Week 2: Neonatal Health Services Research/Quality Improvement

NICU QI and Safety II

Tuesday, June 16  4:30-6:00 pm EDT

**Moderators**
Heather Kaplan
Leon Hatch

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Note: Schedule subject to change based on presenter availability.
Aim ing for zero! Reducing unplanned extubations in a “greenfield” single-family room quaternary NICU

Background: An unplanned extubation (UE) is defined as dislodgement of the endotracheal tube (ETT) from the trachea in a patient receiving invasive mechanical ventilation at a time not specifically intended. The Vermont Oxford Network benchmark for NICU patients is <2 UE per 100 ventilator days. The rate of UE was high following activation of a new NICU service in Qatar, integrating heterogeneous practices within a highly skilled, but multinational workforce. Within a quality improvement project, factors associated with UE were identified and a “prevention of UE” care bundle was implemented.

Objective: To assess the rate of UE in NICU before and after the introduction and thus to study the effectiveness of a prevention bundle.

Design/Methods: All UE in NICU from March to November 2018 were retrospectively studied. A standardized assessment form was used to investigate each UE event and the most common risk factors for UE were identified by a multidisciplinary working group (Fig.1). Data collected included gestational age, birth weight, position of ETT, route of intubation, sedation, time of day and patient care activity at the time of the event. An UE prevention bundle was formalized and updated periodically which included a bedside ETT care checklist, risk assessment score (Fig. 2,3), uniform ETT securement along with staff education focused on positioning and management of agitation. A prospective review was undertaken following the introduction of the prevention bundle, and the UE trends over the two epochs were compared.

Results: 60 UEs occurred in 309 intubated patients throughout the study period. There was no significant difference in the demographic characteristics of the patients intubated across the two epochs. Mean duration of ventilation per patient was 6.5 days. The most common risk factors associated with UE were suboptimal sedation, lack of personnel when performing complex procedures, inconsistent ETT securement and poor surveillance of tube fixation. Following the introduction of the prevention bundle in December 2018, UE has decreased from a peak of 6.3 per 100 patient ventilated days in May 2018 to 0.7 in February 2019 and has remained consistently below the benchmark over the last 6 months (Fig 4).

Conclusion(s): Our data suggests that high UE rates in a “greenfield” NICU can be reduced and maintained by implementing a bundle of interventions supplemented by intensive staff education and surveillance to decrease variability of care practices.
Fig 1. Cause and effect diagram for UE

Fig 2. ETTCARES bedside card and Risk Assessment Score (RAS)

Fig 3. Risk Assessment Score based hierarchy of interventions

Fig 4. Trend of unplanned extubation (UE) rate from March 2018 to October 2019 including timeline of interventions

IMAGE CAPTION:
Fig 1. Cause and effect diagram for UE
Fig 2. ETTCARES bedside card and Risk Assessment Score (RAS)
Fig 3. Risk Assessment Score based hierarchy of interventions
Fig 4. Trend of unplanned extubation (UE) rate from March 2018 to October 2019 including timeline of interventions

CONTROL ID: 3382612
TITLE: Journey to Zero CLABSI
ABSTRACT STATUS: Sessioned
PRESENTER: Trishelle Lynn Himmelrick
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CURRENT CATEGORY: Quality Improvement/Patient Safety
CURRENT SUBCATEGORY: Hospital-based Quality Improvement: Neonatal
KEYWORDS: CLABSI, quality, central line.
SESSION TITLE: NICU QI and Safety II |NICU QI and Safety II
SESSION TYPE: Webinar|Platform

ABSTRACT BODY:
Background: Central venous catheters (CVC) are commonly placed in the neonatal population to deliver nutrition and life-sustaining medications but are not without risk. Central line associated bloodstream infections (CLABSI) can be linked with significant neonatal morbidity. A 2018 spike in NICU CLABSI rates prompted an all hands on deck approach to address this issue.

Objective: Decrease CLABSIs in the NICU from 1.9 to zero and sustain for one year. Decrease CVC days per patient by 15% from 0.35 to 0.30 by July 2019 and sustain for 12 months.

