

Poster Abstracts from the 2018 Spring National Advanced Practice Neonatal Nurses Conference Portland, Oregon, May 4–6, 2018

These are the abstracts* for the poster and podium presentations from the recent 2018 Spring National Advanced Practice Neonatal Nurses Conference in Portland, Oregon. They represent a broad range of neonatal issues. By sharing this information, we hope to increase awareness of research and innovative clinical programs within the neonatal health care community and support evidence-based nursing practice.

*Abstracts may have been edited for publication.

[The Effect of Nurse-Led Multi-Disciplinary Rounds on Nurses' Satisfaction, Skill and Unit Culture in a NICU](#)

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Background: Accurate communication about patients is a critical component of continuity of care. Ineffective rounds can lead to sentinel errors. While structured communication in nurse-led rounds has anecdotally been effective in improving patient outcomes, effects on staff satisfaction and unit culture are not known.

Purpose: The purpose of this longitudinal, quasi-experimental study was to ascertain the effects of nurse-led, multidisciplinary rounds on RN satisfaction and unit culture.

Methods: After obtaining Institutional Review Board approval, all NICU nurses received an email invitation to participate in the study. Participants (N = 47) accessed study materials online. Nurses also were observed for six months by independent coders for skill in leading rounds. Variables under study were staff satisfaction, unit culture, collaboration, and completeness of report. Data were analyzed using *t*-tests and repeated-measures ANOVA.

Results: Satisfaction improved during the study period. There were no differences in unit culture ($p = .43$) and collaboration ($p = .75$); however, these ratings were high at Time 1. There was significant improvement in completeness of report over the six months' observation ($F(2, 863) = 9.16, p = .00$).

Discussion: These findings demonstrate that nurses are skilled at leading multidisciplinary rounds and have increased satisfaction doing so, making this a viable option in NICUs.

[Implementation of Antibiotic Stewardship Strategies in the Intensive Care Nursery](#)

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Aim: The purpose of implementing antibiotic stewardship strategies in the Intensive Care Nursery (ICN) is to decrease the amount of antibiotic exposure to neonates (30–33 6/7 weeks' gestation) who have no indications for treatment other than a 48-hour rule out sepsis protocol.

Background: NICUs must consider antibiotic stewardship practices when developing policies for the use of antibiotics. Discontinuation of antibiotics may be delayed and an infant may receive an extra dosage(s) of the prescribed antimicrobial.

Methods: Implementation of antibiotic stewardship strategies were conducted in PDSA (Plan, Do, Study, Act) cycles. The PDSA cycle began with creation of ICN addendum orders which created a hard

stop for neonates receiving antibiotics for rule out sepsis indications. Next, education cards were created with steps to utilize the ICN addendum orders for an automatic discontinuation of antibiotics prescribed for rule out sepsis. Ongoing Unit Based Leadership Team (UBLT) meetings were held and collaboration between providers improved ordering practices for antibiotics.

Results: Implementation of PDSA cycles demonstrated improvement in ordering practices and decreased the exposure of neonates to antibiotics to this specific population.

Conclusion: Antibiotic strategies can help reduce the exposure to neonates. The creation of a hard stop in ordering sets discontinues antibiotics prescribed for rule out sepsis in a timely manner.

Clinical Importance: The clinical importance of this antibiotic stewardship strategy is to prove that changes to ordering sets and practices can effectively decrease antibiotic exposure in this neonatal population

[The Effects of Nurse Staffing on Transfers Between Neonatal Units](#)

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Purpose: The purpose of this evidence-based project (EBP) is to demonstrate if the incorporation of LEAN methodologies to nurse staffing decrease transfer times between neonatal units.

Background: Lack of processes for transferring patients from NICU to intermediate care; this leads to delays and limited bed spaces available for patients. Intra-hospital transfer times are lengthy (average of 3 hours) and are not accounted for in nurse productivity scoring.

Intervention: In utilizing LEAN methodology a PDSA (Plan, Do, Study, Act) cycle was chosen for this project. The plan consisted of reviewing literature for applicability of process change in neonatal units. Pre- and post- data (N = 25/28) collection included an information sheet kept by nurses from the time a transfer order was in place to arrival on the accepting unit. Collaboration between management and staff nurses led to a change in staffing availability of nurses during periods of being called off. This change allowed for an increase in nurse availability to accept transfers.

Results: Implementation of LEAN methodologies to nurse staffing demonstrated that transfer times increased from 3 hours to 3.4 hours. Results were not consistent with literature findings. One variable that may have impacted length of times for transfer was an increased census during post-data collection. This led to the inability to integrate process change in nurse staffing.

Conclusion: Standardization for transfers can increase efficiency and bed availability as documented in the literature. Further research in this area is necessary to better understand the impact LEAN methodologies have on quality and care.

[Neonatal Resuscitation Simulation: Fostering a Culture of Safety and Improving Teamwork in the Delivery Room](#)

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Background/Purpose: The Neonatal Resuscitation Competency Simulation Program was designed to foster a culture of safety, reduce risks, and improve teamwork.

Methods: A task force with multidisciplinary subject matter experts reviewed simulated and real-world neonatal resuscitations and determined key areas for improvement. Focus areas included teamwork skills, product acquisition, and the safe transfer/transport of neonates. Six learning objectives and 25

critical actions were identified for training based on ideal performance in accordance with 2015 Neonatal Resuscitation Program guidelines. Two in-situ scenarios using an infant manikin were developed. All perinatal healthcare personnel participated in at least one simulation scenario. Competency validation required completion of 90% of critical actions.

