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Gravens By Design: Selected Abstracts from the 37th Annual Gravens Conference on the Environment of Care for High-Risk Infants and Their Families

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Abstract Title: The Neuroprotection of Oral Enjoyment by Offering Milk Drops

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Problem Statement: Determine whether offering oral milk drops with gavage feedings for oral enjoyment would decrease length of stay for premature infants.

Abstract:

Background: The very low birth weight premature infant receives many invasive oral procedures during a critical time of the structural differentiation of the brain. These experiences may have a negative impact on oral sensory and oral motor functioning.

Purpose: To determine if there would be a difference in the length of stay between premature infants who were offered milk drops orally with gavage feedings and premature infants who were not offered milk drops.

Methods: The subjects were NICU infants born at 24 weeks to 33 weeks +6 days gestation. A convenience sample of 99 premature infants who received milk drops orally with gavage feedings were matched, on gender and gestational age only, with a convenience control sample of 99 premature infants who had not received the milk drops.

Results: The premature infants who received milk drops orally with gavage feedings had significantly shorter lengths of stay resulting in significantly less average adjusted costs. Implications for practice/ research: Offering milk drops orally with gavage feedings is a simple, no expense, intervention that allows premature infant enjoyable oral experiences. The consistency of offering milk drops every 3 to 4 hours with gavage feedings reinforces positive neural connections associated with hunger and feedings.

Table 2. Average Length of Stay (LOS), Per Gestational Age for Control and Intervention Groups

Gestational Age (n=x/group)	Average LOS (days): Control Group (n=99)	Average LOS (days): Intervention Group (n=99)
24 (n=2)	135.0	90.0
25 (n=3)	127.7	86.0
26 (n=6)	90.8	88.8
27 (n=5)	98.2	83.4
28 (n=5)	64.8	53.0
29 (n=6)	65.8	56.8
30 (n=9)	55.4	47.2
31 (n=20)	38.5	41.5
32 (n=16)	34.6	30.1
33 (n=27)	24.1	23.6
Average LOS (days): (n=99)	48.30	44.11*

*Difference in overall average length of stay statistically significant between control and intervention group (p=.004). Statistics not conducted on each gestational age due to small "n" in most groups.

REFERENCES:

Pickler RH, McGrath JM, Reyna BA, et al. A Model of Neurodevelopmental Risk and Protection for Preterm Infants. Adv Neon Care. 2013;13 Suppl 5:S11-S20. doi:10.1097/ANC.000000000000002

Rodriguez NA, Meier PP, Groer MW, Zeller JM, Engstrom JL, Fogg L. A pilot study to determine the safety and feasibility of oropharyngeal administration of own mother's colostrum to extremely low-birth-weight infants. Adv in Neon Care. 2010;10(4):206–212. doi:10.1097/ANC.0b013e3181e9413

Lockridge T. Neonatal Neuroprotection: Bringing Best Practice to the Bedside in the NICU. MCN The Am J Mat Ch Nurs. 2018;43(2):66–76. doi:10.1097/NMC.0000000000000411

Lubbe W. Clinicians guide for cue-based transition to oral feeding in preterm infants: An easy-to-use clinical guide. J Eval Clin Pract. 2018;24(1):80–88.

Learner Objective:

1. Discuss why NICU procedures such as taping, intubation, suctioning, and oral care may have a negative impact oral feeding development.

2. List a major developmental reason why premature infants are at increased risk when they receive negative oral experiences.
3. Explain the difference between oral care and offering milk drops.

Gravens 2024-2

Abstract Title: Improving Commitment to Family-Centered Care in the NICU: Phase 3 Efforts from the Family-Centered Care Taskforce

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Problem Statement:

Many professional organizations, conferences, and veteran NICU parent non-profit organizations put together policies and guidelines to create opportunities for family empowerment in the NICU. Despite the progress of these organizations and programs/conferences to disseminate FCC practices and models, the uptake by NICUs has not been widespread or rapid. It is not a part of the standard of care. The FCC Taskforce lies in its ability to break down the silos that often hinder progress in healthcare. Through its global network of institutions, the task force connects healthcare professionals, researchers, and family partners, fostering collaboration, knowledge sharing, and the dissemination of best practices. The taskforce employs a small group model and large group webinars. We are sharing our small group work as an abstract here.

Abstract:

Background and Purpose: Disparities in neonatal health outcomes across racial and ethnic lines persist and may be exacerbated by a lack of family involvement or inclusion in the Neonatal Intensive Care Unit (NICU).(1) Family-Centered Care (FCC) in the NICU is a key factor in improving infant health and family mental health outcomes and empowering family participation in their infant's care.(2) Despite this, very few NICUs across the US have successfully integrated FCC as part of the NICU care model. The process of delivering FCC influenced by factors across 6 categories: equitable relationships, bond of trust, knowledge sharing, empowerment in workplace, environment and culture, and regulations.(3) NICU families are empowered and supported as they care for their infant(s) by nurses, physicians, and other professionals, highlighting the importance of training healthcare professionals to adopt family-centered approaches by using small group mentoring. The FCC taskforce aims to encourage education, create guidelines, and facilitate unit-based interventions related to FCC in NICU. One of the key strengths of the FCC taskforce lies in its ability to break down the silos that often hinder progress in healthcare. The taskforce employs a small group model and large group webinars (9 so far and many more already scheduled), enabling effective communication and facilitating change across various healthcare settings. This abstract shares our phase 3 quality improvement work on implementing FCC committee. Budget and Resources: Supported by a grant from Genentech, a member of the Roche group and partially funded by Prolacta Bioscience Foundation Program, Materials, or Methodology: Our team has successfully garnered the enthusiastic interest of 25 NICUs across the US & Israel with a primary goal to promote FCC by being part of one of five small groups. Each small group has 4–6 centers matched by American Academy Pediatrics NICU Levels (1–4) and their unique needs, led by two neonatologists and 1–2 family partners. Table 1 shows the demographic of the 25 NICUs.

To inform our improvement work, centers were surveyed about barriers/challenges to building an FCC Committee and/or Family Partnership Council (FPC).

Table 1: Demographics of the NICU

Role at Hospital Filled Out the survey		Total Count = 25
	MD	20
	RN	1
	Family Partner	2
	Other	2
AAP Level		
	4	9
	3	16
	2	0
	1	0
Number of Beds		
	20-40	10
	40-60	5
	60+	8
	No answer	2
Number of Neonatologists		
	1-9	12
	10-20	8
	20+	4
	No answer	1
Number of Advanced Practice Providers		
	0	4
	1-9	9
	10-20	9
	20+	2
	No answer	1
Number of Trainees		
	0	6
	1-9	6
	10-20	6
	20+	6
	No answer	1

Figure 1: Pareto Chart of Barriers in forming FCC Committees

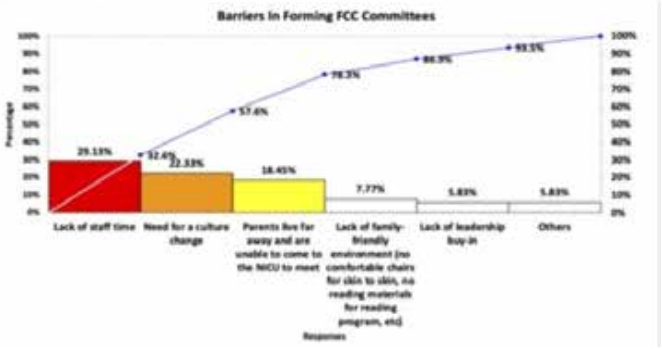
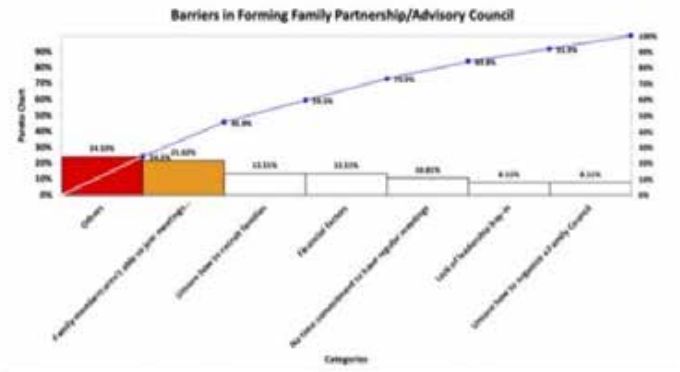
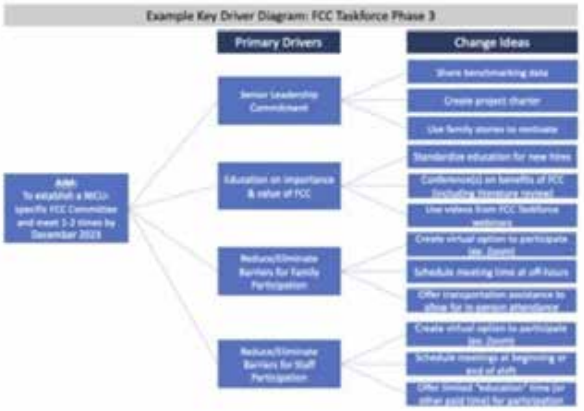


Figure 2 Pareto Chart of Barriers in forming Family Partnership/Advisory Council



Others- Brand new unit with individual rooms, covid - in person prohibited, many non-English speaking families with limited resources, rebuilding after pandemic, COVID

Pareto charts (Figure 1 & 2) were constructed to identify the most common barriers for FCC committee and FPC, and a sample key driver diagram (Figure 3) was created to target our tests of change.



Our SMART (Specific, Measurable, Achievable, Relevant, Time bound) aims are: 1. We aim to increase the percentage of NICUs with a very active (defined as at least meeting quarterly) NICU-specific FCC Committee from a baseline of 20% in Jan 2023 to absolute 10% by Dec 2023. 2. We aim to increase the percentage of NICUs who have a very active (at least meeting 1–2 times a year) Family Advisory/Partnership Council from a baseline of 16% in Jan 2023 to absolute 10% by Dec 2023.Impact or Results: We surveyed the team on their mid-year progress, results shown in Table 2.

Table 2: Results

FCC Present	FCC Present	Baseline (%)	Mid-Year
	Active	5 (20%)	8 (32%)
	Somewhat active	9 (36%)	7 (28%)
	No	11 (44%)	10 (40%)
FPC Present	FPC Present		
	Active	4 (16%)	5 (20%)
	Somewhat active	11 (44%)	9 (36%)
	No	10 (40%)	11 (44%)

We were able to achieve an increase in our aim 1 from 20% to 32% and for aim 2 from 16% to 20%. We also decreased the centers that don't have FCC committees from 44 to 40%. While there were challenges acknowledged by group members in building these FCC committees, we are excited about this improvement in 6 months. The group members are committed to learning more about FCC by participating in FCC taskforce webinars and acting as change agents in their NICUs. Impact: By sharing evidence-based practices and critical family perspectives during webinars as well as facilitating accountability through small groups, we are creating a forward movement to close this healthcare gap in delivering FCC. Next Steps: After working to establish a dedicated, multidisciplinary group focused on improving FCC in their NICU in phase 3, our goal in Phase 4 is to create benchmarking opportunities across institutions to further promote FCC as a culture and standard of care in neonatology.

Acknowledgements: Caroline Toney Noland, FCC Taskforce Executive Council Family and Healthcare Partners:Small Group 1 Leaders - Kerri Z. Machut, MD, Jessica Fry, MD, Elizabeth Simonton, Family Partner: Small Group 2 Leaders - Dharshi Sivakumar, MD, Vargabi Ghei, MD, Katherine Huber, Alex Zavala, Family Partner: Small Group 3 Leaders -Group 3 Leaders - Colby Day, MD, Daphna Barbeau, MD, Morgan Kowalski, Family Partner: Small Group 4 Leaders - Emily Whitesel, MD, Robert Cicco, MD, Molly Faust-Wylie, Family Partner: Small Group 5 Leaders - Robert White, MD, Malathi Balasundaram, MD, Keira Sorrells, Family Partner, Michelle Wrench, Family Partner

Bibliography:

1. *Profit J et al. Racial/Ethnic Disparity in NICU Quality of Care Delivery. Pediatrics 2017;140.*
2. *Ortenstrand A, et alThe Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. Pediatrics 2010, 125:e278-e283.*
3. *Kutahyalioglu NS, et al "It Takes a Village" to Implement Family-Centered Care in the Neonatal Intensive Care Unit. Adv Neonatal Care. 2023 Jul 27. doi: 10.1097/ANC.0000000000001091. Epub ahead of print. PMID: 37499692.*

Learner Objectives:

1. Identify challenges to implementing family-centered care culture in the NICU
2. Describe the importance of family-centered care on patient and family outcomes
3. Understand the benefits gained from external benchmarking on quality improvement metrics, including family-centered care metrics

Gravens 2024-3

Abstract Title: Avoiding antibiotics in chorioamnionitis-exposed infants

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Problem Statement:

Most infants born to mothers with chorioamnionitis do not develop early-onset sepsis, yet many are subjected to laboratory evaluations (including blood cultures) and treatment with antibiotics according to current recommendations. At our institution we culture and treat only symptomatic infants, and a review of our experience over a 5-year period showed there were no adverse outcomes using this approach.

Abstract:

Introduction: Decisions about management of infants exposed to maternal chorioamnionitis are often based on estimates of the risk of infection determined by a neonatal early onset sepsis risk calculator (NEOSC). Such management, however, results in drawing blood from and starting intravenous lines on many healthy infants. In some institutions it also results in separating them from their families for treatment in the neonatal intensive care unit (NICU). Our practice for many years has been to do laboratory studies and give antibiotics to chorioamnionitis-exposed (CE) infants only if they show signs of infection. Using this approach, we have evaluated and treated far fewer infants than we would have if we had used the NEOSC. We reviewed our experience over a 5-year period to document the differences in patient management and to identify adverse outcomes in these infants.

Methods: Charts of CE infants ≥ 35 weeks EGA (estimated gestational age) were reviewed over a 5-year period beginning in 2012 when our institution converted to electronic medical records. Data collected included vital signs, laboratory results, admission to the NICU, treatment with antibiotics, and hospital readmission during the first week after discharge. Their mothers' charts were reviewed for data needed to complete the NEOSC. The number of infants who underwent laboratory evaluations and treatment with antibiotics was compared.to the number who would have had such evaluations and treatment according to NEOSC recommendations.

Results: We treated 126 (16%) of 768 CE infants with antibiotics vs. 216 (28%) who would have been treated according to the NEOSC recommendations. Another 17 patients had blood cultures but were not treated with antibiotics. None of the untreated infants became ill, had positive blood cultures, were admitted to the NICU, or were readmitted to the hospital within the first week after discharge.

Table. Management of chorioamnionitis-exposed infants based on clinical signs only vs NEOSC

Group	Clinical signs only n=768	NEOSC recommendations n=764*	p value
Blood culture and antibiotics	126 (16%) **	216 (28%)	<0.001
Blood culture and observe	17 (2%)	102 (13%)	<0.001

*Insufficient data to calculate NEOSC for 4 patients

**one other patient treated with antibiotics for possible congenital syphilis

The odds of being treated with antibiotics using our "Clinical signs only" approach compared to being treated based on the Neonatal Early Onset Sepsis Calculator (NEOSC) were lower (Clinical signs only group/NEOSC recommendations group treatment odds ratio = 0.5 with a 95% confidence interval of 0.39 to 0.64 based on a Conditional Exact test, p<0.001). Inversing the calculation, the NEOSC would have recommended empiric antibiotics twice as often as they were used. (Odds ratio = 2.0; CI= 1.56 to 2.6; p<0.001).

Conclusion: Most (84%) of the 768 CE infants at our institution were managed without laboratory evaluation and antibiotic treatment. Use of the NEOSC would have resulted in significantly greater numbers of infants being cultured and treated. Our practice avoided subjecting these infants and their families to the stress and risks associated with these procedures. None of these untreated infants experienced adverse outcomes, If our results were corroborated by adequately powered multicenter studies, widespread practice changes could save many at-risk but healthy infants from unnecessary, costly, and detrimental procedures.

Learner Objectives:

1. understand the difference between our approach based only on clinical signs of illness vs. use of the neonatal early-onset sepsis calculator to direct management of chorioamnionitis-exposed infants

2. recognize the possibility of significant reductions in use of laboratory evaluation and antibiotic treatment in these infants

Gravens 2024-4

Abstract Title: A Blueprint for Implementing Early Progressive Mobility in The Neonatal/Infant Intensive Care Unit for Infants with Severe Bronchopulmonary Dysplasia (BPD)

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Problem Statement:

- The negative impact of critical illness and hospitalization in the intensive care unit is well documented in adult populations.
- Physiologic and anatomic changes have also been recognized in PICU patients.
- In order to decrease the effects of mechanical ventilation, sedation, and immobility/bedrest, and promote improved function, progressive mobility programs have become the standard of care.
- Infants in the NICU, with their immature body structures and systems, are also exposed to these negative ICU experiences resulting in impaired growth and development.
- We introduced a program of early mobility for intubated babies on the N/IICU with all infants including infants with severe BPD to decrease the negative impact of bedrest and hospitalization while promoting developmental skills.

Abstract:

1. We performed a prospective, non-randomized, pre-post intervention cohort study with a convenience sample in conjunction with an implantation of a Unit-Wide Culture of Mobility/ Early Progressive Mobility (EPM) Quality Improvement Project. We adopted this design to verify the effectiveness of EPM in two epochs of infants with sBPD before and after implementation of EPM as a standard of care, and to ensure the safety and feasibility of EPM with this patient population. 2. A clinical practice guideline entitled NICU Early Mobility to guide neonatal physical therapists (PTs) and occupational therapists (OTS). B. A N/IICU wide Holding and Mobility Job Aide for all NICU staff. C. Unit wide education

via mandatory electronic learning module for all D. Supplemental bedside education of nursing staff by OTs and PTs. E. A standardized EMR activity order set F. A QI clinical care rounding tool question. 3. A. Items 1–17 from The Test of Infant Motor Performance (TIMP) were used to observe spontaneous movements and to assess head control in our study population at two data points, four weeks apart, starting at 40 weeks PMA and ending by 49 weeks PMA. B. The respiratory severity score (RSS) was calculated and documented daily during the study periods and recorded for all participants.

	Epoch 1 (Pre-EPM education)	Epoch 2 (Post-EPM education)	p-value
BASELINE	**n=16**	**n=16**	
Female – n (%)	6 (38%)	8 (50%)	0.72
Birthweight - grams	651 +/- 229	643 +/- 105	0.90
Gestational age - wks	25.6 +/- 2.1	24.8 +/- 1.7	0.24
FIRST TIMP	**n=15**	**n=16**	
Corrected age - wks	44.8 +/- 3.6	43.4 +/- 3.2	0.29
Respiratory severity score	6.9 +/- 2.3	6.4 +/- 2.8	0.55
SECOND TIMP	**n=15**	**n=14**	
Corrected age - wks	49.5 +/- 3.8	49.1 +/- 4.0	0.79
Respiratory severity score	5.6 +/- 2.2	4.4 +/- 3.6	0.29
Days between TIMPs	32.3 +/- 15.3	40.1 +/- 9.0	0.11
Change in respiratory severity score between TIMPs	-1.1 +/- 1.6	-1.9 +/- 3.1	0.38

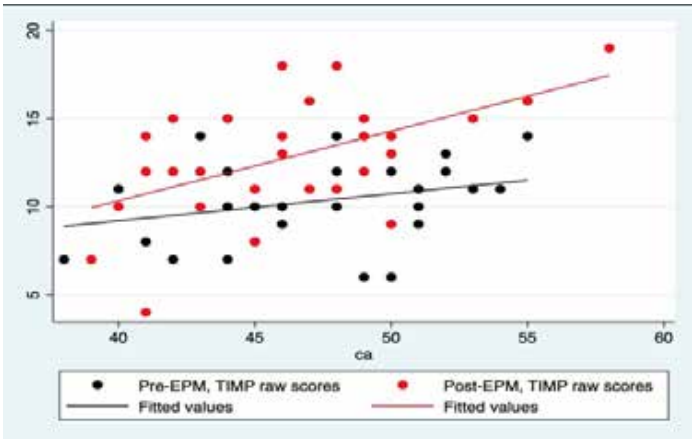
C. Number of therapy, nursing, and parent driven EPM interventions between the TIMP assessments were obtained from the EMR and normalized to one-week intervals.4. 16 infants were enrolled during each epoch with a total number of 32 participants. 5. Quantitative data was obtained. 6. A. Number of EPM opportunities such as assisted sitting, supported sitting in a seating device, prone, and out of bed experiences during the period of observation. B. Number of therapy sessions. C. Carry-over of EPM outside of therapy. D. TIMP Scores F. RSS Scores Impact & results Infants in epoch 2 when compared to those in Epoch 1 had an increase in the number of EPM experiences both in and out of therapy.

	Epoch 1 (Pre-EPM education, n=15)	Epoch 2 (Post-EPM education, n=14)	p-value
Physical or occupational therapy (PT/OT) sessions attempted	2.4 +/- 0.6	3.4 +/- 1.1	0.003
PT/OT sessions completed	1.6 +/- 0.5	2.3 +/- 0.8	0.009
Prone position with nurse or PT/OT	1.5 +/- 1.0	2.7 +/- 2.2	0.07
Sitting up with nurse or PT/OT	1.1 +/- 0.5	1.8 +/- 0.6	0.002
Placed in chair with nurse or PT/OT	0.3 +/- 0.6	2.8 +/- 3.0	0.003
Skin to skin	1.8 +/- 1.3	4.3 +/- 2.2	<0.001
Tilted in bed	12.4 +/- 4.9	8.7 +/- 2.7	0.02
Side lying in bed	17.5 +/- 5.1	16.1 +/- 6.1	0.50

Infants in epoch 2 had more advanced motor development skills on the TIMP, when compared to infants in epoch 1, at both timepoints particularly the elicited head control items and total raw scores.

	Epoch 1 (Pre-EPM education)	Epoch 2 (Post-EPM education)	p-value
FIRST TIMP			
Elicited items	2.5 +/- 2.3	4.3 +/- 1.9	0.02
Observed items	6.7 +/- 1.5	6.9 +/- 1.6	0.72
Total raw score	9.2 +/- 2.7	11.2 +/- 2.9	0.06
SECOND TIMP			
Elicited items	3.7 +/- 1.5	6.4 +/- 2.2	<0.001
Observed items	7.7 +/- 0.5	8.1 +/- 1.0	0.12
Total raw score	11.4 +/- 1.5	14.5 +/- 2.8	<0.001
CHANGE IN TIMP			
Elicited items	1.3 +/- 2.4	2.1 +/- 2.7	0.36
Observed items	0.9 +/- 1.4	1.0 +/- 1.5	0.91
Total raw score	2.2 +/- 2.8	3.1 +/- 2.7	0.36

There was not a statistically significant difference in trajectory of developmental change in skills between two TIMP assessments. However, when you examine the raw scores for each epoch across the study population rather than paired (i.e., TIMP1-TIMP 2), you can see a more positive short-term developmental trajectory post implementation of EPM as a standard of care.



No unplanned extubations or clinical adverse events were reported in this cohort before or after implementation of EPM. Charts and graphs can be provided upon request. Based on the results, we can affirm that EPM is safe and feasible in critically ill, intubated infants with sBPD. No clinical adverse events or unplanned extubations occurred in either cohort. We have demonstrated the beneficial impact of EPM with this high-risk population where the impact of medical status; medical stability; respiratory effort; medication including analgesics and sedatives negatively impact the ability to achieve developmental milestones. While there was not a statistically significant trajectory in TIMP scores between the first and second test administration, the overall trajectory across study participants was more positive in epoch 2. The increase in number of upright sitting experience was anticipated, but the increase in number of therapy sessions or attempts were unexpected as therapy frequency metrics did not change across epochs. Incidentally, the increase in skin-to-skin care (SSC) was also unanticipated as SSC was a well-established program in our N/IICU. However, the education provided to staff when EPM was introduced as a standard of care may have increased staff's knowledge, competence, and willingness with repositioning and mobilizing intubated infants and neonates. Additionally, with frequent reinforcement and encouragement, families may have felt more comfortable performing SSC and holding. Our research study benefited from a well-organized and executed launching of this new standard of care. The historical use of EPM as a therapy intervention since the early-mid 2000s, in the N/IICU and other hospital units, assisted with staff buy-in and engagement. However, introduction of this new standard of care during a global pandemic had its challenges including frequent RN turnovers and limited visitation policies which may have impacted the frequency of EPM and thus, our results. To date, EPM is a standard of care on our unit, but frequent re-education and reinforcement are required for continued success.

References:

Campbell, S. K., & Hedeker, D. Validity of the Test of Infant Motor Performance for discriminating among infants with varying risk for poor motor outcome. J Peds. 2001; 139(4), 546–551.

Campbell, S. K., Kolobe, T. H., Osten, E. T., Lenke, M., & Girolami, G. L. Construct validity of the test of infant motor performance. Phys Ther. 1995; 75(7), 585–596.

Choong, K., Foster, G., Fraser, D. D., Hutchison, J. S., Joffe, A. R., Jouvet, P. A., ... & Ward, R. E. Acute rehabilitation practices in critically ill children: a multicenter study. Ped Crit Care Med. 2014; 15(6), e270–e279.

D'Agata, A. L., Sanders, M. R., Grasso, D. J., Young, E. E., Cong, X., & Mcgrath, J. M. Unpacking the burden of care for infants in the NICU. Inf Ment Health J. 2017; 38(2), 306–317.

DeMauro, S. B. (2018). The impact of bronchopulmonary dysplasia on childhood outcomes. Clin Perinat. 2018; 45(3), 439–452.

DeMauro, S. B., Burkhardt, M., Wood, A., Nilan, K., Jensen, E. A., Bamat, N. A., ... & Gibbs, K. (2022). Early motor development in infants with moderate or severe bronchopulmonary dysplasia. J Neo-Perinat Med. 2022; 15(1), 55–62

Jensen, E. A., Dysart, K., Gantz, M. G., McDonald, S., Bamat, N. A., Keszler, M., ... & DeMauro, S. B. The diagnosis of bronchopulmonary dysplasia in very preterm infants. An evidence-based approach. Am J Resp Crit Care Medicine. 2019;200(6), 751–759.

Kukreti, V., Shamim, M., & Khilnani, P. Intensive care unit acquired weakness in children: critical illness polyneuropathy and myopathy. Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Ind Soc Crit Care Med. 2014; 18(2), 95.

Learner Objective:

1. Demonstrate understanding of current evidence supporting the benefits of early mobilization (EM) in the NICU
2. Explain the team approach needed safely mobilize intubated infants
3. Discuss strategies to promote a culture shift toward mobility in a NICU
4. Summarize data on safety and efficacy of EM with infants with moderate to severe BPD

Gravens 2024-5

Abstract Title: Using a Strategy of Concentrating Total Parenteral Nutrition Potentially Provides More Appropriate Growth Parameters

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Problem Statement: Can nutrition be more optimally delivered in the infant at risk of developmental delay who is not on full enteral feeds?

Abstract:

Background: The transition from a non-per-oral (NPO) status to full enteral feeds in neonatal and pediatric intensive care unit (NICU and PICU) environments presents a complex challenge, particularly for patients who remain dependent on total parenteral nutrition (TPN). This delicate process necessitates a meticulous approach that factors in the intricacies of individual patients and their unique nutritional requirements. In this context, it's crucial to recognize that the decision to wean parenteral fluids should not be made in isolation without considering the imperative to tailor TPN content to the specific needs of the patient. While it may seem convenient and less cumbersome to base the TPN on what the patient would receive if NPO and simply reduce the percentage of the full NPO TPN as enteral feedings progress, such an approach carries the risk of sacrificing significant nutritional advantages. The importance of understanding this issue lies in the recognition that TPN provides a distinct nutritional advantage, especially for critically ill or vulnerable patients, over and above what they might receive orally or enterally. TPN can be custom-tailored to address specific nutrient deficiencies and imbalances, ensuring that patients receive the precise nutritional support they require for their unique medical conditions. This level of precision is especially critical in the NICU and PICU settings, where patients often have complex medical histories and a heightened risk of nutritional deficiencies. Additionally, the rate of advancement from NPO to full feeds can vary significantly among patients. For some, this progression occurs over a relatively short period, while for others, it may be a gradual process extending over several days or even longer. In such cases, the nutritional advantages offered by TPN remain crucial during the extended transition period. Neglecting the need to maintain or even increase the concentration of parenterally delivered nutrients during this time can result in missed opportunities to provide optimal nutritional support. The intricacies of managing TPN in NICU and PICU settings underscore the importance of a patient-centered, detail-oriented approach. Transitioning patients from NPO status to full feeds should be a carefully considered process that maintains the nutritional benefits of TPN even as enteral feeds are introduced or increased. This ensures that each patient receives the customized nutritional support required for their unique medical condition, ultimately optimizing their chances for a positive clinical outcome.

Hypothesis: We asked whether this missed nutrition could be re-captured using an intelligent TPN program with concentrating features.

Design/Methods: Using an MS Excel template-based TPN program (non-commercial) created for this special purpose, a simulated patient was entered. The patient was presumed to be 5 kg and initially receiving 160 mL/kg/day (i.e., 30 mL/hr). As feeds "theoretically" advanced, two approaches were used. In the first, IV fluids were concentrated, prioritizing non-protein calories, protein, intralipid, and an appropriate non-protein calorie nitrogen ratio. In the second, TPN was administered according to a percent of the whole based on decreasing the total amount of fluid allocated. In both cases, a 3-in-1 solution was presumed (i.e., fat percentage stays the same in the whole TPN model).

Results: The results are presented in the tables. Table 1 demonstrates the use of the concentrator.

TPN	Dextrose	Calories	Protein	Fat	CHO	mL	NPCN	Fat %
30	15	121.4	4.5	3.5	14.9	161.5	168.3	28.8
27.5	16	119.5	4.5	3.5	14.7	149.5	165.6	29.3
25	17.5	119	4.5	3.5	14.6	137.5	164.9	29.4
22.5	19.5	119.2	4.5	3.5	14.6	125.5	165.3	29.4
20	19.5	109.9	4	3.5	13	113.5	171.4	31.8
17.5	19.5	100.5	3.5	3.5	11.4	101.4	179.2	34.5
15	19.5	91.1	3	3.5	9.8	89.5	189.5	38.4
12.5	17	75.8	2.4	3.5	8.1	77.5	197	46.2
10	15	63.8	2	3.5	5	65.5	199	54.8
7.5	13	43.7	1.5	2.5	3.3	48.5	181.8	57.2
5	13	29.5	1	1.7	2.2	32.5	184	57.6
2.5	12	13.8	0.5	0.8	1	16	171.6	58.2

Table 2 shows the use of a “percent of whole” strategy. Using a concentrating program resulted in significantly more non-protein calories, protein, and intralipid (as demonstrated in the tables) while maintaining a safe non-protein calorie nitrogen ratio and fat percentage. ($p < 0.05$)

TPN	Dextrose	Calories	Protein	Fat	CHO	mL	NPCN	Fat %
30	15	121.4	4.5	3.5	14.9	161.5	168.3	28.8
27.5	15	111.6	4.1	3.2	13.7	149.5	168.3	28.8
25	15	100.7	3.7	2.9	12.3	137.5	168.3	28.8
22.5	15	90.8	3.4	2.6	11.0	125.5	168.3	28.8
20	15	80.45	3	2.3	9.7	113.5	168.3	28.8
17.5	15	70.18	2.63	2	8.4	101.4	168.3	28.8
15	15	59.91	2.26	1.7	7.1	89.5	168.3	28.8
12.5	15	49.64	1.89	1.4	5.8	77.5	168.3	28.8
10	15	39.37	1.52	1.1	4.5	65.5	168.3	28.8
7.5	15	29.1	1.15	0.8	3.2	48.5	168.3	28.8
5	15	18.83	0.78	0.5	1.9	32.5	168.3	28.8
2.5	15	8.56	0.41	0.2	0.6	16	168.3	28.8

Conclusions: While there is a diverse array of strategies aimed at promoting the enhancement of enteral nutrition in neonatal care, it is of paramount importance to underscore that the pursuit of such enhancements should not occur at the expense of delivering an optimally tailored parenteral solution. The intricacies of neonatal care demand a nuanced approach that takes into account the specific needs of individual infants. In particular, neonates who face an elevated risk of developmental delay and necrotizing enterocolitis (NEC), along with those who grapple with complex congenital heart disease, stand as a distinct cohort that confronts a substantial risk of experiencing growth failure. This vulnerability necessitates a vigilant and comprehensive approach to their nutritional support. While it may appear to be a less labor-intensive endeavor to divert attention away from the meticulous customization of total parenteral nutrition (TPN) content, such an oversight can ultimately undermine the full advantages of parenteral supplementation. To elaborate further, neonates in these high-risk categories demand a meticulous examination of their nutritional requirements. Neglecting the detailed composition of TPN can lead to missed opportunities for targeted intervention and support. In cases of developmental delay, NEC, and complex congenital heart disease, precision in TPN formulation is crucial for mitigating the risk of growth failure and other associated complications. Hence, the imperative of customizing parenteral solutions to address the specific needs of each neonate remains a critical component of neonatal care, notwithstanding the potential perception that it is labor-intensive. In essence, the intricacies of neonatal nutrition call for a multifaceted approach that addresses the unique challenges and vulnerabilities of each infant. This holistic perspective underscores the need to prioritize and optimize both enteral and parenteral nutritional strategies to ensure the best possible outcomes for neonates facing a heightened risk of growth failure and associated complications.

Learner Objectives:

TPN can be concentrated. More nutrition can be delivered to the baby
Better outcomes may result from improved nutrition

Gravens 2024-6

Abstract Title: Case managers at the NICU: Taking care of parents during the roller-coaster of the NICU

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Problem Statement:

Parents with a (threatened) premature birth (specifically below 32 weeks gestational age) end up on a roller-coaster and are confronted with many disciplines. It is important that all these disciplines work together in the right way to generate better care and continuity, so that the (future) parents can be parents as much as possible. Based on the desire to streamline this care, the care providers involved at Maastricht UMC+ MosaKids children’s hospital in the Netherlands have developed the preterm birth care path.

Abstract:

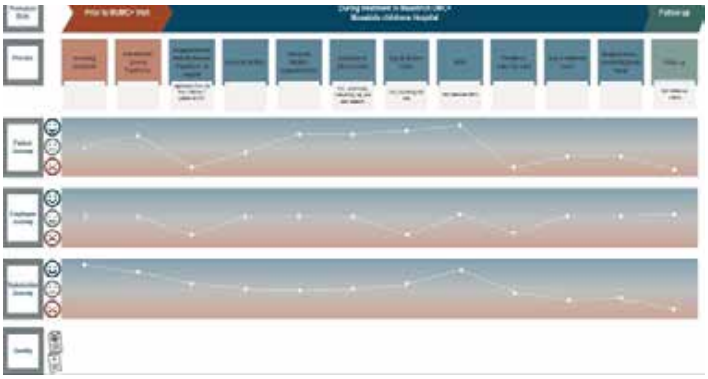
In the first phase of the development of the care path, we looked for points for improvement or bottlenecks by means of a strengths-weaknesses analysis. We considered the current and the desired situation. A patient journey, an employee journey and a stakeholder analysis were performed. Based on the results of this, the implementation of a new function named ‘case manager’ was made possible. To collect data for the patient journey, 20 interviews were conducted with parents of children admitted to NICU in 2020. In the employee journey all steps of the care path were discussed. A large poster with post-it was used, nurses and doctors from delivery room as well as NICU, were invited to share their ‘tips and tops’ on every step of the care path. About 90 nurses and 20 doctors participated in the employee journey. Stakeholder analysis was performed under a selected group of different specialties such as 4 gynecologists and 4 neonatologists from other hospitals with whom we collaborate and also 6 midwives who have their practice in the region of the hospital. Social workers, psychologists, and physical therapists from our hospital. This brings the whole number to 22 stakeholders who completed the questionnaire sent by email. Data obtained was qualitative, collected by questionnaires and interviews. The main outcome measurements were Quality of care improvement, Patient satisfaction, and Reduction of workload for nurses, doctors and paramedic team.