Design/Methods: An interdisciplinary group convened in July 2018 to begin our NICU journey to zero CLABSI. Teams were created: 1) CVC care 2) CVC dressing change 3) CVC removal, and 4) NICU environment. Teams met on a weekly basis to develop and implement action plans and report progress: 1) All nursing staff attended a required educational skills lab to demonstrate competence in CVC entry (scrub the hub), cap change, and dressing change. Blood draws from CVCs were permitted only with an order; 2) A core team of nurses and APPs were designated to change all central line dressings; 3) CVC need was discussed daily, including plans for removal at the afternoon huddle; 4) Environmental team focused on cleaning of rooms and equipment, and reeducated staff on the “hair Up, sleeves Up, and jewelry put Away” (Up, Up, and Away) NICU practice.

Results: Each team was responsible for developing a monitoring plan for compliance. 100% of nursing staff demonstrated CVC care competence and are reevaluated every 6 months. A dressing change nurse is identified on assignment sheet every shift. CVCs are discussed daily at 3pm huddle with 98% compliance. Compliance with “Up, Up, and Away” reached 85%; compliance monitoring for isolette changes and 30 day room changes is ongoing. CLABSI rates in the NICU have decreased from 1.9 to zero. The NICU sustained 14 months CLABSI free. CVC days per patient day decreased by 23% from 0.35 to 0.27 with <2% of patients requiring reinsertion.

Conclusion(s): Solving a problem in the NICU is rarely a one step process. Every contact with a CVC is a potential source for infection. Interdisciplinary engagement and education must be ongoing to sustain a change in culture.

IMAGE CAPTION:
Background: Maternal opioid use and its effects on infants have led to a 52% increase in neonatal abstinence syndrome in Illinois in the last 7 years, consistent with national trends. Best practices include a multidisciplinary approach of engaging mothers with a broad range of multidisciplinary health professionals. Individual hospitals may benefit from shared statewide resources.

Objective: To improve the care of opioid-exposed infants through a statewide quality collaborative. Initiative aims were to decrease the number of infants receiving pharmacologic therapy, to improve breastfeeding rates, and to provide a safe, coordinated discharge.

Design/Methods: The Illinois Perinatal Quality Collaborative (ILPQC) launched a QI initiative with 86 birthing hospitals of all perinatal levels from 7/19 to end 5/20. Included: Infants ≥35 weeks CGA. Excluded: Infants admitted to NICU for reasons not related to NAS. The use of various non-pharmacologic care was emphasized for all aspects of neonatal care. The assessment method (Finnegan vs. Eat, Sleep, Console) was left to the discretion of the individual hospital. A toolkit of key resources was developed by a collaborative workgroup, including a booklet entitled “Neonatal Abstinence Syndrome: What you need to know/Be with your baby/You are the treatment,” and a simulation video entitled “Engaging Mom in Non-Pharmacologic Care” to assist in team education. Additional tools include a newborn care diary for mothers. Monthly webinar meetings were held to review key areas and initiative aims. Data entered by hospital teams were immediately available using RedCap in a run-chart format for real-time QI response. Statistical process control charts were created to determine the impact of the initiative.

Results: There were 1305 opioid-exposed infants who met the study criteria (Table). 75% were Caucasian, 18% African American. 26% of mothers were on Medication-Assisted Treatment at delivery. Rooming-in increased from 37% to 55% (Figure-Panel A). Breastfeeding rates have not yet improved with a mean of 61% of those eligible (Panel B). There was a decrease in infants receiving pharmacological therapy for NAS from 29% to 17% (Panel C).

Conclusion(s): Participation in a large statewide collaborative improved care for opioid-exposed infants in rooming-in and decreased infants receiving opioid-replacement therapy. Our current efforts are focused on identifying strategies to improve breastfeeding rates. Quality improvement activities are ongoing through Spring 2020.
IMAGE CAPTION:
IMPLEMENTATION OF THE EAT, SLEEP, CONSOLE NOWS TOOL IN MASSACHUSETTS’ NEOQIC COLLABORATIVE

Elisha Wachman

Wachman, Elisha1; Houghton, Mary2; Melvin, Patrice3; Murzycki, Jennifer12; Singh, Rachana4; Minear, Susan1; MacMillan, Kathryn Dee L.5; Banville, Debra6; Walker, Amy7; Mitchell, Teresa8; Galimi-Hayes, Rose9; Jorgensen, Selena3; Remy Gomes, Daphne3; Whalen, Bonny L.10; Gupta, Munish11

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Neonatology
Neonatal-Perinatal Health Care Delivery: Quality Improvement
Neonatal Abstinence Syndrome, Eat, Sleep, Console, Neonatal Opioid Withdrawal.
NICU QI and Safety II | NICU QI and Safety II
Webinar|Platform

Background: The Eat, Sleep, Console (ESC) Neonatal Opioid Withdrawal (NOWS) care approach has been associated with decreased need for pharmacologic treatment and shorter hospitalizations in single-center quality improvement (QI) studies.

