

Project Lead/Key Contact
<ul style="list-style-type: none">• Erika Yazawa, MD, Assistant Professor Neonatal-Perinatal Medicine• eyazawa@email.unc.edu• 954-288-4868
Why are you interested in the Improvement Scholars Program?
<p>Throughout my clinical training, I have participated in several quality improvement (QI) projects, including initiatives to increase flu vaccination rates at a community pediatric clinic and implementation of postpartum depression screening for caregivers of NICU patients. These experiences have fueled my passion driving meaningful improvements in neonatal care. Currently, I am leading a QI project focused on reducing unplanned extubation rates in the NICU. As junior faculty, I am seeking to develop expertise in QI methodology and leadership to effectively implement sustainable positive changes and improve patient outcomes. The Improvement Scholars Program offers a valuable opportunity to gain the skills necessary to lead impactful QI initiatives. I believe this program's structured learning, mentorship from IHQI coaches, and collaboration with project managers provide a unique support system that will be instrumental in advancing my growth as a quality improvement leader.</p>
Problem Statement: What is the problem you are looking to solve?
<p>Unplanned extubations (UEs) are a serious and preventable adverse event in the NICU, contributing to increased patient morbidity and higher healthcare costs¹. UEs are associated with immediate complications including rapid cardiopulmonary deterioration, need for resuscitation, airway trauma, and need for emergent reintubation which subsequently increases the risk for prolonged mechanical ventilation, infection, and prolonged hospital stays². The NCCC NICU is a 74-bed unit that cares for infants from 22 weeks gestation through their first year of life. The critically ill neonatal population faces unique risks for UEs including prolonged duration of intubation, shorter tracheas, use of uncuffed endotracheal tubes, and limited sedation to minimize negative neurodevelopmental sequelae. UE events happen both during routine neonatal care as well as high-risk but necessary activities, such as repositioning, bedside imaging, procedures, and transport.</p> <p>The incidence of UE across NICUs varies widely from 0.14 to 5.3 per 100 ventilator days, with the variation influenced by NICU size, level of care, patient acuity, and clinical practice variation³. The NCCC NICU currently has a median UE rate of 0.54 UE per 100 ventilator days, which exceeds the national benchmark of 0.384 per 100 ventilator days set by the Children's Hospitals' Solutions for Patient Safety (SPC).</p> <p>Our key outcome measure is the number of UE events in all intubated patients in the neonatal intensive care unit, excluding patients with tracheostomies. Through this project, we aim to decrease the rate of unplanned extubation events to less than 0.4 per 100 ventilator days by January 2026. Our global aim being to improve patient safety by reducing the incidence of unplanned extubation events in the NICU. Baseline data from January to December 2024 have been collected, and contributing factors are being analyzed. By identifying these factors and implementing targeted interventions, this project aims to reduce UE incidence, improve patient safety, and enhance clinical outcomes for this vulnerable neonatal population.</p>
Importance Statement: Why is this project important?

Unplanned extubations are the fourth most common adverse event in the NICU⁴. This is an important area for improvement because UEs are, to a degree, a preventable patient safety event with the potential for serious complications. Addressing this issue is necessary to align our NICU's care standards with national benchmarks for patient safety, as set by comparable children's hospitals across nation who care for large volume and high acuity neonatal populations as our own. Reducing our UE rate may lead to improved clinical outcomes, efficient resource utilization, and enhanced patient and family experiences.

Potential downsides of this effort include delays in routine activities, as new protocols or safety checkpoints during high-risk activities may initially slow down clinical workflow. Nursing staff may experience delays when waiting for a respiratory therapist to be present for additional support before initiating a high-risk bedside procedure or event. Another potential downside arises from the implementation of new ETT securement methods. Although the goal is to enhance tube stability, respiratory therapists may face an initial learning curve as they adapt to these changes, which could initially result in improper securement and an increased risk of unplanned extubations.

This project aligns with several organizational goals, including promotion of patient safety by minimizing preventable harm to our neonatal patients, achieving clinical excellence by meeting national benchmarks (such as those set by the Children's Hospitals Solutions for Patient Safety), using data-driven and evidence-based interventions thereby promoting a culture of evidence-based quality improvement, improving operational efficiency by reducing the need for emergency intubations and optimizing resource utilization.