Impact and results: Maastricht UMC+ MosaKids children’s hospital is the first hospital in the Netherlands where case management is integrated in the care path for preterm infants. This was initially started as a pilot and has become a permanent part of perinatal care at Maastricht UMC+ MosaKids children’s hospital since 2022. Surveys show that both patients and staff are positive about the added value of case managers in this specific care. We have the ambition to evaluate this in the future by means of quali-

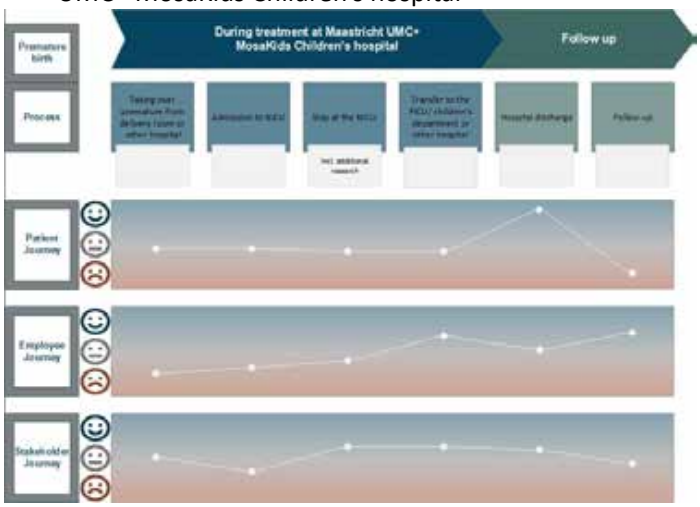
tative scientific research. One of the major bottlenecks for patients was the communication and timing of transfer to other hospitals. We incorporated (online) meetings between doctors, nurses and parents to improve this. No evidence-based results available at this time, only best practice. We intend to make the preterm birth care path evidence based through qualitative scientific research.

Conclusions: Through the use of case managers in the preterm birth care path, continuity is guaranteed, from the moment of admission of a mother with a threatened preterm birth, during the admission to the NICU and the follow-up process until the child is 8 years old at the outpatient clinic. During the pilot we had to convince the Board of Directors that this care path with two case managers was necessary to provide good care for this vulnerable group of patients. To demonstrate the value of the case managers, questionnaires were created for parents, nurses, and doctors. The result was presented to the Board of Directors after which the pilot of two case managers was converted into a permanent position in the care path. We also had to convince colleagues in the two departments of the added value of case managers. Nurses preferred a nurse colleague instead of two case managers, but it turns out that the case managers ensured that the workload was lower for nurses and doctors.

NICU Patient Experience Monitor of Maastricht UMC+ MosaKids Children's hospital, Delivery room



Patient Experience Monitor of Maastricht UMC+ MosaKids Children's hospital



References and/or bibliography:

Diehl-Svrjcek, B. C., & Richardson, R. (2005). Decreasing NICU costs in the magamed care area, the positive impact of collaborative high-risk OB and NICU disease management programs. Lippincott's case management, 10 (3), 159-166.

Slaughter, J. C., Issel, L. M., Handler, A. S., Rosenberg, D., Kane, D. J., & Stayner, L. T. (2013). Measuring dosage: A key factor when assessing the relationship between prenatal case management and birth outcomes. Matern Child Health j, 17, 1414-1423.

Gilette, Y., Hansen, N. B., Robinson, J. L., Kirkpatrick, K., & Grywalski, R. (1991). Hospital-bases case management for medically fragile infants: Program design. Patient education and counseling, 17, 49-58.

Bry, A., & Wigert, H. (2019). Psychosocial support for parents of extremely preterm infants in neonatal intensive care: a qualitative interview study. BMC Psychol 7 (1). 76. https://doi:10.1186/s40359-019-0354-4.

Learner Objectives:

- Better communication and cooperation within the care path improves care for preterm infants and their parents
- The case manager is the key figure within the care path; making a bridge between patients and care providers

Gravens 2024-7

Abstract Title: The Long and Winding Road. Cultural Change in the NICU

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Problem Statement:

Implement Family Centered Care culture in a NICU

Background and Purpose: Neonatal Intensive Care Unit (NICU) admission rate was recently estimated to be 9% of all deliveries. With increasing survival rates in neonatal populations, adverse neurodevelopmental outcomes are still prevalent and may be associated partly with complications of prematurity, by the NICU environment, and by the stress and pain experienced by infants.1 Early parent - infant attachment has been shown to be beneficial for infant and parental outcomes and the recommendations for integrating families into routine care and support of their babies has been acknowledged and supported in many guidelines and position papers.

Though there are variations in the definition or main principles included in the Family-centered care (FCC) approach, as well as challenges in implementing into daily, standardized care, our unit has decided to improve this aspect of our practice in an effort to optimize short and long-term outcomes of our infants and their

families.

Abstract:

Methodology: We are a 40-bed Level 2–3 NICU government hospital with 12,000 deliveries and 450 NICU admissions per year. In the past year team members of our unit have joined a Family Centered Care international collaborative working group to direct neonatal care according to FCC principles. We learned about FCC concepts, facilitation of unit culture change, tools to implement this approach and received support via webinar participation. We utilized a monthly newsletter, shared resources and ideas, and focused, small work groups to support and mentor local change. This is a descriptive overview of steps taken in the last year to implement a cultural change in the NICU, ordered by the components we have adopted for the definition of Family Centered Care.

Outcome: Staff Education and Support - We hold monthly nursing meetings where we introduce topics associated with FCC, explaining the importance of FCC elements, inviting graduate parents to share their experiences including Do's & Don'ts of. We have monthly multidisciplinary meetings to discuss progress and planning for further implementation of FCC strategies. We have created new focus groups for specific topics, such as kangaroo care, bereavement, quiet times etc. Soon, we will be forming a parent council to join these meetings. We have begun incorporating parent communication scenarios in our monthly simulation practice. We are encouraging our staff to join the discussions that are offered by the FCC taskforce, and a representative of our unit takes part in monthly meetings of the taskforce.

Mental Health Professionals—We have had a unit specific psychologist and social worker, who are now more openly involved in daily care routines. They attend morning meetings and handover—where we frequently discuss social and psychological challenges for each baby. We have a shared WhatsApp group with our mental health professionals to alert them in real time of a newborn or parent requiring their attention. The mental health professionals are guiding a communication simulation (shared for nurses and physicians), and they hold group discussion meetings with the residents and nurses.

Peer to Peer Family Support—We have a parent WhatsApp group (to connect with currently admitted and graduate parents for support and resource sharing) and We help facilitate the first connection of our NICU parents to the Israeli Neonatal Association for further support. Additionally, Family-Centered Developmental Care—The inconsistencies in practice of Family-Centered Developmental Care in our unit was one of the largest challenges. We emphasized the importance of Kangaroo Care to the team, we renewed the guidelines for skin-to-skin care, as well as placing emphasis on four handed care. We have started having quiet times that include darkening of the room and quiet surroundings (with attempts to have kangaroo holding done at these times). We are reducing the number of pricks and pokes and introduced a project of offering knitted octopus dolls to our babies in the level 2 unit. Our physiotherapist and occupational therapist teams are more involved with care and parental guidance in the level 3 unit during the early stages of admission. We have a planned renovation of our NICU and have altered the plans to better accommodate and support a developmental care-oriented unit.

Post Discharge Follow Up—This topic is a great challenge for us. We are very limited in resources and find it difficult to make a plan that will be feasible to support parents after discharge. On the other hand, as Israel is a small country, and our local health services are available and reliable—most discharged parents have a pediatrician, and good access for further follow up. Typically, the babies stay within our hospital for imaging, neurology, and ophthalmologic follow up. Barriers: There are many barriers for implementing this new approach, including, poor resources, staffing, prejudice regarding the perception of the parents' place as an integral member of the NICU care team, and previous local habits and beliefs that are not always consist with the basic elements of FCC. However, with persistence and support we are very proud of our work and hope to take more steps to optimize care for the infants and their families.

Impact: Family testimonial: "I am never alone at NICU" was my answer to those who worried about me going alone into hospital every day. Four years after our first child's admission, we found ourselves back at NICU, with the birth of our second child. This time for a longer and much more complicated period. Unlike our first admission, this time we felt involved in the recovery process of our baby and at the same time the medical staff paid closer attention to our mental state and wellbeing. NICU team encouraged us to hold our baby (kangaroo) as soon as his medical condition allowed it which contributed greatly to our connection with our baby. Being at NICU became a getaway from the outside world, a parallel universe, where good must win. Staff member testimonial: lately, a gradual, significant change in the attitude and perception of the parent's role in our NICU has occurred. More attention is given to the developmental needs of the premature baby alongside advanced medical care and there is recognition of the importance of a multidisciplinary team in the early stages of care. Early intervention and continuous efforts to reduce stress factors, encourage parent-infant bonding and support parental competence are new routines. Next step: Palliative and bereavement care—this field still needs further attention and work—we are currently forming a group to promote this topic.

Acknowledgement: Entire NICU team, FCCare Taskforce, Infants and parents admitted to our unit.

Bibliography:

Jarjour IT. Neurodevelopmental outcome after extreme prematurity: a review of the literature. Ped Neurol. 2015;52:143-52.

Stark AR, et al. Standards for Levels of Neonatal Care: II, III, and IV. Pediatrics. 2023;151(6):e2023061957.

Hall SL, et al. The neonatal intensive parenting unit: an introduction. J Perinatol. 2017;37(12):1259-1264.

Kalyan G, et al Opinion and Beliefs of Physicians about Integrating Families into the Care System of Preterm Hospitalized Neonates. Indian J Pediatr. 2023;10.1007/s12098-023-04691-w.

Learner Objective:

To learn how to implement Family-centered care practices in the NICU.

To learn how multidisciplinary collaboration including veteran families help in implementing FCC practices.

To learn barriers and challenges in implementing FCC.

Gravens 2024-8

Abstract Title: Current practices and parental attitudes of the role of neonatal therapies during therapeutic hypothermia for hypoxic ischemic encephalopathy

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Problem Statement:

Background: Therapeutic hypothermia (TH) protects the brain after hypoxic ischemic injury. Currently, there is no standard of care for the involvement of neonatal therapists during TH. The parental perspective on how to introduce therapies has not been evaluated.

Aims: The objective of this study is to evaluate current therapy practices across the United States (US) and the parental perspective on therapy involvement for infants with hypoxic ischemic encephalopathy (HIE).

Abstract:

Study Design: Participants were recruited from the National Association of Neonatal Therapists and parent support group, Hope for HIE, to complete anonymous surveys. Participants included US neonatal therapists and parents of infants, aged 6 to 24 months, with HIE.

Results: A total of 63 parents participated. Almost 70% of parents reported that therapists first met with them after magnetic resonance imaging (MRI). Over 75% said therapists didn't attend conferences to discuss imaging and 73% did not think therapists used imaging to design plan. Most parents would have wanted to meet earlier (63% during TH vs. 37% after). A total of 115 therapists participated. The majority (67%) reported that their institution didn't have a standardized protocol. Over 60% believe that MRI results help with planning. Both parents and therapists felt that written and video educational materials would be of most value.

Conclusion: There is variability in neonatal therapy services for infants undergoing TH. In this anonymous survey study, parents want to meet therapists earlier in treatment and neonatal therapists feel that standardized guidelines could improve care, as well as developing written and video materials for education. Further research is necessary to delineate best standards of care for providing neonatal therapies for patients with HIE and practicing family centered care during this stressful time for parents.

References:

Russ JB, Simmons R, Glass HC. Neonatal Encephalopathy: Beyond Hypoxic-Ischemic Encephalopathy. Neoreviews. Mar 2021;22(3):e148-e1622.

Higgins RD, Raju T, Edwards AD, et al. Hypothermia and other treatment options for neonatal encephalopathy: an executive summary of the Eunice Kennedy Shriver NICHD workshop. J Pediatr. Nov 2011;159(5):851-858.e13.

Slattery J, Morgan A, Douglas J. Early sucking and swallowing problems as predictors of neurodevelopmental outcome in children with neonatal brain injury: a systematic review. Dev Med Child Neurol. Sep 2012;54(9):796-8064.

Marlow N, Shankaran S, Rogers EE, Maitre NL, Smyser CD, Committee NBSGaP. Neurological and developmental outcomes following neonatal encephalopathy treated with therapeutic hypothermia. Semin Fetal Neonatal Med. Oct 2021;26(5):1012745.

Glass HC, Ferriero DM, Rowitch DH, Shimotake TK. The neurointensive nursery: concept, development, and insights gained. Curr Opin Pediatr. Apr 2019;31(2):202-2096.

Lemmon ME, Donohue PK, Parkinson C, Northington FJ, Boss RD. Parent Experience of Neonatal Encephalopathy. J Child Neurol. Mar 2017;32(3):286-2927.

Pilon B, Craig AK, Lemmon ME, Goeller A, Committee NBSGaP. Supporting families in their child's journey with neonatal encephalopathy and therapeutic hypothermia. Semin Fetal Neonatal Med. Oct 2021;26(5):1012788.

Sagaser A, Pilon B, Goeller A, Lemmon M, Craig AK. Parent Experience of Hypoxic-Ischemic Encephalopathy and Hypothermia: A Call for Trauma Informed Care. Am J Perinatol. Mar 04 20229.

Perez M, Poskey G. A Survey on NICU Therapists' Role for Infants with Hypoxic Ischemic Encephalopathy Following Therapeutic Hypothermia. J Allied Health. 2022;51(1):15-2010.

Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009 Apr;42(2):377-8111.

Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, McLeod L, Delacqua G, Delacqua F, Kirby J, Duda SN; REDCap Consortium. The REDCap consortium: Building an international community of software platform partners. J Biomed Inform. 2019 Jul; 95:10320812.

Malan R, Van Der Linde J, Kritzinger A, et al. Evolution of swallowing and feeding abilities of neonates with hypoxic-ischaemic encephalopathy during hospitalisation: A case series. Int J Speech Lang Pathol. Nov 29 2022:1-1013.

Shankaran S, McDonald SA, Laptook AR, et al. Neonatal Magnetic Resonance Imaging Pattern of Brain Injury as a Biomarker of Childhood Outcomes following a Trial of Hypothermia for Neonatal Hypoxic-Ischemic Encephalopathy. J Pediatr. Nov 2015;167(5):987-93.e3

Learner Objectives:

1.) Identify current neonatal therapy practices for assessment and treatment of infants with HIE.

2.) Describe frequent barriers to assessment and treatment for infants with HIE

Gravens 2024-9

Abstract Title: "It Takes a Village" Sustaining the Family-Centered Care Practices—Single Center Seven year Journey

Authors: Malathi Balasundaram, Dharshi Sivakumar, Georgette Aquilina, Melinda Porter, Michelle Wrench, Diane Crothers, Annie Li

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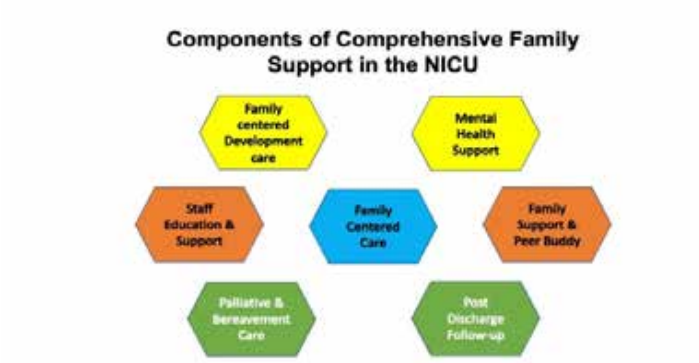
Problem Statement:

Family-centered care (FCC) ensures caregivers are active and engaged in their infants' care throughout the Neonatal Intensive Care Unit (NICU) Journey. A large body of evidence has shown FCC in the NICU promotes the health outcome of the infants' well-being of the parents and supports parent-infant bonding (1,3). The process of delivering FCC is influenced by factors across six categories: equitable relationships, established trust, knowledge sharing, empowerment in the workplace, environment and culture, and regulations. (2) El Camino Health NICU initiated the Family-Centered Care Program (FCCP) in 2016. We will share our efforts and experience in developing and sustaining FCC practices in healthcare professionals and families, even during the pandemic.

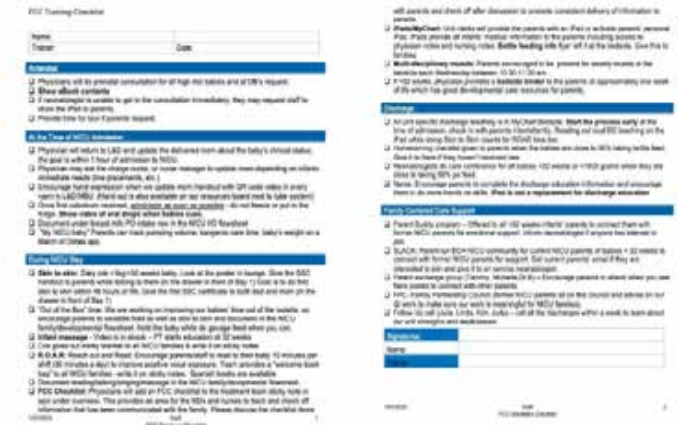
Abstract:

We are a 20-bed community Level 3 NICU with approximately 4000 deliveries and 450 NICU admissions per year. We have made several changes in our unit to integrate families in the infants' care. We started our journey by forming a Family Partnership Council (FPC) with veteran family partners, physicians, and hospital administrators. We implemented education and support for staff, developmental care, parent support groups, parent buddy support, post-discharge support, palliative and bereavement care guidelines (Figure 1).

Sub-committees were formed to utilize their time efficiently and focus on projects they were passionate about. An FCC leadership team with an FCC chair, medical director, nurse manager, clinical educator, lactation consultant, veteran NICU parent and bedside nurses was formed to coordinate the sub-committees. We have 13 FCC subcommittees with staff, physicians, therapists, and parents as members. The current number of committee members is in parentheses. Skin to Skin Committee (4),Language Nutrition - Reach Out and Read (ROAR) Committee (5), Early Hand Expression of Colostrum (22) Labor & Delivery, post-partum and NICU staff, Arts and Crafts (4),Post-Discharge Follow-Up Phone Call (4), Discharge Taskforce (6), Parent Buddy Program (6-2 parents), Reunion Organizing Team (8), Monthly Parent Exchange Hour (3), Palliative & Bereavement Team (3-1 parent),NICU Connect (parent-led committee) (5-3 parents), Developmental Care Committee (8), Family Partnership Council (~26 parents). Sustaining the Program: 1. Program Revamp: Instead of having a large FCC committee with poor staff participation and an inability to hear everyone's voice, we created subcommittees. Each committee has autonomy in establishing the Program, motivated bedside staff champions to bring it to fruition, and sustaining it by educating other healthcare professionals in the NICU. Each sub-committee shares their progress with the FCC chair regularly. The FCC chair shares this information with the leadership team and FPC. Utilizing the committee members' time and communication has helped to sustain these programs efficiently. 2. Staff Buy-in: The FCC Chair discussed the sub-committee tasks with individual staff to facilitate their interest and recruited them for the program. The program rapidly grew as they were motivated to work in groups with similar passions. The staff was truly encouraged by the hospital service award "Teamwork in Action" in 2020, followed by the CPQCC "Wirtschafter Award" in 2021. 3. Staff Education: We educated all the NICU healthcare providers during the sustainability period and created an orientation checklist including all FCC activities (Figure 2) for review. All new staff, travel nurses, and trainees are trained using this checklist during their orientation.



Hall et al; The neonatal intensive parenting unit: an introduction Journal of Perinatology (2017)



The FCC leadership team members championed staff education by training all staff individually. The FCC chair created a virtual 20-minute recording of the orientation video and shared it with trainees to use during their rotation orientation. 4. Gratitude: The entire NICU staff is committed to improving the family experience in the NICU. As a token of appreciation and to encourage participation, we created a monthly "FCC Star" (Figure 3) recognition award to honor interdisciplinary staff for their above-and-beyond FCC work. The winner is announced in the FCC newsletter, highlighting their critical work and its impact on our families.

5. FCC Chair: It is very important to have a passionate leader with endless vision to be a chair of a project. We are so fortunate to find such a chair to lead our program. Her tireless contributions have raised the bar of our program over the past seven years. Our chair was nominated by the team members and received the CPQCC "Wirtschafter Award" in 2022 for her contribution to the unit and the larger neonatal community. 6. Leadership Buy-in: Securing strong leadership and establishing a team of champions to take

ownership of the program was key to our growth and success. The FCC chair shares the parent comments from follow-up phone calls and post-discharge surveys to the NICU health professionals in the monthly Physician-Staff partnership council and through the FCC quarterly newsletter. This newsletter (Figure 4) illustrates parents' comments as important reminders of the FCC and the FCC star. Ensuring the hospital administration is well informed on the success and progress of our FCC program has made advocating for our families' needs more productive.

The hospital administration responded to our requests during the pandemic and allowed both parents to be present and participate in the infant's care to alleviate the parental separation trauma. 7. Standardization: We incorporated several FCC practices into our standard of care. 1. We started a QI project to communicate efficiently with mothers about their infants' condition and to encourage early hand expression of breast milk within one hour of delivery. This project was well received by families and helped to alleviate stress and trauma. Now, it is a standard of care in our NICU. 2. We transferred all of our discharge education to MyChart Bedside Electronic Health Records so families could access all the education materials during NICU admission. This allows parents to start learning about discharge on admission instead of feeling overwhelmed on the week/day of discharge. 3. We started the QI Reading program to encourage parental empowerment and provide language nutrition to babies; staff or parents read to babies 10 minutes per shift, which has been a standard of care. 4. We incorporated all FCC activities into our EHR flowsheets (Figure 5), including skin-to-skin care and read-to-baby time for easy documentation by staff as a standard of care and the ability to access data and reports to assess improvement and sustainability.

8. Collaboration: One of the four core principles of FCC is the collaboration of healthcare professionals with family partners; several veteran NICU parents have partnered with us as active members of our subcommittees to improve our quality goals. Impact: We have made many amazing and tangible improvements for our NICU babies and their families by working with veteran families, our colleagues in different departments and the members of our FCC team. It is crucial to share the successes of the program through parents' voices and data with the hospital administration to maintain financial support to sustain the program and improve further.

References:

1. *Ortenstrand A, et al. The Stockholm Neonatal Family Centered Care Study: effects on length of stay and infant morbidity. Pediatrics 2010, 125:e278-85.*

2. *Kutahyalioglu NS, et al. "It Takes a Village" to Implement Family-Centered Care in the Neonatal Intensive Care Unit. Adv Neonatal Care. 2023 Jul 27. doi: 10.1097/ANC.0000000000001091. Epub ahead of print. PMID: 37499692.*

3. *Toivonen M, Lehtonen L, Ahlqvist-Björkroth S, Axelin A. Effects of the close collaboration with parents intervention on the quality of Family-Centered Care in NICUs. Adv Neonatal Care. 2023 Jun 01;23(3):281-289.*

Learner Objectives:

1. Identify challenges to implementing a family-centered care culture in the NICU
2. Practical tips for overcoming barriers to forming and sustaining FCC committees and subcommittees.
3. How to involve hospital administration to support the program's development and financial sustainability.

Gravens 2024-10

Abstract Title: Implementation of a Bundle to Prioritize Skin to Skin in the NICU

Authors: Colleen Calpin, BSN, RN, RNC-NIC, C-NNIC; Jan Wilson, DNP, NNP-BC, C-ELBW, FAANP, Faculty Advisor; Andrew Velazquez, MHA, BSN, RN, CLNC, Clinical Site Representative; Jacquelyn Bell-Benton, Nursing Director, Site Sponsor

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Problem Statement:

In a 40-bed, level IIIB NICU in a major metropolitan area, while the introduction of skin to skin care (SSC) is an overall goal, in a site review, only 23 % of patients actually received SSC in the first week of life. Literature supports that early initiation of SSC demonstrates improvement in vital sign regulation, hypothermia reduction, weight gain, as well as a potential decreased length of stay when compared to conventional care (Conde-Agudelo & Díaz-Rossello, 2016; Levesque,et al, 2021; Linner, et al, 2022). Scientific Question: Will implementation of an evidence-based SSC bundle improve management and documentation of SSC for all patients admitted to the NICU within the first week of life greater than the baseline of 23%?

Abstract:

Methods: Utilizing the Framework of Complex Innovations, a QI project was developed to improve implementation of SSC in a level III NICU within the first 7 days of life over the course of a 15-week period from August 25–December 8, 2023. Many barriers exist to support and sustain skin to skin care (SSC) initiation for newborns, including staff understanding of the benefits and risk of SSC, parent awareness of SSC opportunities, and limited space and personnel to support safe SSC for acutely ill neonates. An SSC evidence-based bundle was developed to address unit specific and common SSC implementation barriers. The evidence-based bundle includes multimodal bedside RN education, parent education, and an interprofessional collaboration component via daily discussion between the attending physician and the RN to identify SSC candidates. The discussion between provider and RN is reflected in the unit's safety checklist and considers patient stability, institution protocols around intraventricular hemorrhage prevention, use of humidity, or other factors that the provider or RN decided SSC would not be safe or beneficial for the patient in the next 24-hour period. These results are then communicated with the family. Tactics to support practice change included shout-outs, unit-based champions, and reminders of SSC promotion. Weekly audits based on nursing documentation identified the percentage of infants who received SSC in the first week of life for all NICU admissions, and the average day the first instance of SSC occurred. Balancing measures based on provider and staff concerns with SSC were included in data collection. Such measures included temperature change, FiO_2 requirement change, occurrence of apneas, bradycardias, or desaturations, and any line or tube dislodgements. In addition to the outcome goal of improving SSC initiation from baseline, an emphasis was also placed on the process goal of adherence to the collaboration component and occurrence of parent education was also evaluated in the weekly audit. The results of weekly audits were coded and stored in the REDCap HIPAA-compliant database via a standardized form. Run charts were used to analyze adherence to bundle elements over the 15-week implementation phase.

Results: Preliminary results have identified of the 23 patients admitted to the NICU to date (August 25– September 15, 2023), 56% completed SSC within the first 7 days of life. This is an improvement from the baseline of 23% SSC in the first 7 days prior to the practice change. While SSC has increased, swaddled holding dropped from 77% at baseline to 73%. Preliminary balancing measure data supports the conclusion that SSC can be safely increased without an increase in adverse events or vital sign dysregulation. There have been no events of line or tube dislodgement during SSC thus far. Average difference in temperature before and after SSC is +0.09 degrees Celsius.

Conclusions: Initiation of an evidence-based SSC care bundle is feasible and can improve patient outcomes in a level III NICU. Balancing measures including temperature difference pre- and post-SSC holding, FiO_2 requirement during SSC compared to baseline for that day, evidence of cardiac or respiratory decompensation, and line and tube dislodgement. Preliminary results of these measures support the early conclusions of safe increases in SSC without an increase in adverse events or vital sign dysregulation for the NICU population. There have been no events of line or tube dislodgement during SSC thus far. Unit-specific barriers were overcome with inclusion of crib cards encouraging SSC and staff re-education supported by results of weekly audits to support safety of SSC. In order to promote sustainability, barriers to practice change following implementation were discussed and included staff reluctance to change practice, particularly with UVC line or intubated patients. Areas of opportunity for project continuation include group definition of inclusion and exclusion criteria outside of daily candidacy discussion and expansion of evaluation to entire NICU length of stay.

References:

Conde-Agudelo, A., & Díaz-Rossello, J. L. (2016). Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. The Cochrane Database of Systematic Reviews, 8, CD002771. https://doi.org/10.1002/14651858.CD002771.pub4

Levesque, V., Johnson, K., McKenzie, A., Nykipilo, A., Taylor, B., & Joynt, C. (2021). Implementing a skin-to-skin care and parent touch initiative in a tertiary cardiac and surgical neonatal intensive care unit. Advances in Neonatal Care: Official Journal of the National Association of Neonatal Nurses, 21(2), E24-E34. https://doi-org.proxy-hs.researchport.umd.edu/10.1097/ANC.0000000000000770

Linnér, A., Lode Kolz, K., Klemming, S., Bergman, N., Lilliesköld, S., Markhus Pike, H., Westrup, B., Rettedal, S., & Jonas, W. (2022). Immediate skin-to-skin contact may have beneficial effects on the cardiorespiratory stabilization in very preterm infants. Acta Paediatrica (Oslo, Norway: 1992), 111(8), 1507-1514.

Learner Objective:

The learner will be able to identify 2 risks and 2 benefits to skin-to-skin care and will relay 2 of the 3 components of the bundle by the end of the presentation. Project Objectives: The objective of this project is to investigate if the components of an evidence-based SSC bundle would safely increase SSC and if adherence to bundle elements are reflected as an increase of SSC events for infants in the first 7 days of life when compared to baseline.

Gravens 2024-11

Abstract Title: The power of three: An interdisciplinary support model for ROP exams in the NICU

Authors: Anthony Borzi, MA, MT-BC; Kristina Richetts, MS, MT-BC; Lori Tobias, RN; Stacie Dill, RN, HN-BC, LMT

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Problem Statement:

Learn how a group of interdisciplinary colleagues have adapted foundational knowledge in trauma-informed, age-appropriate care to develop a tiered support model for retinopathy of prematurity exams in a level IV neonatal intensive care unit. Explore how theoretical approaches are applied in everyday practice. Understand how Coughlin's five core measures of trauma-informed, age-appropriate care and AIs' Synactive Theory of Infant Development are combined to influence and inform clinical practice.

Abstract:

Retinopathy of prematurity (ROP) is an acquired, potentially blinding, eye disorder that primarily affects premature infants (National Eye Institute, 2019). Infants born before 31 weeks gestational age, weighing 1250 grams or less are at higher risk for developing this condition, and it is the most common cause of vision loss in children. Ophthalmologists conduct exams to screen, diagnose, and track the progression of ROP in the neonatal intensive care unit (NICU). Depending on the severity, surgery may be required

in some cases (March of Dimes, 2018). This is a stressful, and potentially traumatic experience for the often critically ill infants. It is also a distressing procedure to witness, per numerous caregiver reports. The presenters are part of an interdisciplinary team consisting of ophthalmologists, an infant developmental specialist, music therapist, child life specialists, integrative care nursing, and bedside staff. Over the past two years, this team has developed, trialed, and refined a tiered support model that aims to deliver intervention at each point of care: before, during and after the ROP exam. The tiered model is informed by Mary Coughlin's five core measures of trauma-informed, age-appropriate care: protected sleep; pain and stress management and assessment; developmental activities of daily living; family-centered care; and a healing environment (Coughlin, 2021 & 2017). It also draws from Heidelise Als' synactive theory of infant development, which states that there are five subsystems of functioning: autonomic, motor, state, interactional, and regulatory. These subsystems function in relation to one another, meaning that if one subsystem is experiencing an irregularity, each system in turn is affected (Als, 1986). This session aims to present a review of current music therapy literature on the support of ROP exams in the NICU; introduce the theoretical framework used in the design and implementation of the model; and give a systematic overview of the current working model and its application in clinical practice.

Learner Objective:

1. Participants will identify at least two benefits of collaborative, interdisciplinary care in the NICU
2. Participants will be able to articulate the evidence-based rationale for a trauma-informed, age-appropriate approach in the NICU

Gravens 2024-12

Abstract Title: PIE Anyone? Building a program to promote and maintain NICU staff resiliency

Authors: KristiLynn Cedars, Ph.D, Kim Hoey, RN[1], Nicola Herting, Ph.D

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Problem Statement:

The NICU is a very stressful environment not only for patients and families but also for staff. NICU staff frequently encounter death and loss in their jobs and often do not have the tools to cope effectively. Developing a robust staff support program to help them process impactful events and to promote resiliency is imperative to maintaining an engaged and healthy workforce.

Abstract:

Exposure to trauma and loss is part of the everyday work environment in the NICU, but that doesn't mean the people doing the work are immune to the impact of the pain and suffering they witness. According to compassion fatigue expert Francoise Mathieu (2012), as high as 85% of "helping professionals" develop vicarious trauma, compassion fatigue and/or high rates of traumatic symptoms. Pre-program survey results at our hospital indicated that 57% of our team members had experienced intrusive thoughts about a patient when they didn't want to. Research shows that high-stress, trauma-exposed workplaces are at increased risk for a wide range of negative effects on individuals, teams and organizational health and their functional capacity (Mathieu, 2007). Cumulatively, these reactions can deplete personal resiliency and result in vicarious trauma with wide-ranging negative effects on occupational performance as well as personal health and well-being. Vicarious trauma can significantly impact the well-being of the members of the medical team and can impair capacity to respond effectively to the needs of patients. These conditions are known to increase sickness absence, psychological injury claims, and job turnover, and negatively impact productivity (Mathieu, 2007; Cocker & Joss, 2016). Historically, organizations have attempted to deal with the concern of vicarious trauma, compassion fatigue, and burnout by sending staff to brief trainings, providing supportive debriefing sessions, and putting the burden on staff to participate in better self-care. Pre-survey data at our organization show that less than 50% survey respondents feel like there is effective and accessible strategies for debriefing after a significant event. The reality is that this response is not enough to protect against the risk of vicarious trauma. Additionally, when supportive debrief sessions are offered, they can be more harmful than helpful when facilitators are not trained in trauma-informed and evidence-based methods. Our PIE (Processing Impactful Events) program set out to change how we handle impactful events in the hospital by seeking innovative solutions to improve workplace culture, process of impactful events, teach skills to build individual and team resiliency, protect against vicarious trauma, and uphold principles of trauma-informed care. The Processing Impactful Events (PIE) program is a multi-factorial program which was started by a group of direct care staff who recognized the impact of trauma on the medical staff. The PIE program was a collaborative effort between our Children's Hospital, Traumatic Stress Treatment Center, and Child Advocacy group. The goal of the PIE program is to support staff and providers' processing of impactful events and build resiliency. The PIE program also set out to promote a healthcare culture that normalizes the impact of working in a trauma exposed environment. The initiative worked to make sure that all members of the Children's Hospital staff understood the goals of the initiative and how it was different than what was previously offered and to educate everyone about secondary traumatic stress, compassion fatigue, burnout and building resiliency. New direct care staff also received information about the PIE model, resources, and tools for resiliency during their orientation. Targeted education was also provided to leadership and key stakeholders to help ensure their engagement with and understanding of the program to help ensure the shift in culture. Further targeted education was provided for key players in the PIE program including PIE champions and PIE group facilitators. PIE Champions are supervisors and team leaders including a physician from each team that received training in psychological first aid and specific education to increase their supervisory skills to support their teams and help them implement resiliency skills on a one-on-one setting. PIE Group Facilitators lead groups that focus on processing impactful events using trauma-informed and evidence-based methods. Education and training for PIE Group Facilitators included psychological first aid and focused training on a structure for leading group session for staff following an impactful event utilizing low impact debriefing. Since 2021, over 50 PIE group processing sessions have been held impacting more than 350 staff and providers. Nine general education programs have been provided for all staff and 78 new direct care staff have received orientation training (since August of 2022). Program evaluation survey results show that 83% of participates found a PIE group processing session helpful. Things they found most helpful included: having the opportunity to speak and share feelings with individuals who have had similar experiences and receive peer support from other with the shared experience; receiving validation and normalization of

feelings in response to an impactful event; developing of coping strategies and receiving the opportunity to process the event and gain 'closure.' Overall, the PIE program has been successful at engaging staff and providing education and opportunities for processing impactful events. Program challenges include maintaining a group of trained PIE group facilitators, providing on-going education and opportunities for PIE Champions to use the skills and tools they learned in training, and finding the right scheduled time for group session and balancing online and in-person attendance at group processing sessions. Our goal is also to create a sustainable program financially which means developing a series of educational programs and making sure we have in-house trainers who have completed train-the-trainer programs with national experts.