Objective: We sought to support interested hospitals in Massachusetts’ NeoQIC NOWS collaborative with adoption of ESC with a structured ESC NOWS Tool, and to assess impact of ESC adoption on NOWS hospital outcomes.

Design/Methods: Between 2016-2019, 11 of 37 NeoQIC collaborative hospitals adopted the ESC NOWS Tool. Pre-implementation, all hospitals used Finnegan scoring. Hospitals participated in ESC training workshops and webinars and received ESC implementation materials including a training manual, video, and standardized training cases. Data was collected on all opioid-exposed newborns ≥35 weeks. Time frames were shifted for analysis to align ESC adoption across all hospitals as ESC adoption occurred at different time points. Outcomes were compared in Pre- and Post-ESC cohorts using multivariable mixed effects regression models adjusting for covariate fixed effects and site-level random effects. Statistical Process Control (SPC) charts were used to examine changes in pharmacologic treatment rates and length of stay (LOS) over time.

Results: There were 828 infants in the Pre- and 470 in the Post-ESC cohorts. Fewer infants were cared for in a NICU (OR 0.52, 95% CI 0.38, 0.71), with more skin to skin (OR 2.72, 95% CI 1.86, 3.96) and mother’s milk at discharge (OR 1.37, 95% CI 1.05, 1.79) Post-ESC (Table 1). In multivariable mixed effects regression models, the Post-ESC group had lower rates of pharmacologic treatment (OR 0.32, 95% CI 0.23, 0.43) and secondary agents (OR 0.22, 95% CI 0.10, 0.49), with shorter LOS (RR 0.78, 95% CI 0.75, 0.81) and opioid treatment days (RR 0.89, 95% CI 0.83, 0.96) (Table 2). The 30-day NOWS re-admission rate was 1.2% in the Pre- and 0.6% in the Post-ESC cohort, and 30-day ER visit rate was 2.5% Pre- versus 0.6% Post-ESC (p<0.2). SPC charts indicate a significant shift in pharmacologic treatment from 57.1 to 36.4% (Figure 1) and LOS from 16.3 to 11.3 days (Figure 2) Post-ESC.

Conclusion(s): The ESC NOWS Care Tool was successfully implemented across a state perinatal QI collaborative with improvement in NOWS hospital outcomes. Significantly more infants were cared for with rooming-in, skin-to-skin, and mother’s milk with the ESC approach. Further research is necessary on long-term outcomes of ESC.
CONTROL ID: 3382565

TITLE: A Quality Initiative Prioritizing Nasal-tracheal Intubation Reduces Unplanned Extubations in a Level IV Neonatal Intensive Care Unit

ABSTRACT STATUS: Sessioned

PRESENTER: Courtney Juliano

AUTHORS (LAST NAME, FIRST NAME): Juliano, Courtney2; spain, shanna1; Albutt, Lindsay1; Connors, Jillian3; Stroustrup, Annemarie4; Green, Robert S.2

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CURRENT CATEGORY: Quality Improvement/Patient Safety

CURRENT SUBCATEGORY: Hospital-based Quality Improvement: Neonatal

KEYWORDS: Unplanned Extubation, Nasal intubation.

SESSION TITLE: NICU QI and Safety II |NICU QI and Safety II

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Neonates are at high risk for unplanned extubation (UE) events, which are associated with increased morbidity including hypoxemia, bradycardia, and prolonged ventilator dependence. For these reasons, UE is a frequently targeted quality metric in the Neonatal Intensive Care Unit (NICU). Intubation via either the oral-tracheal or nasal-tracheal route is regarded as acceptable practice for neonates. Unit convention typically dictates which method of intubation is preferred. Nasal-tracheal tubes are anecdotally described as more secure, but this has not previously been demonstrated.

Objective: To reduce the incidence of unplanned extubations in our NICU through a practice change prioritizing nasal-tracheal intubation over oral intubation.