This problem has been addressed at several high performing level IV NICUs across the country^{5,6,7}. Institutions have published their quality improvement interventions including high-risk event protocols, staff (respiratory and nursing) training on ETT securement methods, training and adherence to best practices during routine and high-risk activities (repositioning, transport), implementation of standardized protocols, post-UE huddles and real-time event analysis, non-pharmacologic interventions for intubated infants with BPD, and improved communication and awareness of UE events. The Solutions for Patient Safety network provides recommendations for standards of care, which can be used to derive site-specific UE care bundles⁸.

Project Scope

In Scope:

- *What is the specific patient population your project will impact?* This project will impact intubated neonates admitted to the NICU, with a particular focus on patients identified as being at high risk for unplanned extubation. This includes infants with a history of a prior unplanned extubation and those with critical airways, with the potential to expand interventions to additional at-risk populations as resources allow.
- *How many patients are in the population?* In 2024 there were 47 unplanned extubation events, affecting 32 patients. This intervention would impact all infants with a documented UE as well as critical airways, with the potential to expand to ELBW infants and older infants with BPD who remain intubated.
- *In what setting(s) would this problem be addressed?* The intervention will take place in the NCCC NICU.

Out of Scope:

While this project may raise important questions regarding broader systems issues, such as sedation practices or extubation readiness assessment/protocols, these will not be primary intervention targets in this project.

Measures: (Process, Balancing, Structure)

Erika Yazawa, MD, Neonatologist
ISP Application

04/14/2025

Please describe the anticipated outcome measure(s), 2-3 process measures, and one balancing measure. Please do not include more than 5 measures total.							
Measure Name	Measure Type	Measure Calculation	Measure Exclusion	Data Source	Baseline	Goal	Collection Frequency
UE Rate	Outcome	Number of UE events/100 ventilator days, displayed on a run chart	Infants with tracheostomies	RT documentation of UE events	.54	0.40	Monthly
Days since last UE event	Outcome	Number of days since last UE event, displayed on a G chart	Infants with plug-related UE event	RT documentation of UE events	X	Y	Daily/Weekly
%High risk patients with signage at bedside	Process	#high risk patients with appropriate signage at bedside/total #high risk patients	Not yet determined	Weekly ETT audit/rounds to verify adherence to guidelines, presence of adequate signage at bedside	X	Y	Weekly
%Intubated patients with risk category documented	Process	#intubated patients with risk category documented/total # intubated patients	Not yet determined	Weekly ETT audit/rounds	X	Y	Weekly
Delays in patient care	Balancing	#events during which patient care was delayed due to waiting for second caregiver to arrive at bedside to assist with patient care	Not yet determined	SAFE reports by nursing	X	Y	As indicated

Root Cause Analysis

What do you think are the underlying causes of the problem? Why do you think the problem is happening?

I think that the underlying causes fall into two general categories: individual patient risk and system-level practice failures. From an individual patient perspective, factors that contribute to higher risk include small size, use of uncuffed ETTs, shorter airways, prolonged intubation, use of minimal sedation to avoid negative neurodevelopmental sequelae, presence of copious secretions that can lead to loosening of ETT tape, and

complex/difficult airway anatomy, among others. From a system-level perspective, factors that contribute to UEs include variation in ETT management during routine or high-risk bedside activities. As an example, intubated infants must undergo care times, baths, linen changes, xrays, procedures, and repositioning for transport – there is inconsistent presence of a respiratory therapist at the bedside for these events to assist with airway management during activities that may result in an unplanned extubation event. Furthermore, there is a lack of risk stratification and identification of patients and activities that pose a higher risk for UEs. There are communication gaps and unclear delineation of roles during high-risk activities that further increase the likelihood of UE events. The multiple UE events reflect a broader issue of practice variation, insufficient situational awareness, and missed opportunities for risk mitigation in intubated patients who are all at risk for unplanned extubations.