Learner Objectives:

Attendees will be able to identify key stakeholders in their organization needed to develop a staff support program. Attendees will be able to list 2–3 existing educational resources for developing a staff support program. Attendee will be able to describe key component of low impact debriefing.

Gravens 2024-13

Abstract Title: NICU Infant Developmental Optimization (NIDO): A pilot program to support the development of post term babies in the NICU

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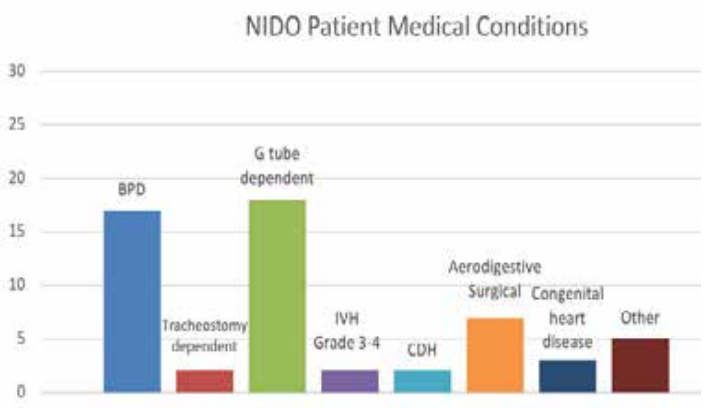
Problem Statement:

The survivability of preterm infants continues to improve while developmental morbidity is on the rise,1 leading to an increased number of children with medical complexities who spend vital months of their development in the NICU. How can we adapt care to support the developmental needs of a growing infant transitioning out of the neonatal and newborn periods within a low-stimulation environment and culture of strict 3-hour hands-on times?

Abstract:

Program Methodology: University Hospital (UH) in San Antonio, TX, houses a 70-bed, level 4 (neonatal intensive care unit) NICU and is a level 1 trauma center in South Texas. Our diverse population comes from the San Antonio metroplex and surrounding Texas and Mexico areas, with majority Medicaid-funded and uninsured. The UH NICU has seen a growing need to support "older infants." We care for infants with significant medical complexities, including extreme prematurity, chronic lung disease, and aerodigestive conditions. Medically complex infants have a prolonged length of stay as they work to achieve stability, and medical teams coordinate resources for discharge home, many times to rural areas. "Big babies" spend months of a developmentally rich time within an ICU. It is known that developmental needs of an infant adjusted to 6 months is vastly different than a newborn. 2We created a program with goals of providing developmental support in the shape of supporting sleep hygiene, providing appropriate levels of stimulation, advocating for infant enriching sensory and bonding experiences such as moving outside the confines of the patient bedspace. In December 2022, we began the NICU Infant Developmental Optimization (NIDO) Program, NIDO is Spanish for nest, a symbol of nurture and pays homage to the primary language spoken by many families we serve. The NIDO Program is led by a multidisciplinary team of physical/occupational/speech therapists, child life specialists, a neonatologist, and nurses. Patients are considered for enrollment if they remain admitted in the NICU at 46–48 weeks postmenstrual age and are anticipated to stay in the hospital for >1 week. NIDO rounds are held weekly with the following topics for each patient reviewed: developmental achievements, nurse updates, medical updates, primary nurse identification, discharge barriers, family availability, and therapy assessments, weekly goals, and discharge needs. Topics discussed may include use of certain toys, sensory items, support devices (i.e., tumbleform chairs), helping families and infants gain comfort using equipment (i.e. strollers) and moving longer distances (i.e., bed to the gym), and planning "field trips" from the bedside to the hospital garden. Information is disseminated to NIDO members weekly and medical teams informed of NIDO team recommendations. In the UH NICU, patients are initially evaluated and followed by either PT or OT and will receive ST for feeding support. As babies transition to the NIDO Program, all 3 disciplines will begin working with the infant, as this is when developmental skills begin to emerge and goals become more differentiated. At this point many of the patients' therapy goals transition from neonatal support (ex. maintaining quiet alert state) to developmental goals (ex. batting at a toy, participating in rolling). The NIDO Program has increased caregiver involvement by utilizing bedside rounding with a primary focus on their child's developmental care. Team members schedule a meeting time with the caregiver at the bedside or by phone and begin with asking the parent or primary nurse, "What is a favorite thing your baby has learned this week?". This is followed by therapy updates and a platform for parents to discuss developmental goals or concerns.

Impact and Results: Since beginning of our program from 12/2/22 to 9/1/23 we have served 30 babies with varying comorbidities (Figure 1).



We have on average of 4–7 babies per week enrolled in the program and 3–5 babies nearing criteria for enrollment. We have created custom education pages called "playbooks" for our most complex patients (Figure 2).

We have recruited primary nurse champions and educators who specialize in needs of older NICU patients. Since the NIDO program began we have trialed the use of various standardized developmental assessments prior to discharge. Our program has utilized the GMA (general movement assessment), HINE (ham-

Fig. 2

mersmith infant neurological exam), TIMP (test of infant motor performance), Brigance and components of the Bayley-4. Respectively we have completed 8 TIMPs, 3 Bayley-4s, 3 Brigances, 22 GMAs, 3 HINEs. Age, tolerance to handling, medical stability, patient history and provider preference are measured drivers. Information is also provided to the UH NICU neurodevelopmental follow-up program.

Conclusion: There is a growing number of older infants with prolonged NICU length of stays. These children and their families have different developmental needs compared to their newborn and neonatal neighbors that live in the NICU. Major accomplishments of our program include increasing awareness of patients' developmental needs, improved communication among staff, creation of a platform to trackdevelopmental progress of patients, and increased resources for families before discharge. Barriers we have encountered include high NICU census leading to decreased staff to provide therapies and limited time for staff to perform bedside rounds with families. Families have barriers to being present at the child's bedside, including lack of transportation. As we move forward, we plan to refine developmental assessment processes for our patients and promote family involvement.

References:

1. *Soleimani F, et al. Do NICU developmental care improve cognitive and motor outcomes for preterm infants? A systematic review and meta-analysis. BMC Pediatrics. 2020;20(1). doi:10.1186/s12887-020-1953-1*
2. *Peterson JK, Evangelista LS. Developmentally supportive care in congenital heart disease: A concept analysis. Journal of Pediatric Nursing. 2017;36:241-247. doi:10.1016/j.pedn.2017.05.007*
3. *So S, Rogers A, Patterson C, et al. Parental experiences of a developmentally focused care program for infants and children during prolonged hospitalization. Journal of Child Health Care. 2013;18(2):156-167. doi:10.1177/1367493513485476*

Learner Objectives:

After participating in this session, attendees will be able to 1. Explain how prolonged hospitalization, once transitioned out of the neonatal and newborn phases, can affect all aspects of development. 2. Describe how developmental support of a baby >6 weeks may differ from younger patients in the NICU. 3. Review strategies to support family-centered developmental care for older infants with prolonged length of stays in the ICU.

Gravens 2024-14

Abstract Title: Nurses' and parents' perceptions of family-centered care and light and sound environmental control in the NICU

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Problem Statement:

Background: Both parents and nurses play an essential role in promoting preterm infants' growth and development in the Neonatal Intensive Care Unit (NICU). As nurses should encourage Family-Centered Care (FCC), including parental presence (Hallowell et al., 2019), in addition to a calm, quiet and welcoming environment for parents, it was pertinent to evaluate the nurses' and parents' perceptions of the FCC in the NICU as well as the physical environment to guide neonatal care. The objective of this study was to compare the nurses' and parents' perceptions of the NICU ability to provide FCC along with the environmental control of light and sound.

Abstract:

Methods: Secondary analysis of two studies conducted in the same universities affiliated NICUs in Montreal, Canada. Overall, 109 nurses with more than 6 months of neonatal experience and 45 parents whose preterm infant was hospitalized for at least seven days composed the sample. The FCC-Questionnaire for nurses and parents (Shields & Tanner, 2004) assessed their perceptions of the NICU's ability to provide FCC, scores could range from 20 to 80, and a higher score indicated more favorable perceptions. Two questionnaires assessed nurses' and parents' perceptions about NICU environmental control (Walsh-Sukys et al., 2001), where a higher score indicated higher level of agreement about the appropriateness of the light and sound environment.

Results: No significant difference was found between the mean scores of nurses' and parents' perceptions about the NICU ability of providing FCC (respectively, x=64.1 ± 5.37 vs. 64.3 ± 8.44, p=.888). Total mean scores of the appropriateness of the light environment did not indicate a significant difference between nurses (x=15.4 ± 2.5) and parents (x=16.1 ± 2.6) (p=.128). Also, mean scores for the appropriateness of the sound environment did not differ significantly between nurses (x=10.1 ± 2.9) and parents (x=10.8 ± 2.4) (p=0.115).

Conclusion: Perceptions of nurses and parents were similar for FCC as well as NICU light and sound environmental control. Nurses' and parents' perceptions about these practices were comparable even if parents spend less time in the NICU compared to nurses who are continuously working in the neonatal unit, suggesting that care seem to be systematically and consistently offered by nurses.

References:

Craig, J. W., Glick, C., Phillips, R., Hall, S. L., Smith, J., & Browne, J. (2015). Recommendations for involving the family in developmental care of the NICU baby. J Perinatol, 35 Suppl 1 (Suppl 1), S5-8. https://doi.org/10.1038/jp.2015.142

Shields, L., & Tanner, A. (2004). Pilot study of a tool to investigate perceptions of family-centered care in different care settings. Pediatr Nurs, 30(3), 189-197.

Walsh-Sukys, M., Reitenbach, A., Hudson-Barr, D., & DePompei, P. (2001). Reducing light and sound in the neonatal intensive care unit: an evaluation of patient safety, staff satisfaction and costs. J Perinatol, 21(4), 230-235. doi:10.1038/sj.jp.7200534

Learner Objectives:

1. Recognize that both parents and nurses play an essential role to promote preterm infants' development;

2. Comprehend the similarities between the nurses' and parents' perceptions of FCC and environmental light and noise in the NICU.

Gravens 2024-15

Abstract Title: Promoting Family Resilience Through Family-Centered Care: Evidence from a Multiple Regression Analysis

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Problem Statement:

Background: The NICU hospitalization of a preterm infant can be experienced as a challenging time for a family. It can have significant emotional repercussions, impact parental mental health and affect family functioning, including problem-solving abilities, emotional communication skills and responsibilities sharing habits (Treyvaud et al., 2011). The family-centered care (FCC) approach is already part of the strategies internationally implemented by nursing staff and is reported to reduce some of the stress and anxiety experienced by parents in the NICU (Chang et al., 2021). However, in order to further investigate parental mental health in the NICU, it is interesting to examine family resilience, i.e., a family's ability to bounce back and thrive despite a difficult experience (Walsh, 2016). More specifically, it becomes important to identify the personal and environmental factors that influence family resilience, including the potential contribution of FCC to the resilience of hospitalized NICU families.

Abstract:

Methods: The aim of this quantitative cross-sectional study was to estimate the impact of five factors on the resilience of families hospitalized in a level II or III neonatal unit: (1) education level, (2) primiparity, (3) years since being in a relationship, (4) infant gestational age and (5) perception of FCC. The secondary objective of this study was to compare fathers' and mothers' perceptions of FCC. A total of 87 parents (n=57 mothers, 30 fathers) of preterm infants, i.e. born before 37 weeks' gestational age, whose infants are hospitalized on either neonatal units (level II or III) in a Bordeaux university-affiliated hospital, completed the French version of the COCINL scale (Laporte, unpublished), which measures family resilience in the NICU, as well as the Family-Centered Care Questionnaire (FCCQ) (Shields and Tanner, 2004), which measures perceptions of their unit's ability to provide respectful, collaborative and supportive care. Paper questionnaires were anonymously completed by French-speaking parents whose hospital stay was longer than 10 days.

Results: In a model explaining 58% of the variance of family resilience, the results of multiple regression analyses show that two of the five factors, namely perception of units' ability to provide FCC and primiparity, are significant predictors of family resilience total score. The model predicts an increase in family resilience score of 22% for every FCCQ unit increase, as well as an increase of 5% of the family resilience score when a family has multiple children. As for the secondary objective, no difference was found in the scores for perceptions of family-centered care obtained by fathers and mothers in our sample.

Conclusion: Family resilience in the neonatal setting appears to be influenced by parents' perception of the unit's performance in providing family-centered care as well as by the family's primiparity status. This study thus reveals an additional positive benefit of family-centered care, namely fostering family resilience, suggesting that efforts must be made to ensure the provision of quality FCC to promote the overall health of NICU families.

References:

Treyvaud, K., Lee, K. J., Doyle, L. W. et Anderson, P. J. (2014). Very Preterm Birth Influences Parental Mental Health and Family Outcomes Seven Years after Birth. The Journal of Pediatrics, 164:3, 515-521. https://doi.org/10.1016/j.jpeds.2013.11.001

Cheng C, Franck LS, Ye XY, Hutchinson SA, Lee SK & O'Brienon K on behalf of the FICare Study Group and FICare Parent Advisory Board. (2021) Evaluating the effect of Family Integrated Care on maternal stress and anxiety in neonatal intensive care units, Journal of Reproductive and Infant Psychology, 39:2, 166-179, DOI: 10.1080/02646838.2019.1659940

Walsh, F (2016) Family resilience: a developmental systems framework, European Journal of Developmental Psychology, 13:3, 313-324, DOI: 10.1080/17405629.2016.1154035

Shields, L., & Tanner, A. (2004). Pilot study of a tool to investigate perceptions of family-centered care in different care settings. Pediatr Nurs, 30(3), 189-197.

Learner Objectives:

1. Recognize that family resilience is influenced by multiple factors, including the quality of family-centered care provided in the NICU;

2. Recognize family resilience as a potential outcome measure of family health in the NICU.

Gravens 2024-16

Abstract Title: The BABIES Adaptive Behavior Inventory: Measuring developmental adaptation in the first months after discharge.

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Problem Statement:

Babies transitioning from hospital to home undergo significant brain development neurophysiological and behavioral adaptation. The first 2–4 months are foundational for both baby and caregiver to attain homeostasis and regulatory capacity. Currently, there is no comprehensive assessment of the major developmental tasks babies need to achieve in the first six months after birth. The BABIES Adaptive Behavior Inventory (BABI) has been developed for professionals who see babies and families after discharge from the Neonatal Intensive Care Unit (NICU). It is designed to provide a view of the baby's organization of early developmental tasks, establish a supportive stance with the caregiver, and inform clinical intervention.

Abstract:

Introduction/purpose: Babies transitioning from hospital to home undergo significant brain development neurophysiological and behavioral adaptation. The first 2–4 months are foundational for both baby and caregiver to attain homeostasis and regulatory capacity. Currently, there is no comprehensive assessment of the major developmental tasks babies need to achieve in the first six months after birth. The BABIES Adaptive Behavior Inventory (BABI) has been developed for professionals who see babies and families after discharge from the Neonatal Intensive Care Unit (NICU). It is designed to provide a view of the baby's organization of early developmental tasks, establish a supportive stance with the caregiver, and inform clinical intervention. Method: The BABI was developed by an interprofessional group of NICU, Early Intervention, and parent participants. Six essential foundational domains were identified: Biophysiologic organization, Arousal and sleep, Body movement, Interaction with others, Eating, and Soothing. (1, 2) Each domain represented less to more stable adaptive behaviors, resulting in 38 total items. The BABI was then distributed to a national panel of experts for consensus on content and construct validity. Virtual BABI training with early intervention professionals using observation and scoring was done with videos of babies up to 6 months corrected age. Factor analysis reduced the number of items to a total of 33. Interrater reliability(N=45) from videotaped scores exceeded 80%.

Conclusions: The BABI was developed to better understand the adaptive development of high-risk babies up to 6 months corrected age. It includes domains of early development not currently addressed on other standardized assessments. Initial validation indicates robust construct, content, interrater reliability, and appropriate clinical application in situations with babies and families after discharge from the hospital.

References:

1. *Browne JV. BABIES and PreSTEPS Manual. [Manual]. In press 2023 rev.*

2. *Browne JV, Talmi A. Developmental supports for newborns and young infants with special health and developmental needs and their families: The BABIES Model. Newborn and Infant Nursing Reviews. 2012;12(4):239-47.*

Learner Objectives:

1. The learner will gain information on the developmental skills of newborns and young infants.
2. The learner will become knowledgeable about the six essential foundational domains in the BABI Adaptive Behavior Inventory

Gravens 2024-17

Abstract Title: Contextual Factors Influencing Maternal Nurturing Touch Patterns Across Time during Dyadic Interactions in the NICU

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Problem Statement:

For preterm infants in the NICU, nurturing touch, and not task touch, has direct implications in the development of secure attachment as well as the potential to mitigate the deleterious effects of preterm birth (Feldman et al., 2014; Silberstein et al., 2009). Thus, this exploratory study aimed to identify contextual factors that influence the duration of maternal nurturing touch during naturalistic dyadic social encounters in order gain an understanding of which contextual influences may impact maternal-infant engagement in the NICU.

Abstract:

Methodology: This study used a within-subjects repeated time series design to observe changes in duration of maternal nurturing touch patterns in 12 mother-preterm infant dyads hospitalized in a level-IV NICU. Beginning when infants were between 32-weeks gestational age (M=32.7), dyads were video recorded across three time points in three social situations (routine cares, feeding, and nurturing) resulting in a total of 27 total minutes per dyad. Maternal nurturing touch, defined as infant-directed affectionate touch such as gentle caressing, kissing, patting for comfort, light pokes, and playful touches such as light tickles (Feldman et al. 2011; Holditch-Davis et al., 2003), was coded using frame-by-frame microanalysis. To estimate intercoder reliability for infant behaviors and maternal behaviors, 15% of the videos were randomly selected and coded by all members of the coding team which included the study investigator (i.e., gold standard coder) and three additional trained coders. Using a 1-s window with the frequency/sequence setting in the Observer XT software, the average Cohen's kappa was 0.88 (range: 0.85–0.92). In addition, intra-coder reliability was calculated using another set of 15% randomly selected videos and averaged a Cohen's kappa of 0.92 (range: 0.81–1.00). Data collected also included infant medical factors (e.g., respiratory status, feeding delivery method) and contextual characteristics (e.g., infant location in crib or being held) for each social situation. Analysis included a two-step process. First, the mean duration of nurturing touch over time was compared for each video and then categorized according to increasing, stable, or decreasing trend of duration of nurturing touch. Next, each video was subsequently reviewed and referenced to identify specific contextual factors that may correlate with the observed trend in nurturing touch patterns over time.

Results: Descriptive statistics of infant medical factors and the

contextual characteristics for each observation session are reported in Table 1.

Table 1. Infant Medical and Contextual Characteristics across each Time Point

	Time Series 1		Time Series 2		Time Series 3	
	M (*SD*)	Range	*M* (*SD*)	Range	*M* (*SD*)	Range
Gestational Age (days)	229 (1.4)	227-233	239 (3.5)	234-247	245 (3.1)	241-252
Weight (kg)	1.60 (.29)	1.17-2.17	1.86 (.33)	1.40-2.54	2.06 (.39)	1.58-2.84
Respiratory Status						
HFNC	8		7		5	
CPAP	1		1		1	
Nasal Prong Vent	1		0		0	
Nasal Cannula	1		0		0	
Room Air	1		4		6	
Feeding Type						
Gavage in crib	5		2		3	
Gavage while holding	5		3		1	
Gavage while holding twin	2		3		0	
Gavage with Nuzzling	0		2		1	
Pacifier Dips	0		1		0	
Bottle	0		1		7	
Nurturing Style						
Infant held alone	7		8		10	
Infant held with twin	2		3		2	
Infant in bed	3		1		0	
Bed Type						
Isolette	9		8		4	
Radiant Warmer	2		2		0	
Open Crib	1		2		8	

Note: N=12 infants; HFNC = high flow nasal cannula; CPAP = continuous positive airway pressure

Infants demonstrated variability in medical characteristics with some infants requiring greater respiratory support than others across all time points of data collection. Contextual factors varied across social interaction situations and time, most notably in feeding contexts (see Tables 2 and 3).

Table 2. Contextual Factors Present Over Time – Dyads with Increasing Trend in Nurturing Touch Duration from Week 1 to Week 3

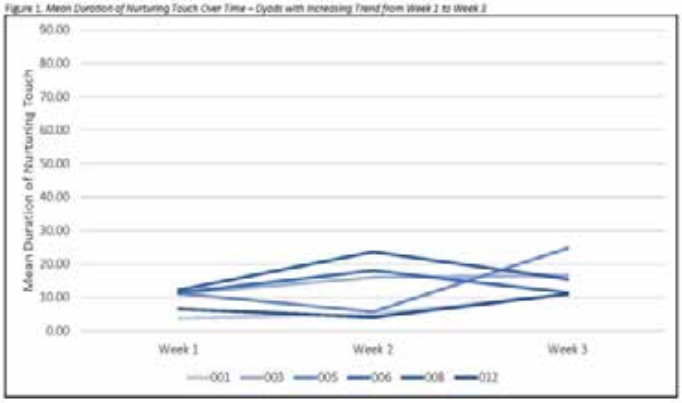
Dyad	Contextual Factor	Week 1	Week 2	Week 3
001	Respiratory Support	nasal cannula	room air	room air
	Feeding Method	gavage	gavage	bottle
	Infant Swaddle During Nurturing	blanket	blanket	blanket
	Infant Situation During Nurturing	held by mother	held by mother	held by mother
003	Respiratory Support	high-flow nasal cannula	high-flow nasal cannula	room air
	Feeding Method	gavage w/ pacifier	gavage w/ pacifier	gavage w/ pacifier
	Infant Swaddle During Nurturing	sleep sack	no video data	full swaddle
	Infant Situation During Nurturing	held by mother	no video data	held by mother
005	Respiratory Support	room air	room air	room air
	Feeding Method	gavage	breastfeed	breastfeed
	Infant Swaddle During Nurturing	partial swaddle	blanket	full swaddle
	Infant Situation During Nurturing	held by mother	held by mother	held by mother
006	Respiratory Support	high-flow nasal cannula	high-flow nasal cannula	high-flow nasal cannula
	Feeding Method	gavage	gavage w/ breast nipple	gavage w/ pacifier
	Infant Swaddle During Nurturing	full swaddle	full swaddle	partial swaddle
	Infant Situation During Nurturing	held by mother	held by mother	held w/ contact limbs
008	Respiratory Support	room prong cannula	nasal CPAP	nasal CPAP/HFNC
	Feeding Method	gavage	gavage	gavage
	Infant Swaddle During Nurturing	none	partial swaddle	full swaddle
	Infant Situation During Nurturing	isolette	held by mother	held by mother
012	Respiratory Support	high-flow nasal cannula	high-flow nasal cannula	high-flow nasal cannula
	Feeding Method	gavage	gavage	bottle
	Infant Swaddle During Nurturing	blanket	no video data	blanket
	Infant Situation During Nurturing	held by mother	no video data	held by mother

Table 3. Contextual Factors Present Over Time – Dyads with Decreasing Trend in Nurturing Touch Duration from Week 1 to Week 3

Dyad	Contextual Factor	Week 1	Week 2	Week 3
002	Respiratory Support	nasal cannula	room air	room air
	Feeding Method	gavage	gavage	bottle
	Infant Swaddle During Nurturing	blanket	blanket	blanket
	Infant Situation During Nurturing	held by mother	held by mother	held by mother
004	Respiratory Support	high-flow nasal cannula	high-flow nasal cannula	room air
	Feeding Method	gavage w/ pacifier	gavage w/ pacifier	gavage w/ pacifier
	Infant Swaddle During Nurturing	sleep sack	no video data	full swaddle
	Infant Situation During Nurturing	held by mother	no video data	held by mother
007	Respiratory Support	room air	room air	room air
	Feeding Method	gavage	breastfeed	breastfeed
	Infant Swaddle During Nurturing	partial swaddle	blanket	full swaddle
	Infant Situation During Nurturing	held by mother	held by mother	held by mother
009	Respiratory Support	high-flow nasal cannula	high-flow nasal cannula	high-flow nasal cannula
	Feeding Method	gavage	gavage w/ breast nipple	gavage w/ pacifier
	Infant Swaddle During Nurturing	full swaddle	full swaddle	partial swaddle
	Infant Situation During Nurturing	held by mother	held by mother	held w/ contact limbs
010	Respiratory Support	nasal prong cannula	nasal CPAP	nasal CPAP/HFNC
	Feeding Method	gavage	gavage	gavage
	Infant Swaddle During Nurturing	none	partial swaddle	full swaddle
	Infant Situation During Nurturing	isolette	held by mother	held by mother
011	Respiratory Support	high-flow nasal cannula	high-flow nasal cannula	high-flow nasal cannula
	Feeding Method	gavage	gavage	bottle
	Infant Swaddle During Nurturing	blanket	no video data	blanket
	Infant Situation During Nurturing	held by mother	no video data	held by mother

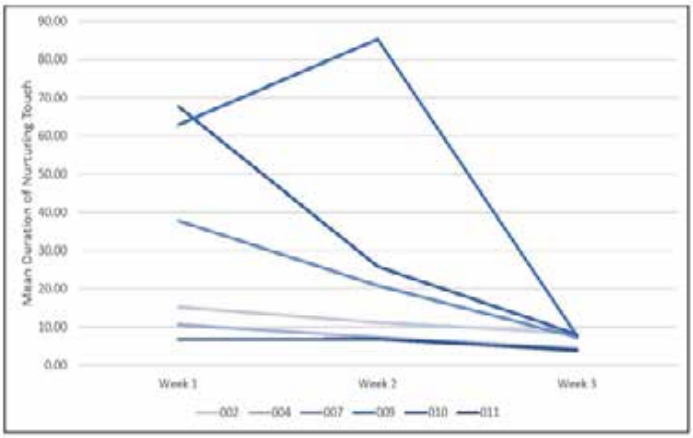
Five of the twelve dyads exhibited an increasing trend in mean nurturing touch duration from week 1 to week 3 while one dyad exhibited a stable trend (see Figure 1).

Figure 1. Mean Duration of Nurturing Touch Over Time – Dyads with Increasing Trend from Week 1 to Week 3



For those dyads showing increasing trends in nurturing touch, infants typically were more medically stable than those infants showing a decreasing trend as indicated by respiratory support status. Six of the twelve dyads exhibited a decreasing trend in mean duration of nurturing touch over time (see Figure 2).

Figure 2. Mean Duration of Nurturing Touch Over Time – Dyads with Decreasing Trend from Week 1 to Week 3



Decreases in nurturing touch behaviors were often correlated with the following contextual factors: transitioning from gavage feeding to bottle feeding, transitioning from no swaddle or partial swaddle/blanket to the infant being fully swaddled, and whether the infant position/location was being held by the mother or laying in the isolette during the nurturing situation. Dyads with decreasing trends in duration of nurturing touch spanned a wider range of values than dyads with an increasing trend. The mean decreasing trend from week 1 to week 3 was -13.45 seconds while the mean increasing trend from week 1 to week 3 was +2.76 seconds duration of nurturing touch.

Conclusion: This present investigation identified contextual factors that may correlate with an increasing or decreasing trend across time for maternal nurturing touch patterns with their preterm infants in the NICU. Findings indicated that duration of maternal nurturing touch with their preterm infants may be influenced by infant medical characteristics, specifically respiratory status and method of feeding delivery, as well as other contextual factors such as infant position/location during the dyadic interaction and degree of swaddling. For instance, as preterm infants became more medically stable (i.e., requiring less respiratory support), certain contextual factors seemed to impact opportunities for quality nurturing touch interactions between mother and infant. Specifically, as these infants became stronger and transitioned to bottle feeding, the mother's focus during feeding interactions became

more task oriented whereas during gavage feeding sessions, the mother's focus was more nurturing oriented. Further, when infants were fully swaddled when held by their mother, there were fewer opportunities for skin-to-skin affectionate touch interactions as compared to holding the infant during kangaroo or modified kangaroo care, or when the mother was touching the infant positioned without swaddle inside the isolette. This study builds on developmental science principles in furthering understanding of early relational communication patterns between mothers and preterm infants as they naturalistically unfold in the NICU (Provenzi et al., 2018). Replication of the methods utilized in this study may highlight further contextual influences on quality touch interactions in the NICU including cross-cultural variations. Ultimately, findings from this study are positioned to inform healthcare professionals and families receiving healthcare on adapting infant oriented care to create more opportunities for nurturing touch interactions throughout all phases of the NICU hospitalization experience.

References:

Feldman, R., Magori-Cohen, R., Galili, G., Singer, M., & Louzoun, Y. (2011). Mother and infant coordinate heart rhythms through episodes of interaction synchrony. Infant Behavior and Development, 34(4), 569-577.

Feldman, R., Rosenthal, Z., & Eidelman, A. I. (2014). Maternal-preterm skin-to-skin contact enhances child physiologic organization and cognitive control across the first 10 years of life. Biological Psychiatry, 75(1), 56-64.

Holditch-Davis, D., Schwartz, T., Black, B., & Scher, M. (2007). Correlates of mother-premature infant interactions. Research in Nursing & Health, 30, 333-346.

Provenzi, L., di Minico, G. S., Giusti, L., Guida, E., & Müller, M. (2018). Disentangling the dyadic dance: Theoretical, methodological and outcomes systematic review of mother-infant dyadic processes. Frontiers in Psychology, 9(MAR), 1-22.

Silberstein, D., Feldman, R., Gardner, J. M., Karmel, B. Z., Kuint, J., & Geva, R. (2009). The mother-infant feeding relationship across the first year and the development of feeding difficulties in low-risk premature infants. Infancy, 14(5), 501-525

Learner Objectives:

1. Participants will identify contextual factors that may influence the duration of maternal nurturing touch interactions with their preterm infants in the NICU.
2. Participants will acquire information regarding systematic observational methods that can be used to measure familial interaction processes in the NICU.

Gravens 2024-18

Abstract Title: PRAMS Pain Recognition Model Classified Neonatal Pain with 98% Accuracy

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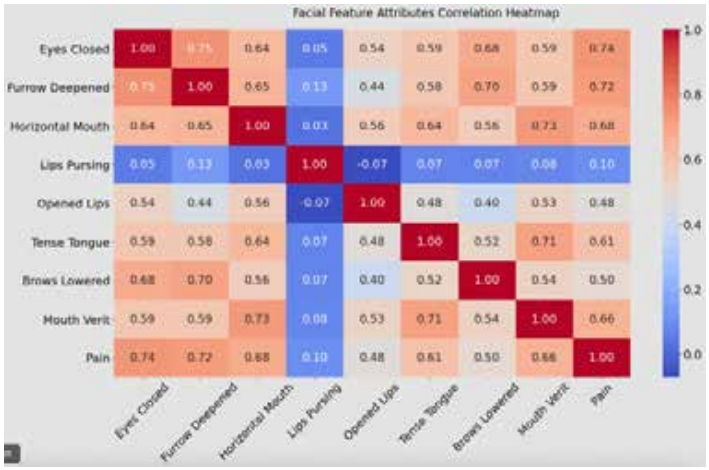
Problem Statement:

Early-life pain is associated with adverse neurodevelopmental outcomes. Current pain assessment practices in the NICU are discontinuous, inconsistent, and highly dependent on clinician presence in that observational tools are used to assess pain in neonates. Among the observational tools used to assess neonatal pain, only the Neonatal Facial Coding System (NFCS) is associated with brain-based evidence of pain. However, clinical utility of the NFCS is not optimal. Our goal is to develop a continuous, unbiased, artificial intelligence (AI)-powered model, Pain Recognition Automated Monitoring System (PRAMS), for detecting pain in the NICU.

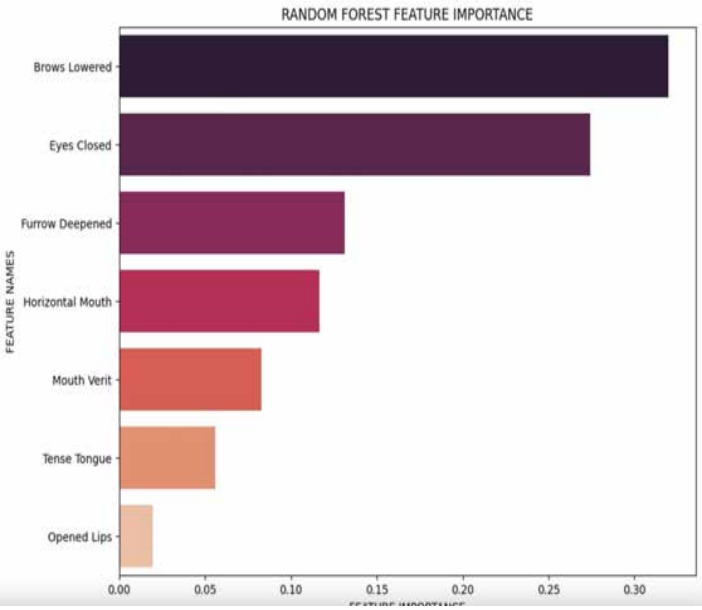
Abstract:

Methods: The specific aims of this study were to evaluate nurses' inter-rater reliability (IRR) and compare it to PRAMS' accuracy (correct predictions/total predictions), precision (true positives/true & false positives), recall (true positives/true & false negatives), and compare PRAMS' Area Under the Curve (AUC) to nurses' AUC. Human to artificial intelligence (H2AI), an intuitive software application for data labeling, facilitated data capture of model training data that were labeled by 6 trained NICU nurses from randomly assigned iCOPEvid (infant Classification Of Pain Expression video database) videos. A pre-trained model, MobileFaceNet, was integrated into H2AI for facial detection and landmarking. Data generated in H2AI from 16 pain videos (563 frames) and 46 non-pain videos (809 frames) were then used to train a supervised computer vision model to classify pain.

Impact and Results: NICU nurses mean IRR was 71% (65–78%) for individual NFCS items, 78.5% (70–92%) for pain/no-pain classification by frame, and 88% (81–100%) for pain/no-pain classification by video. Nurse accuracy measured via AUC was poor to acceptable at 0.68 (0.59–0.74). The champion PRAMS model was highly reliable, with 98% accuracy, 97.7% precision, 98.5% recall, and outstanding discrimination, with an AUC of 0.98.



A correlation heatmap (Figure 1) from labeled data and the champion model feature importance graph (Figure 2) indicate the importance of brow lowering and nasolabial furrow deepening in infant pain classification.



Conclusions: Nurses' labeled data was used to train a computer vision model to classify pain with greater accuracy, precision and recall than humanly possible. Micro-facial expressions, such as brow lowering, require less energy expenditure by a preterm or sick neonate. The importance of changes in micro-facial features over less subtle facial expressions, such as open, vertical and horizontal mouth stretch, suggests that we may be able to extend this model to classify pain in preterm and medically fragile NICU infants, including orally intubated infants. Our next step in the development of PRAMS is a clinical trial of the model in the NICU.

References:

Anand KJS, Eriksson M, Boyle EM, et al. Assessment of continuous pain in newborns admitted to NICUs in 18 European countries. Acta Paediatr 2017; 106: 1248-1259.

Brahnam S, Nanni L, McMurtrey S, et al. Neonatal pain detection in videos using the iCOPEvid dataset and an ensemble of descriptors extracted from gaussian of local descriptors. Appl Comput Informat 2020; 19: 122-143.

Grunau RE, Oberlander T, Holsti L, Whitfield MF. Bedside application of the Neonatal Facial Coding System in pain assessment of premature neonates. Pain 1998; 76: 277-286.

Herr K, Coyne P, Ely B, Gelinas C, Manworren RCB. Pain assessment in the patient unable to self-report: clinical practice recommendations in support of the ASPMN 2019 position statement. Pain Manag Nurs 2019: 20; 404-417.

Walker S. Long-term effects of neonatal pain. Semin Fetal Neonatal Med 2019; 24: 101005.