Design/Methods: This quality improvement project was conducted in a Level IV academic NICU with > 8000 deliveries annually and a robust transport program. In November of 2017 an initiative to change unit practice from primarily oral-tracheal intubation to primarily nasal-tracheal intubation was implemented. Baseline data was collected prospectively for a period of 28 months prior to the start of this practice change. The unplanned extubation rate was tracked by using a U-control chart. Standard rules for detecting special cause variation were applied. Number of ventilator days with a nasal endotracheal tube in place were also tracked monthly and reported as percentage of total ventilator days.

Results: Following implementation of the practice change, the UE rate in our unit fell from an average of 4.7 per 100 ventilator days to 0.7 per 100 ventilator days, an 85% decrease, which was sustained over the course of the study period. The number of ventilator days with a nasal ETT in place increased steadily over 12 months following the practice change. The number of UE events per month was found to be inversely related to the proportion of total ventilator days that were nasal ETT ventilator days (p value <0.05). The only adverse event noted was nasal mucosal injury, which occurred with very low incidence.

Conclusion(s): A shift in practice from primarily oral-tracheal intubation to primarily nasal-tracheal intubation significantly reduced the rate of unplanned extubation events in a level IV NICU.
A U-chart demonstrating the unplanned extubation rate (UE per 100 ventilator days) over a period of 54 months. Following implementation of a practice change prioritizing nasal-tracheal inubation there was a center-line shift in the UE rate.

A steady increase in percentage of total ventilator days with nasal-tracheal tube in place following implementation of the practice change

Rate of UE was inversely related to percentage of ventilator days with nasal ETT in place. (p value = 0.03)

IMAGE CAPTION:
A U-chart demonstrating the unplanned extubation rate (UE per 100 ventilator days) over a period of 54 months. Following implementation of a practice change prioritizing nasal-tracheal inubation there was a center-line shift in the UE rate.

A steady increase in percentage of total ventilator days with nasal-tracheal tube in place following implementation of the practice change

Rate of UE was inversely related to percentage of ventilator days with nasal ETT in place. (p value = 0.03)

CONTROL ID: 3367834
TITLE: Decreasing Time to Parent Updates after Delivery
ABSTRACT STATUS: Sessioned
PRESENTER: Tinisha Morace Lambeth
AUTHORS (LAST NAME, FIRST NAME): Lambeth, Tinisha M.1; Akinola, Modupeola1; Davis, Linwood L.2; Downey, Laura C.1; Gogcu, Semsa1; Hanson, Shannon G.1; Helderman, Jennifer1; Holman, Jennifer1; Mappa, Jessica2; Seidel, Corey2; Smith, Ann L.2; Taylor, Deborah G.2; Lovegreen, Mary1

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CURRENT CATEGORY: Quality Improvement/Patient Safety

CURRENT SUBCATEGORY: Hospital-based Quality Improvement: Neonatal

KEYWORDS: Quality improvement, communication, family update.

SESSION TITLE: NICU QI and Safety II |NICU QI and Safety II

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Parents cope more effectively with a premature infant in the neonatal intensive care unit (NICU) when there is "attentive" communication from providers (Wigert et al. 2014). However, at this NICU procedures and charting were given precedence over timely updates after delivery. As a result, only 37.5% of parents received an update from a provider on their baby within 90 minutes of delivery with a mean time to an update of 146 minutes.

Objective: Increase percentage of parents who receive a quality, provider to parent update within 90 minutes of birth from 37.5% to 60% by December 12, 2019.

Design/Methods: Joined Vermont Oxford Network iNICQ collaborative. Model for Improvement methodology was used with PDSA Cycles. Statistical process control was used to track data over time. Six weeks of baseline data was collected due to lack of past documentation/time constraints of the collaborative. Standardization driver PDSA cycles: #1-EPIC smart phrase added to the history & physical (H&P) note which was a required parent update section, #2-Continued testing parent update section in the H&P note. Texted updated expectations to the neonatal nurse practitioner (NNP)/physician assistant (PA) group (preferred method). Continued documentation audits for complete update sections, #3-6-Continued testing parent update section in the H&P note. Results emailed to individual NNP/PAs and highest performers were recognized at meetings. Family Integration driver PDSA cycles: #1-began inviting fathers/support persons to accompany infant to NICU for admission, #2-Sent email reminders and mentioned at meetings of providers to invite fathers/support persons to accompany infant to NICU for admission, surveyed parents about receiving an update.