Beyond the scope of this project are several related issues that may contribute to UEs and warrant future exploration. These include extubation readiness assessments—are some infants self-extubating because they should have been extubated earlier? Should we consider more proactive extubation practices, such as extubating overnight rather than waiting until morning? Additionally, are we providing sufficient non-pharmacologic support for older intubated infants with BPD, particularly those who are weaning off or no longer receiving sedation? Are there infants, such as post-operative patients, who may be receiving inadequate sedation and should we incorporate reporting and targeting particular State Behavioral Scale (SBS) scores into rounds? These areas represent important areas for potential future quality improvement work.

Ideas for Improvement

What ideas do you have for changes that will result in improvement?

Key interventions that aim to enhance communication, promote a culture of airway safety, and implement a workflow for risk mitigation include:

- Process for identification of patients at high risk for UE through the addition a prompt to the current UE document
- Risk stratification with visual indicators at the bedside and on the NICU census board to prompt additional precautions
- Requiring two caregivers to be present for high-risk infants and high-risk activities
- Weekly ETT audits (added to current CLABSI, CAUTI rounds)
- Guidelines for ETT securement with tape including step-by-step instructions, accompanying photos, adequate positioning for x-rays to ensure adequate ETT assessments on imaging
- Unit-level awareness tools, such as “days since last UE” displays, monthly reporting, and post-UE huddles
- Development of an EPIC smart form for standardized UE documentation, digitizing and replacing the current paper documentation process for improved data collection and tracking

Risks and Opportunities

What factors do you anticipate will foster improvement? Interdisciplinary collaboration among nursing, respiratory therapy, and medical teams. RT/nursing currently participating in purple belt with this project, which will promote autonomy and a sense of ownership in the project. Divisional and departmental leadership support this project and believe it aligns with institutional goals. Clear visual cues will enhance consistency with workflow as they may serve as a bedside reminder. Data transparency (ie displaying days since last UE) to promote awareness and motivation.

What are the major challenges you anticipate? Anticipate there may be workflow disruption, as routine and high-risk activities will requiring additional staffing. For example, if two-person handling is required during these previously described activities, instead of proceeding right away with a task, a nurse will have to wait for an RT or other caregiver to assist with the activity, potentially causing delays to their workflow in patient care. There may be slow adoption of standardized practices. There may also be a lack of consistent use of the visual indicators at the bedside, this will require RT to get the sign, complete it, and place it at the bedside.

Stakeholders and Project Team Members

- *Who are the key stakeholders in your system and processes?*
- *Who are the key project team leaders to design and implement change?*

Name	Role
Misty Good, MD	<i>Sponsor(s)</i>
Erika Yazawa, MD	<i>Team Lead</i>
Nora Hardenberger	<i>Subject Matter Expert, Respiratory Therapist, NICU RT lead</i>
Lindsay Lawson	<i>Data Lead, RT lead</i>
Melissa Bisher	<i>Respiratory therapist, RT educator</i>
Christy Rowe	<i>Respiratory therapist, PICU</i>
Shannon Heath	<i>NICU nursing lead (CN3)</i>
Kate Carver	<i>NICU nursing lead (CN3)</i>
Catherine Cunningham	<i>NICU physical therapist</i>
Katie Clement	<i>PICU MD</i>

Impact on the Quintuple Aim

- *Improved health:* Preventing UEs improves clinical outcomes by avoiding complications such as bradycardia/desaturation events, the need for reintubation, and potential risk for airway trauma with reintubations.
- *Enhanced patient experience:* Minimizing UEs reduces potentially painful interventions and promotes physiologic stability which is critical for high-risk infants.
- *Enhanced clinician and staff experience:* Standardized processes, risk stratification, and visible communication tools serve as reminders/guides for staff to employ practices that can mitigate high risk activities, without having to remember to do these things amongst the many tasks that need to be done in providing patient care.
- *Health equity:* Data is being stratified by race and gestational age to identify potential disparities in UE rates. I suspect that the etiologies for UE are very different for small, ELBW infants as compared to older, larger infants with BPD. This may inform targeted improvement efforts to ensure all infants receive safe, equitable care.
- *Reduced costs:* Preventing UEs may avoid the need for potential resuscitation and associated medications/supplies, prolonged ventilation, or extended NICU stays.