Zhi R, Zamzmi G, Goldgof D, et al. Automatic infants' pain assessment by dynamic facial representation: effects of profile view, gestational age, gender, & race. J Clinical Med 2018; 7(7): 173.

Learner Objectives:

1) *Compare the accuracy of neonatal nurses' assessments of neonatal pain to that of a machine learning model for assessing neonatal pain.*

2) *Discuss the clinical implications of a continuous, unbiased, artificial intelligence (AI)-powered model for detecting pain in the NICU.*

Gravens 2024-19

Abstract Title: Screening for Social Determinants of Health in a NICU Follow-Up Clinic

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Problem Statement:

Social determinants of health (SDH) disproportionately affect families with preterm infants; they have a higher risk of healthcare challenges and unmet basic needs than term newborns (1). Premature infants are a particularly vulnerable pediatric population, with a significant risk of developmental delays, learning issues, complex medical care, hospital utilization, and growth challenges (2–4). Research has shown that premature babies who experience unfavorable social conditions tend to have poorer neuro-developmental outcomes (5-6). Currently, the extent of the burden of SDH for infants seen in the NICU follow-up clinic is unknown. Furthermore, how to implement a screening tool and provide referral resources when seen in the NICU follow-up clinic has yet to be investigated. In light of these gaps, our pilot study aimed to 1) Determine the frequency of SDH risk factors in a NICU follow-up clinic at a large academic referral center, 2) Determine the composite number of unmet needs, 3) Determine what strategies for screening and intervention were most successful and sustainable in a system-based model.

Abstract:

Methods: Population and Setting: The Special Infant Care Clinic (SICC) is the only growth and developmental assessment clinic at UNC Children's. A self-administered paper questionnaire assessed various unmet needs, including food insecurity, transportation, smoke exposure, mental health, housing, and utilities. The final question of the screening tool asked respondents if they would like assistance in any of these categories. Our pilot study (Phase 1) took place between February 2021 and December 2023 to accomplish our first two aim statements. Phase 2 began in January 2023, where quality improvement (QI) methodology was selected to track the most successful interventions to improve questionnaire completion percentages and positive screen with intervention (Social Work referral) rate. The University of North Carolina at Chapel Hill Institutional Review Board approved the study. Main outcomes: Our primary measure was the incidence of families having any unmet basic needs and the incidence of each SDH category. We also examined a composite number of unmet basic needs, categorized as 0, 1, or ≥2. Secondary outcome measures were the rate of completed questionnaires and positive screen with intervention (SW referral) rate. Attributes: During Phase 2 of this study, we used the electronic medical record (EMR) to collect socioeconomic and demographic characteristics, including gestational age, insurance, primary language, and race/ethnicity.

Statistical Analysis: We examined descriptive statistics, including frequencies with percentages. Sub-analyses using the chi-square test looked at the bivariate relationship between screening positive on the questionnaire, requesting assistance, each unmet basic need, the cumulative number of needs, and each sociodemographic attribute.

Results: A total of 1,270 families (64%) seen in the SICC completed the questionnaire. Using QI methodology in Phase 2, our PDSA cycles improved the SDH questionnaire completion percentage from 61% to 81%. In Table 1, we represented the extent of unmet needs for our families.

Characteristics		UNC Chapel Hill N (%)	UNC Blue Ridge N (%)	Overall N (%)
Screen Positive	Yes	196 (36)	251 (35)	447 (36)
	No	350 (64)	457 (65)	807 (64)
Screened Positive and Requested Resources	Yes	43 (22)*	50 (20)*	93 (21)*
Positive screening for housing	Yes	67 (34)*	75 (30)*	142 (32)*
Positive screening for smoking	Yes	66 (34)*	63 (25)*	129 (29)*
Positive screening for food	Yes	33 (17)*	47 (19)*	80 (18)*
Positive screening for transportation	Yes	34 (17)*	28 (11)*	62 (14)*
Positive screening for Mental Health	Yes	91 (46)*	141 (56)*	232 (52)*
Composite Number of Needs	One	128 (65)*	176 (70)*	304 (68)*
	Two	47 (24)*	51 (20)*	98 (22)*
	Three	21 (11)*	25 (10)*	46 (10)*

Table 1: Incidence of SDH burden, using data collected from February 2021 to August 2023.
*Percentages calculated based on the total number of patients who screened positive

In total, 36% of our families screened positive on the SDH questionnaire; within the positive screens, 21% of families requested assistance with resource identification. The most common positive social determinants categories were mental health (52%) and housing (32%). Other unmet needs included food insecurity (18%) and transportation (14%). In our sample, 68% had one unmet need, 22% had two, and 10% had three or more unmet needs. When families request resource assistance, our clinic referred 100% of these families to social work. After referral, 57% of families received a list of relevant resources, 30% received tangible assistance such as gas cards, food pantry retrieval, or payment of utility bills, and 7% could not be reached by the SW. Table 2 describes baseline characteristics for the families seen in SICC during Phase 2 of data collection. The majority of families were White (43%), insured by Medicaid (58%), and English was their primary language (92%). Families with Medicaid had a 1.5 times higher risk of screening positive compared to children insured with private insurance (95% CI 1.21–2.01). After screening positive, families with Medicaid were 6.5 times more likely to request assistance (95% CI 1.60-26.35). Non-white and non-English-speaking families had double the risk of requesting assistance (RR 2.4; 95% CI 1.05–5.66 and RR 2.7; 95% CI 1.33–5.42, respectively). Compared to private insurance, Medicaid was significantly associated with a higher relative risk of having housing/utility needs (RR 2.2; 95% CI 1.21–3.82), food insecurity (RR 3.5; 95% CI 1.47–8.18), and unmet transportation needs (RR 5.0; 95% CI 1.14–21.42). Families experiencing food insecurity were five times more likely to be present in non-White families (95% CI 1.90–12.13) and four times more likely in non-English speaking families (95% CI 2.23–8.20). Lastly, families who screened positive for more than one SDH category were twice as likely to be non-White (95% CI 1.01–2.9) and 2.5 times more likely to be non-English speaking (95% CI 1.32–4.42) or have Medicaid for insurance (95% CI 1.40–4.75).

Discussion/Conclusion: Our study demonstrated that a third of our families seen in NICU follow-up clinics have unmet basic needs, with mental health and housing/utilities being the most prevalent. Insurance, primary language spoken, and race were vital sociodemographic attributes associated with an increased risk of having unmet basic needs and requesting assistance. Our project showed the feasibility of implementing an SDH screening tool into the clinic's workflow. Additionally, it showed that families were willing to complete the questionnaire and state their need for assistance despite potential vulnerability. Using QI methodology during Phase Two, we learned having nursing staff administering the questionnaire, EMR hard stops incorporated into the clinic note, and an embedded nurse practitioner as a project champion were crucial components to ensure the successful implementation of the SDH questionnaire. Furthermore, having a social worker reach out to families proved to be the most effective intervention to get families the necessary resources. Future steps for this project will involve improving no-show rates for the clinic; currently, our average no-show rate is 22%. Families that are no-shows may have more SDH barriers that prevent them from being able to attend the SICC. Future direction includes implementing an SDH screening tool in the inpatient setting to support families while their infants are still in the NICU; this may reduce the burden of unmet needs in the outpatient setting.

References:

1. Parker MG, Ettinger De Cuba S, Rateau LJ, et al. Household unmet basic needs in the first 1000 days and preterm birth status. doi:10.1038/s41372-022-01325-52.
2. Allotey J, Zamora J, Cheong-See F, et al. Cognitive, motor, behavioural and academic performances of children born preterm: a meta-analysis and systematic review involving 64 061 children. BJOG. 2018;125(1):16-25. doi:10.1111/1471-0528.148323.
3. Shah P, Kaciroti N, Richards B, Oh W, Lumeng JC. Developmental outcomes of late preterm infants from infancy to kindergarten. Pediatrics. 2016;138(2). doi:10.1542/PEDS.2015-3496/524254.
4. Woythaler M. Neurodevelopmental outcomes of the late preterm infant. Semin Fetal Neonatal Med. 2019;24(1):54-59. doi:10.1016/J.SINY.2018.10.0025.
5. Parker MG, de Cuba SE, Rateau LJ, et al. Associations of household unmet basic needs and health outcomes among very low birth weight children. J Perinatol. 2023;43(3):364-370. doi:10.1038/S41372-023-01626-36.
6. Brumbaugh JE, Vohr BR, Bell EF, et al. Early-Life Outcomes in Relation to Social Determinants of Health for Children Born Extremely Preterm. J Pediatr. 2023;259. doi:10.1016/J.JPEDS.2023.113443

Learner Objectives:

1. Understand barriers to implementing an SDH screening tool and successful strategies and resources for overcoming these barriers.
2. Understand how premature and medically fragile infants have combined increased risk for developmental delays.

Gravens 2024-20

Abstract Title: Social Vulnerability and Parent Presence in the NICU

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Problem Statement:

Despite the importance of parental presence in the NICU, parent presence in the NICU is highly variable, and there is a paucity of research describing factors, including social determinants of health, that may influence parent presence and engagement in the NICU. This aim of this study was to explore associations between NICU parents' sociodemographic variables, their neighborhood-level social vulnerability, measured using the Centers for Disease Control and Prevention's Social Vulnerability Index (CDC SVI) scores, and parent presence and engagement in the NICU.

Abstract:

Methods: The SVI was developed to identify a community's vulnerability to experiencing disproportionately negative outcomes following stressors such as natural disasters. Based on 15 variables related to social determinants, SVI scores are linked to health disparities in four themes including socioeconomic status (SES), household composition and disability, minority status and language, and housing type and transportation. SVI scores are updated every two years and are available for every US census tract. SVI scores range from 0 to 1 with higher scores indicating more vulnerability. While research has established that SVI can be used to identify as-risk communities, more recent studies have demonstrated utility of SVI scores beyond disaster management; and the SVI has been associated with risk of preterm birth, teen pregnancy, and attendance at pediatric follow-up appointments. Following institutional review board approval, an existing dataset representing 78 NICU families from a Midwestern tertiary-level NICU was extended to include SVI scores by census tract. All families in the dataset were living together at the time of their infants' NICU admission, and family home addresses were used to obtain overall SVI scores, as well as SVI scores representing the four SVI themes, for each family. SVI scores were added to parent sociodemographic data in the dataset that included parents' age, education level, work status, number of siblings in the home, and distance from home to the NICU. The dataset also included parent presence, skin to skin care (SSC) and NICU infant data representing the 78 families that included 41 were term and 37 were preterm infants born at > 28 weeks gestation. Median length of infants' NICU stay was 33 days. Parent presence was operationally defined as the amount of time one or both parents were with their infant in the NICU, as measured in hours per day through NICU discharge, and as measured in cumulative hours over an infant's first month in the NICU. SSC was operationally defined as the amount of time parents participated in SSC with their NICU infant in hours per day through NICU discharge, as well as cumulative hours over the infant's first month in the NICU. Parent presence and SSC data were collected from NICU infants' electronic medical records.

Impact and Results: Mean parent presence in hours per day was 6.45 (3.29) hours per day and ranged from 1.37 to 17.78 hours per day. Among mothers, only level of education (r=.35, p=.002) and work status (r=.22, p=.05) were significantly correlated to hours per day of parent presence. The overall SVI score (r= -.37, p<.001) and theme SVI scores for SES (r= -.41, p<.001), minority status and language (r= -.27, p=.02), household composition and disability (r= -.307, p=.01) were significantly correlated to parent presence in hours per day. Results of multiple regression analyses supported a model including SVI theme scores for SES, household composition and disability, and minority status and language for explaining parent presence in the NICU in hours per day (R2=0.17, F=4.96, p=.003), with the SES theme score being significant (p=.05). Simple regression used to test whether SVI SES score explained parent presence in hours per day also resulted in a significant model (R2=0.17, F=14.98, p=<.001). Cumulative parent presence over the first four weeks of life ranged from 28 to 466.25 hours, with a mean of 137.11 hours. No parental variables were significantly associated with cumulative parent presence. The overall SVI (r= -.25, p=.03), SVI SES (r= -.24, p=.03), and SVI household composition and disability scores (r= -.25, p=.03) were significantly associated with cumulative parent presence. Simple regression analysis indicated that overall SVI score explained cumulative parent presence (R2=0.06, F=4.97, p=.03). No significant associations between parent variables or SVI scores were identified for SSC measured in hours/day, or cumulative SSC over the first month in the NICU.

Conclusions: In this study few parent sociodemographic variables were significantly related to parent presence in the NICU. However, SVI overall scores and theme scores were significantly associated with and explained NICU parent presence measured in hours per day, as well as parent presence measured cumulatively over the infant's first month in the NICU. SVI scores are accessible online using a home address and may be useful in identifying families in need of support to be present in the NICU.

References:

Centers for Disease Control & Prevention. (2022). Social Vulnerability Index. https://www.atsdr.cdc.gov/placeandhealth/svi/index.html

Givens, M., Teal, E. N., Patel, V., & Manuck, T. A. (2021). Preterm birth among pregnant women living in areas with high social vulnerability. American journal of obstetrics & gynecology MFM, 3(5), 100414. https://doi.org/10.1016/j.ajogmf.2021.100414

Pineda, R., Bender, J., Hall, B., Shabosky, L., Annecca, A., Smith, J. (2018). Parent participation in the neonatal intensive care unit: Predictors and relationships to neurobehavior and developmental outcomes. Early Human Development, 117, 32-38. doi:10.1016/j.earlhumdev.2017.12.008

Yan, F., Pearce, J. L., Ford, M. E., Nietert, P. J., & Pecha, P. P. (2022). Examining Associations Between Neighborhood-Level Social Vulnerability and Care for Children With Sleep-Disordered Breathing. Otolaryngology--head and neck surgery, 166(6), 1118-1126. https://doi.org/10.1177/01945998221084203

Learner Objectives:

1) Describe associations between parents' sociodemographic variables, their Social Vulnerability Index scores, and parent presence and engagement in the NICU.

2) Discuss clinical implications of using SVI scores to identify barriers to parent presence in the NICU.

Gravens 2024-21

Abstract Title: Family at the Bedside: To Stay or Not to Stay? Depends Who You Ask

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Problem Statement:

There are barriers that are multifactorial in nature that effect the frequency and duration that a family is present at the bedside during their child's NICU stay. The aim of this quality improvement initiative is to describe the staff perspective regarding parental presence during the day and at night as an attempt to identify any modifiable variables that could potentially improve the likelihood, feasibility, comfort, and acceptance of parental presence at the bedside in a level 4 NICU.

Abstract:

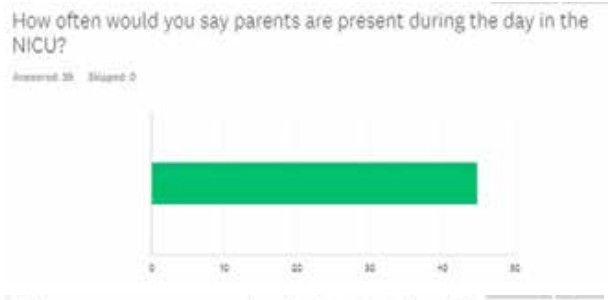
Program/ Methodology: Nationwide Children's Hospital's Neonatal Intensive Care Unit (NICU) is a 130-bed unit that provides interdisciplinary care to babies requiring a variety of comprehensive medical intervention. Because the child's family is the most important component of a baby's care team through their NICU journey, it is important that we, as a culture, can foster an inclusive, welcoming, and comfortable environment during this period of stress, uncertainty and unknown for the babies and families. If we can identify any unconscious bias, procedural barriers, structural limitations, or any other implications that our contribution to the environment is having on a family's participation in their child's care, it is our responsibility to adjust and adapt to optimize the involvement of the family during the NICU admission. A survey was distributed to the nursing staff at Nationwide Children's Hospital's NICU via email on two distribution cycles. A total of 39 responses were collected, and this represented a mix of day shift nurses and night shift nurses. The survey contained a mix of multiple choice and free-text responses providing qualitative data. The survey questions inquired about the perceptions of parental presence during the day and night, perceived frequency of visitation, involvement when family is present and suggestions for improvement for the unit regarding optimization of parental involvement. The responses were available individually and words of importance were extracted from free responses and distribution was performed on the multiple choice questions. The major accomplishment of this data is informative for improvements to the unit, potential for further education and initiatives to ultimately increase and optimize parental presence at the bed side. As described below, common words used in the responses to the question "Please describe your thoughts/feelings when you get in report that parents are here all day" respectively from nurses were "happy," "helpful," "great," "glad," but also "difficult," "depends," and "dread" (Figure 1).

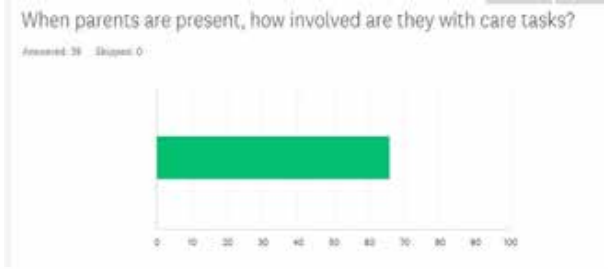
To the question "Please describe your thoughts/feelings when you get in report that parents are here all night," the most common terms utilized in responses were "difficult," "frustrating," and "in the way" (Figure 2). The size of the words in these pictographs are correlated with the frequency that they appeared in responses.

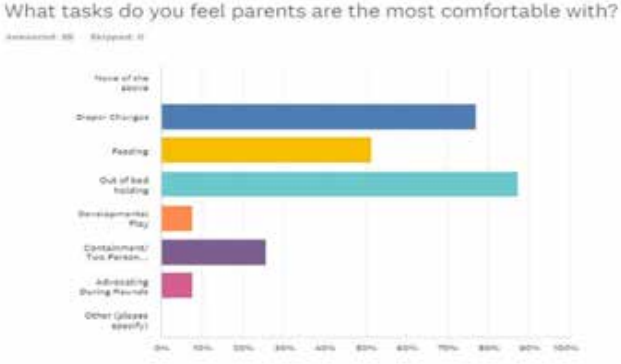
Impact/ Results: This survey estimates that parents are at the bed side during the day an average of 45% of the time and for the time that they are there, it is estimated that they are involved with care tasks less than 70% of the time (Figures 3 and 4).

These findings suggest a significant area for important investigation and potential for improvement as these families are present infrequently and when they are, they are not participating in the cares consistently. The survey inquired about comfort levels of parents with different care tasks and activities, and it was noted that nursing perspective suggests that parents are most comfortable with diaper changes, feeding and out of bed holding (Figure 5).

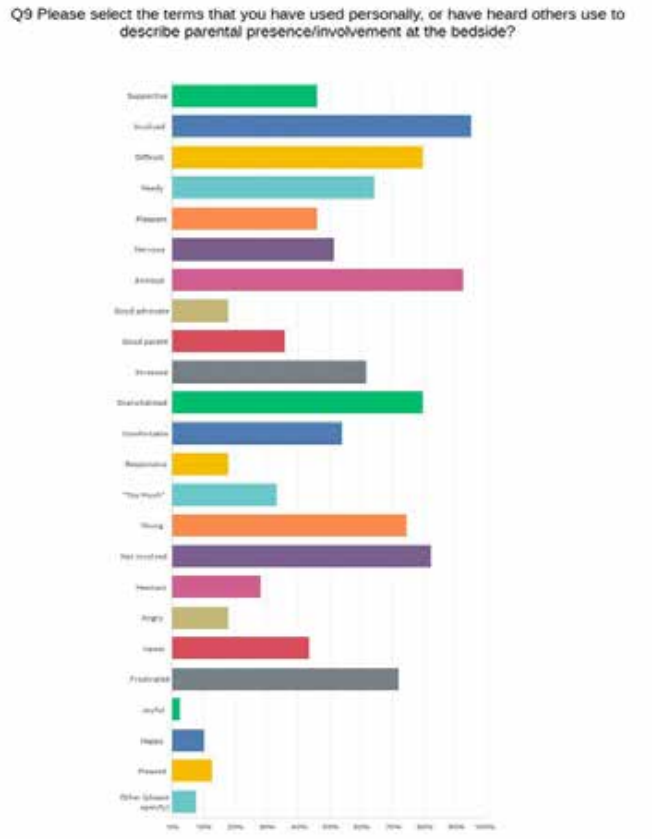
It was notable that staff suggests that parents are least comfortable with developmental activities and support such as containment and developmental play. It was alarming that staff feels that families are the least comfortable with advocating during rounds (tied with comfort level of developmental play).







Conclusion: Due to the explorative and qualitative nature of this study, outcomes regarding the difference between the nursing perspective of parental presence during the day and night is appreciated with parental presence overnight being more negatively perceived and during the day, more positively perceived. This is apparent in the difference in the most common words utilized in the responses. This observation would benefit from further investigation however it is predicted that this is likely due to the fact that parents may likely sleep at the bedside overnight and are awake and participatory during the day. Initial steps to address parental perspective and perception of involvement in cares and presence at the bedside have been taken by initial interviews. Overall, this quality improvement initiative identified areas for growth based on staff perspective and institutional and unit-specific support to make this an optimal environment for parents, staff and babies. Further investigation is needed to discover potential interventions to improve parental presence frequency and participation as well as barriers to advocating during rounds for their babies. Beginning by addressing the negative connotations used by staff to any degree, at any time when referring to or considering a family's presence at the bedside is a possible first step (Figure 6).



Beginning with a culture shift of staff has the possibility to overall make their child's bed side a more welcoming and supportive place as their family navigates this foreign and stressful environment. This will allow us, as support staff in the Neonatal Intensive Care Unit, to use our voices to support, advocate for and lead these families through this journey.

References:

1. *Ou, J., et al. (2023). Effects of family integrated care on weight gain in extremely preterm infants. Minerva Pediatr (Torino) 75(2): 253-259.*
2. *Abukari, A. S. and S. Schmollgruber (2023). Concepts of family-centered care at the neonatal and paediatric intensive care unit: A scoping review. J Pediatr Nurs.*
3. *McAndrew, N. S., et al. (2022). Systematic review of family engagement interventions in neonatal, paediatric, and adult ICUs. NursCrit Care 27(3): 296-325.*

Learner Objectives:

1. To appreciate the multifactorial nature of involving families at the bedside in the Neonatal Intensive Care Unit (NICU).
2. To recognize the barriers and facilitating factors of families staying at the bed side during the day and night while their child is in the NICU.
3. To identify the need for further research and quality improvement initiatives within the NICU environment to optimize parent-involvement and presence at the bed side.

Gravens 2024-22

Abstract Title: Developmental Sensory Care Map

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Problem Statement:

The Sunnybrook NICU noted a lack of evidenced-based, consistent information for clinicians and families around how best to support the neuropromotion and mitigation of stress of neonates as they progress through the developmental continuum.

Abstract:

Background: The involvement of families in their children's care in the NICU has been shown to improve outcomes (1–3). However, care implementation evolves with the developmental stage of an infant (4). For parents in the Sunnybrook NICU, information about the type and timing of care strategies was anecdotally found to be inconsistent, not easy to access and sometimes outdated. In our center, families received informal educational information regarding Kangaroo Care (KC), talking (language exposure), hand hugging (nurturing touch) and the relationship of these strategies to positive brain development. Families identified that information they received from health care providers in the NICU was inconsistent at best and contradictory at worst. This inconsistency of information has been shown to increase the families' anxiety which in turn causes confusion and increased stress (5). Staff received specialized educational sessions that are geared toward health care providers, however, this did not include specific stages of sensory development. Often, families and staff alike seek to gather their own information from various sources which may not be reliable and may not be in line with the opinions and evidence guiding the practices in our center. Our goal was to create an educational tool for families and staff with consistent, evidence-based information utilizing shared language to protect and promote brain development across the spectrum of gestational ages in the Sunnybrook NICU in Toronto, Canada.

Methods: Recognizing the need for consistent, evidenced-based education for staff and families, a quality improvement project was

initiated. An interdisciplinary team was established to facilitate a solution that would be evidence based, accessible to families and staff and fit with the unit culture and language. Our first step was to conduct a review of the literature to understand how this was addressed at other institutions. Second, a gap analysis was performed; hearing from the multidisciplinary team revealed that our NICU inconsistently provided developmentally appropriate sensory stimulation. Third, surveys were distributed to both families and clinicians in the Sunnybrook NICU to further characterize the local need. Equipped with a better understanding of the local need and various tools published in the literature, an interprofessional local team designed a sensory care map for parents and clinicians to use together at the bedside of each neonate. This team included nurses, physiotherapist, nurse practitioner, graphic designer, physician, and parent partner.

Impact: The literature review helped inform the tool (4, 6–10). Some approaches focused on the senses, some focused-on patient stability and other focused on only certain senses or developmental stages. Different formats were also used, some being only paper based. Based on local feedback, it was thought that being uniquely paper-based format limited access especially in the current technology era. Given the goal of cohesiveness, we felt it crucial for the language of the tool to reflect the language and culture of our unit and therefore identified language used by others that fit. Learning what others did helped us create a resource that truly fit the Sunnybrook unit and build a library of references to ensure it truly be evidence based. Surveys from the clinicians (N=38) confirmed that most respondents (68%) did not feel they had enough education related to the various stages of neonatal development. One third of clinicians (32%) did not feel they knew the difference between neuroprotection and neuropromotion, a central tenant to providing developmentally appropriate care. In addition, 31% of staff did not feel comfortable teaching parents about their baby's brain development. In the family surveys (N=10), all parents (100%) identified that nurses were the most important person they relied on to learn about their baby's development. Parental surveys further identified families had information about hand hugs and KC but lacked information about developmental stages. The third step, the gap analysis (Figure 1) identified that developmentally appropriate care was inconsistently practiced.

PBP 4: Apply developmentally sensitive neuroprotective/promotive care during every experience	NOT practiced	Practiced RARELY	Practiced INCONSISTENTLY	OFTEN practiced	CONSISTENTLY practiced	Information Source (opinion, data)	Priority to our Team (High, Med, Low)
Provide support/mindful handling with all interactions (parents as much as possible)				x			
Provide nurturing/positive touch (family)					x		
Provide nurturing/positive touch (staff)				x			
Minimize bright light exposure				x			
Minimize noise exposure				x			
Proper positioning/containment					x		
Protect infant sleep				x			
Developmentally appropriate sensory stimulation			x				High

In addition, many other developmentally essential cares were being practiced, but not consistently. Using information from the literature, interviews and the gap analysis, the care map created (Figure 2) shows a gradual onset and/or offset of activities based on developmentally age-appropriate readiness.

It is a pictorial depiction of the development of senses, along with protective and promotive strategies based on gestational age. It is one chart that can guide appropriate care activities throughout the continuum of their NICU journey. This chart doesn't need to be updated by families or staff, remaining a constant reference. It is a global presentation of sensory development along with appropriate strategies that can be used by families and clinicians alike. It uses language that is a clear and consistent with that used in the Sunnybrook NICU.

Conclusion: Stress within the NICU has been shown to alter the brain development of the preterm infant (11). Parents have been shown to help modulate this by providing nurturing and positive interactions that help mitigate the stresses infants face (2). By providing suitable and user-friendly information to parents and clinicians, the ability to modify and provide age-appropriate sensory input for the infant can be an important strategy to reduce infant stress and facilitate their healthy brain development. This care map is created based on the literature and local needs, identified by both families and clinicians. Further steps include measuring and assessing its implementation, how it is able to improve parental capacity and facilitate communication between clinicians and families. Parents can feel reassured that they are providing the best possible developmental care at each stage of their infant's journey within the NICU. Clinicians can use this tool to have consistent and clearer messaging regarding an infant's neonatal developmental journey and how parents can best support their infants.

References:

1. *Church PT, Grunau RE, Mirea L, Petrie J, Soraisham AS, Synnes A, et al. Family Integrated Care (FICare): Positive impact on behavioural outcomes at 18 months. Early Hum Dev. 2020;151:105196.*

2. *McLean MA, Scoten OC, Yu W, Ye XY, Petrie J, Church PT, et al. Lower Maternal Chronic Physiological Stress and Better Child Behavior at 18 Months: Follow-Up of a Cluster Randomized Trial of Neonatal Intensive Care Unit Family Integrated Care. J Pediatr. 2022;243:107-15.e4.*

3. *O'Brien K, Robson K, Bracht M, Cruz M, Lui K, Alvaro R, et al. Effectiveness of Family Integrated Care in neonatal intensive care units on infant and parent outcomes: a multicentre, multinational, cluster-randomised controlled trial. Lancet Child Adolesc Health. 2018;2(4):245-54.*

4. *Pineda R, Raney M, Smith J. Supporting and enhancing NICU sensory experiences (SENSE): Defining developmentally-appropriate sensory exposures for high-risk infants. Early Hum Dev. 2019;133:29-35.*

5. *Miles MS, Funk SG, Carlson J. Parental Stressor Scale: neonatal intensive care unit. Nurs Res. 1993;42(3):148-52.*

6. *Bloomfield FH, Alexander T, Muelbert M, Beker F. Smell and taste in the preterm infant. Early Hum Dev. 2017;114:31-4.*

7. *El-Metwally DE, Medina AE. The potential effects of NICU environment and multisensory stimulation in prematurity. Pediatr Res. 2020;88(2):161-2.*

8. *Filippa M, Panza C, Ferrari F, Frassoldati R, Kuhn P, Balduzzi S, et al. Systematic review of maternal voice interventions demonstrates increased stability in preterm infants. Acta Paediatr. 2017;106(8):1220-9.*

9. *Knudsen K, Steffen E, Sampson L, Bong K, Morris M. Collaboration to Improve Neuroprotection and Neuropromotion in the NICU: A Quality Improvement Initiative. Neonatal Netw. 2021;40(4):201-9.*

10. *Scala M. The iRAINBOW program. In: Scala M, editor. Vermont Oxfort Network Pod Webinar; May 17, 2023 at 2pm EST; Zoom: Lucile Packard Children's Hospital Stanford; 2023.*

11. *Smith GC, Gutovich J, Smyser C, Pineda R, Newnham C, Tjoeng TH, et al. Neonatal intensive care unit stress is associated with brain development in preterm infants. Ann Neurol. 2011;70(4):541-9.*

Learner Objectives:

1. Demonstrating the process of identifying a solution within your own context.
2. Utilizing a multidisciplinary approach that includes parents to develop a sustainable tool to develop a shared language and consistent approaches to sensory development.

Gravens 2024-23

Abstract Title: NICU: Where the Little Things Matter - The Impacts of NICU Unit Design

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Problem Statement:

The variability of design within NICUs leads to significant planning and operational impacts. The analysis of three different planning models demonstrates the direct impact on family experience and perception, infection control, pandemic readiness, staffing considerations, acoustics, as well as families desire for both socialization, privacy, and normalcy.

Abstract:

Neonatal Intensive Care Units (NICUs) serve some of the most fragile hospital patients, who have unique needs to support healthy development and stabilization. The variability of design within NICUs leads to significant planning and operational impacts. Three unique NICU designs will be analyzed to show the direct impacts of their overall design as well as unique design interjections which have significant impacts on key design drivers. Qualitative and quantitative data has been gathered that help analyze and understand the implications of specific NICU organization principles including Open Bay Unit Arrangement, Pods/Neighborhood Unit Arrangement, as well as a Linear Unit Arrangement of patient care spaces. Areas of study for each arrangement include the impact on six key metrics: 1. Patients' families experience while in the NICU as well as their overall perception of the environment of care; 2. Pandemic readiness to flex and adapt to changing needs and environments; 3. Errors and infection control; 4. Staffing considerations including staffing and operational models, communication, peer to peer visibility, ability for collaboration and mentorship, respite, and comradery; 5. Acoustical impacts of different unit configurations and layouts; 6. Supporting and encouraging families simultaneous desire to have socialization, privacy, as well as develop a since of normalcy. The analysis and comparisons have been conducted on NICUs with similar sized patient populations with a similar geographic area to help normalize some of the findings. This presentation will review the findings from all 9 case study facilities. The findings in this presentation were the result of a series of surveys of families and staff to assess their thoughts on their built environments. These were conducted over a 2-week period in 2022 at 9 hospital organizations spread across the southeast. Feedback was received from over 40 parents and 160 staff members. This feedback was combined with an extensive evidence synthesis of NICUs. This document collates evidence from empirical literature, case studies and subject matter experts for various healthcare environments including inpatient accommodation, diagnostic and treatment, clinical, operational, and general support services. A bibliography for this presentation can be found in the attached documents.

Learner Objectives:

1. Demonstrate the direct impacts of NICU design that improve the physical, emotional, and social well-being of the units' occupants.
2. Assess safety implications both actual and perceived among the clinical staff, including desires for increased peer to peer connections while maintaining individual areas to work and focus.
3. Identify planning methodologies that support the fragile social structures that exist within NICU environments for families.

Gravens 2024-24

Abstract Title: Effects of Facilitated Tucking During Routine Caregiving Activities: A Case Series on Preterm Infant Pain Expression

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Problem Statement:

The effects of facilitated tucking on infant stress during routine caregiving activities have not been well explored. The purpose of this case series was to compare infants' behavioral and physiologic responses to caregiving procedures performed with and without a facilitated tuck intervention provided by a Neonatal Physical Therapist.

Abstract:

Methodology: Three stable, hospitalized infants, between 26 and 29 weeks post-menstrual age (mean = 28.5 weeks) on the day of observation, were assessed during routine caregiving activities. A randomly sequenced crossover design was used with infants serving as their own controls. In the experimental condition, the physical therapist first supported each neonate with a facilitated tuck for two minutes. The nurse then performed routine caregiving activities while the Neonatal Physical Therapist maintained the facilitated tuck position. The infant was further supported in the facilitated tuck position for an additional two minutes after the caregiving activities were completed. During the control condition, the nurse alone provided care to the infant without facilitated tucking. Each infant's response was measured using the Neonatal Pain, Agitation, and Sedation Scale (N-PASS, a valid, reliable, five-item tool used to assess acute pain in preterm infants). This scale allows quantitative data collection of autonomic, motor, and behavioral state expressions of pain. Infants' N-PASS scores were recorded every 2 minutes throughout a 10-minute pre-care baseline, with each caregiving activity (i.e., diaper change, auscultation, axillary temperature, etc.), and documented at 2-minute intervals during a 10-minute recovery period.

Results: Infants supported by facilitated tucking during routine nursing caregiving activities demonstrated a mean N-PASS score of 3.3, compared to a mean of 4.6 when not tucked. Additionally,

during the recovery phase, infants supported with a facilitated tuck demonstrated a lower mean N-PASS score of 3.1, compared to a mean of 4.3 when not supported with a facilitated tuck.

Conclusions: Infants demonstrated a lower stress response when supported with a facilitated tuck prior to, throughout, and post nursing caregiving activities. Physical therapists skilled in neonatal handling techniques can contribute to a reduced stress response in infants less than 30 weeks post-menstrual age by supporting them throughout routine caregiving activities and during their transition back to a restful state.

Learner Objectives:

1. Describe the differences between mean pain scores in the infants who received facilitated tucking and those who did not.
2. Identify the role of the Neonatal Physical Therapist in supporting infants less than 30 weeks post-menstrual age during routine caregiving activities.

Gravens 2024-25

Abstract Title: Standardizing Infant Massage for Neonatal Opioid Withdrawal Syndrome: A Qualitative Study

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Problem Statement:

The opioid epidemic in the United States has led to a significant increase in opioid use in pregnancy, resulting in utero exposure and the development of withdrawal symptoms in newborns, known as Neonatal Opioid Withdrawal Syndrome (NOWS). State Perinatal Quality Collaboratives (SPQCs) have been successful in collaborating with hospitals in quality initiatives (QIs) to improve standardization for NOWS; however, there remains a critical gap in knowledge in the normalization processes for nonpharmacological interventions, such as infant massage, for a comprehensive family-centered developmental care approach. The objective of this qualitative study was to explore, as reported by healthcare providers, the process and experiences of implementing infant massage as a standard practice for NOWS. The findings of this study aim to inform healthcare providers, as well as national, state, and local policy initiatives, on the integration and standardization of additional nonpharmacological intervention for NOWS.