Results: Over three months, 40 simulations, totaling 326 training hours were conducted, validating 96 percent of our perinatal staff. These exercises addressed performance gaps and systems issues, which were reconciled judiciously. Simulation debriefings provided feedback regarding individual skillsets, improving confidence in resuscitation, and enhancing teamwork skills.

Conclusion/Implications: The development of a comprehensive, problem-based, neonatal simulation training program has been instrumental in creating a culture change for safety by encouraging the application of evidence-based clinical processes. Through targeted training and focused feedback, we remain relentless in our goal for continuous quality improvement.

[Creating a Robust Resuscitation Team in a Level I Nursery](#)

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The Neonatal Resuscitation Program (NRP) requires the competence of individuals that care for a baby during a resuscitation. Increasingly, pediatricians in Level I nurseries are not immediately available at the time of delivery to perform this role and may be 30 minutes away. And even when available, many do not perform resuscitation frequently enough to be confident in their skills.

These needs required us to create an innovative program to train a subset of our RNs to have the increased skills and confidence needed to lead resuscitations. This was accomplished by providing additional training beyond basic NRP using the methods listed.

The objective was to provide a standardized response to increase the skills and confidence of the ten-member resuscitation team (RTeam) so that they could serve as the lead in initial newborn resuscitation. A secondary objective was to increase the confidence of all staff by requiring their participation in these regular simulation drills.

Methods:

- Climate of safety training
- Didactic training
- Annual competency review
- STABLE training
- Simulations drills
- NRP training station available 24/7
- Written pre/debriefs
- Review of resuscitation events

Result: A highly functioning RTeam. In a 12 month period, two babies (7.1%) were transferred to a higher level of care for post-resuscitation reasons alone, while the system average is 69.2 percent. In 2017, we conducted a total of 185 simulation drill events and 29 live resuscitations. Anecdotally, we raised the skills and confidence of the entire team.

[Dextrose Gel as a First Line Treatment for Hypoglycemia](#)

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Neonatal hypoglycemia is the most frequent metabolic disorder experienced by newborns after birth and is the leading cause of admissions in the neonatal intensive care units (NICUs). Neonatal hypoglycemia can lead to maternal anxiety, difficulty establishing breastfeeding, and possible separation of the infant from the parents if admission is required into the NICU to treat the hypoglycemia with IV

dextrose. The purpose of this quality improvement (QI) project is to implement a practice change in the newborn nursery, post-anesthesia care unit (PACU), labor and delivery, and Level II NICU by working with a multidisciplinary team to initiate the use of 40% glucose gel as an alternative option in our medical institution. Neonatal hypoglycemia most often occurs within the first 48 hours of life and oral 40% glucose gel provides a simple, safe, inexpensive, and non-invasive treatment option for neonatal hypoglycemia. Implementation of this QI project will be initiated by formulating a new policy and procedure with an algorithm for the use of 40% glucose gel. The use of 40% glucose gel will be evaluated for its effectiveness in decreasing neonatal hypoglycemia and decreasing the number of NICU admissions.

Increasing Communication: Improving the Retro-transfer Process in Neonates

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Background: Canadian neonatal intensive care units (NICUs) are regionalized based on acuity. Healthcare regionalization causes infants to transition between NICUs for convalescent care. This can cause parental distress, reluctance to transfer, lengthened admissions, and amplified costs. No informational resources exist describing the operation of prospective NICUs to inform parents of environmental and practice differences.

Purpose: Complete a Quality Improvement initiative to fulfill parental retro-transfer informational needs by developing a one-page communication tool for the prospective NICUs in the Greater Toronto Area (GTA) that will assist nurses in providing communication regarding transfers.

Methods: In Phase I, a literature review identified parental retro-transfer experiences and needs. In Phase II, post-retro-transfer parents were recruited and interviewed using a semi-structured guide to discover knowledge gaps. Interviews and qualitative data analysis occurred simultaneously until data saturation was achieved. In Phase III, data obtained from interview analysis was used to create a one-page template with parent-desired informational categories. This document was sent to NICUs in the GTA and completed by them.

Results: Parents described the retro-transfer process as “fear of the unknown,” and desired better communication with healthcare providers. Analysis of the 15 parent interviews revealed that less than 15% of parents feel very prepared for their transfer. Ten categories of highly desired informational items were identified, with overnight stay and NICU contact information being most common.

Conclusion: Parent health and well-being, essential for child health, can be maximized when parents’ retro-transfer informational needs are addressed. This information also positively impacts transfer reluctance and NICU length of stay.

Keeping Moms and Babies Together: Oral Glucose Gel for Treatment of Neonatal Hypoglycemia

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In a continuous endeavor to maintain best practice for neonatal care, increasing and maintaining exclusive breastfeeding rates stays at the forefront of our perinatal department’s agenda. With the intention to lower the rate of separation of mothers and infants and positively impact breastfeeding, we joined together. In collaboration with all perinatal areas, lactation, pediatrics, neonatology, information systems, and the families we serve, in July 2017, we launched the use of oral glucose gel for treatment of neonatal hypoglycemia. Evidence was presented to all staff. Following American Academy of Pediatrics guidelines, an algorithm was established, policy and practice were updated, and the staff trained one-on-one. Through two quarters we fine-tuned our data collection, adjusted to the unexpected new

glucometers, and managed to drop our rate of admission to the NICU with a primary diagnosis of hypoglycemia from 12 percent to 3 percent of all hypoglycemic neonates born at our community NICU.