Sustainment Plan

- *What ideas do you have for sustaining the improvement?* Plan to embed changes into existing workflows, such as adding UE prompt to identify patients at high risk and risk indicators to the census board/bedside/potentially EMR. Education will be reinforced through periodic training, given frequent turnover of RT/nursing staff. We will monitor adherence through ongoing audits and incorporate UE events into post-event debriefs to promote continuous learning.
- *How do you see the work you start with IHQI's support continuing?* With IHQI's support, we aim to build a foundation of interdisciplinary teamwork, a new workflow for risk stratification of UE risk, increased measures to mitigate activities that may lead to UE events, and digitizing the data collection process. Successful components may be scaled to other areas or shared with collaborative networks.

Carolina Quality Tools

How will Carolina Quality tools (Just Culture, SAFE reporting, TeamSTEPPS, huddles, and visual management boards) be used to support the work? Although use of these tools is not required, applications including them will be strengthened.

Post UE huddles involving the nurse, RT, and medical provider will be used to review the event, including the circumstances and suspected etiologies or factors that contributed to the UE event. Visual management boards, specifically our NICU census board, will display icons to quickly identify patients at high risk for unplanned extubation, ensuring real-time situational awareness. SAFE reporting will be encouraged for all UE events to support non-punitive, transparent awareness of events. Lastly, TeamSTEPPS strategies such as SBAR and closed-loop communication could be promoted during high-risk activities like repositioning or transport to reduce miscommunication and prevent UEs.

References

- Sponsor letters, see separate letter of support – Misty Good, MD
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 2. Pavlek LR, et al. Short-term complications and long-term morbidities associated with repeated unplanned extubations. *Journal of Perinatology*. 2021.
 3. Lucas da Silva PS, et al. Unplanned extubation in the neonatal ICU: a systematic review, critical appraisal, and evidence-based recommendations. *Respir Care*. 2013.
 4. Sharek PJ, Horbar JD, Mason W, et al. Adverse events in the neonatal intensive care unit: development, testing, and findings of an NICU-focused trigger tool to identify harm in North American NICUs. *Pediatrics*. 2006; 118:1332–1340
 5. Mahaseth M, et al. Reducing Unplanned Extubations in a Level IV Neonatal Intensive Care Unit: The Elusive Benchmark. *Pediatric Qual Safety*. 2020.
 6. Ahn E, Cullen SM, et al. Reducing NICU Unplanned Extubations from Tube Dislodgement. *Quality Reports*. *Pediatrics*. 2024. 153 (6).
 7. Galiote JP, et al. Reduction in Unintended Extubations in a Level IV Neonatal Intensive Care Unit. *Quality Reports*. *Pediatrics*. 2019. 143 (5).
 8. Klugman D, Melton K, Maynard PO, et al. Assessment of an Unplanned Extubation Bundle to Reduce Unplanned Extubations in Critically Ill Neonates, Infants, and Children. *JAMA Pediatrics*. 202. 174(6).