Abstract:

Research Questions: Research Question 1 (RQ1): What were the reported implementation standardization processes to incorporate infant massage as a nonpharmacological standard of care for NOWS treatment in NICU and non-ICU settings in birthing hospitals to inform national public health policy and state quality initiatives? Research Question 2 (RQ2): What were neonatal and pediatric healthcare providers' experiences of utilizing infant massage as a nonpharmacological standard of care for newborns with NOWS in hospital settings?

Methods: A general qualitative study included 11 neonatal or pediatric healthcare providers, two registered nurses, and nine occupational therapists who care for infants with NOWS in birthing hospitals and utilize infant massage as a nonpharmacological intervention. Virtual interviews were conducted via mobile application and Microsoft Teams, utilizing an interview protocol aligned with the four constructs of the Normalization Process Theory (NPT), including coherence, cognitive participation, collective action, and reflexive monitoring, with a duration of 23 to 58 minutes audio-recorded and transcribed. Data analysis utilizing the framework approach and the computer-assisted qualitative data analysis software ATLAS.ti to identify themes. The application of Kurt Lewin Force Field Analysis (FFA) assisted with identifying driving and restraining forces to standardization of infant massage as nonpharmacological treatment for NOWS.

Results: Six themes emerged from the study: participants identified NOWS as (a) a challenging population, (b) provided perceptions of benefits and barriers of implementation of infant massage for NOWS, including bonding as a primary benefit to support families, (c) identifying a family-centered individualized nonpharmacological approach, (d) core certified team driving culture change, (e) continual education and allocation of resources for staff and families, with notable (f) variability in organizational implementation and monitoring processes. Driving forces for successfully implementing and standardizing infant massage as a nonpharmacological intervention for NOWS, as reported by participants, are critical for embedding into workflows and sustainability; these included (a) a certified core team, (b) automatic orders, (c) modified massage, (d) nonpharmacological standard of care, (e) buy-in from healthcare providers, (e) parent/caregiver inclusion and willingness, (f) establishing a routine in the hospital, (g) education, (h) interprofessional communication and collaboration, (i) documentation, and (j) reimbursement standard practices. Maternal barriers to performing infant massage for NOWS, as reported participants, include (a) a lack of knowledge of NOWS and (b) presence at the bedside, which may be a result of social determinants of health or healthcare provider stigma, (c) knowledge of NOWS, (d) fearfulness and (e) apprehension in caring for their babies withdrawal symptoms, (f) their level of understanding and (g) acceptance of performing infant massage, (h) mothers receiving treatment themselves, and (i) their ability to self-regulate and (j) understand their baby's cues. Restraining forces for successful implementation of infant massage for NOWS, as reported by participants, include (a) a medical model of care, (b) lack of funding, (c) healthcare provider stigma, (d) inadequate staffing resources, (e) families not present, (f) time constraints, and (g) lack of inclusion and understanding of a core team of organizational processes. These findings provide valuable insights into the complexity of standardizing nonpharmacological care for NOWS and the resources needed to inform single-center and state perinatal quality initiatives.

Conclusion: Standardizing infant massage as a nonpharma-

cological intervention for NOWS in birthing hospitals during the postpartum period supports families while meeting the needs of newborns with NOWS, decreasing the incidence of learned withdrawal behaviors, which lead to unnecessary pharmacological interventions, prolonged hospital stays, and admittance into NICUs contributing to the economic burden and strains on social and healthcare systems. The study also highlights the need to raise awareness within the community and to individuals with opioid use in pregnancy on NOWS, provide a toolbox of nonpharmacological interventions and education to families with NOWS newborns, and educate healthcare providers to reduce the stigma of addiction that creates a barrier to care and optimal health outcomes.

References:

Hirai, A. H., Ko, J. Y., Owens, P. L., Stocks, C., & Patrick, S. W. (2021). Neonatal abstinence syndrome and maternal opioid-related diagnoses in the US, 2010-2017. JAMA, 325(2), 146-155. https://doi.org/10.1001/jama.2020.24991

Hwang, S. S., Weikel, B., Adams, J., Bourque, S. L., Cabrera, J., Griffith, N., ... & Wymore, E. (2020). The Colorado Hospitals Substance Exposed Newborn Quality Improvement Collaborative: Standardization of care for opioid-exposed newborns shortens length of stay and reduces number of infants requiring opiate therapy. Hospital Pediatrics, 10(9), 783-791. https://doi.org/10.1542/hpeds.2020-0032

Jilani, S. M., Jones, H. E., Grossman, M., Jansson, L. M., Terplan, M., Faherty, L. J., ... & Davis, J. M. (2022). Standardizing the clinical definition of opioid withdrawal in the neonate. The Journal of Pediatrics, 243, 33-39. https://doi.org/10.1016/j.jpeds.2021.12.021

Patrick, S. W., & Lorch, S. A. (2021). It is time to ACT NOW to improve quality for opioid-exposed infants. Pediatrics, 147(1), Article e2020028340. https://doi.org/10.1542/peds.2020-028340Perez, C. (2022). Exploring Infant Massage as Standard Nonpharmacological Treatment for Neonatal Opioid Withdrawal Syndrome (Publication No. 29321960) [Doctoral dissertation, Walden University). ProQuest Dissertations and Theses Global.

Snowden, J. N., Akshatha, A., Annett, R. D., Crawford, M. M., Das, A., Devlin, L. A., ... & Nesmith, C. C. (2019). The ACT NOW clinical practice survey: Gaps in the care of infants with neonatal opioid withdrawal syndrome. Hospital Pediatrics, 9(8), 585-592. https://doi.org/10.1542/hpeds.2019-0089

Learner Objectives:

Define Neonatal Opioid Withdrawal Syndrome (NOWS) symptoms, prevalence, and care approaches.

Discuss the benefits of infant massage for NOWS and the importance of an individualized approach.

Identify facilitators and barriers to standardizing infant massage for NOWS.

Gravens 2024-26

Abstract Title: Implementing a Developmental Care Team

Authors: Monika Reisenauer, DNP, APRN, NNP-BC; Valicitie Porrata-Rubino; Christiana Farkouh-Koraleski, MD; Alina Levin; Lisa Crilly, PT

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Problem Statement:

Infants born prematurely, especially those born less than 32 weeks gestation, have an increased risk of long term adverse developmental outcomes (Spittle, 2016). Noxious environmental stimuli are correlated with increased morbidity and negatively impact neurodevelopmental outcomes in preterm infants (Soleimani, 2020). The NICU at The Valley Hospital in Ridgewood, New Jersey has implemented a Developmental Care Team (DCT) consisting of a multidisciplinary team with the goal of improving neonatal outcomes by decreasing noxious stimuli and providing appropriate supportive care to infants and their families.

Abstract:

A quasi-experimental pre-post study was conducted to evaluate the efficacy of the Developmental Care Team at The Valley Hospital. Valley Hospital's neonatal intensive care unit (NICU) is located in Ridgewood, New Jersey. It is a 15-bed level-III unit with a three-year average delivery rate of 3807 deliveries/year and 411 NICU admission/year for a total of 4931 NICU patients. About 100 infants per year meet the criteria for needing developmental care. Infants discharged from the NICU are seen in the Developmental Follow-up Clinic in 3–6-month intervals from 2 months through 36 months of age. The DCT consists of physicians, nurse practitioners, nurse educators, nurses, nursing leadership, social workers, lactation consultants, physical therapists, feeding therapists, audiologists, family support specialists, and nurture specialists. Study inclusion criteria were patients who were admitted to the NICU born less than 35 weeks gestational age and/or less than 1500g. DCT implementation was rolled out in phases as per the Guidelines for the Institutional Implementation of Developmental Neuroprotective Care in the NICU parts A and B (Appendix D) (Milette, 2017).

On October 14, 2020, The Valley Hospital NICU gathered the multidisciplinary team to hold their first DCT meeting. The DCT agreed to focus on light, sound, and positioning. Developmental Pearls were rolled out to parents and staff supporting developmental care (Appendix C).

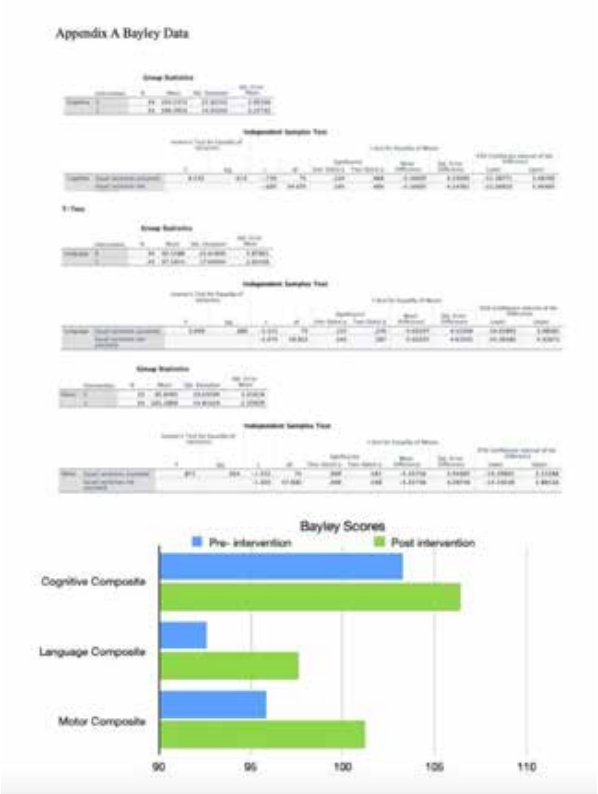
Nursing staff participated in NANN developmental care continuing education through May 2021. To measure the efficacy of the DCT, three outcome measures were tracked. Infant positioning assessment tool (IPAT) is a tool used to evaluate posture of premature infants (Coughlin, 2010). (Appendix B).

Supportive positioning in preterm infants improves postural and musculoskeletal development. (Peterson, 2018). Scores were extracted onto a run chart. An increase in scores would show that developmentally sound positioning techniques were established. The second measure is the infants' length of stay (LOS). Developmental Care can lead to shorter NICU stays (Sánchez-Sánchez, 2022). Participants' LOS was plotted on a run chart to determine if LOS was impacted by implementing the DCT. A run chart with the difference of the means was used to analyze the results. A decrease in LOS would show that short term outcomes were improved with the implementation of the DCT. The third measure is the Bayley Scales of Infant Development (BSID-III) scores of patients between 18 and 36 months. Infants discharged from the NICU were followed outpatient and administered the BSID-III. This formal developmental tool is used for identifying developmental delays in early childhood. The BSID is considered an effective assessment of infants' developmental improvement (Soleimani, 2020). An independent t-test analyzed the data. An improvement in BSID scores would show that long term outcomes were improved with the implementation of the DCT. Infant data

for LOS was coded by gestational age. The intervention started on October 18, 2020. 18 and 58 infants were included in the pre-intervention and post-intervention groups, respectively. Due to small samples within gestational groups, descriptive statistics are presented for GA over time. Annual LOS decreased from 2020 to 2021 for many gestational groups but increased overall in 2022 (Appendix E).

LOS decreased only for infants born at 33 weeks, but the results were not statistically significant. Average cumulative IPAT scores were compared within gestational groups. 34 and 95 infants met the study criteria for the pre-intervention and post-intervention groups, respectively. Post-intervention IPAT scores increased for the 32- and 33-week gestational groups (Appendix B).

BSID-III scores in cognitive, language and motor domains were compared between groups of infants born before and after the implementation of the DCT. 34 and 43 patients met the study criteria for the pre-intervention and post-intervention groups, respectively. Scores increased in every domain in the post-intervention group. This increase in scores was not statistically significant. (Appendix A)



Implementing a DCT did not impact LOS. There are some factors that could not be controlled for that may have impacted results. This study was conducted during the COVID-19 pandemic. Valley Hospital's MFM had suspended its assistive fertility operations, impacting the NICU census and acuity, likely decreasing LOS in 2021. Discharge from the NICU was also prioritized to mitigate the risk of COVID-19 infection. IPAT scores did not significantly change after the implementation of the DCT. However, previous studies evaluating the efficacy of IPAT determined that scores >10 indicated proper positioning techniques. Appropriate positioning techniques were maintained throughout the study as mean scores were > 10 pre- and post-intervention groups. BSID-III scores in all domains increased following the implementation of the DCT, although these results were not statistically significant. A small sample size may account for the lack of statistical significance. Replication studies should be conducted in larger academic centers to provide insight into the impact of the DCT with greater sampling power.

References:

Coughlin, M., Lohman, M. B., & Gibbins, S. (2010). Reliability and Effectiveness of an Infant Positioning Assessment Tool to Standardize Developmentally Supportive Positioning Practices in the Neonatal Intensive Care Unit. Newborn and Infant Nursing Reviews, 10(2), 104-106. https://doi.org/10.1053/j.nainr.2010.03.003

Milette, I., Martel, M.-J., da Silva, M. R., & Coughlin McNeil, M. (2017). Guidelines for the Institutional Implementation of Developmental Neuroprotective Care in the NICU. Part B: Recommendations and Justification. A Joint Position Statement From the CANN, CAPWHN, NANN, and COINN. Canadian Journal of Nursing Research, 49(2), 63-74. https://doi.org/10.1177/0844562117708126

Peterson, J. K. (2018). Supporting Optimal Neurodevelopmental Outcomes in Infants and Children With Congenital Heart Disease. Critical Care Nurse, 38(3), 68-74. https://doi.org/10.4037/ccn2018514

Sánchez-Sánchez, M., García, T. L., Heredia, D., Reséndiz, I., Cruz, L., Santiago, J., Rojas-Granados, A., Ubaldo-Reyes, L., Pérez-Campos-Mayoral, L., Pérez-Campos, E., Vásquez, G. S., Moguel, J. M., Zarate, R., García, O., Sánchez, L., Torres, F., Paz, A., Elizarraras-Rivas, J., Hernández-Huerta, M. T., & Angeles-Castellanos, M. (2022). Effect of a light-darkness cycle on the body weight gain of preterm infants admitted to the neonatal intensive care unit. Scientific Reports, 12(1), 17569. https://doi.org/10.1038/s41598-022-22533-1

Soleimani, F., Azari, N., Ghiasvand, H., Shahrokhi, A., Rahmani, N., & Fatollahierad, S. (2020). Do NICU developmental care improve cognitive and motor outcomes for preterm infants? A systematic review and meta-analysis. BMC Pediatrics, 20(1), 67. https://doi.org/10.1186/s12887-020-1953-1

Learner Objectives:

1. Understand the impact of NICU stay on preterm infants' development
2. Articulate the benefits of Developmental Care and compare various developmental care models
3. Replicate aspects of the Developmental Care Team within your units and utilize the evaluation methods discussed to strengthen your DCT

Gravens 2024-27

Abstract Title: Addressing Adverse Childhood Experiences: Implications for the NICU

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Problem Statement:

It is widely understood that NICU hospitalization is associated with an increased risk for infant stress and poor parental mental health. As evidence continues to emerge supporting the short- and long-term associations between NICU hospitalization and risks for poorer infant and family outcomes, previous frameworks of stress and early life trauma may be inadequate or underused. The Adverse Childhood Experiences (ACEs) framework provides a useful structure to clarify and sharpen our understanding of the relationships between stress and trauma exposure in the NICU and risks for future adverse health outcomes.

Abstract:

Infants and families requiring NICU care often experience significant stress and trauma during the earliest period of the infant's life, leading to increased risks for poorer infant and family outcomes. There is a dire need for frameworks to guide clinical practice and research that account for the complex interactions of generational and toxic stress, pain, parental separation, and lifelong health and developmental outcomes for infants and families. Thus, the purpose of this work was to describe the Adverse Childhood Experiences (ACEs) framework in the context of the NICU as a usable structure to guide clinical practice and research focused on infant neurodevelopment outcomes and parental attachment. An overview of published literature about ACEs will be discussed along with a detailed discussion of risk at each level of the ACEs pyramid in the context of the NICU (see figure). For many infants, NICU hospitalization can be conceptualized as potentially the first ACE or considered an additional ACE, resulting in an increased risk for poorer health outcomes. The promotion of safe, stable, and nurturing relationships, implementation of Trauma Informed Care, and individualized developmental care can counter the negative impacts of stress in the NICU. Additionally, authors will discuss supportive and protective factors to help mitigate the risk of ACEs in the NICU by detailing how providers can help balance the negative stimulation of the NICU through positive interventions including facilitated tucking, skin-to-skin care, mother's own milk, and active participation of parents in infant care. The goal of this presentation is to offer new thinking about how the ACEs framework may be applied in the NICU and its utility as a platform to advance neuroprotective and developmental care.

Learner Objectives:

1. To identify Adverse Childhood Experiences (ACEs) and connections to infant developmental and parental well-being outcomes.
2. To describe recommendations for mitigating trauma and stress in the NICU.

Gravens 2024-28

Abstract Title: Promoting NICU Support for Successful Home Transitions: The Tiny Tots Interprofessional Pilot Program

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Problem Statement:

Neonatal ICU admission can impact family mental health as well as long-term parenting and long-term neurodevelopmental outcomes in infants already at risk. Programs that empower parents to engage their infants in neurodevelopmentally appropriate activities can reduce trauma associated with a NICU admission and life with a high-risk infant. Additionally, these types of programs can support a smoother transition from hospital to home. Our program entitled "Tiny Tots Transition to Home" enhances access to these resources in our local tri-county area in South Florida.

Abstract:

Program and Methodology: The Tiny Tots program is a pilot family-centered program that fosters caregiver inclusion and support during an infant's NICU stay, while providing key information for home transition to empower families as they navigate the discharge process and subsequent first months at home. Primary project goals are peer to peer support networking, improved parental mental health, increased awareness of infant neurodevelopment, and facilitation of transition needs of this specialized population of parents, many of whom already exist in disenfranchised communities with poor social support. In a collaboration between the University Hospital NICU and multiple departments at Nova Southeastern University, parents have access to a weekly series targeting the NICU experience. A keen focus is placed on transition to home with salient education on family bonding, mental health, infant development, peer to peer networking, resilience, and nutrition. Presenters include licensed mental health therapists, psychologists, nutritionist, occupational therapy, physical therapy, speech therapy, respiratory therapy, and neurology. Some sample topics have been sleep, reading in the NICU, feeding, caring for the caregiver, communication, safety, tummy time, grieving the expected parenting journey, developmental outcomes, play, referrals, and follow-up care of the NICU graduate, among others. Sessions incorporate discussion, opportunities for parents to share their experience, interactive craft activities, and access to a complimentary hot meal. Emphasis is placed on making each session revolve around parent questions and experiences, and the sharing of information and resources for current and future use. At the end of each session, attendees are surveyed on the usefulness of the session.

Impact: The program creates a community for these families that often sit at the fringe of other parent groups, by facilitating peer to peer mentorship and establishing long-term relationships between NICU families. Additionally, this program recognizes food insecurity and assists those who reside in food deserts in our community by providing access to hot well-balanced nutrient dense meals. Other complimentary experiences like massages or crafts are also provided to support parental mental health. The program has been in place since July 2022 and has served over 300 families. Caregivers reported increased self-efficacy in caring and advocating for their infants, and enhanced feelings of belonging as part of the networking group, with some families returning after discharge to continue serving as peer mentors to others. Health care sciences students have also been able to actively participate in some sessions as facilitators, enhancing their commitment to service

and their understanding of interprofessional collaboration through experiential learning.

Conclusion: The pilot Tiny Tots program has successfully created a community for caregivers of infants in the NICU through interprofessional collaborations that emphasize the holistic needs of infants and families. Program sustainability is enhanced by participation of multiple departments and stakeholders, and the program also serves an educational purpose for future clinicians by allowing them to better understand the importance of collaboration and community service.

References:

Kellner, P., Kwon, J., Smith, J., & Pineda, R. (2022). Neurodevelopmental Outcomes following Preterm Birth and the Association with Postmenstrual Age at Discharge. American Journal of Perinatology, a-1733-2690. https://doi.org/10.1055/a-1733-2690

Laccetta, G., Di Chiara, M., De Nardo, M. C., & Terrin, G. (2023). Symptoms of post-traumatic stress disorder in parents of preterm newborns: A systematic review of interventions and prevention strategies. Frontiers in Psychiatry, 14, 998995. https://doi.org/10.3389/fpsyt.2023.998995

Mazur, K. M., Desmadryl, M., VanAntwerp, K., Ziegman, C., Nemshak, M., & Shuman, C. J. (2021). Implementing Evidence-Informed Discharge Preparedness Tools in the NICU: Parents' Perceptions. Advances in Neonatal Care, 21(5), E111-E119. https://doi.org/10.1097/ANC.0000000000000836

McKeown L, Burke K, Cobham VE, Kimball H, Foxcroft K, Callaway L. The Prevalence of PTSD of Mothers and Fathers of High-Risk Infants Admitted to NICU: A Systematic Review. Clin Child Fam Psychol Rev. 2023 Mar;26(1):33-49. doi: 10.1007/s10567-022-00421-4. Epub 2022 Dec 23. PMID: 36564614.

Learner Objectives:

1. Value the impact of interprofessional collaboration in providing NICU-related education that maximizes parental mental health, infant neurodevelopment, and safe discharge to home.

2. Describe the importance of community programs to support transition needs of NICU parents, many of whom live in disenfranchised communities with poor social support.

Gravens 2024-29

Abstract Title: Perceptions of Interdisciplinary NICU Staff on the Physical Environment in a hybrid design level-III NICU

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Problem Statement:

The neonatal intensive care unit (NICU) physical environment and model of care may impact NICU staff in their work and influence the experience of newborns and their family. This study seeks to better understand the perceptions of interdisciplinary NICU staff working within a hybrid model of care unit on how NICU designs may facilitate safe and effective delivery of family-centered developmental care practices.

Abstract:

Background: The NICU environment plays an important role in the multisensory experiences of preterm and/or critically ill infants during an important time-window for brain development. (1,2) NICU models of care and architectural designs including room type may influence how environmental factors impact brain structure and activity in the neonatal period, with implications for later neurodevelopment. (3) In addition, the physical environment in the NICU may affect the NICU staff as well as families during their infant's NICU stay. Previous work has helped understand NICU staff satisfaction levels in single-family room versus open bay units, (4) and helped identify key environmental factors contributing to noise levels in the NICU. (5) Yet, the perceptions of interdisciplinary NICU staff about the sensory environment and the effects of NICU design on newborns, families, and themselves remains poorly understood. The objective of this study is to survey NICU staff working within a newly renovated hybrid model of care unit integrating single-family room (SFR) and semi-open bay (SOB) designs, in order to assess their perceptions about the physical and multisensory environment surrounding newborns during their NICU stay, and the impacts of NICU physical environments on patient and staff experience.

Methodology: This is a survey-based study conducted within a 66-bed level-III NICU from an urban academic institution (Brigham and Women's Hospital in Boston, MA). The unit has been recently redesigned as a hybrid design and model of care, where high-risk infants typically initiate their stay in SFR while requiring acute/critical care, and subsequently transition to a local or community-based level II nursery, or a within-NICU SOB neurodevelopmental unit when medically stable. (6) Over a two-month period, we surveyed the interdisciplinary NICU staff working in the unit, including attendings, nurses, nurse practitioners, physician assistants, respiratory therapists, allied health professionals (therapists, dietitians, pharmacists), clinical research members, and mental health providers (social workers). The survey consisted of 17 questions documenting the role and demographics of respondents, inquiring about their perceptions on the NICU sensory environment, and assessing potential impacts of NICU room type for newborns, families, and staff.

Results: A total of 127 participants answered the survey. The sample was composed of interdisciplinary NICU staff, with a broad range of experience and diverse scope and setting of practice (Table 1). The majority of respondents believed that meaningful infant-directed language (87%) and music with human voice (69%) were the most beneficial types of auditory exposures for infants in the NICU. However, electronic sounds and noise were the main auditory components reported (48%) in SFR, while distant / non-infant-directed language was the main type of sound reported in SOB (44%). NICU staff perceived that meaningful language and music represented the minority of auditory experiences of infants in both room types. Overall, 31% of respondents preferred to work in SFR, while 29% preferred SOB, and the remainder (40%) reported no preference. The most frequently reported advantages of SFR versus SOB were more privacy for families (97%), a quieter environment (70%), and easier practice of breastfeeding (59%) and skin-to-skin (58%). The main perceived advantages of SOB compared with SFR were a safer work environment (59%), easier promotion of music (48%) and adapted visual / light stimuli (41%), and easier interactions with colleagues (40%). SFR was perceived as best to favor parent-infant bonding (68%), while SOB appeared

superior for social connections among families (77%).

Table 1 Characteristics of study participants

	n (%)
Role in the unit	
Nurse	83 (65.4)
Attending	9 (7.1)
Nurse practitioner or physician assistant	7 (5.5)
Respiratory therapist	8 (6.3)
Other allied health disciplines (therapist, social worker, dietitian, pharmacist, audiologist)	11 (8.7)
Clinical research staff	8 (6.3)
Years of service in the unit	
0 to 6 months	10 (7.9)
6 months to 4 years	47 (37.0)
5 to 9 years	21 (16.5)
10 to 14 years	2 (1.6)
≥ 15 years	46 (36.2)
Main setting of practice	
Single-family room	65 (51.2)
Semi-open bay	6 (4.7)
Fairly equal distribution between both	54 (42.5)
Main type of shifts	
Day shifts	73 (57.5)
Night shifts	45 (35.4)
Fairly variable shifts	7 (5.5)

Conclusions: In this survey-based study, interdisciplinary NICU staff reported varied perceptions on the optimal sensory environment for infants and their family during their NICU stay. Although meaningful language and music appeared most beneficial, they were perceived as occurring rarely in both room design types. Each type of NICU physical environment appeared to have advantages and disadvantages for different patients and families, and NICU staff reported a variety of preferences. The findings of this study conducted within a hybrid model of care unit complement the existing literature on perceived advantages and challenges of different architectural environments and models of care in the NICU. The potential differences of perceptions according to NICU staff characteristics will be further examined and discussed. The study suggests the NICU physical design may be a modifiable factor which could be leveraged to best support infants and families within family-centered developmental care framework.

References:

1. *Tierney AL, Nelson CA. Brain Development and the Role of Experience in the Early Years. Zero Three. 2009;30(2):9-13.*
2. *Maitre NL, Key AP, Chorna OD, et al. The Dual Nature of Early-Life Experience on Somatosensory Processing in the Human Infant Brain. Curr Biol. 2017;27(7):1048-1054. doi:10.1016/j.cub.2017.02.036*
3. *Pineda RG, Neil J, Dierker D, et al. Alterations in brain structure and neurodevelopmental outcome in preterm infants hospitalized in different neonatal intensive care unit environments. J Pediatr. 2014;164(1):52-60.e2. doi:10.1016/j.jpeds.2013.08.047*
4. *Domanico R, Davis DK, Coleman F, Davis BO. Documenting the NICU design dilemma: parent and staff perceptions of open ward versus single family room units. J Perinatol. 2010;30(5):343-351. doi:10.1038/jp.2009.195*
5. *Darcy AE, Hancock LE, Ware EJ. A descriptive study of noise in the neonatal intensive care unit. Ambient levels and perceptions of contributing factors. Adv Neonatal Care. 2008;8(3):165-175. doi:10.1097/01.ANC.0000324341.24841.6e*
6. *Erdei C, Inder TE, Dodrill P, Woodward LJ. The Growth and Development Unit. A proposed approach for enhancing infant neurodevelopment and family-centered care in the Neonatal Intensive Care Unit. J Perinatol. 2019;39(12):1684-1687. doi:10.1038/s41372-019-0514-7*

Learner Objectives:

1. To learn the interdisciplinary NICU staff's perceptions on the NICU multisensory environment according to NICU design (single-family room vs semi-open bay models).
2. To learn the interdisciplinary NICU staff's perceptions on the impact of NICU designs for newborns, families, and the staff.

Gravens 2024-30

Abstract Title: Evolution of the Auditory Environment of Hospitalized Very Preterm Infants in Relation to Room Type and Parental Presence

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Problem Statement:

Environmental factors and neurosensory exposures play a role in brain growth and development of very preterm infants while hospitalized in the neonatal intensive care unit (NICU). This study aims to assess the evolution of auditory experiences of very preterm infants as they advance in postmenstrual age in the NICU and examine how room type and parental presence may influence these experiences.

Abstract:

Background: Infants born very preterm undergo rapid brain development, including the auditory cortex, while in the NICU before term equivalent age (TEA). (1) Optimal and meaningful auditory experiences can enhance brain development, while adverse exposure to alarm noises and/or excessive silence may impair cortical development. (2) However, auditory exposures in the NICU may include loud alarm noises, excessive silence, and insufficient meaningful experiences such as human voice. NICU environmental factors such as room type and parental presence have the potential to influence these auditory experiences during this critical period of brain growth and development. (3) In this context, the objective of this study is to assess the trajectories of auditory exposures experienced by infants born very preterm before TEA in a level-III NICU and examine the potential implications of room type and parental presence on these auditory experiences.

Methodology: This is a prospective observational study of infants born < 33 weeks gestational age (GA) in a level-III NICU functioning within a hybrid design and model of care. In this unit, very preterm infants are initially cared for in single-family rooms as they require initial critical care support. When they are medically stable and positive pressure respiratory support is no longer necessary, infants transition to a semi-open bay convalescent neurodevel-

opmental unit (Growth and Development Unit), generally around 33–34 weeks. This hybrid architectural design allowed us to characterize the evolution of auditory exposures as very preterm infants advance in postmenstrual age and experience both types of environments. We used the Language Environment Acquisition (LENA) device4 to perform weekly auditory recordings of 16 hours for of up to six consecutive weeks for each study patient. The LENA device was placed in the infant's incubator or crib at each measurement, and recordings were analyzed using the LENA automated software. The program allows the quantification of adult word count exposure and classifies the auditory environment into six categories, including meaningful language, distant language, electronic, overlap, noise, and silence. Demographic data and setting of recording were obtained from medical charts. We documented room type (single-family or private room vs semi-open bay) and parental presence (quantified as 6 hours or more vs. less than 6 hours around the time of recording) at each measurement. We assessed the evolution of auditory exposures with advancing postmenstrual age using repeated measure correlations and examined differences according to room type and parental presence graphically.

Results: A total of 128 recordings were obtained among a sample of 25 very preterm infants, with 20 infants having complete data of at least 5 consecutive recordings. Mean gestational age was 30.3 weeks, median birth weight was 1600 grams (range 485–2160), and median length of stay was 47 days (11–139). 73 measurements (57%) were performed in a single-family room and 44 (34%) were recorded while parents were present 6 hours or more. Hospitalized very preterm infants experienced a variety of auditory exposure before TEA (Table 1).

	31-32 weeks (n=18)	33 weeks (n=26)	34 weeks (n=22)	35 weeks (n=19)	36 weeks (n=17)	37-39 weeks (n=23)	All (n=128)
Meaningful language							
Percentage, mean (SD)	1.17 (1.06)	2.90 (2.72)	3.54 (2.62)	5.34 (3.87)	6.03 (3.26)	6.91 (3.36)	4.32 (3.49)
Percentage, median (IQR)	0.88 (0.69)	2.05 (3.01)	2.73 (4.71)	4.68 (2.85)	5.06 (4.94)	6.52 (2.82)	3.94 (4.98)
Distant language							
Percentage, mean (SD)	8.06 (12.80)	8.14 (8.35)	5.94 (6.50)	3.88 (3.48)	5.11 (3.55)	5.51 (6.01)	6.41 (7.35)
Percentage, median (IQR)	2.66 (7.62)	5.65 (10.43)	4.41 (4.43)	4.96 (4.86)	4.43 (5.12)	4.26 (5.62)	4.57 (5.67)
Electronic sounds							
Percentage, mean (SD)	31.76 (18.41)	20.04 (20.97)	17.73 (17.21)	16.77 (22.52)	11.25 (10.80)	16.79 (15.84)	16.98 (18.88)
Percentage, median (IQR)	32.45 (34.03)	13.42 (23.23)	14.92 (17.71)	9.96 (22.60)	7.16 (15.53)	11.21 (21.75)	14.53 (20.66)
Overlap sounds							
Percentage, mean (SD)	0.97 (1.91)	1.04 (0.88)	1.06 (1.67)	0.97 (0.85)	1.06 (1.38)	1.05 (1.23)	1.03 (1.31)
Percentage, median (IQR)	0.40 (0.80)	0.87 (1.30)	0.58 (0.82)	0.72 (0.85)	0.57 (0.98)	0.69 (0.78)	0.66 (0.94)
Noise							
Percentage, mean (SD)	41.61 (20.56)	25.53 (22.29)	10.94 (11.88)	8.96 (9.71)	5.35 (7.36)	2.34 (2.54)	15.59 (19.35)
Percentage, median (IQR)	41.07 (35.68)	21.13 (33.69)	7.25 (23.27)	7.29 (12.11)	2.21 (8.63)	1.40 (2.90)	7.66 (23.28)
Silence							
Percentage, mean (SD)	16.42 (17.93)	41.28 (27.85)	58.87 (25.43)	62.59 (21.13)	71.21 (14.72)	67.57 (11.17)	53.17 (27.35)
Percentage, median (IQR)	8.50 (25.56)	47.38 (50.15)	67.82 (37.54)	65.39 (18.44)	74.85 (10.69)	70.00 (12.76)	63.15 (40.15)
Average decibels							
Mean (SD)	60.00 (2.25)	59.66 (2.40)	57.80 (2.33)	57.05 (2.76)	56.20 (3.33)	57.84 (2.85)	58.15 (2.91)
Median (IQR)	60.36 (2.49)	59.20 (2.78)	57.85 (3.37)	56.79 (4.06)	55.52 (3.32)	57.53 (3.27)	57.96 (4.24)
Peak decibels							
Mean (SD)	89.46 (1.96)	87.72 (2.93)	87.83 (3.27)	86.95 (2.58)	87.66 (3.13)	88.42 (3.26)	87.55 (2.92)
Median (IQR)	88.65 (2.71)	86.72 (5.54)	86.87 (7.28)	85.77 (3.30)	87.08 (6.75)	87.64 (6.84)	86.11 (3.21)
Adult word count							
Mean (SD)	1627.89 (2104.56)	3855.04 (3594.08)	5123.64 (4329.81)	7239.66 (6741.94)	6195.76 (4683.54)	9627.65 (6905.29)	5955.39 (5643.76)
Median (IQR)	945.00 (1192.50)	2937.50 (5392.50)	3813.50 (6744.50)	5417.50 (5303.25)	6959.00 (8729.00)	9634.00 (7607.00)	4427.00 (7347.50)
Infant vocalizations							
Mean (SD)	21.72 (30.78)	55.50 (60.32)	68.14 (70.40)	87.36 (82.40)	61.88 (63.02)	79.09 (64.21)	63.48 (66.39)
Median (IQR)	9.00 (17.50)	33.50 (69.50)	36.50 (56.75)	53.00 (132.25)	54.00 (41.50)	73.00 (72.00)	37.00 (69.25)
Conversational turns							
Mean (SD)	2.22 (2.32)	13.04 (19.03)	15.09 (14.57)	17.64 (19.03)	12.71 (12.97)	18.43 (11.77)	13.59 (15.43)
Median (IQR)	2.00 (2.25)	9.50 (14.75)	10.00 (14.00)	9.00 (20.75)	10.00 (10.00)	15.00 (20.00)	9.00 (16.00)

The NICU auditory environment was predominantly composed of silence (53.2±27.4%), electronic sounds (19.0±18.9%), and noise (15.6±19.4%), while distant language (6.4±7.4%) and meaningful language (4.3=±3.5%) represented the minority exposure. With advancing postmenstrual age, there was an increase in meaningful language exposure (r = 0.54, p = 0.001) and a decrease in noise exposure (r = -0.59, p<0.001; Figure 1).