Effects of an Antimicrobial Dosing Guideline for Inpatient Neonates

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Objective: To assess the effects on antibiotic dosing and frequency error rates prior to and after the implementation of the Arizona Children's Center Neonatal Antimicrobial Dosing Guidelines.

Methods: This was a single center, retrospective chart review of antibiotic orders in the time periods of April 1, 2012 to March 31, 2014 (pre-intervention) and August 1, 2014 to July 31, 2016 (post-intervention). Select antibiotic orders (ampicillin, cefepime, cefotaxime, gentamicin, piperacillin/tazobactam, and vancomycin) during hospital admission from patients less than 29 days of age were included. Exclusions included one-time antibiotic orders and orders modified based on patient age, weight, or drug levels during the treatment course. A total of 164 antibiotic orders were randomized between the pre- and post-intervention groups. The primary endpoint was rate of antibiotic dosing and frequency errors before and after implementation of the dosing guideline. A chi-squared test was used for the primary endpoint. A Students t-test with a 95% confidence interval was utilized to evaluate secondary endpoints.

Results: A reduction in antibiotic dosing error rate was observed after implementation of the dosing guideline (21% vs. 2%, $p < .001$). There was also a decrease in incorrect antibiotic dosing interval (21% vs. 6%, $p < .001$). Combined, there was a decrease in orders having both incorrect dose and frequency after guideline implementation (29% vs. 6%, $p < .001$). These results were consistent across all medical units.

Conclusion: The implementation of an antibiotic dosing guideline significantly reduced the rate of antibiotic dosing and frequency error rates in hospitalized neonates.

Drugs and Bugs: A Closer Look at Antibiotic Stewardship in the NICU

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Background: Inappropriate and overuse of antibiotics is linked to many health complications and prolongs separation from the family. For rule-out sepsis infants, our standard of practice was a 72-hour treatment of antibiotics.

Problem Statement: With the knowledge of overuse of antibiotics we were challenged to decrease our usage. In 2016, we joined the California Perinatal Quality Care Collaborative for antibiotic stewardship.

Methods: A multidisciplinary antibiotic stewardship (ABS) team was created and developed an early-onset sepsis guideline. A 48-hour antibiotic treatment practice was instituted. On daily multidisciplinary rounds, a 48-hour time-out is called to review cases. The ABS leadership team meets monthly to review usage. The data is reported in patient safety huddles to keep staff informed.

Results: Our baseline antibiotic utilization rate was 20.6 percent with a goal of 15.4 percent. Our end result was 11.96 percent with a decrease of 42 percent from our baseline.

Impact: Our infants are being exposed to fewer antibiotics and going home a day sooner. This has saved 20 patient care days with an approximate cost savings of \$178,000. For counterbalances, no infant was readmitted requiring antibiotics for sepsis.

[Understanding Quality Evidence in Practice Guidelines](#)

Disclosure: This presenter received a research grant from Prolacta Biosciences

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Background: Practice guideline developers use different rating scales for quality of evidence and grading the strength of recommendations, making it difficult for practitioners to judge the usefulness of the guidelines. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach provides one system for rating quality of evidence and strength of recommendations. This approach is becoming more accepted by organizations worldwide. The Cochrane Neonatal Collaborative currently uses the GRADE system.

Purpose: To describe the GRADE approach in assessing the quality of evidence and recommendations.

Objectives: To (1) list four elements of the GRADE system; (2) show how the quality of evidence is ranked; (3) describe five factors that lower the quality of evidence.

The level of evidence focused on by the Cochrane Neonatal Collaborative is the randomized trial. The quality of the evidence is ranked as high, moderate, low, or very low. The strength of the recommendation of quality is determined by: limitations of design, inconsistency, indirectness, imprecision, and publication bias.

Conclusion: It is essential that developers of guidelines describe the method used to assess the quality of the evidence because the strength of the recommendation may vary based on the approach.

[Nurse Led Rounds and Increase in Patient Satisfaction](#)

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Background: Parents expressed concerns about continuity of communication from nurses and providers. This was reflective in our fiscal year 2017 (FY17) family satisfaction survey. First key driver question: 58.5 percent. Second key driver question: 70.7 percent. This was evident in FY17 NDNQI survey results scoring 4.24 (autonomy) and 3.78 (interprofessional roll-up).

Objective: Establish one method to improve interdisciplinary communication in regards to planning of patient care in the NICU.

Methods:

Phase 1: Family Experience Committee implemented communication boards at every patient's bedside.

Phase 2: Nurse-led rounds were implemented.

Phase 3: Addressed the family satisfaction score of 76.9 percent related to the question, "During this hospital stay, did providers or other hospital staff ask about your child's pain as often as your child needed?" Pain management was added to the nurse-led rounds template to ensure parents could hear and contribute to the discussion with the team of the patient's pain control level.

Results: Our family satisfaction scores improved for all three key driver questions in FY18 to date. For good communication we improved to 75.6 percent (a 17.1% increase). The second question for consistent communication scored 79.5 percent (an 8.8% increase). Lastly, pain control improved to 84.6 percent (a 7.7% increase). NDNQI results improved to 4.46 (autonomy) and 4.00 (interprofessional roll-up). Providers have commended the nursing staff on their improved communication and knowledge of patients. Nurses have expressed increased satisfaction with providers promptly entering orders during rounds.