Data/Figures

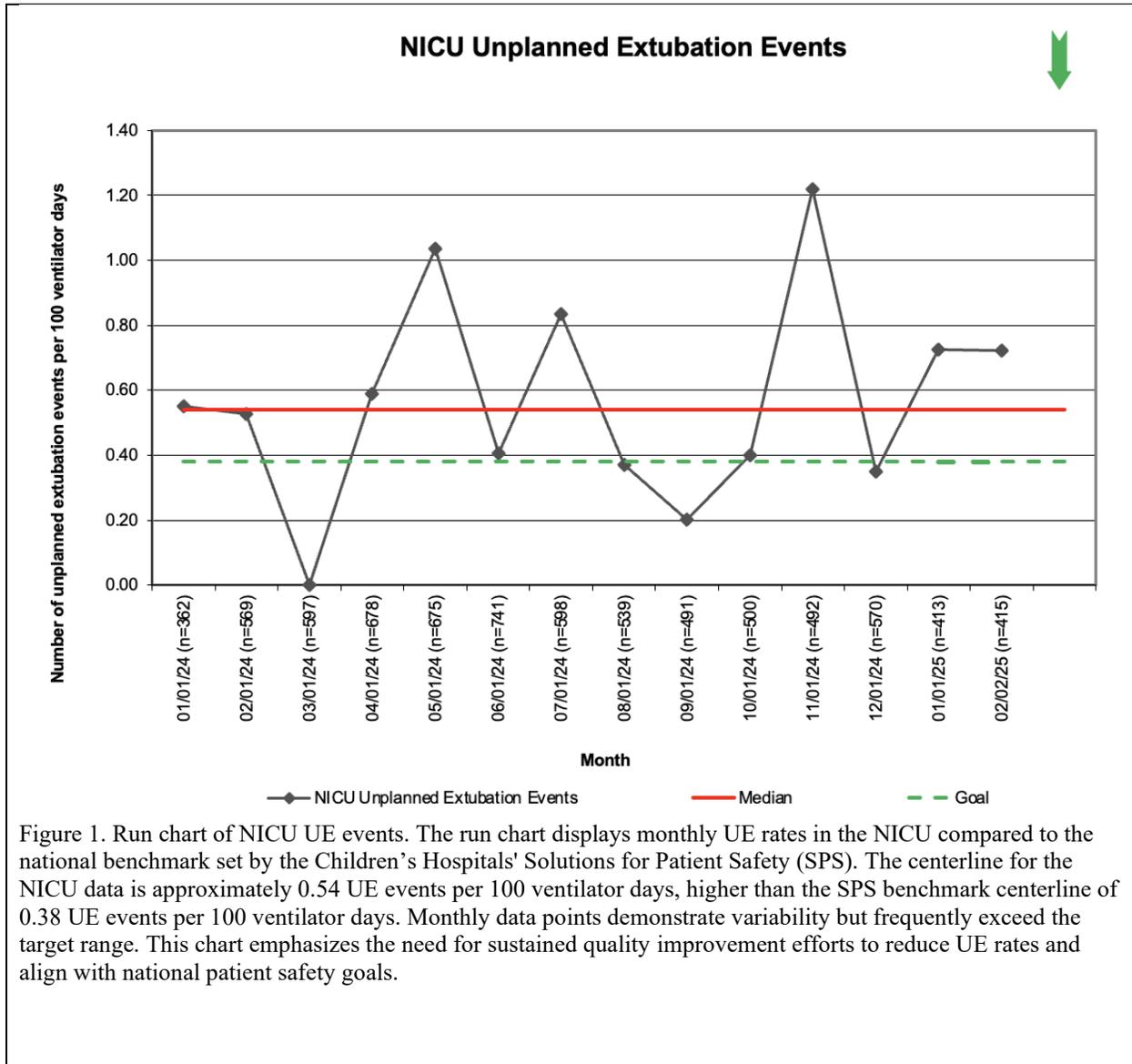