Results: We observed special cause variation and a significant increase, from 37.5% to 81%, in the percentage of parents who received an update within 90 minutes after delivery. Mean time to an update decreased from 146 to 75 minutes. 82% of parents surveyed remembered receiving an update with multiple episodes of positive feedback from parents during daily leader rounds. We also observed an increase in fathers/support persons accompanying infants to the NICU from 0 to 8%.

Conclusion(s): Working as a team, admission orders and procedures can be completed, while also keeping families involved and updated in a timely manner. Prior to this initiative, fathers/support persons were not invited to accompany infants from the delivery/operating room to the NICU during the admission process. Future PDSA cycles will continue to address this culture change.

[Image: Parent Update Key Driver Diagram]
Percent of Parents Who Received an Update Within 90 Minutes of Delivery-P control chart

Minutes to Parent Update X-bar control chart

**IMAGE CAPTION:**
Parent Update Key Driver Diagram

Percent of Parents Who Received an Update Within 90 Minutes of Delivery-P control chart

Minutes to Parent Update X-bar control chart

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**CONTROL ID:** 3373254

**TITLE:** Improving Utilization of a NICU Rounding Checklist through Low- and High-technology Tests of Change

**ABSTRACT STATUS:** Sessioned

**PRESENTER:** Leah Hannah Carr

**AUTHORS (LAST NAME, FIRST NAME):** Carr, Leah H.¹; Padula, Michael A.¹; O'Connor, Theresa¹; Flibotte, John¹; Cunningham, Megan M.¹; Chuo, John¹; Thomas, Beth¹; Nawab, Ursula S.¹


**CURRENT CATEGORY:** Quality Improvement/Patient Safety

**CURRENT SUBCATEGORY:** Hospital-based Quality Improvement: Neonatal

**KEYWORDS:** checklist, human factors, clinical informatics.

**SESSION TITLE:** NICU QI and Safety II |NICU QI and Safety II

**SESSION TYPE:** Webinar|Platform

**ABSTRACT BODY:**

**Background:** Six rounding teams in our 102-bed neonatal intensive care unit (NICU) employ a checklist during rounds to implement improvement and safety initiatives. However, compliance is variable and completion is not tracked in a standard way.

**Objective:** Using the Institute for Healthcare Improvement (IHI) Model for Improvement, we sought to improve checklist compliance from 29% to ≥75% by July, 2019.

**Design/Methods:** A multidisciplinary team, including a human factors engineer, was assembled to improve compliance. This outcome metric was measured initially by direct observations of rounds and recorded in a REDCap database. As the project evolved, these data were ultimately captured via an automated dashboard created from the EHR. Process metrics included the number of patients assessed daily and staff perceptions of work burden and relevance to patients collected via a REDCap survey at 1 and 5 months into the project. The balancing measure was duration of checklist completion.
Barriers to completion were assessed via Pareto analysis. Based on this, the original checklist (Fig 1) was modified to a version (Fig 2) designed to remind team members to ask questions and identify patient-specific question relevance. A high-technology clinical decision support (CDS) tool was designed and implemented after initial culture change to further address these challenges through a dynamic method of completion that also allows for data collection (Fig 3). Multiple Plan-Do-Study-Act (PDSA) cycles occurred from 11/20/2018 through 10/29/2019 (Fig 4).

**Results:** Barriers to checklist utilization were inability to remember, perceived lack of question relevance to patients, and rounding interruptions. Baseline checklist completion was 29% and improved to an average of 86% (Fig 3). Checklist completion time decreased from 54 to 16 seconds. Average daily patients assessed increased from 4.6 to 101. Follow-up surveys after initial intervention demonstrated more respondents felt questions were “completely relevant,” (42% pre vs 34% post), but also an increase in perceived work burden (75% pre vs 63% post).

**Conclusion(s):** Using the IHI Model for Improvement, human factors-based interventions, and a novel CDS tool, we improved efficiency and checklist compliance from 29% to 86% and created an automated, sustainable method for monitoring compliance and responses. We now plan to evaluate the impact of checklist utilization on patient care using outcome metrics from various QI efforts linked to the questions.
Example of the custom CDS tool on a Wednesday when access, weight adjustment, and vaccines are the main points of discussion. As this patient has no central access, arterial access, or urinary catheter these questions are auto-populated as “not applicable.” In addition, this patient has no Best Practice Advisory to clear, auto-populated in green, and the information regarding outside hospital vaccine reconciliation has carried over from the prior entry. Information regarding active lines/drains/airways is pictured as well as specific weight trends.