[Integrated Neonatal Intensive Care: Intensive Care for Baby at the Mother's Bedside](#)*Gina Kubik, BSN, RN**Brenda Wallingford, DNP, APRN, NNP-BC*

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Problem: Traditional neonatal intensive care units (NICUs) remove infants from the mother's room, predisposing a family to poor parenting outcomes. A quality improvement program for a new practice model was undertaken by a Midwest hospital to keep infants admitted to the Level II NICU with the mother. The Integrated Neonatal Intensive Care (INIC) model provides the entire NICU stay at the mother's bedside.

Literature Review: Limited data and research exists regarding programs of this design.

Methods: Historical data collection and evaluation of outcomes between patients cared for in the previous single patient NICU unit and the new INIC model. A Likert survey was developed and distributed to registered nurses to understand their perceptions of the model. Using the Nurse Parent Support Tool, and The Parental Stressor Scale: Neonatal Intensive Care Unit, parent stress and satisfaction in the INIC model will be evaluated and compared to previously published results.

Discussion: The INIC model showed increased rates of breastfeeding and breast milk given to infants at discharge with total of 84 percent of INIC model infants receiving maternal milk versus 64 percent of traditional NICU infants. Discharged infants in the INIC model had increased weight gain and similar length of stay and safety outcomes. Parents surveyed demonstrated low to moderate levels of stress related to their relationship/role, the sights/sounds of the room, and the appearance of their infant. This model has the potential to increase maternal/parent bonding. Registered nurses surveyed perceive that the INIC model promotes parent involvement and patients are positively affected. Parents' perceptions and satisfaction with nursing staff was high. This project showed the INIC model in this facility is a safe and effective alternative to separating the NICU infant from the mother and family and has positive effects on both baby and mother.

[Use of KOH Test Reduces Antifungal Medication Use for Suspected Monilial Diaper Dermatitis in the NICU: A QI Project](#)*Juliana Campbell, MS, ARNP, NNP-BC**Valerie MacConnell, RN, MSN, CNS, NNP-BC**Lauren Sacco, DNP, ARNP, NNP-BC**Ramona J. Zuill, MN, ARNP**Elena Bosque, PhD, ARNP, NNP-BC*

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Purpose: To implement a quality improvement (QI) project study to determine if the use of a fungal KOH test, when monilial diaper dermatitis (MDD) is suspected, will produce more accurate diagnoses, with decreased antifungal medication exposure.

Methods: QI project method with new protocol in 2017 for treatment of MDD after KOH positive testing. If a monilial rash is suspected after two KOH negative tests, then an antifungal is ordered (considered false negative). Cost was determined. Chi-square testing to determine differences.

Sample: Neonates in two Level III NICUs.

Outcome Variables: KOH test results, use of antifungal medication, cost.

Results: From January–October 2016, vs 2017 (pre- vs post-protocol) there 97/809 vs 35*/736 antifungal use/total admissions (* $p=.0001$, 95%CI 0.92–0.96). Antifungal cost was reduced from \$501 to \$184. KOH costs increased to \$2778. Total costs increased from \$501 to \$2961. There was a 64 percent reduction in the use and 63 percent decreased cost, of antifungal agents. Overall cost, including cost of KOH test, increased by 591 percent, but was still low. One infant received three negative KOH tests, then one positive one. This would have met the definition of a false negative test, per protocol. There were no

cases of fungal sepsis. These results indicate that a QI protocol in which the use of KOH testing is required before antifungal agents are prescribed, may result in decreased exposure with minimal increased cost.

Effects of a New Skincare Protocol on Severe Diaper Dermatitis in NICU Patients with Neonatal Abstinence Syndrome

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Background: Diaper dermatitis and skin excoriation are painful conditions for an infant and may have an indirect impact on the assessment of severity of withdrawal symptoms in the population with neonatal abstinence syndrome (NAS). Severe diaper dermatitis (excoriation of the diaper area) and its occurrence in the neonatal intensive care unit (NICU) population, particularly in the newborn with NAS is under-researched. Best practices for diaper hygiene in the NAS population are not definitively addressed in the neonatal literature.

Aim: Decrease the incidence of severe diaper dermatitis through implementation of a diaper hygiene protocol utilizing evidence-based guidelines in the NICU population admitted for observation and/or treatment of NAS.

Methods/Programs/Practices: A skin care protocol specific to the population with NAS was developed and presented to the nursing staff. The diaper hygiene protocol was made available at the bedside for each newborn admitted with a diagnosis of NAS.

Outcome Data: Prior to implementation of the new skin care guidelines, severe diaper dermatitis had affected 66–90 percent of newborns with NAS during the preceding seven years. Post-implementation analysis revealed rates of severe diaper dermatitis decreased to 24 percent.

Conclusion: New clinical guidelines for diaper hygiene in the NAS population have proven successful in reducing severe diaper dermatitis.

Adopting Braden Q in the NICU to Identify Neonates at Risk of Developing Pressure Injuries

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Background: Neonates are at significant risk for developing pressure injuries in the hospital setting. Contributing factors include immature skin, decreased mobility, poor perfusion, moisture, altered neurological responsiveness, and the presence of medical devices. The Neonatal Skin Condition Score (NSCS) is currently being used to evaluate the overall skin condition of neonates. The NSCS is not a risk assessment tool; therefore, neonates at risk of developing pressure injuries are not always properly identified. Our NICUs continue to have a high incidence of hospital-acquired pressure injuries, prompting the adoption of the Braden Q Scale for risk assessment for pressure injuries. Early risk identification along with the implementation of appropriate interventions is critical to preventing pressure injuries in the neonatal population.