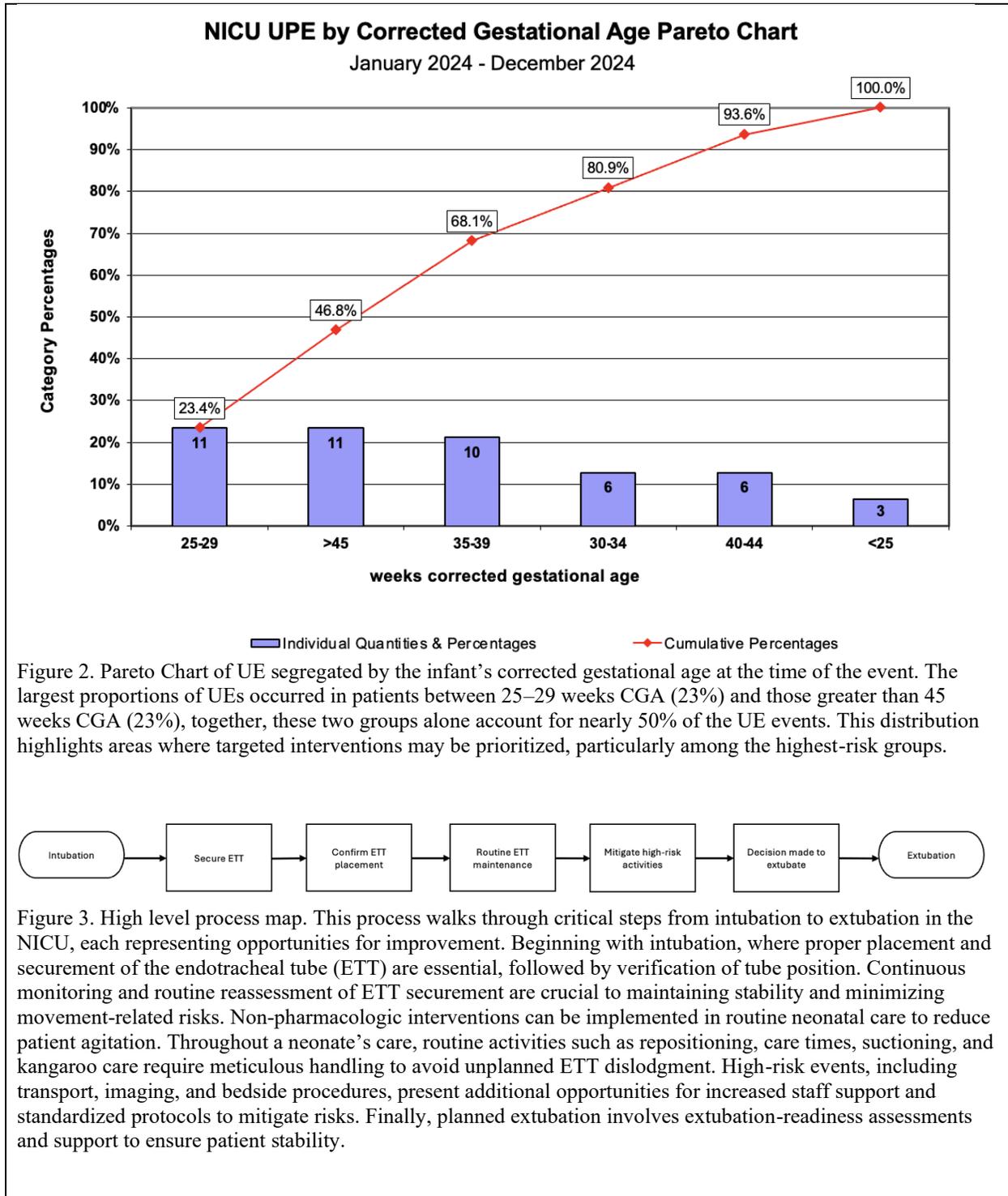
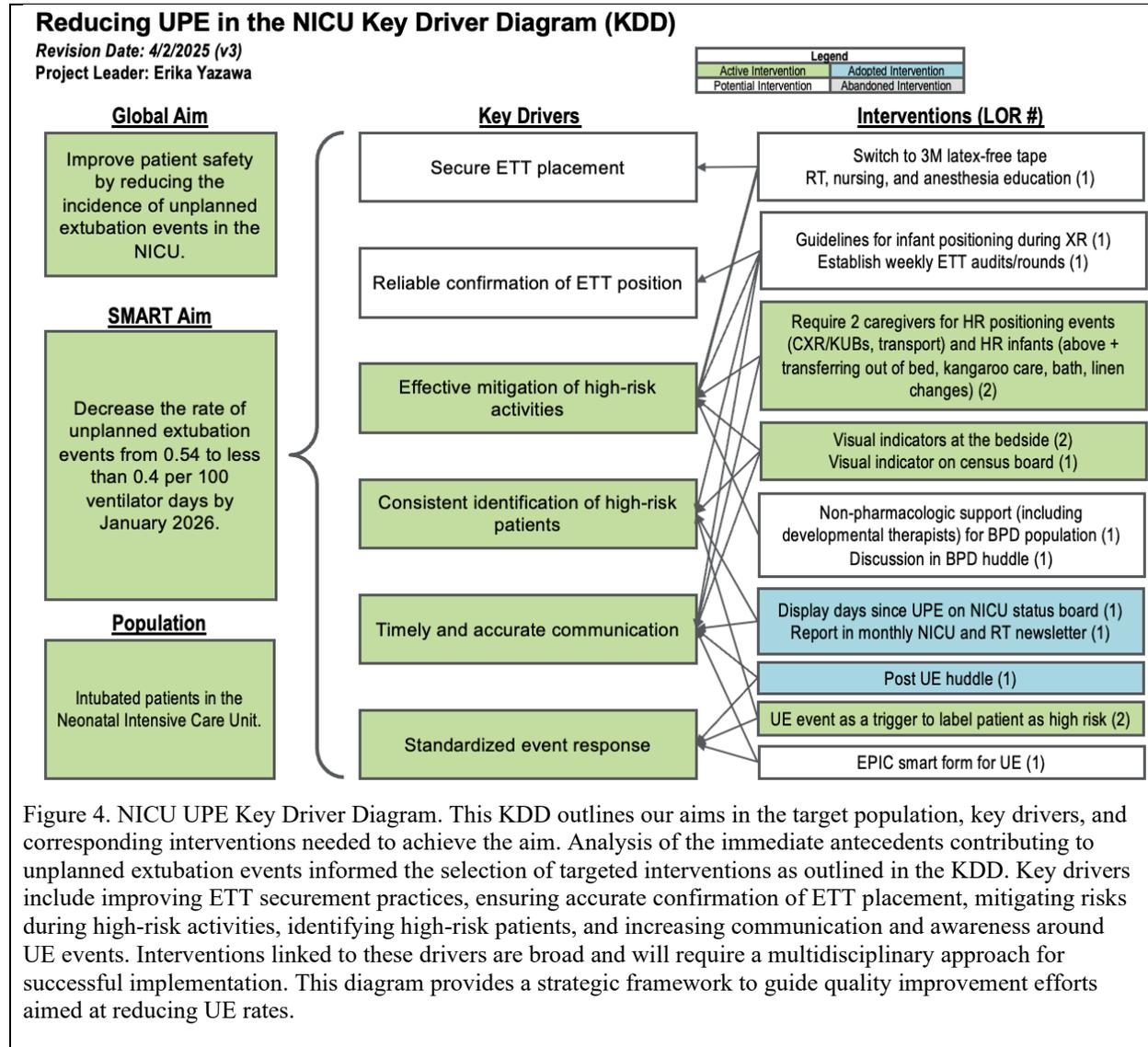