P statistical process control chart showing percent checklist compliance over 2-week time periods, annotated with change concepts and PDSA cycles.

**IMAGE CAPTION:**
Original Clinical Care Question checklist.

Abbreviated checklist following human factors consultation.

Example of the custom CDS tool on a Wednesday when access, weight adjustment, and vaccines are the main points of discussion. As this patient has no central access, arterial access, or urinary catheter these questions are auto-populated as “not applicable.” In addition, this patient has no Best Practice Advisory to clear, auto-populated in green, and the information regarding outside hospital vaccine reconciliation has carried over from the prior entry. Information regarding active lines/drains/airways is pictured as well as specific weight trends.

P statistical process control chart showing percent checklist compliance over 2-week time periods, annotated with change concepts and PDSA cycles.

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**CONTROL ID:** 3369758  
**TITLE:** Standardizing NICU Nursing Handoffs to Improve Safety  
**ABSTRACT STATUS:** Sessioned  
**PRESENTER:** Shilpa J Patel  
**AUTHORS (LAST NAME, FIRST NAME):** Patel, Shilpa J.¹; Durbin, Marsha²; Theel, Crystal²; Fernandez, Madeline²; Methered, Tracy²; Sataraka, Catherine²; Lai, Bridget²; Roman, Xuchyll Ann²; Tabîl, Jensen R.²; Kamai, Sally R.²; Ashton, Melinda²  
**CURRENT CATEGORY:** Neonatology
Background: Results of annual Culture of Safety surveys and engagement focus groups demonstrated that communication at nursing shift change was high-risk. Lack of structured processes and tools led to highly variable nursing handoffs, resulting in patient harm, inefficiencies, and ineffective communication.

Objective: To reduce reported patient harm by >20% by standardizing neonatal nursing handoff at shift change over 12 months in the neonatal intensive care unit (NICU). Secondary aims included reduction in overtime occurrences.

Design/Methods: Through an iterative process utilizing I-PASS as an organizing framework, the expertise of front-line neonatal nurses, nurse educators, and supervisors was harnessed to streamline and standardize handoff content and workflow for nurses in a busy 84 bed Level 4 NICU. Standard verbal communication processes were facilitated by integrating into the electronic health record (EHR) tools tailored for nursing workflow (e.g., review of orders, lab results, notes, checking lines/meds at the patient bedside). We used a data-driven, “model for improvement” approach that highlighted weekly direct observations with immediate feedback over 18 months. An added focus was to move the handoff back to the bedside to improve patient safety and communication with parents/families.

Results: -Reported minor harms decreased from 3.06 to 0.20 per 1000 hours worked (p<0.02). Reported major harms decreased from 0.72 to 0.10 per 1000 hours worked (Image 1).
-Reported medication errors related to communication decreased from 0.44 per 1000 dispenses to 0.35 per 1000 dispenses (Image 2).
-Adherence to each of the five I-PASS mnemonic elements remained at or above 75% in the post-implementation phase, up from as low as 3.3%.
-Adherence to all five elements of I-PASS increased from 0% baseline to as high as 96% at times, remaining above a mean of 57% post implementation (Image 3).
-High quality contingency plans increased from 3% to 72%, action items from 20% to 87%, and prioritized information from 43% to 99%.
-Total overtime occurrences decreased from 1,579/4 month baseline period to 661/3 month post-implementation (Image 4).

Conclusion(s): Standardizing NICU nursing handoff and providing EHR-imbedded tools built to support nursing workflow and verbal handoff sustainably reduced reported patient harms and medication errors. Efficiency improved, with significant reduction in overall overtime occurrences. The policy of weekly handoff observations by leaders reinforced the standardized process and revived the practice of bedside handoff.
Image 3: Adherence to all five elements of I-PASS mnemonic.

Image 4: Total overtime occurrences at various stages of project.

**IMAGE CAPTION:**

Image 1: Reported major and minor harm related to communication.

Image 2: Reported medication errors related to communication.

Image 3: Adherence to all five elements of I-PASS mnemonic.

Image 4: Total overtime occurrences at various stages of project.