Objective: To implement a pressure injury prevention program in the NICUs that includes utilizing the Braden Q Scale to identify neonates at risk of developing pressure injuries. The program includes educating staff on use of the Braden Q Scale and interpretation of Braden Q Scale sub-scores to assist nurses in implementing appropriate evidence-based interventions to prevent pressure injuries.

Outcomes: Upon implementation, random chart audits indicated high compliance to Braden Q Scale documentation and selection of appropriate interventions for neonates with medium-risk or high-risk sub-

scores. Additionally, NICU nurses reported satisfaction in utilizing the Braden Q Scale and identifying interventions for high-risk patients. During a recent CALNOC skin prevalence study, no new pressure injuries were identified in the NICU, demonstrating success in using the Braden Q Scale to identify neonates at risk of developing pressure injuries.

Practice Makes Perfect: Skills, Simulation and Self-Directed Learning

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Background: Annual nursing competencies alone are inadequate for improving nursing comfort levels and proficiency performing rare critical procedures. Assessing nurses' knowledge based on competency assessments or technical skills alone doesn't encompass a complete view. Skills assessment that includes hands-on and simulation offers nurses opportunity to practice, using critical thinking, communication skills, and teamwork, while incorporating opportunities to assess strengths and weaknesses. Evidence shows self-directed learning with access to instructions and simulation environments helps enhance patient safety and improve nurses' competencies and comfort levels.

Method: This evidence-based practice (EBP) project focused on implementing a skills-cart where NICU nurses used self-directed, hands-on learning at their leisure, monthly, to improve their confidence/competency when performing infrequently used skills during emergencies.

Nurses completed a survey to self-measure skill proficiency of UAC/UVC, chest-tubes, and surfactant and epinephrine administration. Procedural guidelines and supplies were available on a mobile cart for each skill. Skills were validated during each nurse's initial cart interaction. Nurses reviewed and performed each skill monthly, at their leisure, and checked-off completion. Assessing nurses' knowledge based on competency assessments or technical skills alone doesn't offer a complete picture of nurses' overall competency. Giving nurses an opportunity to practice, use critical thinking, teamwork, and communication improves nurses' competency/comfort levels.

Results and Conclusion: During the skills-cart implementation, 100 percent of nurses participated. Prior to the skills-cart implementation, 37.5 percent of nurses were not confident in the four skills. After one year, a post-survey showed that 84.5 percent of nurses felt comfortable with the skills.

Neonatal Vascular Access: Pearls, Proficiency and Innovation in Practice

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Establishing vascular access is one of the most frequently performed procedures in the neonatal intensive care unit (NICU) Thus, it is imperative that we apply the latest evidence in our approach to these vital life lines. Vascular access in the neonatal population represents a unique array of challenges. The challenges require knowledge, understanding, and proficiency to ensure patient safety and promote optimal outcomes. This poster succinctly addresses the latest evidence in neonatal vascular access (peripheral and central): vein preservation/selection, device options, current recommendations for insertion, skin antisepsis, and site dressing. Tools and technologies are explored along with avoidance of complications and safety strategies. Recommendations for vascular access training and professional advancement are outlined as well as the power of advancing practice through the impact of vascular access data collection to improve patient outcomes. This poster provides a concise primer on what every clinician needs to know to improve their vascular access practice.

Orogastric Tube Insertion Length in Extremely Preterm Infants: A Comparison of Three Methods

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Problem: The nose–ear–mid-umbilicus (NEMU) method is a standard procedure for inserting orogastric (OG) tubes in extremely preterm infants. However, as new methods become available, these alternative methods must be validated. Weight and length-based formulas have been proposed.

Methodology: OG tubes were inserted using the NEMU method. All radiographs were taken after initial tube placement. For primary analysis, tubes placed too high with the tip in the esophagus or too low, into the duodenum, were considered misplaced.

Data Analysis: The sample consisted of 37 extremely preterm infants (<6 hours of age). NEMU resulted in high tubes (14%), optimal tubes (30%), and low tubes (56%). Insertion accuracy was 38 percent for the length-based formula ($1.95 + 0.372$ [length of neonate in cm]), 43 percent for the NEMU method, and 60 percent for the weight-based formula ($\text{birth weight g} \times 0.004 + 9.44$). Alternative regression formulas using birth weight (BW) as reference ($8 + [6.2 \times \text{BW}]$) did not result in superior accuracy of insertion length.

Interpretation: NEMU combined with birth weight–based formulas may increase optimal placement of OG tubes in extremely preterm infants. Because weight is more accurately measured than length in neonatal units, standardization of length measurements should be implemented before utilizing length-based formulas.

A Program to Reduce Feeding Intolerance in ELBW Infants Receiving CPAP Support

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Background: Current neonatal practices increasingly favor non-invasive respiratory support (i.e. CPAP) for extremely low birth weight (ELBW) infants. The diagnosis of feeding intolerance often accompanies infants on CPAP, and decompression of the stomach is important in reducing the frequency of diagnosis.

Overview: The Tummies & Tubes (T&T) program was designed to optimize orogastric (OG) tube placement, find alternatives to gastric residuals as a verification method, and to facilitate decompression between feedings in ELBW infants.

