, then I think that could potentially be interesting. You know, if we had an approach like the ICU where we should have some **failed extubations**. Otherwise, we're not being aggressive enough. So, a reintubation rate that's zero is kind of a lower quality, a lower value than say, a reintubation rate of 5% or something like that. So that's where my attention goes.

*Viviane Nasr (Boston Children's)*: Yes, we're all interested in outcome. But I think when you're going to look at the outcome, you really want to understand the process and the structure to make sense of the outcome. I am in favor looking at things that we collect appropriately before we start defining outcomes necessarily. If I'm going to look at cardiac arrest or hospital readmission, I'm going to try to define predictors, or am just going to look at incidents. If you're just looking at incidents, that's fine. But if you are going to start looking at risk factors and the process of collecting some of the data like **glycemic control, thermoregulation** is not maybe there, then I don't know how you would link them. For patients on CPB, glycemic control is something that is frequently discussed

*Morgan Brown (Boston Children's)*: Yeah. And the adults have strong feelings on it, and I know at least when you pull our own data, you can see there's a fair bit of variation.

*Viviane Nasr (Boston Children's)*: Yeah, temperature management on bypass is also very variable.

*Faith Ross (Seattle Children's*): The other thing, I think, would be interesting if we have — I'm not sure about the quality of data, maybe a limiting factor — but you know, **cerebral insults**. Which you could then look at, you know, risk factors for that, including **pressure on bypass**, NIRS and anemia, and how they contribute.

*Morgan Brown (Boston Children's)*: Yeah, no, I think that's true. It's a little challenge right now. They only — we only have data for a few hours after surgery, so we wouldn't be able to catch all cases of stroke, for example, but we could certainly look at the **components that contribute to cerebral injury**. I know, at least when the adult groups have looked at, you know, the **hyperthermia** issue. It was surprising to some of them, because, I don't know, we at least here we're very strict about our rewarming protocols and allowing patients to get too warm, for example. But that was not consistent amongst different centers whatsoever.

*Viviane Nasr (Boston Children's)*: Again, for some of the adult cardiac. Would it be easy? I know you showed a diagram about what's easy and what is going to take more time. That's another way to think about them, right?

*Morgan Brown (Boston Children's)*: Yeah, I think — and I don't actually do this programming. So I don't know entirely how much effort each individual one might be, but it would give us some of those adult ones do give us at least a starting point where we can then edit what they've decided on rather than starting from complete scratch.

*Meridith Wade (MPOG):* Yeah. And sometimes we just don't know until we start trying like the bypass start phenotype. When I started cleaning that, I thought it would be pretty straightforward, and that everyone just documented it. And it's not the case at all. It's taken three or four months of cleaning. So sometimes you just don't know but like Morgan said if we do something very similar to what the adults have done, the code's kind of already there, so it makes it a little simpler.

*Kirsten Groody (University of Michigan):* I think there's been some adult MPOG work done in like **benzodiazepine use**. I don't know if that would be of interest at all, or even **pain control**, just looking at variation across institutions and more practice patterns, not so much outcomes, but just sort of what other places are doing.

*Morgan Brown (Boston Children's)*: Yeah, I don't think they've — They've talked about some of those. I know there would be. I mean, one could do things that are like what STS in theory can do for us like we could look at **block usage** or those kinds of things, because those things, I think, should be able to be captured. I just don't know if anyone's actually tried to do that for a quality metric. And I'm sure you could look at the **opioid use for cardiopulmonary bypass cases**.

*Morgan Brown (Boston Children's)*: And yes, there's been multiple papers in the adults where they're — seems like there's a group of anesthesiologists who feel like Benzodiazepine should be avoided at all costs in elderly patients, although, if I recall, I think their studies so far have been somewhat negative on any findings of benefit of that strategy.

*Meridith Wade (MPOG):* Yeah, we do have opioid equivalency metrics. They're not as forward-facing on our dashboard. But that's not to say that we couldn't create some — a different metric surrounding that and put it on the dashboard to kind of look at variation across sites.

*Morgan Brown (Boston Children's)*: Yeah. And if we did it as an **opioid per kilo**, and then also perhaps considered, or at least looked at, what the data would look at per time. It might be interesting to see whether it's consist, you know what it does.

*Bishr Haydar (University of Michigan):* I think, for the **patients who are early extubated, the use of regional anesthesia or opioid-sparing adjuncts would be a reasonable quality measure**. Whether we're giving them the best chance for success.

*Morgan Brown (Boston Children's)*: Right. So sort of a two-pronged one of you know, who's getting, how many patients are getting extubated, and of those patients getting extubated, what adjuncts and or including regional are they getting? Is that what you're saying, Bishr?

*Bishr Haydar (University of Michigan):* Exactly right.

*Viviane Nasr (Boston Children's)*: Morgan from the ones that you had in the paper you guys published, how many of those are already captured in MPOG?

*Morgan Brown (Boston Children's)*: So, the intraop cardiac arrest is not, the infection prevention bundle is challenging in that many of those things are not well captured in the record, however, the antibiotics would fall under that. The **blood conservation strategies**, I think, is one that will also be very interesting like how many centers are using cell saver, how many centers are using TXA or other medications? Obviously, the extubation. And then and that's sort of the ones that we'd identified. The blood stuff is also fascinating. And I think that there's an enormous potential there for different metrics. I know at the adult cardiac group, they were starting to think about looking at hematocrit goals and those numbers on bypass. I'm sort of tempted to let them try to do some of that first cleaning, because I think it's going to be complex. But I think there's a lot there that we could get at that would be really quite helpful, you know. I mean, I think even we've had discussions at our centers lately about what the **ideal flow rate is and these kinds of things on bypass**. I think going forward hopefully, as we kind of are able to better understand the perfusion data and clean it up, that it will yield us some interesting information.

*Meridith Wade (MPOG):* So I guess for next steps I could could query some of the data and look at the variation in practice to see what measure might be worth going after first. I'm hoping to have it done in December, so with the holidays, maybe we meet to review the data of interest at the beginning of next year in January.

*Morgan Brown (Boston Children's)*: Yeah, I think, that makes a lot of sense to do it that way and show people some of this variation. And then at that meeting could then sort of finalize which ones we think we want to go after for our actual metrics. That sounds reasonable to everyone else.

*Faith Ross (Seattle Children's*): Yeah, that'd be my preference too.

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**Meeting Concluded @ 1602**