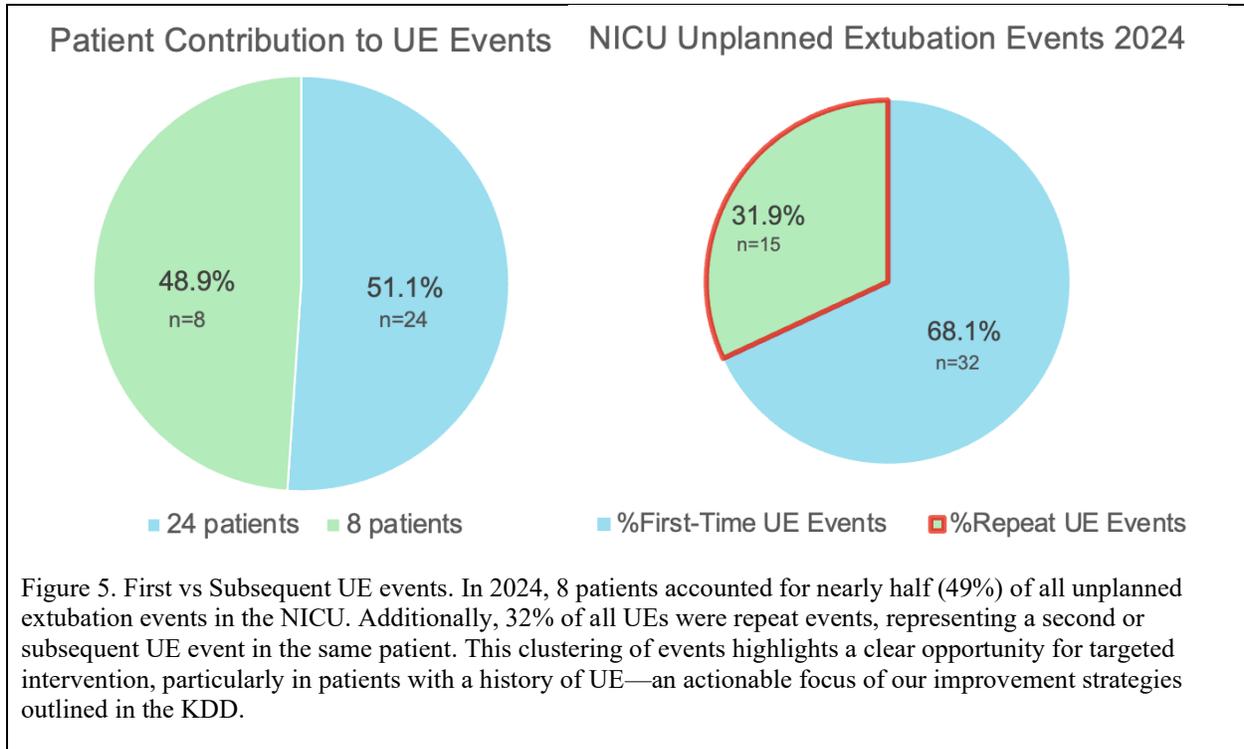