The increase in meaningful language and decrease in noise exposures continued to be observed as infants transitioned from single-family rooms to semi-open bays (Figure 2).

Figure 1 Correlation of postmenstrual age with meaningful language and noise exposures

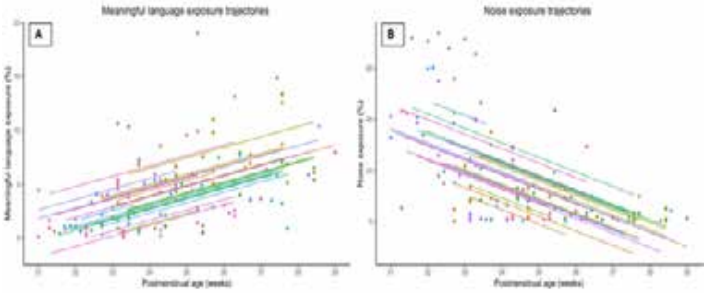
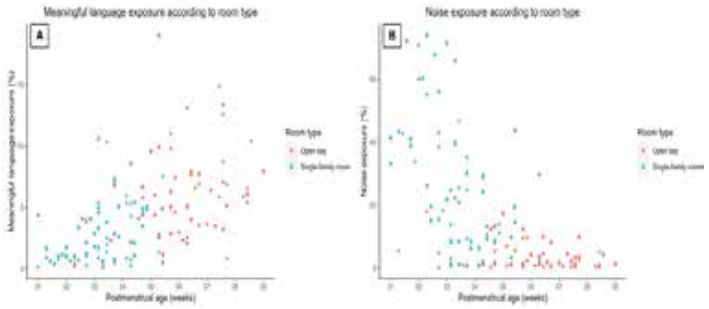
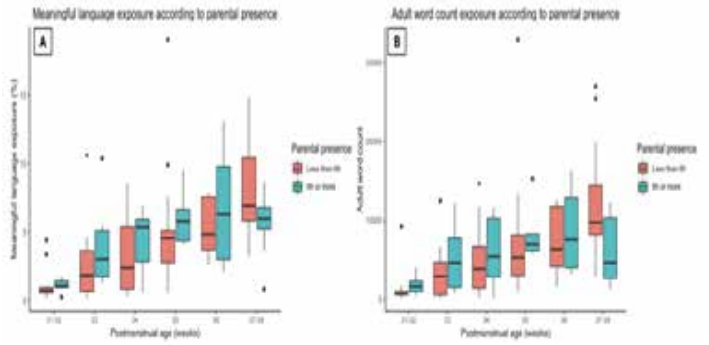


Figure 2 Evolution of meaningful language and noise exposures according to room type



The degree of exposure to meaningful language and adult word account appeared higher with a parental presence of 6 hours or more, especially before 37 weeks' postmenstrual age (Figure 3).

Figure 3 Evolution of meaningful language and adult word count exposures according to parental presence



Conclusions: In this study, very preterm infants experienced a majority of silence and undesirable exposures such as alarms and noises while hospitalized in the NICU before TEA. The auditory environment included a limited amount of meaningful language exposures. The predominance of silence and noise with limited meaningful exposure was especially present in the earliest weeks of life when infants require intensive care in single-family room. Transition to the semi-open bay model of care was accompanied by a continued rise in meaningful language exposure and a persisting decrease in noise exposure. A higher parental presence appeared to potentially contribute to more meaningful language and adult word count exposures in the earliest postmenstrual ages. A hypothesis is that parents represent the main source of these exposures earlier and in single-family room, while the transition to semi-open bay with advancing postmenstrual age may favor the contribution of other adults such as hospital staff caring for the infant. Findings of this study highlight that the paucity of meaningful auditory experiences represent an ongoing concern in the NICU, especially in the youngest postmenstrual ages and in single-family room. Modifiable factors such as the NICU architectural design, model of care, and parental presence may play

a role in the auditory experiences of very preterm infants before TEA. There is a need to further examine the effects of the neurosensory environment on the preterm infant, with implications for the implementation of intervention strategies in the NICU aiming to optimize outcomes.

References:

1. *Inder TE, Volpe JJ, Anderson PJ. Defining the Neurologic Consequences of Preterm Birth. N Engl J Med. 2023;389(5):441-453. doi:10.1056/NEJMra2303347*
2. *Maitre NL, Key AP, Chorna OD, et al. The Dual Nature of Early-Life Experience on Somatosensory Processing in the Human Infant Brain. Curr Biol. 2017;27(7):1048-1054. doi:10.1016/j.cub.2017.02.036*
3. *Pineda R, Durant P, Mathur A, Inder T, Wallendorf M, Schlaggar BL. Auditory Exposure in the Neonatal Intensive Care Unit: Room Type and Other Predictors. J Pediatr. 2017;183:56-66.e3. doi:10.1016/j.jpeds.2016.12.072*
4. *Caskey M, Vohr B. Assessing language and language environment of high-risk infants and children: a new approach. Acta Paediatr. 2013;102(5):451-461. doi:10.1111/apa.12195*

Learner Objectives:

1. To learn the composition of the auditory environment of very preterm infants in the NICU before term equivalent age.
2. To learn how auditory experiences of hospitalized very preterm infants evolve with advancing postmenstrual age.
3. To learn how NICU environmental factors such as room type and parental presence may play a role to influence these auditory experiences.

Gravens 2024-31

Abstract Title: Benefits and Challenges of an Adaptation of FICare for Ugandan Mothers

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Problem Statement:

This qualitative descriptive study aimed to examine the perceptions of mothers and health care professionals of the benefits and challenges of the adaptation of FICare to care in a special care unit in Uganda.

Abstract:

Background: In high-income countries, parent engagement in care for their hospitalized infant is increasingly acknowledged as an essential component of NICU care, and WHO has outlined the requirement for parental participation (World Health Organization) (World Health Organization, 2020). Family Integrated Care (FICare) is an approach to care integrating parents as key partners in NICU care. FICare is associated with shorter length of stay, lower rates of infection, better weight gain and breastfeeding rates, and lower parent stress (K. O'Brien et al.; Karel O'Brien et al., 2018). Ugandan newborns are 7 times more likely to die after birth compared to newborns in high-income countries (United Nations Interagency Group for Child Mortality Estimation). In 2020 our team developed an adaptation of FICare, called UFICare, for the 20 bed Special Care Unit at Jinja Regional Referral Hospital in Uganda based on interviews with mothers and health care professionals (HCP) from that unit. From these interviews it was determined that mothers could be taught tasks typically assumed by nurses including monitoring/recording newborn danger signs, taking temperature/weight, and documenting feedings. Afterwards tools were developed to facilitate teaching and learning, as well as the recording of mother's observations and measurements. The tools include many visual images and a small amount of text. Topics included breastfeeding, how to recognize respiratory distress, lethargy, seizures; and how to take an infant's weight and temperature. In 2020–21 51 mothers of hospitalized infants born >2000 grams participated in a pilot study implementing UFICare in this unit (Duby et al., 2022). At enrolment in the study, they were taught the care tasks and asked to do these daily during their infant's hospitalization. The teaching materials described above were given to mothers and used by the study staff to teach mothers. At the end of this pilot of the program we conducted this qualitative descriptive study to examine the perceptions of participating mothers and health care professionals (HCPs) in the unit of both the benefits and challenges of UFICare.

Methods: After discharge from hospital a sub-sample (n = 15) of the UFICare mothers provided informed consent to participate in focus groups to explore the benefits and challenges of this approach from their perspectives. Interviews with 8 unit HCPs were also conducted. Transcripts from focus groups and interviews were analyzed using inductive content analysis to describe the benefits and challenges of UFICare from the perspectives of mothers and HCPs. Verbatim quotes will be in this presentation to describe and illustrate the benefits and challenges.

Results: Mothers and HCPs identified many benefits, and there was some overlap in their perceptions. Increased maternal knowledge and lower stress were benefits reported by both mothers and HCPs. Mothers' behaviour changed over time as their confidence in their abilities to perform the infant care tasks grew they became more autonomous in caring for their infant. Both mothers and staff described improved relations between mothers and HCPs. This improvement was characterized by greater exchange of information and HCPs greater attentiveness to mothers' observations. Mothers felt ready for discharge and used their knowledge once home often sharing what they had learned with family/friends. HCPs' support and their own recognition of the value of their skills and knowledge and the benefits to their infant's health facilitated maternal engagement in infant care. Challenges included the need for mothers to overcome fears about performing the tasks, their literacy skills and energy levels, and gaining access to needed equipment, such as the scale.

Conclusion: Findings are promising and point to the potential value of assessing the benefits of implementing UFICare in a clinical trial. Moreover, similar adaptations of FICare may be possible in other low-income countries. Mothers felt prepared for discharge and continued to use the knowledge and skills post-discharge, suggesting that benefits may extend beyond hospitalization.

References:

Duby, J., Kabajaasi, O., Barth, D., Feeley, N., O'Brien, K., Kenya-Mugisha, N., . . . O. Wiens, M. (2022). A locally adapted Family Integrated Care Program (aFICare) in a Ugandan Neonatal Hospital Unit: A feasibility study [article under review].

O'Brien, K., Bracht, M., Macdonell, K., McBride, T., Robson, K., O'Leary, L., . . . Lee, S. K. (2013). A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. BMC Pregnancy Childbirth, 13(Suppl 1), S12. doi:10.1186/1471-

2393-13-S1-S12

O'Brien, K., Robson, K., Bracht, M., Cruz, M., Lui, K., Alvaro, R., . . . Lee, S. K. (2018). Effectiveness of Family Integrated Care in neonatal intensive care units on infant and parent outcomes: A multicentre, multinational, cluster-randomised controlled trial. The Lancet Child & Adolescent Health, 2(4), 245-254. doi:10.1016/S2352-4642(18)30039-7

United Nations Interagency Group for Child Mortality Estimation. (2018). Levels and trends in child mortality report 2018. Retrieved from Geneva, Switzerland: https://www.unicef.org/reports/levels-and-trends-child-mortality-report-2018World Health Organization. (2020). Standards for improving the quality of care for small and sick newborns in health facilities. Retrieved from Geneva: https://www.who.int/publications/i/item/9789240010765

Learner Objectives:

1. Understand the benefits from the perspective of both mothers and health care professionals of teaching Ugandan mothers to participate in and monitor their infant's health in a special care unit.
2. Understand what resources and training are needed to help mothers assume care of their infants.

Gravens 2024-32

Abstract Title: Safety trial of the Skincubator: A novel device for early prolonged skin-to-skin-care for very and extreme preterm neonates.

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Problem Statement:

Background: Skin-to-Skin-Care (SSC) reduces morbidity and mortality in preterm neonates (Sivanandan, WHO, Sehgal). However, extreme preterm neonates are generally ineligible for early, prolonged SSC for several reasons, including the need to regulate humidity levels using traditional incubators, and concerns of line dislodgment (Thernström Blomqvist). To enable continuous SSC in this population we invented the Skincubator a novel, small incubator, designed to attach to the caregiver's torso without any barrier between the parent chest and the baby. The Skincubator creates a concealed environment with all the advantages of a neonatal incubator, while enabling parents of very preterm and extreme preterm neonates to provide SSC to their infants from birth for extended periods. We hypothesized that performing SSC within a heated and humidified environment will result in better thermoregulation.

Abstract:

Methods: A safety trial aimed to measure humidity within the Skincubator and compare thermal stability during traditional-SSC (t-SSC) sessions, and during Skincubator sessions.Humidity within the Skincubator was continuously monitored and recorded every 10 seconds with an Elitech GSP 6 hygrometer (Elitech LTD, Paris, France).Temperature was monitored continuously and recorded every minute by a skin temperature probe attached to the infant's axilla with a Vyaire temperature probe cover sticker and connected to Mennen VitaLogik 6000 monitor (Mennen Medical ,Yavne, Israel). We recorded also vital signs, procedures performed and adverse events during Skincubator care and t-SSC. Population: Step 1: five premature neonates (), 26-33 week from day of life (DOL) 4. Step 2: fifteen premature neonates, GA 26-33 wk from birth or 24-28 from DOL 4. Inclusion criteria was infant in at least 70% humidity in an incubator. Exclusion criteria included invasive ventilation, arterial line and cardiovascular instability.

Outcomes: The primary outcome was the temperature drop from the pre-SSC temperature while the baby was in the incubator to the lowest temperature during SSC. Secondary outcomes included mild and moderate hypothermia and humidity percent within the Skincubator.

Results: Twenty PN were enrolled in the study and treated in the Skincubator. One couple who consented to Skincubator care during delivery did not consent to Skincubator care in the NICU, so the baby was excluded from paired Skincubator and t-SSC analysis. For 19 babies we had paired sessions of Skincubator sessions and t-SSC to compare. We have compared 54 paired sessions of Skincubator and t-SCC. Average GA was 29 (26–32); average weight -1296±271 gr (range 680-1660) and average DOL 5±2 (range 1–11). No safety issues occurred during Skincubator care. The average humidity in the Skincubator was 84.9%±7.3% and was in the target range (above 70%) during 93.4% of the time that a baby was in the Skincubator. All parents reported that the Skincubator felt safe and comfortable except for one mother that was not comfortable in a reclined position. Eight babies had PICC lines in place, 1 baby had umbilical vein and 1 baby received thototherapy during Skincubator care. No line dislodgment or other adverse events occurred during Skincubator care or T-SSC. No baby had moderate hypothermia during Skincubator care. Eight babies experienced moderate hypothermia of 35.5-35.9 during 9 t-SSC sessions (chi-square p<0.001). During Skincubator care babies had less hypothermia (defined as axillary temperature <36.5º) than during t-SSC. Average hypothermia time per session was (mean (25th%–75th%) 8.2 minutes (0–9) vs 27.8 (0–56) during Skincubator and T-SSC respectively (Wilcoxon Singed Rank Test (WSRT) p=0.002 n=19). Initial temperature drop during transfer to Skincubator care, was smaller than in t-SSC (0.2º (0.2-0.3) vs 0.4º (0.3–0.6) (WSRT p<0.001 n=19). Hypothermia time and temperature decline were also statistically significant when analyzed per session (Paired T test p<0.001 n=54).

Conclusions: The Skincubator can effectively create a humidified, warm environment on the human body for preterm neonates to be cared in SSC. The Skincubator seems superior to t-SSC in maintaining preterm neonates' temperature and this may be of clinical significance in extreme preterm babies in the first weeks

of life. The Skincubator may help promote early SSC for very and extreme preterm neonates.

References:

Sivanandan S, Sankar MJ. Kangaroo mother care for preterm or low birth weight infants: a systematic review and meta-analysis. BMJ Glob Health. 2023 Jun;8(6):e010728. doi: 10.1136/bmjgh-2022-010728. PMID: 37277198; PMCID: PMC10254798.

WHO recommendations for care of the preterm or low-birth-weight infant 15 November Guidelines. Accessed 14.08.23: https://www.who.int/publications/i/item/9789240058262

Sehgal A, Nitzan I, Jayawickreme N, Menahem S. Impact of Skin-to-Skin Parent-Infant Care on Preterm Circulatory Physiology. J Pediatr. 2020 Jul;222:91-97.e2. doi: 10.1016/j.jpeds.2020.03.041. Epub 2020 May 7. PMID: 32389414.

Thernström Blomqvist Y, Ågren J, Karlsson V. The Swedish approach to nurturing extremely preterm infants and their families: A nursing perspective. Semin Perinatol. 2022 Feb;46(1):151542. doi: 10.1016/j.semperi.2021.151542. Epub 2021 Nov 10. PMID: 34911652.

Learner Objectives:

1. To know some of the physical challenges to perform early prolonged SSC in extrem preterm neonates.
2. To state the potential ways in which the Skincubator may help to overcome those challenges.

Gravens 2024-33

Abstract Title: Infant-and Family-Centered Developmental Care Principles, Standards, Competencies and Best Practice Guidelines for Neonatal Intensive Care Practice

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Problem Statement:

Overview: An international, collaborative inter-professional panel representing key disciplines involved in neonatal intensive care developed an evidence-based, consensus document on standards, competencies, and practice guidelines for infant-and family-centered developmental care. Successful implementation of the best practice guidelines integrates the family into the NICU team, offers measurable clinical competencies within each standard, guides NICU care policy, and contributes to optimizing outcomes for infants and families.

Abstract:

Program Design and Concept Model: The collaborative, interdisciplinary panel conducted an analytic review of evidence (over 2,000 research articles) and assigned levels and strength of evidence in six general areas of developmental practice. The six infant- and family-centered developmental care practice standards and competency areas were 1) systems analysis; 2) body position and touch; 3) sleep and arousal; 4) skin-to-skin contact with intimate family members; 5) pain and stress management; 6) feeding, eating, and nutrition. An infant- and family-centered concept model was designed by panel members to link seven developmental care components: 1) baby competency in interaction and communication; 2) involvement of family; 3) neuroprotection of the developing brain; 4) environmental protection from sensory overload; 5) pacing and individualizing of care procedures; 6) interaction and attachment of infant and parent (infant mental health processes); and 7) analysis of complex, adaptive NICU systems. Application to Neonatal Therapy Highlights of the evidence-based Body Positioning and Touch Competencies are featured with application for Neonatal Therapy practice. In addition to NICU application, the best practice guidelines for infant-and family-centered developmental care can inform and individualize pediatric physical therapy in home and outpatient settings.

Conclusions: The strength, credibility, and scope of the Best Practice Guidelines for Infant- and Family-Centered Developmental Care are derived from critical analyses of evidence and collaborative design of standards and competencies by international, inter-disciplinary panel of NICU professionals with reviews by consultants and clinicians. The Neonatal Physical Therapy focus on the Body Positioning and Touch competencies illustrated not only Neonatal Intensive Care application but extension to home and outpatient settings for vulnerable preterm infants and families.

References:

Brown JV, Jaeger CB, Kenner C. Executive summary: standards, competencies, and recommended best practices for infant-and family-centered developmental care in the intensive care unit. Journal of Perinatology. 2020; 40 (Supplement 1) 5-10.

Browne JV. Infant mental health in intensive care: laying a foundation for social, emotional, and mental health outcomes through regulation, relationships, and reflection. Journal of Neonatal Nursing. 2021; 27 (1): 33 - 39.

Sweeney JK, McElroy J. IFCDC recommendations for best practices for positioning and touch. In Consensus Committee on standards, competencies, and best practices for infant and family centered developmental care in the intensive care unit. 2020; https://nicu-design.nd.edu/nicu-care-standards/

Sweeney JK, McElroy J. Collaborative therapeutic positioning: multisystem and behavioral implications. In Kenner C & McGrath J, eds. Developmental Care for Newborns and Infants. 3rd Edition. Philadelphia, Wolters Kluwer; 2023; 231-251.

Learner Objectives:

1. Identify six infant-and family-centered developmental care practice standards and competency areas for NICU practice developed by an interdisciplinary, international consensus panel
2. Describe six body positioning and touch competency components with implications for Neonatal Therapy practice
3. Explain how the best practice guidelines for infant-and family-centered developmental care can support, enhance, and individualize pediatric physical therapy for preterm infants in home and outpatient settings

Gravens 2024-34

Abstract Title: Engagement of Families in a State-Wide Quality Improvement Initiative on Skin-to-Skin Care (SSC) in the Neonatal Intensive Care Unit (NICU)

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Problem Statement:

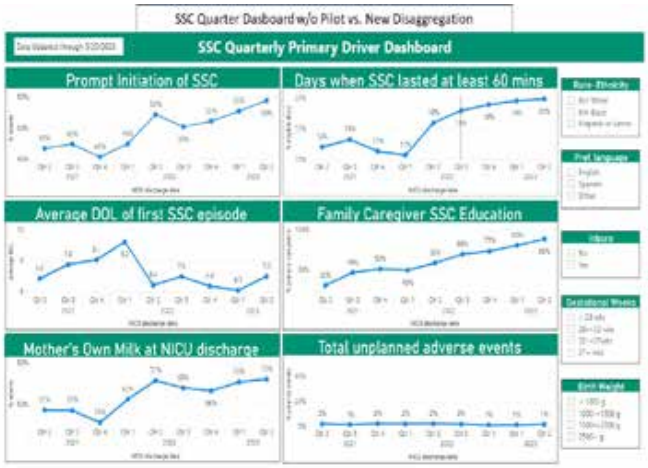
Family-centered care is a philosophy of care that embraces a partnership between staff and families. Families, patients, and staff benefit in a family-centered care environment. Family-Centered Care is the focus of Florida Perinatal Quality Collaborative's newest NICU quality project: PAIRED. PAIRED is the pneumonic the advisory committee chose to reflect the initiative's emphasis on the need for paired care between the medical team and the families. Why Focus on Skin-to-Skin Care? Utilizes all four domains of family-centered care. Evidence base shows optimal outcomes for babies and their families. Easily instituted with minimal costs. Easily measured.

Abstract:

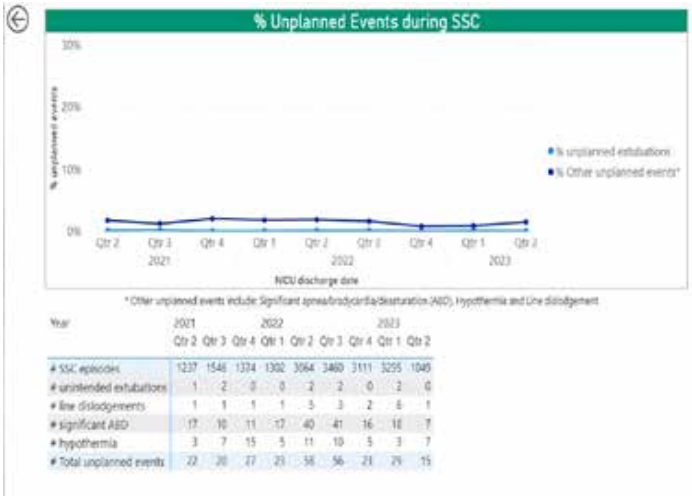
Background and Significance: Emerging evidence in the literature supports the premise that family-centered care (FCC), including early and frequent skin-to-skin care, improves the outcomes of infants hospitalized in the NICU and of their families. Our statewide quality initiative sought to expand FCC in the NICU by engaging the entire medical team to enlist families as essential care providers. The centerpiece intervention of this project was to expand the access of infants to early skin-to-skin care (SSC) and to establish frequent SSC throughout the hospitalization as a core unit culture. As part of this initiative, the FPQC provided education about and tools to support adoption of interventions in each of the four fundamental domains of FCC. These domains were foundational to the key driver diagram and served as the framework and reference for all participating units. This innovative integration of family perspectives ensured that the work was anchored in FFC values and genuinely reflected the needs and priorities of the families. **PRIMARY Aim Statement:** By 6/2023, each NICU will achieve a 20% increase from baseline in the percentage of infants who receive skin-to-skin care from at least one family caregiver within 3 days of clinical eligibility, as defined by individual unit protocols. **SUPPLEMENTAL Aim Statement:** By 6/2023, parental surveys will demonstrate a 20% improvement from baseline in the perception of the culture of family-centered care in each NICU across all 4 domains.

Approach: A unique ad hoc team of families was assembled, half of whom had a recent NICU experience while the other half had completed their NICU journey over a decade ago. This intentional design helped to illuminate the long-lasting challenges faced by families over time with respect to SSC and other FCC practices in the NICU. Notably, these families represented an exceptionally diverse spectrum. The FPQC led this quality improvement initiative to integrate families into SSC practices in 33 NICUs across Florida and 1 team in NY. Educational materials were developed for both healthcare providers and families. An evidence-based toolkit contained potentially better practices for FFC and implementation resources. Participating teams received training, webinars, coaching calls, education materials, rapid data reporting, and technical assistance. Data collection encompassed caregiver surveys, interviews with graduate NICU families, and patient data abstracted from medical records. Participating NICUs submitted data on 5129 neonates. Qualitative and quantitative data informed our assessment of the effect of aspects of FCC, including measures of bonding, stress levels, and clinical outcomes. Metrics and Methods: SSC measures included outcome, structural, process, and balancing measures. These measures assessed prompt initiation, the average day of life for initiation, family caregiver involvement, and use of standardized documentation. Additionally, we evaluated provider and family caregiver education and competency training. A number of balancing measures assayed possible adverse events that might result from SSC. Inclusion Criteria: Qualifying infants for the initiative were NICU-hospitalized infants anticipated to require more than 5 days of care, who were eligible by hospital protocol for skin-to-skin care, had survived at least 3 days post-eligibility, and had engaged family caregivers.

Results: Hospitals improved significantly from baseline to the last quarter with respect to several outcome measures, including prompt SSC initiation (49% to 59%), the number of days when SSC lasted at least 60 minutes (16% to 22%), provider SSC education and training (22% to 79%), caregiver SSC education (42% to 83%), and breastfeeding rates at discharge (57% to 63%).



Throughout this period, possible adverse events (extubation, dislodged lines, hypothermia, increased apnea/bradycardia/desaturation events) remained very low (0–1.5% per hospital).



Year	2021				2022				2023	
	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	
# SSC episodes	1237	1546	1374	1302	3064	3460	3111	3255	1040	
# unintended extubations	1	2	0	0	2	2	0	2	0	
# line dislodgements	1	1	1	1	5	3	2	6	1	
# significant ABD	17	10	11	17	40	41	16	10	7	
# hypothermia	3	7	15	5	11	10	5	3	7	
# Total unplanned events	22	20	27	23	56	56	23	29	15	

Additionally, 97% of NICUs implemented a policy that promoted and/or expanded eligibility for SSC. Despite initial implementation challenges, the number of caregiver surveys completed grew over time, reaching a total of 728. Additionally, more than 90% of caregivers consistently reported agreement that hospital care aligned well with the 4 domains of FCC.

Conclusion: Our initiative validated the feasibility and benefits of involving NICU families in SSC. The increase in early and prolonged SSC rates achieved by this quality improvement initiative

reflects the commitment of our centers to improving patient care, enhancing the patient and family experience, and implementing evidence-based practices. The longitudinal perspective highlighted the enduring challenges. Through education and training, we were able to overcome significant implementation barriers through the COVID-19 pandemic to enrich our quality improvement initiative. It was our impression that healthcare teams that worked most collaboratively attained the highest rates of improvement. These findings offer valuable insights for NICUs nationwide and emphasize the continued need to enhance FCC to improve the care and outcomes of infants.

References:

American Academy of Pediatrics. (2003). Policy statement: Family-centered care and the pediatrician's role. Pediatrics 112, 691-696.

Gooding JS, Cooper LG, Blaine AI, Franck LS, Howse JL, Berns SD. Family support and family-centered care in the neonatal intensive care unit: origins, advances, impact. Semin Perinatol. 2011 Feb;35(1):20-8. doi: 10.1053/j.semperi.2010.10.004. PMID: 21255703.

Gao H, Xu G, Li F, Lv H, Rong H, Mi Y, Li M. (2018) Effect of Combined Pharmalogical, Behavioral, and Physical Intervention for Procedural Pain on Salivary Cortisol and Neurobehavioral Development in Preterm Infants: A Randomized Control Trial. Pain. January; 162(1): 253.

Luddington S. SAFE Technique. https://skin2skincontact.com/ April 2021.

Pado B, Hess F. (2020) Systematic Review of the Effects of Skin-to-Skin Care on Short-Term Physiologic Stress Outcomes in Preterm Infants in the Neonatal Intensive Care Unit. Advances in Neonatal Care. 20(1), 48-58.

Smith, CR (2021) When Our Hand Touch Babies, Everything Changes. National Association of Neonatal Therapy 11: Annual Conference April 2021.

Learner Objectives:

1. Understand the benefits from the perspective of both mothers and health care professionals of teaching Ugandan mothers to participate in and monitor their infant's health in a special care unit.
2. Understand what resources and training are needed to help mothers assume care of their infants.

Gravens 2024-35

Abstract Title: NICU Design Mythbusters

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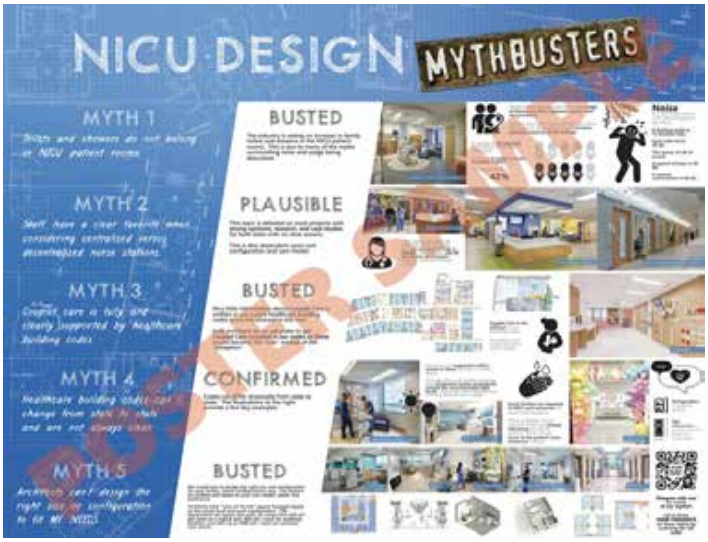
Problem Statement:

There are many misconceptions about the design of NICU rooms and units. This poster's intent is to dispel some of those myths around patient room toilets, centralized vs decentralized nurse stations, couplet care, building codes, and designing for staff needs via case studies and research.

Abstract:

Neonatal Intensive Care Units (NICUs) serve some of the most fragile hospital patients, who have unique needs to support healthy development and stabilization. The variability of design within NICUs leads to significant planning and operational impacts. These impacts have given rise to many myths surrounding the design of these units. These myths include the following:1. Toilets and showers do not belong in NICU patient rooms; 2. Staff have a clear favorite when considering centralized versus decentralized nurse stations; 3. Couplet Care is fully and clearly supported healthcare building codes; 4. Healthcare building codes can change from state to state and are not always clear; 5. Architects can't design the right size or configuration to fit client needs. The findings in this poster were pulled from various research articles and case studies to confirm, bust or deem plausible each of the listed myths. A link to a survey will also be included in the poster to allow attendees to give their opinions on the myths with gifts given to each person who submits an answer. The first myth around toilets in the NICU patient rooms was proven false (busted). Providing toilets within these patient room types is currently on the rise in our industry as proven by a survey of over 20 projects. This is due in part to increased family satisfaction and presence at the bedside when they are provided. Mitigation of toilet noise has also propelled the addition of these into the NICU landscape. The second myth does not have a clear answer and was therefore deemed "plausible." The nurse station layout is highly dependent upon overall unit configuration, the care model used at that facility, as well as personal preference. Studies have shown that decentralizing the care stations just outside the patient rooms provides better, safer care as staff have direct line of site to their babies. This has also increased family satisfaction scores as they can have constant visualization of their nurse. However, other studies and staff surveys have shown that staff feel more isolated in the decentralized model (especially when they have previously come from an open bay model with a centralized nurse station). Some of these effects have been mitigated with the creation of more collaboration spaces for staff to huddle and discuss patient care. Conversely, the centralized nurse station encourages staff to work together, providing a home base for those informal discussions. Though, these stations are typically further away from the patient rooms, making staff response times longer, adding steps, and removing staff from the bedside for longer periods of time. The myth about Couple Care is confirmed, building codes have not yet adopted any regulations around these room types. This means that a facility must reach out to their state officials to get special compensation when they intend to build this configuration. With the help of establishments like Perinatal Advisory Council: Leadership, Advocacy, and Consultation (pac/lac) and conferences like the Gravens Conference on the Environment of Care for High Risk Newborns, architects hope to push our building code authors for this inclusion. The fourth myth about inconsistent building codes is confirmed. Although there are some building codes that apply to all facilities, each state could have its own healthcare building code dictating the use or exclusion of different design features. One example is exterior windows. There are many NICU units around the world which do not have exterior windows but use artificial lighting or circadian lighting in their rooms. There are a couple studies that support this, stating that rooms with exterior windows constantly exceed the recommended lighting levels for these neonates (especially when proper shading devices are not utilized). Alternatively, the state of Texas currently requires all NICU rooms to have large exterior windows. The fifth and final myth concerning unit design and size is false (busted). The patient room layout, unit configuration, and room / unit size are very malleable and can be adjusted to fit the needs of the facility. This presentation illustrates a few of the room configura-

tion options: 3 wall bays, hybrid, single family rooms (SFR), SFR with toilet, SFR with room for mom, and SFR in pods. The size of these rooms and units are just as varied. Architects have "rules-of-thumb" square footages based on the acuity level and room configuration. The department net square feet (nsf) can range from 600 nsf per room on a typical unit, 800 nsf / room for academic facilities, and even up to 1000 nsf / room for universal care rooms.



References:

1. *Feeley, Nancy PhD, RN; Robins, Stephanie MSc; Charbonneau, Lyne MN, RN; Genest, Christine PhD, RN; Lavigne, Geneviève PhD; Lavoie-Tremblay, Mélanie PhD, RN. NICU Nurses' Stress and Work Environment in an Open Ward Compared to a Combined Pod and Single-Family Room Design. Advances in Neonatal Care 19(5):p 416–424, October 2019. DOI: 10.1097/ANC.0000000000000603*
2. *Fay, Lindsey MSArch; Real, Kevin PhD; Haynes, Shannon MSN, BSW, RN, CNML; Daneshvar, Zahra MArch. Examining Efficiency in Open-Bay and Single-Family Room NICU Designs. Advances in Neonatal Care 23(4):p 355-364, August 2023. DOI:10.1097/ANC. 0000000000001058*
3. *Crump, Laura MScN, RN; Gosselin, Émilie PhD, RN; D'addona, Melissa MScN, RN; Feeley, Nancy PhD, RN. Factors Influencing Parents' Perception of Their Infants' Transition From a 6-Bed Pod to Single Family Room in a Mixed-Room Neonatal Intensive Care Unit. Advances in Neonatal care 23(5):p 442–449, October 2023. | DOI: 10.1097/ANC.0000000000001062*
4. *Jones, Carolyn West PhD, NNP-BC; Moya, Fernando MD; Lynch, Natalie MSN, NNP-BC. Unintended Consequences of the Neonatal Intensive Care Unit Environment: Integrative Review of Single-Family Room Unit Design. Advances in Neonatal Care 23(2):p 151–159, April 2023. DOI: 10.1097/ANC.0000000000001023*
5. *Fay L, Real K, Haynes S. The Healthcare Workspace: Understanding the Role of Decentralized Nursing Stations, Corridors, and Huddle Spaces as Locations for Teamwork in a Neonatal Intensive Care Unit. HERD: Health Environments Research & Design Journal. 2022;15(4):270–282. doi:10.1177/19375867221106503*
6. *Aita, M., Robins, S., Charbonneau, L. et al. Comparing light and noise levels before and after a NICU change of design. J Perinatol 41, 2235-2243 (2021). https://doi.org/10.1038/s41372-021-01007-8*
7. *Zana-Taieb, E., Sizun, J., Kuhn, P., Reynaud, A., GREEN study group from the French Neonatal Society, Allen, A., Berne-Audeoud, F., Bouvard, C., Brandicourt, A., Caeymaex, Denoual, H., Duboz, M. A., Evrard, A., Fichtner, C, Fischer-Fumeaux, C., Girard, L., Gonnaud, F., Haumont, D., Hüppi, P., Zores-Koenig, C. (2022). Practical recommendations on room sizes for hospitalised newborn infants and their families based on a systematic review of the literature. Acta Paediatrica, 111(6), 1109-1114. https://doi.org/10.1111/apa.16308*
8. *Dunn, M.S., MacMillan-York, E., & Robson, K. (2016). Single family rooms for NICU: Pro's con's and the way forward. Newborn and Infant Nursing Reviews, 16(4), 218221. doi:10.1053/j.nainr.2016.09.011*
9. *Denham, M. E., Bushehri, Y., & Lim, L. (2018). Through the Eyes of the User: Evaluating Neonatal Intensive Care Unit Design. HERD: Health Environments Research & Design Journal, 11(3), 49–65. https://doi.org/10.1177/1937586718761017*
10. *Machry, H., White, R., & Barton, S. A. (2021). Gravens By Design: The Case of a NICU with Single family Rooms: Design Recommendations to Support Family Engagement Behaviors. Neonatology Today. http://www.neonatologytoday.net/newsletters/nt-sep21.pdf*

Learner Objectives:

1. Identify and refute several false myths surrounding NICU unit design. These include the exclusion of family toilets in NICU rooms, couple care being fully supported by building codes, and architects being unable to cater the unit size and configuration to the client's needs.
2. Confirm several true myths surrounding healthcare buildings codes and their effects on unit design as well as centralized versus decentralized nurse or team stations.