Implementation: The program analyzed methods used for OG placement, standardization of verification on x-rays, use of 6.5 Fr. OG tubes, avoidance of checking residuals, and included nursing education. Over three months, T&T was implemented in 45 infants with birth weights <1,000 g or gestational ages ≤ 28 weeks.

Results: Approximately 60 percent of infants had an OG placed before the first x-ray on admission. Of tubes placed, 100 percent were OG and 68 percent were 6.5 Fr. size. In the first week of life, 25 of 45 infants (56%) had no residual checks and the number of abdominal x-rays was reduced to 40 percent. Nine percent developed NEC.

Conclusion: As compliance increases with the program, we will validate alternative methods used to optimize OG placement and eventually discontinue the practice of checking residuals for OG placement verification.

Severity of Anemia, Blood Transfusions, and Feeding Practices in Extremely Preterm Infants

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Background: Necrotizing enterocolitis (NEC) affects 6–10 percent of preterm infants. The interaction between anemia, transfusions, and feedings to assess the risk of NEC should be identified to establish the best practices regarding feeding and transfusions.

Methods: After making donor milk available and continuing feedings during transfusions, we assessed hematocrit values, transfusion practices, and NEC diagnoses from birth to 32 weeks postmenstrual age (PMA).

Results: Forty-six infants born preterm at ≤ 28 weeks' gestation were studied. On admission, 18 percent were anemic (Hct $< 40\%$). In the time between birth and 32 weeks PMA, 52 percent developed severe anemia (Hct $< 25\%$). Gestational age was the only significant factor associated with a higher risk of NEC, with 6 of 8 cases occurring in infants ≤ 24 weeks gestation. Five of 8 cases (62%) were anemic (Hct between 25% and 34%) a week prior to the development of NEC.

Interpretation: Since NEC was more common in anemic infants with gestational ages of ≤ 24 weeks despite the use of human milk, prevention of anemia in this group might be necessary to reduce the risk of NEC as opposed to withholding feedings.

Parents' Experience with and Contribution to NICU Care for Their Preterm Infants

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Background: Despite the well-documented benefits of parental involvement in the care of preterm infants and the adoption of a Family-Centered Care (FCC) approach by many neonatal intensive care units (NICUs), parents largely remain passive bystanders in the NICU setting. Family Integrated Care (FI-Care) is a novel intervention that teaches and supports parents to be primary caregivers for their infants and fully integrates parents into the care team.

Objective: We developed a secure mobile phone application to capture data about parent involvement in NICU caregiving and to remotely deliver elements of mobile-enhanced FI-Care (mFI-Care). An exploratory two-group, multisite comparison study was initiated to compare usual FCC with mFI-Care on growth and clinical outcomes of preterm infants, as well as the stress, competence, and self-efficacy of their parents.

Design/Methods: A total of 350 preterm infants (≤ 33 weeks gestational age) and their parents or guardians will be enrolled across the five participating hospitals, with 175 infants in each phase (FCC and mFI-Care). Parents are provided with the We3health™ Tracker app, they document their involvement in their infants' care and complete online surveys about their experience, thus capturing the parent contribution to infant caregiving in the FCC baseline context.

Results: To compare the FCC and mFI-Care approaches to caring for preterm infants, we are measuring infant and parent outcomes:

- **Primary outcome:** Infant growth – do preterm infants gain more weight sooner with mFI-Care compared to FCC?
 - **Secondary outcomes:** co-morbidities of prematurity, breastfeeding rates, length of hospital stay, parent stress, anxiety and self-efficacy.
- Parents' use of the We3health™ app will also be evaluated.

Conclusions: Preliminary findings indicate that parents make active use of the We3health™ app while their preterm infant is in the NICU. Using the We3health™ app, parents report considerable involvement in their infant's care in a NICU with a FCC model of care, including the particularly important and typical parenting activities such as infant holding and feeding. However, parents also report moderate levels of stress and anxiety. Additional recruitment within and across sites will provide a better understanding of the prevalence and variation among families and NICUs with different characteristics.

Improving Family Support through Innovative and Interactive Staff Education

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Disclosures: Medela (Unrestricted Support for Course Launch/Marketing)

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MYNICUNETWORK

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Introduction: Hospitalization of a baby in a neonatal intensive care unit (NICU) is traumatic for both parents and baby. Parents have higher rates of postpartum depression and post-traumatic stress disorder, leading to adverse developmental outcomes in their infants. NICU parents desire and benefit from psychosocial support from staff, yet many neonatologists and neonatal nurses do not feel they have adequate skills to do this.

Design and Method: To bridge this identified gap for NICU professionals, an online NICU staff education course was developed through collaboration between professionals from the National Perinatal Association and Patient + Family Care, and members of The Premie Parent Alliance, who served as experts by experience. The course, *Caring for Babies and their Families: Providing Psychosocial Support in the NICU*, is based on the Recommendations for Psychosocial Support of NICU Parents. The seven-module course is clinically relevant, evidence-based, story-driven, trauma-informed, resource-rich, and is the only interactive and family-centered education of its kind.

Implications for Practice: Interprofessional collaboration with NICU parent graduates is a viable model for developing NICU staff education that is inclusive of the parent's voice, enhancing its relevance. NICU staff can benefit from education that focuses on how to provide psychosocial support to families of babies hospitalized in the NICU. This course has the potential to improve the social and emotional wellbeing of NICU babies, family, and staff.