Figure 1. Run chart of NICU UE events. The run chart displays monthly UE rates in the NICU compared to the national benchmark set by the Children’s Hospitals’ Solutions for Patient Safety (SPS). The centerline for the NICU data is approximately 0.54 UE events per 100 ventilator days, higher than the SPS benchmark centerline of 0.38 UE events per 100 ventilator days. Monthly data points demonstrate variability but frequently exceed the target range. This chart emphasizes the need for sustained quality improvement efforts to reduce UE rates and align with national patient safety goals.









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Erika Yazawa, MD

April 4, 2025

Dear IHQI Leadership,

I am writing to enthusiastically recommend Dr. Erika Yazawa for the IHQI Improvement Scholars Program (ISP). Erika has been on faculty as a neonatologist at UNC Chapel Hill since 2023, during which she has demonstrated excellent clinical skills and patient care, a commitment to education, and a desire to contribute to the improvement of our unit and the care of children in North Carolina.

During her training as a pediatric resident and neonatology fellow, Erika was a driving force behind several impactful QI initiatives. Most notably, Erika led a QI initiative focused on the implementation of postpartum depression (PPD) screening for caregivers of NICU patients. This project, developed in close collaboration with social work and nursing teams, addressed a critical gap in care by establishing a workflow for PPD screening in a high-risk population. Through this effort, they were able to establish postpartum depression screening, develop and distribute educational materials and connect families with mental health resources that they otherwise would not have been able to access. Erika demonstrated leadership and interdisciplinary collaboration, key elements of effective quality improvement.

While Erika has had some foundational experience in quality improvement methodologies during her training, the ISP would provide a structured framework and toolset which would position her for success as she takes on additional leadership roles in the future. This opportunity will be able to refine her ability to identify areas for improvement, develop strategic plans, and implement evidence-based interventions while leveraging the expertise available at UNC. She has experience in basic science research and data analysis, which will serve as a valuable asset in enabling her to analyze data sets and translate insights into meaningful change.

The ISP is designed to cultivate leaders in quality improvement, and Erika is ideally suited for this opportunity. As an early-career faculty member, she is at the right stage in her career to build on her existing skills in order to take on greater leadership responsibilities, such as a medical director role in the future. She is eager to learn and apply the knowledge and skills gained from the course to develop QI projects within the UNC NICU. Erika's vision includes fostering a culture of continuous improvement, educating and training staff on QI

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methodologies, and enhancing patient outcomes through data-driven decision making. As a division, we fully support Erika's application to the IHQI Improvement Scholars Program. This opportunity aligns well with our commitment to expanding and strengthening quality improvement initiatives within our division, the neonatal intensive care unit, and represents a valuable opportunity in Erika's development as a leader in this field.

Thank you for considering Erika's application. She has my highest recommendation for the IHQI Improvement Scholars Program.

Sincerely,



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