Gravens 2024-36

Abstract Title: Improving Family Involvement of Small Babies through Family Integration, Family Education and Multidisciplinary Teamwork

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Problem Statement:

The primary aim of this quality improvement project is to improve family involvement for infants who are born less than 28 weeks or birthweight less than 1000g through family integration, family education and collaborative multidisciplinary care in the Golisano Children's Hospital (GCH) NICU at the University of Rochester Medical Center (URMC). The goal is to provide education to families through a multidisciplinary family-centered care conference during the infant's stay to empower families to be active partners

in their infant's care, support their infant's neurodevelopment, promote understanding of the NICU journey and enhance their overall NICU experience.

Abstract:

Program: The project has received URMC IRB determination of not human research. This project utilizes the Model for Improvement as a framework for quality improvement project design. The team has created a key driver diagram (Figure 1) with primary drivers to guide iterative Plan-Do-Study-Act Cycles (PDSA) of potentially better practices.

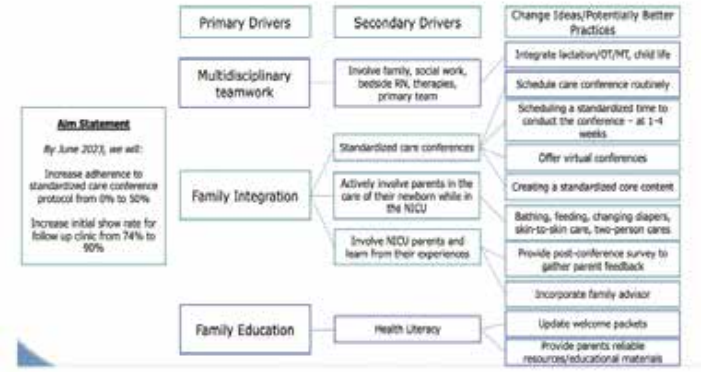

Figure 1. Key Driver Diagram

Eligible infants are those born less than 28 weeks or birth weight less than 1000g and alive on day of life (DOL) 7. Patients with congenital lethal medical conditions or have expired before DOL 7 are excluded. We are currently continuing to approach families as they become eligible. The multidisciplinary team created is comprised of social workers, occupational and music therapists, child life and lactation specialists, nursing, management, and physicians. The conferences are scheduled and conducted routinely, usually around 1–4 weeks of life of the infant. The conferences are mainly conducted in person, but also offered virtually and in Spanish. The core content is focused on the benefits of family involvement in bedside care, skin to skin care, 2-person care, oral immune therapy, family advocacy, family and sibling support and anticipated transitions during the NICU stay. Our future PDSA cycles are geared towards family education by updating our welcome packets and providing resources and educational materials to our NICU families. We have had multiple PDSA cycles starting May 2022 (Figure 2).

In May, we were able to educate our staff and faculty regarding the project, aims, intended population, structure, and measures. In October 2022, we were able to start our first conference. After each conference, we obtain feedback from families on how to continue to improve the conferences. As a response to their feedback, in December 2022, we created a pamphlet handed out to families demonstrating the goals, topics, and photos of the team involved in the conferences. In that same month, small baby rounds were initiated twice a week, serving as a consult service separate from the medical team focused on optimizing neurodevelopment and nursing and family education. It also has served as a means to introduce, follow up and schedule the conferences routinely. In the early part of 2023, our multidisciplinary team has expanded and included a parent educator, who is a bedside nurse approved for hours to provide education to families and a paid family advisor. Both qualitative and quantitative data were obtained. The outcome measures are adherence to standardized care conference protocol and the percentage of small babies attending their first follow up clinic and are tracked and reported monthly. The process measures are percentage of timely conferences occurring DOL 8-28, the post-conference parent survey that consists of three open ended questions and three questions answered via a Likert scale and are collected in REDCap. The balancing measure is the number of patient encounters per month per team member and is tracked monthly. All measures are reported as Statistical Process Control Charts and evaluated for special cause variation.

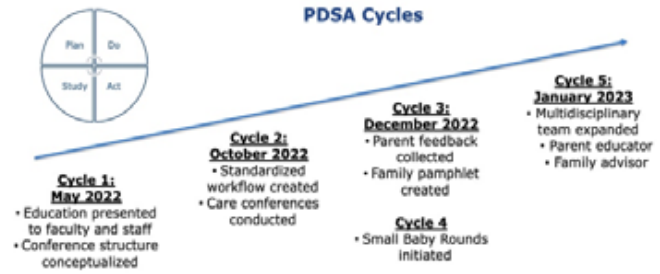

Figure 2. PDSA Cycles

Impact and results: As of September 30, 2023, our team has been able to conduct family-centered care conferences for 33 infants. The first outcome measure is percent adherence to care conferences since October 2022 (Figure 3), which has demonstrated a significant change from 0% to 42%.

We are continuing to plan PDSA cycles to achieve the goal of 50%. Our second outcome measure is the percent attendance for the first NICU follow up clinic for former eligible small babies (Figure 4).

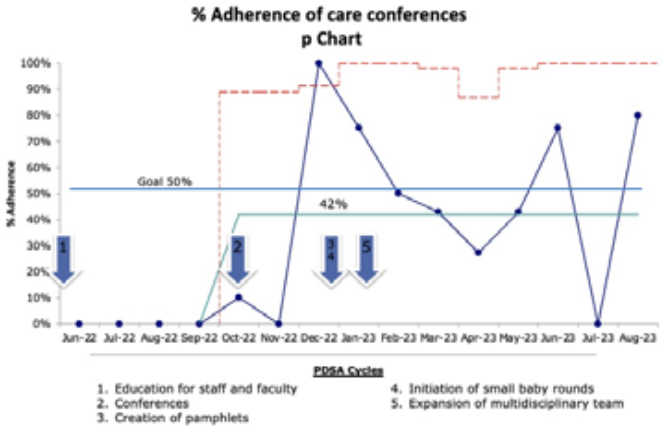

Figure 3. pChart of percent adherence of care conference

From January 2022 to June 2023, the show rate has been averaging 74%. We expect infants who had conferences starting in October would not have been seen in follow up clinic until January 2023 at the earliest. While we have not shown signal change yet with the number of available months of data, we are encouraged by the apparent trend toward special cause variation and will continue to track. According to the post-conference family survey, families consistently demonstrated they agree and strongly agree to the following: the care conference was helpful in providing them information on how they can be involved in their infant's care, recommend the care conference to other families and they would be interested in a second care conference later in their infant's NICU stay that is focused on preparing for discharge home. Parents' answers from the survey question regarding their takeaway from the conference were: "Was a great opportunity to meet every team member and know what to expect during out NICU stay. Also gave

us the opportunity to ask questions," "there are several resources available to help support all aspects of a NICU baby's development and helpful resources for parents as well."

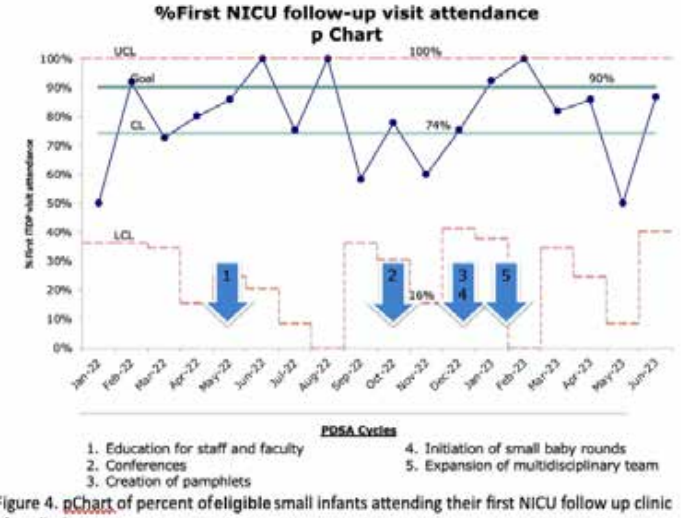

Figure 4. pChart of percent of eligible small infants attending their first NICU follow up clinic after discharge

Conclusion: The multidisciplinary family-centered care conferences help bridge the gap between families and care teams, provide empowerment and support for families to advocate for their child and themselves and serve as an effort to establish integration of families into their infant's care during critical developmental stages of their lives. To help cater to families who have another primary language other than English, we have been able to conduct these conferences with an in-person Spanish interpreter with the help of our university's interpretative services. For families who have difficulties with childcare, location, or transportation, we have also been able to offer the care conferences virtually. Our team is currently working on a small workgroup to help focus on a second care conference that would be conducted nearing discharge to help families with the transition to home.

References:

1. *Trujillo, J. A., Fernandez, Y., Ghafoori, L., Lok, K., & Valencia, A. (2017). Interdisciplinary Family Conferences to Improve Patient Experience in the Neonatal Intensive Care Unit. Health & social work, 42(4), 241-246. https://doi.org/10.1093/hsw/hlx039*
2. *Craig, J. W., Glick, C., Phillips, R., Hall, S. L., Smith, J., & Browne, J. (2015). Recommendations for involving the family in developmental care of the NICU baby. Journal of perinatology: official journal of the California Perinatal Association, 35 Suppl 1(Suppl 1), S5-S8. https://doi.org/10.1038/jp.2015.142*
3. *Cooper, L., Gooding, J., Gallagher, J. et al. Impact of a family-centered care initiative on NICU care, staff and families. J Perinatol 27, S32-S37 (2007). https://doi.org/10.1038/sj.jp.7211840*

Learner Objectives:

1. Understand the importance of family involvement in the care of their infants and how this impacts long term outcomes.
2. Discuss various ways families can be involved at bedside throughout the NICU stay

Gravens 2024-37

Abstract Title: Improving Family Centered Care and Perception of Competence Through Implementation of Positive Sensory Input and Neuroprotective Care in NICU Patients

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Problem Statement:

Family integrated care models are associated with decreasing maternal and paternal stress at discharge and improved mental health outcomes. Our hypothesis is that integrating positive sensory interventions with family would improve parent's perception of competence and involvement in their child's care.

Abstract:

In July 2022, the NICU team joined the California Perinatal Quality Care Collaborative (CPQCC) NICUs Enabling Optimal Brain Health (NEOBrain) Collaborative working to implement a neuroprotective approach to care which promoted positive sensory interaction, minimized unnecessary interventions, and integrates parents as crucial team members and partners in care. The NICU NEOBrain Taskforce collaborated to develop key drivers to success in implementing a neuroprotective approach to care which promoted positive interactions, minimized unnecessary interventions, and integrated parents as partners in care. In September 2022, the new processes to provide positive sensory input in the NICU through parent involvement in care were implemented. Critical to the success of implementation of the first performance improvement Plan Do Study Act (PDSA) cycle was to optimize the electronic medical record documentation to capture all sensory input provided by the care team and parents and to implement a program of education for the family. The program, Supporting and Enhancing NICU Sensory Experiences - SENSE defines, by gestational age, interventions for all five senses that help neonatal patients grow and develop in the NICU. The goal included engaging parents and to achieve 1) inclusion of a parent as the second set of hands to support their baby during painful procedures or care times and 2) implementing tools that support parent-infant interactions and promote positive touch and sensory input. Interventions developed:

- Educating team on the new plan of care for patients.
- Introduction and implementation of the SENSE program.
- EMR optimization for the occupational therapy and the nursing teams to improve their respective documentation elements.

Data Collection: The Neonatal Service Line of Valley Children's Healthcare is a complex model. This project is implemented in the level IV and the level III NICUs. Eligible infants: Infant born less than 32 weeks of gestation and admitted to the NICU within 24 hours of life. We collected qualitative data via parent survey and quantitative data through patient chart reviews. Process Measures:

- Percentage of eligible infants receiving parental positive touch within 72 hours of birth
- Percentage of eligible infants receiving parental positive touch on a weekly basis
- Percentage of eligible infants receiving positive touch daily from care team
- Percentage of eligible infants receive skin to skin in the first week of life
- Breastfeeding at discharge

Outcome measures:

- Percentage of parents reporting yes for the question "Were you allowed to be involved in your child's stay as much as you wanted?"

Balancing measures:

- Percentage of eligible infants who develop severe IVH (grade III or IV)
- Unplanned extubation (UPE)All data reported from June 2022 till August 2023. The process measures averaged over a 14-month period.

Process Measures:

- Percentage of eligible infants receiving parental positive touch within 72 hours of birth improved from 46% at baseline to 80%.
- Percentage of eligible infants receiving parental positive touch on a weekly basis was at zero percent at baseline. Through targeted interventions we were able to achieve great strides even achieving 100% at one point, now averaging out to 35 %.
- Percentage of eligible infants receiving positive touch daily from care team improved from 50% to 100% and has been sustained.
- Percentage of eligible infants receive skin to skin in the first week of life improved from none to an average of 44 %.
- Breastfeeding at discharge improved from 69% in 2022 to 75 % now.

Outcome measures: During the pre-intervention timeframes, the NICU patient/family satisfaction top box survey score for "Were you allowed to be involved in your child's stay as much as you wanted?" averaged 72.7%. During the post-intervention timeframes, the NICU patient/family satisfaction top box survey score for "Were you allowed to be involved in your child's stay as much as you wanted?" averaged 100%. This represents a 27% increase. **Balancing measures:** Our IVH rate stayed the same at 1% and our UPE rates for the eligible infants remained unchanged at zero.

Conclusion: The NEOBrain Collaborative under the guidance of CPQCC aligned with patient and family satisfaction goals of Valley Children's Healthcare. It also provided an anchor to solidify the neuroprotective and holistic care that we hope to provide to the tiniest of our patients and the most fragile families in the hospital system. These interventions helped narrow the care gap and consequences of provider centric care versus patient and family centric care. Implementation of the SENSE Program is helping to maximize parent engagement, starting very early during hospitalization, so that parents can feel empowered to positively influence the outcomes of their infant. Barriers: We have a wide referral base and catchment area with many of our families struggling with transportation and childcare. There are minimal rooms available for the families to stay locally. There was some resistance from the staff and physicians implementing the guiding principles of family centered care especially in regard to early holding. Culture change requires steady attention and focus. We formed The NEOBrain Taskforce as an interdisciplinary team who works together to develop goals and provide education. We developed the role of nurse navigator to impact early contact with families and enable them to be a part of their infant's care. We hope to not only sustain this improvement but work towards transforming into a Neonatal Intensive Parenting unit.

References:

Pineda R, Raney M, Smith J. (2019). Supporting and Enhancing NICU Sensory Experiences (SENSE): defining developmentally-appropriate sensory exposures for high-risk infants. Early Human Development, 133:29-35.

Waddington, Chandra, et al. "Family integrated care: Supporting parents as primary caregivers in the neonatal intensive care unit." Pediatric investigation 5.02 (2021): 148-154.

van Veenendaal NR, van der Schoor SRD, Broekman BFP, de Groof F, van Laerhoven H, van den Heuvel MEN, Rijnhart JJM, van Goudoever JHB, van Kempen AAMW. Association of a Family Integrated Care Model With Paternal Mental Health Outcomes During Neonatal Hospitalization. JAMA

Learner Objectives:

1. Describe benefits of family integrated care.
2. List interventions to provide gestationally appropriate positive sensory input.
3. List 3 process measures to improve family/patient satisfaction with involvement in care.

Gravens 2024-38

Abstract Title: Examination of Medical and Social Factors Contributing to School Readiness in Preterm Infants

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Problem Statement:

Premature birth is a condition often caused or confounded by social factors, and research has well-established that prematurity can increase the likelihood that a child's readiness for school will be negatively impacted. The current study seeks to understand how selected variables associated with a child's premature birth, as well as the preterm child's immediate social environment and early intervention experiences, may help to explain differences in cognitive ability and school readiness skills at 60 months of age.

Abstract:

School readiness is a term used to describe how prepared a young child is to learn and perform in the classroom. Recent literature on child development and early childhood education has expanded the definition of school readiness to include multiple domains: self-regulation/social-emotional readiness, physical health/motor readiness, language/communication readiness, cognitive readiness, and approaches to learning. Research has well-established that complications associated with premature birth can increase the likelihood that a child's readiness for school will be negatively impacted in one or more domains. Such complications may include low gestational age and birth weight, reduced growth rate, increased length of stay in the NICU, and diagnostic abnormalities. Premature birth is a condition often caused or confounded by social factors, which may continue to influence the preterm-born child's early life experiences and developmental trajectory. Social determinants of health are nonmedical factors that determine health outcomes, such as access to adequate nutrition and healthcare, economic stability, primary language, and educational level. Participation in early intervention therapies and/or educational programs has been found to significantly improve a preterm child's development and readiness for school. The current study seeks to understand how selected variables associated with a child's premature birth, as well as the child's immediate social environment and early intervention experiences, may help to explain differences in school readiness skills at 60 months of age. Participants were sampled retrospectively from the PREMIEre Clinic Database using the information entered in patient charts from 2012 to 2022, with completion of the Differential Ability Scales-2nd Edition (DAS-2) recorded at the 60-month-old visit. A total of 56 participants were reviewed, and 42 were included in our regression model. Descriptive statistics (Table 2), chi-squares, independent t-tests, analysis of variance, and regression statistics were performed.

Statistical significance ($p < 0.05$) was based on chi-square statistics or where appropriate, Fisher's Exact Test as well as t-tests and ANOVAs. A standard multiple linear regression model was constructed to assess if the independent variables predicted school readiness scores. Factors observed to be significant in univariate analysis were entered into regression models along with potential confounders.

The significant independent variables included the following: a mother's education level (Fig. 1, Table 1, Fig. 2), insurance (Fig. 3), 24-month early intervention services (Fig. 4), and 24-month Bayley Scales of Infant and Toddler Development, 4th Edition (Bayley-4) Cognitive Composite scores.

Table 2
Descriptives

	Gestational Age	Length of Stay	Birth Weight in Grams
N Valid	56	51	56
Missing	0	5	0
Mean	27.25	97.96	1039.88
Std. Deviation	2.481	70.244	358.424
Minimum	23	19	490
Maximum	33	473	2430

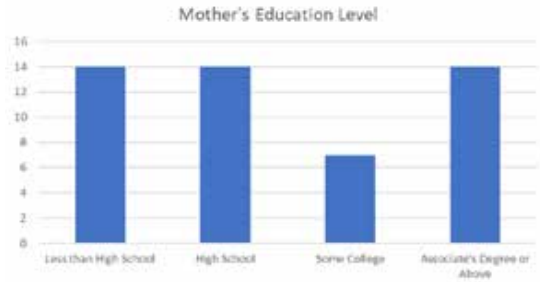
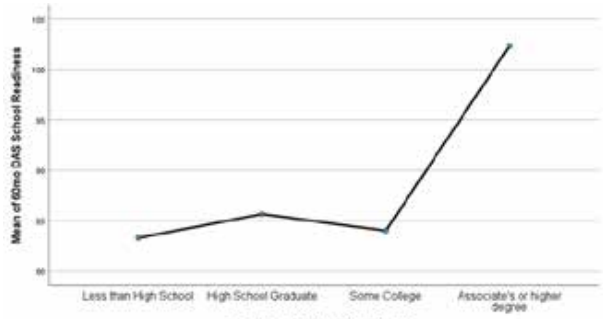
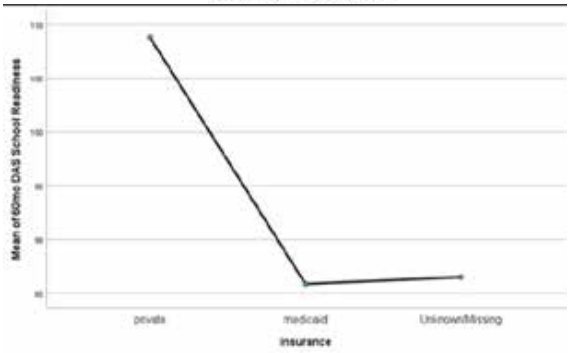
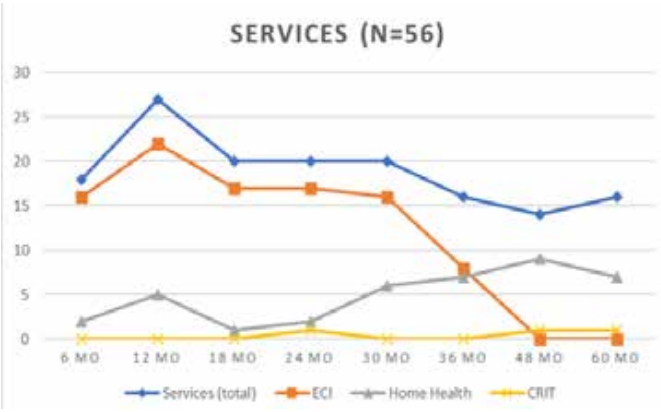


Table 1

		N	Mean	Std. Deviation
60mo DAS School Readiness	Less than High School	14	83.29	9.879
	High School Graduate	14	85.64	14.275
	Some College	7	84.00	9.399
	Associate's or higher degree	14	102.36	13.865
	Total	49	89.51	14.593







The dependent variable was the 60-month DAS-2 School Readiness Composite score. Mother's education level and 24-month Bayley-4 Cognitive scores had a positive relationship with DAS-2 School Readiness scores, while insurance and 24-month early intervention services had an inverse relationship. Patients with Medicaid insurance or services at 24 months had lower DAS-2

School Readiness scores. Each factor contributed to the prediction model and all predictors were significant to the DAS-2 School Readiness score (p = 0.000 to 0.032). Our prediction model had a value of prediction of 71% (R = 0.710) for our sample with an estimate of the prediction in the population of 50.4% (R2 = 0.504) with a standard error of ±11.15. Both mother's education level and 24-month services were significantly different in the prediction model (p < 0.001, p = 0.004). The ANOVA was significant (p < 0.001) with the strongest predictor being maternal education level, followed by 24-month services, insurance, and lastly Bayley-4 Cognitive scores at 24 months. Our results complement prior research linking earlier gestational age and decreased birth weight to increased length of hospital stay and increased need for early intervention services by 24 months of age. We found maternal education level to be the strongest predictor of the preterm infant's school readiness at 60 months. Specifically, the preterm infants of mothers who achieved an associate's college degree or higher performed at higher school readiness levels than those infants of mothers with less education. Other studies describe how maternal education influences children's later cognitive performance. With regard to early intervention services, higher school readiness scores were associated with the absence of 24-month services. Future research may explore the hypothesis that former preterm 24-month-old toddlers who do not demonstrate a need for therapies, or who perhaps graduated from services, continue to follow a more typical developmental trajectory. Private insurance correlated with higher school readiness scores and Medicaid correlated with lower scores. As the literature on socioeconomic status has conveyed, Medicaid coverage is often an indication of lower household income and instability of healthcare access, both of which are proven risk factors for birth outcomes and school readiness. Lastly, higher cognitive scores at 24 months correlated with increased school readiness scores; this finding is consistent with similar studies. More research is needed to determine the impact of prematurity and accompanying social factors on each of the domains of school readiness. Our findings offer important markers to consider as part of the preterm infant's follow-up care. Extra support and guidance for mothers with less education and Medicaid (or no insurance) is likely needed. Toddlers who demonstrate low cognitive skills at 24-month follow-up may need to be more closely monitored for reduced school readiness at later ages. Identification of variables that pose the greatest risks to the preterm child's readiness for school should allow for more timely support and hopefully increase the child's opportunity for later school success.

References:

1. *Scharf, RJ. (2016). School readiness. Pediatrics in Review. 37(11): 501–503.*
2. *Ayward, GP. (2005). Cognitive and neuropsychological outcomes of infants born prematurely. Journal of Developmental & Behavioral Pediatrics. 26(6): 427–440.*
3. *Spittle, A. & Treyvaud, K. (2016). The role of early developmental intervention to influence neurobehavioral outcomes of children born preterm. Seminars in Perinatology. 40: 542–548.*

Learner Objectives:

1. The audience should be able to understand and define the term "school readiness" and its importance in the overall health and well-being of the preterm child.
2. The audience should be able to identify social and family variables that may positively or negatively influence a preterm child's school readiness skills.

Gravens 2024-39

Abstract Title: The effects of a multimodal environmental modulation on sleep stage distribution in preterm infants: a randomized controlled trial

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Problem Statement:

The neonatal intensive care unit (NICU) environment is a source of both sensory deprivation and developmentally inappropriate sensory stimulation that is disruptive to the development of sleep-wake behavior in preterm neonates. Since sleep-wake architecture is important for neurodevelopment, there is an urgent need for sleep interventions in the NICU to mitigate these harmful environmental effects. We hypothesized that the use of a multimodal bassinet that aims to recreate features of the intrauterine environment would provide a more appropriate pattern and quality of sensory stimulation and thus would lead to more mature sleep state architecture as represented by an increase in the percentage of total sleep time (TST) spent in quiet sleep (QS)—the sleep stage that is particularly important for neuroplasticity and the temporal organization of which has been shown to correlate with postmenstrual age (PMA).

Abstract:

Methodology: The SNOO Smart Sleeper (SNOO) is a bassinet that combines gentle side-to-side rocking, a snug swaddle using a proprietary sleep sack that anchors the infant in the supine position, and white noise to recreate features of the intrauterine sensory experience. The SNOO has been granted De Novo authorization by the FDA for its ability to keep infants supine during sleep and has been commercially available since 2016. The SNOO was chosen as an acute intervention for this randomized controlled trial in a group of preterm infants admitted to the NICU to improve their sleep-wake architecture given its unique combination of three modalities to mimic in-utero conditions. Twenty infants born between 28w0d and 36w6d gestational age (GA) who were admitted to our tertiary level IV NICU were enrolled in the study. The study was approved by the institutional IRB and the parents of enrolled infants provided written informed consent. The study protocol commenced when the infants reached 35w0d to 36w6d PMA, weighed over 1800 grams (in accordance with the SNOO manufacturer's specifications), had been weaned off respiratory support, and demonstrated stable thermoregulation in open cribs. At a single time point following an afternoon feed, the infants were randomized to be placed in a SNOO with full functionality (swaddle, rocking, and white noise; n = 11), or in a SNOO that remained powered-off, serving as controls (n = 9). From the time the infants were placed in the SNOOs until the time of their next scheduled feed, a research team member continuously coded the infants' behavioral sleep states (QS; indeterminate sleep, IS; active sleep, AS; awake; and crying) every minute using previously validated and established sleep state scoring criteria. To test our hypothesis, we used TST in QS as a proxy for neuromaturation for comparing the experimental and control groups using Student's

t-tests.

Results: The control and SNOO groups were similar in demographic and clinical characteristics including GA at birth, birth weight (BW), gender, 5- and 10-minute APGAR scores, receipt of antenatal steroids, respiratory support at birth, early- and late-onset sepsis workups, caffeine use, age, and weight at the time of the intervention, and PMA at discharge. Tests of variance (Levene's) and normality (Shapiro-Wilk) confirmed that the assumption of homogeneity of variance was met and that both groups had normally distributed data.

	Control (N = 9)	SNOO (N = 11)	p-value
Mean GA (weeks)	33.5	32.9	0.41
Mean birth weight (g)	2077	1978	0.71
No. female (%)	5 (55.6)	5 (45.5)	0.65
Mean APGAR, 1 minute	7.9	7.5	0.89
Mean APGAR, 5 minute	9	8.5	0.13
No. SGA (%)	2 (22)	2 (18)	0.82
No. complete course of antenatal steroids (%)	5 (56)	6 (55)	0.67
No. CPAP at birth (%)	8 (89)	10 (91)	0.88
No. early onset sepsis eval (%)	6 (67)	5 (45)	0.34
No. late onset sepsis eval (%)	1 (11)	1 (9)	0.88
No. positive blood culture (%)	1 (11)	0	0.26
No. caffeine use (%)	1 (11)	4 (36)	0.19
Mean PMA on day of intervention (weeks)	35.7	35.7	0.80
Mean weight on day of intervention (g)	2346	2348	0.99
Mean no. of days since last painful procedure prior to intervention	2	3.7	0.24
Mean PMA at discharge (weeks)	37.5	36.8	0.32

Table 1. Demographics and clinical characteristics.

When taking the total duration of the study into account, there was no difference in the percentage of time spent asleep between infants in the interventional SNOO and control groups (89.9 ± 12.3% vs. 94.5 ± 5.5%, p = 0.138). Infants in the SNOO group spent significantly more time in QS than infants in the control group (23.7 ± 8.0% vs. 18.6 ± 4.7%, p = 0.049). In addition, infants in the SNOO group also spent significantly less time in AS than infants in the control group (56.1 ± 12.9% vs. 68.1 ± 9.6%, p = 0.014). There were no differences in time spent in IS and in awake or crying states between the two groups. When taking only TST into account, infants in the SNOO group again spent significantly more time in QS (26.8 ± 9.5% vs 19.8 ± 5.1%, p = 0.025) and significantly less time in AS (61.9 ± 9.8% vs 71.8 ± 7.5%, p = 0.010) than infants in the control group. While there was a trend towards a greater percentage of TST spent in IS, this effect was nonsignificant (11.3 ± 3.7% vs 8.4 ± 4.0%, p = 0.058).

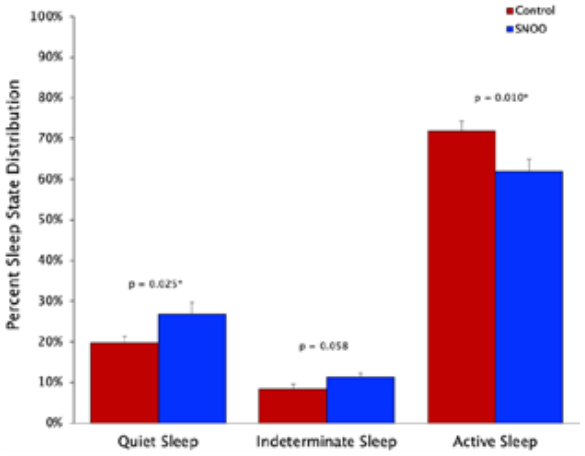
Table 2. Mean percentages ± standard deviations of sleep

	Control (N = 9)	SNOO (N = 11)	p-value
Quiet sleep (%)	18.6 ± 4.7	23.7 ± 8.0	0.049*
Indeterminate sleep (%)	7.8 ± 3.5	10.1 ± 3.8	0.087
Active sleep (%)	68.1 ± 9.6	56.1 ± 12.9	0.014*
Awake (%)	3.8 ± 4.0	6.7 ± 8.2	0.162
Cry (%)	1.7 ± 2.4	3.5 ± 4.8	0.144

and waking states during the sleep intervention for the total study duration. *p < 0.05.

Figure 1. Mean percentages with standard error bars showing percent of total sleep time spent in quiet, indeterminate, and active sleep during the sleep intervention. *p < 0.05.

Conclusions: Preterm infants placed in the fully functioning SNOO and exposed to swaddling, continuous rocking, and white noise for a single 2–3 hour mid-day post-prandial period exhibited a significant increase in the percentage of QS and a significant decrease in the percentage of AS, both in the total study period and during TST in particular. While the SNOO showed no effect on quantitative time asleep, there were measurable effects on sleep quality. These data suggest that brief exposure to multimodal vestibular, proprioceptive, and auditory modulation to mimic the intrauterine environment in preterm infants results in more mature sleep state architecture. Further research is needed to ascertain whether the demonstrated effects on sleep-wake behavioral distribution are transient or persistent and can influence long-term sleep health and neurodevelopmental outcomes.



References:

1. *Cailleau L, Weber R, Cabon S, et al. Quiet Sleep Organization of Very Preterm Infants Is Correlated With Postnatal Maturation. Front Pediatr. 2020;8:559658. doi:10.3389/fped.2020.559658*
2. *Provasi J, Blanc L, Carchon I. The Importance of Rhythmic Stimulation for Preterm Infants in the NICU. Children. 2021;8(8):660. doi:10.3390/children8080660.*
3. *Sahni R, Schulze KF, Stefanski M, Myers MM, Fifer WP. Methodological issues in coding sleep states in immature infants. Dev Psychobiol. 1995;28(2):85-101. doi:10.1002/dev.420280203.*

Learner Objectives:

1. To establish the use of a commercially available, multisensory bassinet in preterm neonates
2. To determine if the re-creation of the in utero sensory experience improves sleep-wake behavior in preterm infants

Gravens 2024-40

Abstract Title: The Power of Touch: A collaborative, family-centered approach to making Skin-to-Skin Care Safe and Accessible for Infants on High Frequency Oscillatory Ventilation (HFOV)

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Problem Statement:

High frequency oscillatory ventilation (HFOV) presents unique challenges as a barrier to skin-to-skin (STS). Our hypothesis is that an educational video about how to hold STS on HFOV will have a statistically significant impact on provider comfort and confidence in facilitating this procedure.

Abstract:

Skin-to-skin (STS) care, often referred to as Kangaroo Care, has been cited time and time again as a beneficial practice linked to positive health outcomes. Like a joey in its mother's pouch, STS is the practice of holding an infant's bare chest against their parent's bare chest in an upright position. This approach was first described in the literature in the 1970s in Bogota, Columbia, where the morbidity and mortality of low birthweight infants was high as a result of limited staffing and resources (Hubbard & Gattman, 2017). Mothers held their newborns STS throughout most of the day and night to promote thermoregulation and breastfeeding (Hubbard & Gattman, 2017). This allowed the limited number of health care workers to assist sicker infants and isolettes were then more readily available. As a result, the health outcomes of newborns in Bogota improved significantly (Hubbard & Gattman, 2017).

High frequency oscillatory ventilation (HFOV) presents unique challenges as a barrier to skin-to-skin (STS). This mode of ventilation relies on low tidal volumes, constant mean airway pressures, and high respiratory rates. It is often used as a rescue strategy when conventional ventilation has failed. The decreased tidal volume delivered by HFOV decreases barotrauma caused by the traumatic inflate-deflate cycle imposed by conventional ventilation. Infants requiring this type of ventilation are often quite sick. Furthermore, the ventilator is very large and uses rigid, inflexible tubing that prevents an infant from being repositioned or moved with ease, which has implications for STS holding. Clinician comfort levels surrounding STS while an infant is on HFOV vary. A survey of fifty-five physicians, nurses (RNs), and respiratory therapists (RTs) conducted by Kenaley and colleagues found that just over half of survey respondents thought that infants on high frequency ventilation were stable for STS (Kenaley et al, 2020). In a Pareto chart depicting results of the staff survey regarding attitude toward medical stability, HFOV falls on the threshold of stable and unstable (Kenaley et al, 2020). Similarly, in their quality improvement initiative, Nation and colleagues performed a pre-intervention nursing comfort assessment for STS using a Likert scale (Nation et al, 2021). They found that RN comfort for placing an intubated infant STS was consistently lowest in infants receiving high-frequency ventilation (Nation et al., 2021). In addition to uncertainty about staff comfort and whether or not infants on HFOV are medically stable to be held STS, there is little to no existing research on STS holding on this type of ventilator. Without existing evidence, there is an increasing drive-in health care for creativity and innovation to tackle challenges. As RNs and nursing students navigate and confront obstacles in their learning and working environments, creativity becomes a critical competency. The approach to safely holding STS on HFOV was first considered when the question of "How do we move the baby to mom?" shifted to, "How do we move the mom to baby?" Using a bariatric stretcher chair allows for a process where the baby and rigid ventilator tubing remain almost completely still, and everything and everyone else moves about the baby and ventilator. With the support of NICU leadership, a bariatric stretcher chair was borrowed from the adult ICU to facilitate STS holding on HFOV. This process was unofficially rolled out around 2018 at a unit-based skills day. In 2022, the procedure was incorporated into the NICU policies, procedures, and guidelines (Skin-to-Skin (STS) Care, Swaddle Holding and Hand Hugs for Meaningful Touch). We believe the number of infants being held STS on HFOV has increased, and the exact numbers are currently being compiled by our NICU statistician. There have been no adverse events directly related to STS holding.