Parents of NICU Babies are Particularly Interested in More Complete Parent Centered Tools

Jin Lee, PhD

Disclosure: Founder of Qidza Foundation and a stock shareholder

QIDZA FOUNDATION

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Introduction: Premature babies who spend time in the neonatal intensive care unit (NICU) may need specialized follow-up care after discharge. Research has shown that neonatal developmental care can improve neurodevelopmental outcomes. Qidza Foundation partnered with hospitals to measure parents' interest in a digital model of follow-up.

Method: Invitation to take the survey was sent out to Qidza Foundation subscribers. Fifty mothers completed the online survey; eight were interviewed with more in-depth questions.

Results: Ninety percent of parents desired an end-to-end system to connect with all the providers that care for the babies: nurses, pediatricians, occupational therapists, social workers, physical therapists, nutritionists, and others. Eighty percent reported wanting telemedicine instead of in-person visits. Seventy-four percent reported their child's developmental progress as their top concern. The majority of parents desired a digital model of care coordination for follow-ups with a strong preference for smartphone push notifications.

Infant Cuddler Study: Neonatal Abstinence Syndrome and Impact of the Family Support Program

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Problem: The Infant Cuddler Study was designed to compare lengths of NICU stay (LOS) for infants requiring management of neonatal abstinence syndrome (NAS) before and after the introduction of a volunteer cuddler initiative called the Family Support Program (FSP).

Literature: Antenatal opioid exposure can produce NAS that results in the infant's NICU LOS ranging from several days to weeks. While Kangaroo Care benefits are well described, little research exists on the impact of cuddler programs on LOS in infants with NAS. Only one cuddler program reports LOS reduction of 3.8 days for infants with NAS.

Methodology: A Research Ethics Board-approved pilot prospective cohort study compared LOS of infants with NAS before and after implementation of the FSP. Interview-based qualitative descriptive methodology focus groups were conducted with FSP volunteers and NICU RNs to seek program perceptions.

Analysis: The Prospective Group had a LOS reduction of 6.9 days compared to the Retrospective Group (24 vs 30.9 days). Focus group data were analyzed for themes, strengths, and challenges.

Interpretation: Hospital cost savings were realized with FSP implementation and the infant cuddler program was embraced as a standard of care.

A Scoping Review of Acupuncture and Acupressure as a Potential Intervention for Neonatal Abstinence Syndrome

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Background: Over the past 15 years, the incidence of NAS has risen by 300 percent, and now affects 6 infants/1,000 live births in the United States. This trend has increased health care treatment costs an estimated range of \$190 million to \$720 million.

Theoretical Framework: Use of the social ecological model (SEM) guided a thorough description of the behavioral and environmental influences that affect NAS. The Arskey and O'Malley methodological framework guided this scoping review with enhancements directed by Colquhoun and associates and Levac. This five-stage approach included identifying the research question, identifying relevant studies, selecting applicable studies, charting the data, and summarizing the results.

Methods: A search strategy was developed and devised after consultation with a reference librarian. The PRISMA statement was used to organize selected publications, and a flow chart was created to display the search process.

Conclusion: The most prominent finding from this review is the use of acupuncture and/or acupressure is a safe intervention for infants. Given safety has been demonstrated in the neonatal population, these findings support the use of acupuncture as a potential intervention to treat NAS.

[Transforming NICU Care with Music and Language Therapies](#)

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Background: Premature newborns in neonatal intensive care units (NICUs) are at high risk of poor developmental outcome. The single-room design of many NICUs shields infants from harsh noise and light, and may prevent physiologic instability and neurologic injury. Yet new evidence suggests that shielding newborns from enriching sound, such as language and music, may contribute to cognitive and language delay.

Intervention: The NICU music therapy program at PeaceHealth Southwest Medical Center is the first program on the West Coast of the U.S. to employ a full-time board-certified NICU music therapist and an environmental music team. Our NICU music therapist treats babies using vocal tones and drumbeats that emulate maternal heartbeat and placental blood flow. She also teaches parents to sing to their babies in developmentally supportive ways. These techniques may improve infants' physiologic stability, including oxygen saturation and heart rate; relieve pain, stimulate better feeding and growth patterns, and lower parent anxiety.

Our program is using music therapy in innovative ways, for:

- Extremely premature infants as young as 26 weeks' gestation.
- Neonatal narcotic abstinence syndrome, as part of a broader push for non-pharmacologic treatment.
- Retinopathy of prematurity exams, to reduce pain and post-procedure apnea.

We are also pioneering:

- A reading program for our patients, based on research showing that when NICU babies hear more spoken language, they have better long-term language development.
- Full integration of the NICU music therapist into the care team, with the therapist presenting her assessments and plans during daily NICU rounds and documenting these in the medical record.

[The Support Needs of Parents Whose Infants have Congenital Heart Disease](#)

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Background: With improvements in medical technologies, more infants with congenital heart disease (CHD) survive. Past studies have focused on older children and with parental care at discharge. Little is known about the needs of parents during the first year of life of these infants.

Design and Methods: A qualitative design using interviews of nine mothers and two fathers was conducted. Parents were recruited from an NICU in Taiwan using purposive sampling. Content analysis was the analytic method.

Findings: Three major aspects of support needs were extracted from the data; each with 2–4 themes.

- 1) Needs for informational support related to diagnosis and treatment:
 - Explanation clarity by the healthcare team.
 - Searching for information resources.
- 2) Needs of emotional/appraisal support related to uncertainty, care pressure, and guilt:
 - Worries about the infant's vulnerability.
 - Pressure derived from daily home care.
 - Perceived quality of support from others.
 - Searching for the possible cause of CHD.
- 3) Needs of instrumental support related to providing care:
 - Difficulties and confusion encountered during care provision.
 - Preferred learning method.

Conclusions: After the birth of an infant with CHD parents need different supports, including informational, emotional, appraisal, and instrumental, in order to make decisions, adjust their lives, take care of the infant and maintain wellness. Nurses should be aware of the quality of support parents receive and provide efficient ways to meet parents' needs.

Transient Neonatal Hypocalcemia in the IDM

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Clinical History: A large for gestational age female infant born at 36 3/7 weeks to a diabetic mother developed significant hypocalcemia. After consultation with an endocrinologist on day of life (DOL) #3, the following laboratory tests were done with these results: parathyroid hormone (67.4 pg/mL, low); Vitamin D 25-hydroxy (7.4 ng/mL, low); vitamin D1, 25-dihydroxy (154.0 pg/mL, elevated); urine calcium (<5 mg/dL); urine creatinine (28.7 mg/dL); phosphorus (12.5 mg/dL, elevated); magnesium 2 mg/dL (normal). Based on these laboratory values, the endocrinologist diagnosed the infant with hypoparathyroidism and recommended administration of oral calcium gluconate at 800 mg/kg/day divided every 6 hours along with Vitamin D at 1,000 IU daily.

Review of Literature: During the first three days of life, hypocalcemia can occur in up to 50 percent of infants of diabetic mothers (IDMs) and hypomagnesemia can occur in up to 40 percent of IDMs. The hallmark findings of hypoparathyroidism are hypocalcemia and hyperphosphatemia with normal renal function. It is necessary to obtain phosphorus and magnesium levels along with serum calcium levels when hypoparathyroidism is suspected. In the presence of hypomagnesemia, the parathyroid hormone levels are low; hypocalcemia persists until the magnesium level normalizes.

Implications for Practice: Obtain a thorough prenatal history and closely follow calcium/phosphorus levels of infants of diabetic mothers. Early detection of hypocalcemia is necessary, as it can be severe and lead to tetany and/or cardiac arrhythmias. Appropriate consultation with a pediatric endocrinologist is necessary in caring for infants with symptomatic calcium disorders.

Effect of Delayed Cord Clamping on Preterm Infants—One Unit's Experience

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Background: In the range of timing suggested by ACOG (30–60 seconds), preterm infants may potentially derive more short- and long-term benefits with delayed cord clamping (DCC) for at least 60 seconds. However, there are concerns with longer resuscitation delay.

Objective: To compare the clinical consequences of 45 versus 60 seconds DCC in singleton infants born at 23 0/7–31 6/7 weeks' gestation.

Methodology: We implemented the DCC process in very preterm, singleton infants, initially for 45 seconds and later, modified the policy to increase the delay to 60 seconds. We compared the infants born who received DCC ($n = 60$) during the 45 second study period (DCC-45 cohort), from August 19, 2013 to August 18, 2014, to the infants ($n = 63$) during the 60 second study period (DCC-60 cohort), from February 1, 2015 to January 31, 2016.

Data Analysis: DCC-60 cohort did not have any incidence of necrotizing enterocolitis compared to 8.3 percent in the DCC-45 cohort ($p = .02$). Similarly, incidence of culture-positive sepsis was significantly lower in the DCC-60 cohort compared to DCC-45 cohort (7.9% versus 18.3%; $p = .04$). Incidence of mortality and other major morbidities were similar between both groups. Median length of hospital stay in days was significantly lower in the DCC-60 cohort compared to DCC-45 cohort (46.5 versus 59.5; $p = .014$).

Interpretation: DCC for 60 seconds in very preterm singleton infants was safe, feasible, and not associated with any adverse short-term outcomes compared to DCC for 45 seconds.

Effects of Recent NRP Guidelines on Nonvigorous Infants Born through Meconium-Stained Amniotic Fluid Conditions

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Statement of the problem: To study the effects of recent neonatal resuscitation program (NRP) guidelines on nonvigorous infants born through meconium-stained amniotic fluid (MSAF).

Literature review: Recently, the NRP guidelines recommended against routine endotracheal suctioning of nonvigorous infants born through MSAF, but favored resuscitation of these infants with positive pressure ventilation. There are concerns regarding safety and efficacy of this change in practice.

Methodology: This is a pre- and post-intervention study comparing 130 nonvigorous infants born through MSAF during the one-year period before implementation of the new NRP guidelines (October 1, 2015 to September 30, 2016) to 101 infants born during the one year period after implementation (October 1, 2016 to September 30, 2017).

Data Analysis: Endotracheal suctioning was performed predominantly in the retrospective time period (70% vs 2%) indicating the change in practice. Late preterm and postterm deliveries were significantly higher during the prospective time period (11.9% vs 1.5%, $p = .02$). A significantly higher number of infants was admitted to the NICU for respiratory distress during the prospective time period compared to the retrospective time period (39.6% vs 22.3%, $p = .004$). There were no differences in the incidence of other outcomes, including meconium aspiration syndrome (MAS).

Interpretation: The recent NRP guideline change in the management of nonvigorous infants born through MSAF is safe and not associated with an increased incidence of MAS. The increased incidence of NICU admissions for respiratory distress could be due to a higher number of late preterm and postterm deliveries.