With consent from loving families, we have filmed and photographed the procedure, and are currently in the process of making an educational video for NICU staff and caregivers. The aims of this video are to: 1. Explain the benefits of skin to skin; 2. Provide Neonatal Intensive Care staff members with detailed instructions on the process of holding skin to skin on HFOV; 3. Empower caregivers to ask about holding skin to skin on HFOV and help reduce unease around holding on this type of ventilator. When the video is complete, we plan to administer a pre- and post-test to NICU staff to measure their comfort and confidence facilitating STS on HFOV. An independent t-test will allow us to determine if this educational video had an impact on these measures. The development and implementation of this creative process allows more infants, particularly critically ill infants and their families, to experience the benefits of STS holding. These benefits are well-documented, but there is room to investigate the unique obstacles this vulnerable population faces and think creatively about potential solutions to overcoming challenges. As educated, skilled and trusted providers, RNs, advanced practice providers and physicians are well-positioned to inspire innovation using creativity. We hope to share this procedure with other providers and NICUs to ensure that as many infants and caregivers as possible are able to experience the benefits of STS.

References:

Hubbard, J. M., & Gattman, K. R. (2017). Parent-infant skin-to-skin contact following birth: History, benefits, and challenges. Neonatal Network, 36(2), 89-97. https://doi.org/10.1891/0730-0832.36.2.89

Kenaley, K. M., Rickolt, A. L., Vandersteur, D. A., Ryan, J. D., & Stefano, J. L. (2020). An intervention to decrease time to parents' first hold of infants in the neonatal intensive care unit requiring respiratory support. Journal of Perinatology, 40(5), 812-819. https://doi.org/10.1038/s41372-019-0569-5

Nation, H., Sanlorenzo, L., Lebar, K., & Brandon, D. (2021). A quality improvement project to increase frequency of skin-to-skin contact for extreme low-birth-weight infants in the neonatal intensive care unit. Journal of Perinatal & Neonatal Nursing, 35(3), 247-257. https://doi.org/10.1097/jpn.0000000000000556

Learner Objectives:

As a result of this poster and/or podium presentation, viewers/listeners will be able to:

1. Name and describe at least one benefit of skin-to-skin care for baby and/or caregiver.
2. Name the supplies, staff, and steps necessary to facilitate STS on HFOV in your own clinical setting.

Gravens 2024-41

Abstract Title: The Impact of Family Support in a Level III NICU

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Problem Statement:

Parents in the NICU experience high anxiety, post-partum depression, difficulty bonding with their child, and post-traumatic stress. The Valley Hospital NICU family support program has helped parents feel more engaged and a part of their child's journey. By providing resources, support groups, and engaging the family daily, it reduces the stress and anxiety and helps them to feel in control of their stay.

Abstract:

The Valley Hospital Neonatal Intensive Care Unit Family Support Program has provided comfort, support and improvements in patient care by providing a family-centered approach to enhance the standard of care for infants and families. The program improves patient care by ensuring that communication is open and direct (face-to-face) with our families. We facilitate family meetings with the care team, provide educational materials and resources and work closely with the Developmental Care Team within our unit. Our program brings comfort to families by providing care before, during and after their admission into the NICU. We begin connecting with families as early as antepartum and remain in contact well beyond discharge. In addition, we provide bereavement support. As a former NICU parent, the Family Support Specialist helped me to connect with my child. In my role, the main goal that I have is to help guide our parents during this difficult time. We recognize that this was not a part of their plan, but we will help them celebrate the milestones and learn to care for their newborn. The NICU is a beautiful quilt that is stitched together over time.

Learner Objectives:

1. Daily rounding with the family--Asking how they are, listening, engaging them in discussions about the baby, hearing about the family and their circle, and allowing the space to grieve, celebrate and express how they feel.
2. NICU Family Support Group--attended by veteran families. This group is a safe space that allows the families to engage in conversations. They find support from each other and gain insight into their experience.
3. Connections- We have multiple events for graduates and their families. Our Graduate Reunion brings together over 600 families each year with graduates ranging from 3 months to 25 years. Our annual fundraising event is attended by 400 families and raises over $45000.

Gravens 2024-42

Abstract Title: Using the First Family Update to Understand Parental Concerns

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Problem Statement:

While there is extensive evidence on the experiences of parents in the NICU, there is less reported on parental experiences early in the NICU course, specifically from their own perspective. In addition, little is known about parental preferences around communication from the medical team. Our objective was to describe the parental responses regarding their communication needs, and initial concerns and goals regarding their infant's care upon admission to the NICU.

Abstract:

Admission to the Neonatal Intensive Care Unit (NICU) is a sentinel event for parents. Expectations around pregnancy and their child radically shift. (1) The introduction to parenthood is now occurring on stage, adding additional stress to an already worrying event.1 While there is extensive evidence on the experiences of parents in the NICU (2, 3), there is less reported on parental experiences early in the NICU course, specifically from their own perspective. In addition, little is known about parental preferences for communication with the medical team, even as better parent-provider communication in the NICU has been shown to improve infant health outcomes. (4) At Beth Israel Deaconess Medical Center (BIDMC), a 63-bed level III NICU, all families who have an expected stay of at least 14 days have an initial family meeting, the 'First Family Update (FFU).' The practice of a 'First Family Update' was developed to try to help parents assimilate into the NICU, to understand the elaborate system and culture, and to learn about their baby. These updates are in addition to the typical bedside medical update or what a parent may learn on medical rounds. Prior to the update, the parents are given a worksheet, asking them to reply to a variety of questions and prompts. This worksheet was developed by a multidisciplinary team, including former NICU parents, with an iterative approach. The questions range from preferred language, preferences for medical updates (location and frequency), and factors affecting their ability to be with their admitted baby, as well as open ended questions about their specific concerns and hopes for their baby. The completed worksheet is then used to guide the family update meeting and further communication with the parents. This first family update not only allows the team to orient the family to the NICU, it also allows the information given to parents to be individualized, and the focus to be on the parents' need at that time. Our objective for this qualitative study was to describe the parental responses from 244 forms administered, specifically looking at the concerns and hopes of parents in the neonatal intensive care unit upon admission to the NICU. Thematic analysis was conducted through content coding. The surveys were coded independently by three reviewers (LR, EW, PTC) and themes separately identified. The codes were then compared and discussed to determine congruity.

Results: Two hundred forty-four parent reports collected between 2/2022 and 6/2023 were evaluated. Of these, the average day for completion of the first family update was day five and the median gestational age of the infants for whom the parents were completing the form was 33.5 weeks gestation (Table 1).

Table I: Infant & Parent Demographics

Characteristics	Infants (N= 283) Families (N=244) # (%)
Gestational age, median (wk)	33.5
<28 0/7	24 (8.5)
28 0/7 - 33 6/7	127 (44.9)
34 0/7 - 36 6/7	91 (32.2)
≥ 37	41 (14.5)
Duration of neonatal stay, average (d)	34
Families with multiples	36 (14.8)
Self-described non-English proficient	29 (11.9)
Families requesting medical updates in English	207 (84.8)
Surveys completed in:	
Spanish	5 (2.0)
Portugese	8 (3.3)
Hatian Creole	1 (0.4)
Family meeting time, average (days since admission)	5

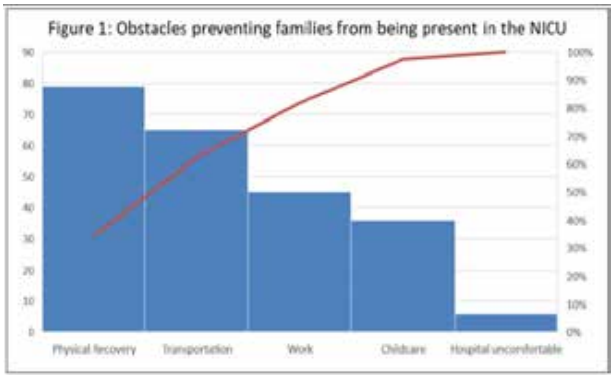
Of the parents who completed the form, 84% expressed a prefer-

ence to have the update provided in English, while 11% self-determined as non-English proficient. Forms were available in English, Spanish, Portuguese, and Haitian Creole. Parents expressed a variety of preferences for location of medical updates, with most preferring updates at their baby's bedside (93.4%), followed in preference by updates over the phone (75.8%), with fewer preferring to receive medical updates during medical rounds (49.2%) (Table 2).

Table II: Parent communication preferences

Characteristics	Parents (N=244) # (%)
Preferred method of communication	
Verbally	224 (91.8)
Written	184 (75.4)
Pictures	113 (46.3)
Preferred update location	
At baby's bedside	228 (93.4)
Phone	185 (75.8)
During medical rounds	120 (49.2)
Over video call	62 (25.4)
Away from baby's bedside	31 (12.7)
Preferred frequency of updates	
As much as possible	22 (9.0)
> 1x/day	14 (5.7)
1x/day	49 (20.1)
Every visit	8 (3.3)
2-5x/week	22 (9.0)
1x/week	14 (5.7)
As needed/with news	60 (24.6)
Blank/unsure	55 (22.5)

Frequency of requested updates ranged significantly, with some families preferring multiple updates per day, while as others requested updates only with changes in care plan. When asked about potential barriers to being at their baby's bedside, the most common barrier noted were their own physical recovery from the birth and transportation, with need to work or care of siblings also factors (Figure 1).



There were two open-ended questions on the worksheet. The first question asked what the parents would like to discuss during the update, as well as if they had any specific concerns. The content of these responses were independently coded. For parental concerns, there were three main themes identified: all or nothing, concerns as they related to the macroenvironment of the NICU, and concerns around the microenvironment of their family and baby (Table 3).

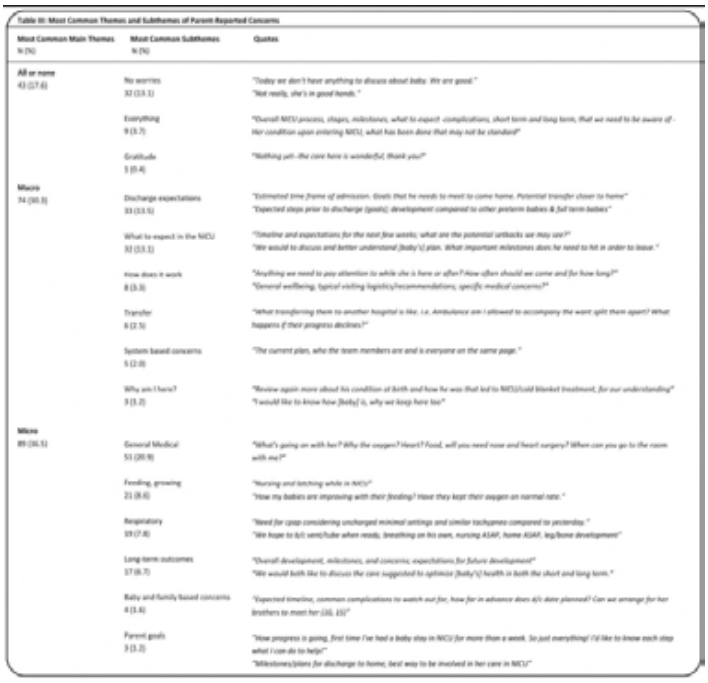
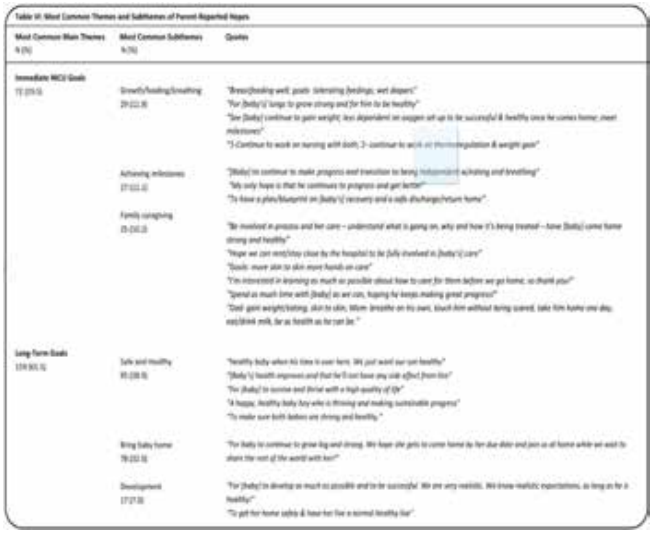


Figure 2: Word Cloud Representation of parental hopes and goals regarding their infant



The theme referred to as 'all or nothing' was endorsed by 17% of parents. More often, this included overarching concerns, though some reflected that all questions were answered. Macroenvironment themes emerged about the systems in the NICU, the general unit flow and culture, and discharge expectations. Microenvironment themes included family or infant specific questions about

specific medical care concerns, parental ability to be at bedside, and concerns about long-term outcomes. The second of the open-ended questions focused on the parent's hopes and goals. The responses generated themes that were divided between those focused on long-term goals, and those focused on more immediate NICU goals. The long-term themes centered on bringing their baby home, long-term development, and an overarching idea of having a safe and healthy baby. The immediate goals focused on specific medical milestones, particularly feeding, or goals for caregiver involvement (Table 3 and Figure 2).

Implications: Admission to the NICU is a sentinel event. Better understanding of parental experience, as told in their own voice, as it relates to their needs, barriers, and concerns and hopes is essential. This information can better inform the process of admission and early hospital care, with the goal to minimize parental trauma and individualize communication for specific parental needs. In doing so, parents may approach the NICU environment, and their baby, more supported and as a result, be more present for their baby and themselves as they grow into parenting.

References:

1. *Dixon SD, et al. Neonatal Intensive Care Unit: Special Issues for the At-Risk Infant and Family. Encounters with Children: Pediatrics and Behavior, 4th edition, eds S. D. Dixon, M. T. Stein. Mosby, Philadelphia, 2006.*
2. *Ionio C et al. Mothers and Fathers in the NICU: The Impact of Preterm Birth on Parental Distress. Europe's J Psychol 2016;12(4):604-21.*
3. *Pace C, et al. Evolution of depression and anxiety symptoms in mothers and fathers of infants born very preterm during the newborn period-a longitudinal study. JAMA Pediatr 2016;170:863-70.*
4. *Waddington C, Family integrated care: Supporting parents as primary caregivers in the neonatal intensive care unit. Pediatr Investig. 2021 Jun 18;5(2):148-154. doi: 10.1002/ped4.12277.*

Learner Objectives:

1. Understand parental preferences for communication vary
2. Each family interaction should be driven by parental needs at that time, as care must be individualized

Gravens 2024-43

Abstract Title: Introducing the Cardiac iRainbow: A developmental care path for infants in the cardiac intensive care setting.

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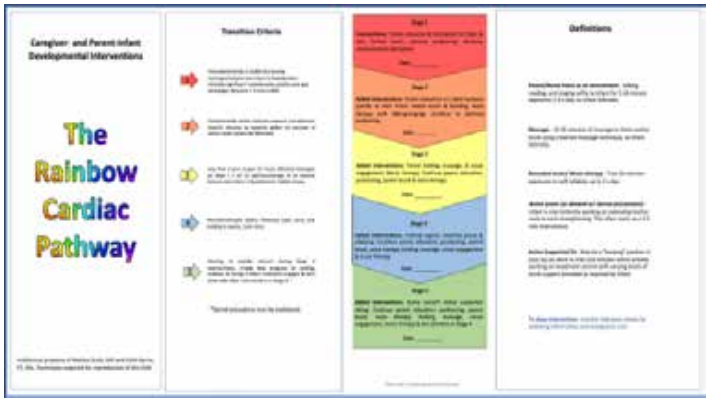
Problem Statement:

Infants and children with congenital heart disease are at risk of neurodevelopmental impairment, and there is a great deal of evidence to support developmental interventions and targeted developmental care in this population. However, implementation of best practices is challenging due to the complexity of patients and competing priorities for care, particularly in the intensive care setting. To address some of the barriers to providing appropriate developmental care, we designed a pathway based on infant clinical status with recommended evidence-based developmental activities that could be used as an educational tool for bedside providers and parents.

Abstract:

Methods: The Cardiac iRainbow (Figure 1) was adapted from the iRainbowc, a developmental tool used in the neonatal intensive care setting.



The Cardiac iRainbow consists of 5 color-coded stages of advancing clinical stability with recommended evidence-based developmental interventions for each stage and infants advance on the pathway based on defined clinical criteria. To study the effectiveness of the Cardiac iRainbow as an educational tool in the selection of appropriate developmental activities, nurses, and parents in the cardiovascular intensive care unit (CVICU) were surveyed pre- and post-training and implementation (Figure 2).

Following the initial survey, training sessions were performed and copies of the Cardiac iRainbow in English and Spanish were hung in each room. In the next 4–8 weeks, using a 5-point Likert scaled questionnaire, nurses and parents were resurveyed on their knowledge and comfort level in selecting neurodevelopmental interventions and activities based on infant clinical status.

Results: Prior to implementation, 26 nurses and 27 parents completed the survey, and afterward, 31 nurses and 5 parents completed the survey (Table 1).

Post implementation, the percentage of RNs stating they had sufficient training to select appropriate neurodevelopmental activities for their patients improved from 38.5% to 67.7% ($p = 0.027$). The percentage of parents who strongly agreed that they felt confident participating in their child's cares improved from 55.5% to 100% ($p = 0.059$). All parents either agreed (3/5) or strongly agreed (2/5) that the Cardiac iRainbow was easy to use.

Conclusion: Implementation of the Cardiac iRainbow in the CVICU improved neurodevelopmental knowledge for nurses, and though the sample size is small, there is a trend toward improved parental confidence in participating in the care of their infant. Further study with larger sample sizes is needed to gain a deeper understanding of nurse and parent needs regarding the selection and implementation of appropriate developmental interventions based on infant clinical status. In addition, future work should include 1) examining the sustainability of the using the Cardiac iRainbow in the CVICU setting and 2) expanding the path to include older infants with cardiac disease.

Table I: Infant & Parent Demographics

Characteristics	Infants (N= 283) Families (N=244) # (%)
Gestational age, median (wk)	33.5
<28 0/7	24 (8.5)
28 0/7 - 33 6/7	127 (44.9)
34 0/7 - 36 6/7	91 (32.2)
≥ 37	41 (14.5)
Duration of neonatal stay, average (d)	34
Families with multiples	36 (14.8)
Self-described non-English proficient	29 (11.9)
Families requesting medical updates in English	207 (84.8)
Surveys completed in:	
Spanish	5 (2.0)
Portugese	8 (3.3)
Hatian Creole	1 (0.4)
Family meeting time, average (days since admission)	5

References:

Ballweg, J.A., Wernovsky, G. & Gaynor, J.W. Neurodevelopmental Outcomes Following Congenital Heart Surgery. Pediatr Cardiol 28, 126-133 (2007). https://doi.org/10.1007/s00246-006-1450-9.

Lisanti AJ, Vittner D, Medoff-Cooper B, Fogel J, Wernovsky G, Butler S. Individualized Family-Centered Developmental Care: An Essential Model to Address the Unique Needs of Infants With Congenital Heart Disease. J Cardiovasc Nurs. 2019 Jan/Feb;34(1):85-93. doi: 10.1097/JCN.0000000000000546. Erratum in: J Cardiovasc Nurs. 2019 May/Jun;34(3):257. PMID: 30303895; PMCID: PMC6283700.

Thomas A. Miller, Amy J. Lisanti, Madolin K. Witte, et al. A Collaborative Learning Assessment of Developmental Care Practices for Infants in the Cardiac Intensive Care Unit. J Pediatr 2020;220:93-100).

Neil Derridj, Romain Guedj, Johanna Calderon, et al. Long-Term Neurodevelopmental Outcomes of Children with Congenital Heart Defects. J Pediatr 2021;237:109-14.

Cassidy, A., Butler, S., Briend, J., et al. (2021). Neurodevelopmental and psychosocial interventions for individuals with CHD: A research agenda and recommendations from the Cardiac Neurodevelopmental Outcome Collaborative. Cardiology in the Young, 31(6), 888-899. doi:10.1017/S1047951121002158.

Learner Objectives:

The learner will understand the use of the Cardiac iRainbow as an educational tool.

The learner will understand how to use the Cardiac iRainbow.

The learner will be able to state at least one outcome from the study presented.

Gravens 2024-44

Abstract Title: Evaluating Racial Disparities in a NICU Parental Support (Bundle) Program

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Problem Statement:

Hypothesis - Are there racial disparities in the NICU Support (Bundle) Program provided to families?

Importance - In order to close the racial divide, we must identify disparities and provide equitable support to our families in the NICU.

Abstract:

PICOT: How can neonatal healthcare professionals provide equitable support to Black families in the NICU (Neonatal Intensive Care Unit)? The purpose of this program evaluation is to examine for the presence of racial disparities in providing parental support to Black families in the NICU. The Easy Evaluation by Adams & Neville, 2020 is the framework utilized. Five data points will be collected to include parental attendance for daily rounds, parental visitation, parental class attendance, the usage of human milk for neonates, and active breast feeding of neonates. Parental attendance in daily rounds, parental visitation, and parental class attendance aid in evaluation of parental communication and consultation. The usage of human milk (mother's own milk or donor milk) aids in evaluation of lactation support. Quantitative data will be collected via electronic medical records and analyzed with a minimal sample size of 50 neonates and their families. Outcome measurements will be available prior to March 2024 (program evaluation is currently in progress).

References:

Ajayi, K. V., & Garney, W. R. (2022). Understanding the domains of experiences of black mothers with preterm infants in the United States: A systematic literature review. Journal of Racial and Ethnic Health Disparities, 1-17.

Beck, A. F., Edwards, E. M., Horbar, J. D., Howell, E. A., McCormick, M. C., & Pursley, D. M. (2020). The color of health: how racism, segregation, and inequality affect the health and well-being of preterm infants and their families. Pediatric research, 87(2), 227-234.

Glazer, K. B., Sofaer, S., Balbierz, A., Wang, E., & Howell, E. A. (2021). Perinatal care experiences among racially and ethnically diverse mothers whose infants required a NICU stay. Journal of Perinatology, 41(3), 413-421.

Healthy People 2030 https://health.gov/healthypeople/priority-areas/social-determinants-health

Johnson, Y. R., Guillory, C., & Imaizumi, S. (2023). Health Care Disparities in High-Risk Neonates. Clinics in Perinatology, 50(1), 67-80.

Kair, L. R., Nidey, N. L., Marks, J. E., Hanrahan, K., Femino, L., Fernandez y Garcia, E., ... & Wood, K. E. (2020). Disparities in donor human milk supplementation among well newborns. Journal of Human Lactation, 36(1), 74-80.

March of Dimes https://www.marchofdimes.org/peristats/assets/s3/reports/prematurity/PrematurityProfile-Virginia.pdf

Montoya-Williams, D., Fraiman, Y. S., Peña, M. M., Burris, H. H., & Pursley, D. M. (2022). Antiracism in the field of neonatology: a foundation andconcrete approaches. Neoreviews, 23(1), e1-e12.

Palmquist, A. E., Asiodu, I. V., Tucker, C., Tully, K. P., Asbill, D. T., Malloy, A., & Stuebe, A. M. (2022). Racial Disparities in Donor Human Milk Feedings: A Study Using Electronic Medical Records. Health Equity, 6(1), 798-808.

Patel, A. L., Schoeny, M. E., Hoban, R., Johnson, T. J., Bigger, H., Engstrom, J. L., ... & Meier, P. P. (2019). Mediators of racial and ethnic disparity in mother's own milk feeding in very low birth weight infants. Pediatric research, 85(5), 662-670.

Petit, M., Smart, D. A., Sattler, V., & Wood, N. K. (2021). Examination of factors that contribute to breastfeeding disparities and inequities for Black women in the US. Journal of Nutrition Education and Behavior, 53(11), 977-986.

Ravi, D., Iacob, A., & Profit, J. (2021, June). Unequal care: Racial/ethnic disparities in neonatal intensive care delivery. In Seminars in perinatology (Vol. 45, No. 4, p. 151411). WB Saunders.

Sankar, M. N., Weiner, Y. E., Chopra, N., Kan, P., Williams, Z., & Lee, H. C. (2022). Barriers to optimal breast milk provision in the neonatal intensive care unit. Journal of Perinatology, 42(8), 1076-1082.

Sigurdson, K., Mitchell, B., Liu, J., Morton, C., Gould, J. B., Lee, H. C., ... & Profit, J. (2019). Racial/ethnic disparities in neonatal intensive care: a systematic review. Pediatrics, 144(2).

Waldron, M. K. (2022). Parent Protector: Perceptions of NICU-to-Home Transition Readiness for NICU Parents of Black Preterm Infant. The Journal of Perinatal & Neonatal Nursing, 36(2), 173-185.

Witt, R. E., Colvin, B. N., Lenze, S. N., Forbes, E. S., Parker, M. G., Hwang, S. S., ... & Colson, E. R. (2022). Lived experiences of stress of Black and Hispanic mothers during hospitalization of preterm infants in neonatal intensive care units. Journal of Perinatology, 42(2), 195-201.

Witt, R. E., Malcolm, M., Colvin, B. N., Gill, M. R., Ofori, J., Roy, S., ... & Colson, E. R. (2022). Racism and quality of neonatal intensive care: voices of Black mothers. Pediatrics, 150(3), e2022056971

Learner Objectives:

1. Identify the need for the experience of Black families in the NICU
2. Identify how racism affects the quality of care of neonates and their families
3. Identify racial disparity in a NICU Support Program
4. Identify where the racial disparities exist (i.e., communication, consultation with families of neonates, breast milk utilization)

Gravens 2024-45

Abstract Title: Standardization of Delayed Cord Clamping for the Term and Preterm Infant

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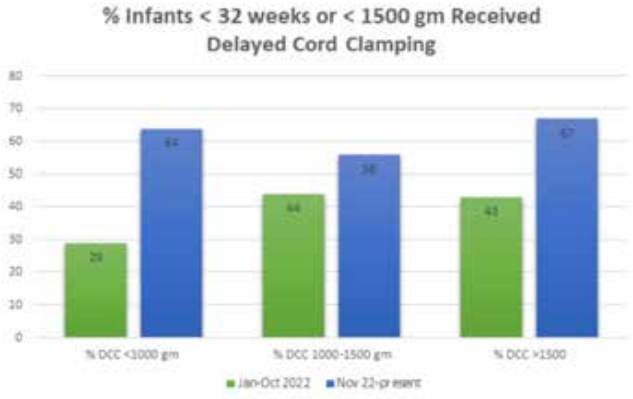
Problem Statement:

This project aimed to standardize utilization of thirty to sixty seconds of delayed cord clamping (DCC) for all neonatal births, including those of preterm infants, as recommended by the American College of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics Neonatal Resuscitation Program. Delayed cord clamping serves to improve transitional circulation, establish red blood cell volume and iron stores, and has been associated with lower incidence of necrotizing enterocolitis and intraventricular hemorrhage. Baseline data revealed a 63.7% DCC utilization rate overall for newborns births with a 37.8% utilization rate for infants born at less than 32 weeks gestation or with a birth weight of less than 1500 grams. Cord milking had become a common modality during cesarean deliveries and is no longer recommended for infants less than 28 weeks gestation due to evidence suggesting higher risk of intraventricular hemorrhage.

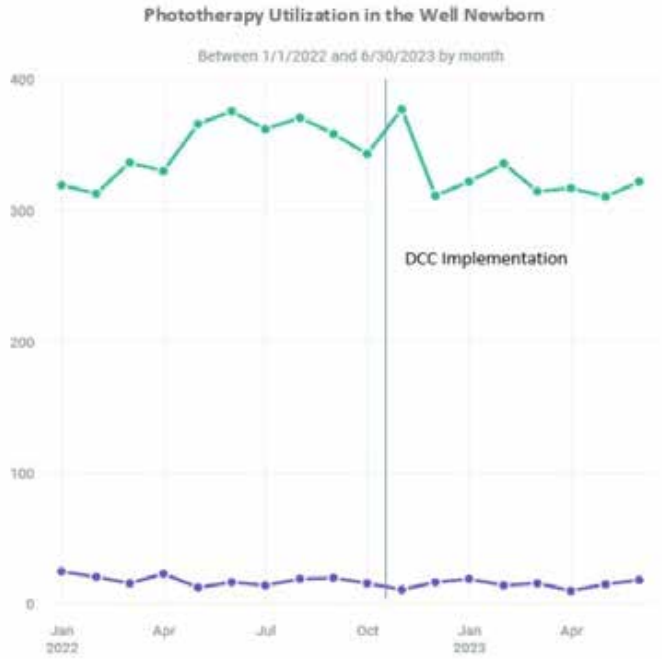
Abstract:

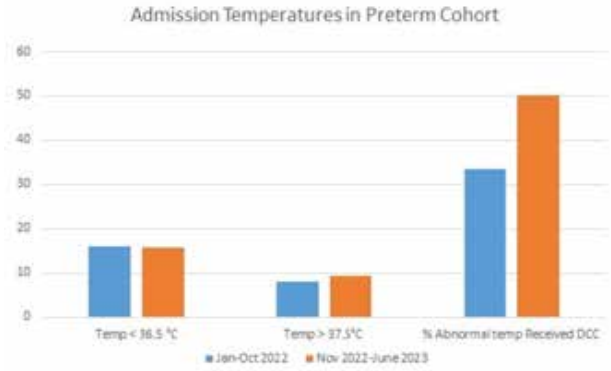
An assessment of current practices and barriers to implementation of standardized DCC was performed. Additionally, a literature review to identify the impact of delayed cord clamping on the preterm infant along with the establishment of applicable exclusion criteria was completed. In order to minimize hypothermia related to evaporative heat loss in our preterm cohort during delayed cord clamping, we organized a trial of a sterile polyethylene suit into which the infant was directly placed upon delivery. An algorithm was developed to provide guidance in respect to DCC inclusion and exclusion criteria as well as indications for utilization of the sterile suit. Collaboration was facilitated between obstetricians, NICU providers, and nursing staff in order to establish a plan to monitor both infant and maternal status and communicate appropriateness and duration of delayed cord clamping. After attainment of key stakeholder approval, education was disseminated to nursing staff and providers via in person sessions in addition to the distribution of a recorded simulation of a preterm cesarean delivery utilizing the sterile suit. Surveys were distributed and evaluated during the initial trial phase of the sterile suit to evaluate any potential impact on patient care. Quantitative baseline data was obtained via Epic reports and manual chart reviews which incorporated 3619 overall births and 37 infants in the preterm cohort consisting of infants < 32 weeks gestational age or < 1500 grams at birth. To date, post-intervention data includes 2701 overall births and 32 infants in the preterm cohort. Outcome measures include overall delayed cord clamping utilization, phototherapy requirements in well newborns, as well as blood transfusion rates, admission temperatures, and rates of intraventricular hemorrhage in the preterm cohort. Since implementation, cord milking practices have ceased and rates of delayed cord clamping utilization have risen from approximately 63% to 83% overall and from 37.8% to 62.9% in our preterm cohort.

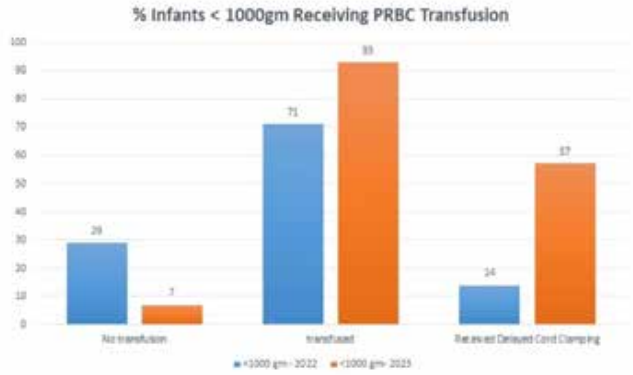
There has not been a substantial impact on phototherapy rates in



the well newborn or on preterm admission temperatures.

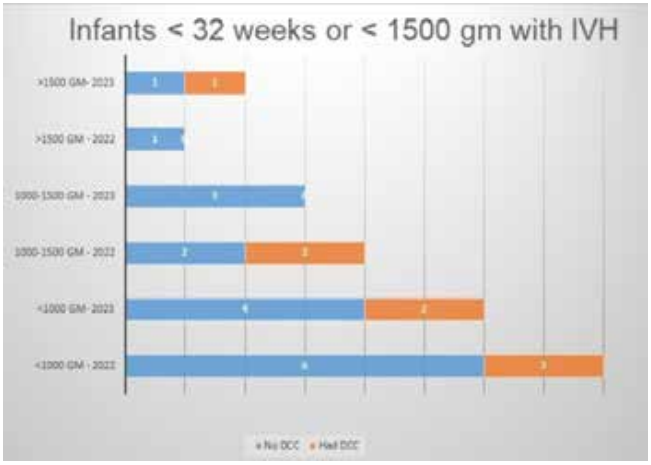






The need for any packed red blood cell transfusion in infants with a birth weight of < 1500 grams was not reduced as we had anticipated, however the median number of units per infant dropped from 4 to 2 units.

We have noted that a larger percentage of intraventricular hemorrhages identified in our preterm cohort have occurred in infants who did not receive delayed cord clamping which aligns with previously published evidence.



Implementation barriers included management of the supply of sterile suits during our trial period. We have since received final approval to purchase the product and establish par levels in strategic areas. Our NICU providers and nursing staff worked together to establish an effective workflow for application of the sterile suit during a preterm vaginal birth with consideration for space and personnel. Operating room staff were pivotal in establishing and re-evaluating the workflow for cesarean deliveries.

Learner Objectives:

Learners will be able to identify two potential positive impacts of utilizing delayed cord clamping in preterm infants.

Learners will identify at least one strategy to mitigate risk for hypothermia during 30–60 seconds of delayed cord clamping.

Gravens 2024-46

Abstract Title: Differentiating between disturbing noise and nurturing voice during Skin-to-Skin Contact (SSC). The Skincubator may enable babies to hear gentle maternal speech during SSC while reducing the sleep disturbing monitor alarm noise.

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Problem Statement:

Preterm babies are born too early into a world of overstimulation relative to the intrauterine environment where natural brain development should occur. Studies have shown that nosocomial noises, common in the NICU, may interfere with neurodevelopment and growth (Khun 2012, Als 2004) Conversely, the voice of the parents particularly the mother's, has a nurturing effect on the

developing brain. Traditional incubators have a disturbing internal noise generated by the fan and motor. Additionally, CPAP noise reverberates from the parallel side walls. In standard incubators, internal noise almost always exceeds the 45 decibels (DB) recommended by the AAP (Committee on Environmental Health 1997, Kuhn 2012). Although incubators offer partial protection of babies from alarm sounds, a study by Kuhn et al. demonstrated that the noise exposure of CPAP-supported preterm neonates in incubators was greater than 62 DB more than 50% of the time. Common NICU monitor alarms are loud and disturbing. Khun et al, have described Sound Peaks (SPs) that may interfere with babies' sleep. They have showed that SPs of 5–10 dBa is enough to arouse a very preterm infant and elicit a measurable physiologic response. NICU SPs are common, and this specific study reported an average of 7(±)5 SPs per hour. The SPs may increase HR especially during active sleep, and interfere with babies' sleep (Kuhn 2012, Kuhn 2013). Of note, Kuhn studied SPs inside incubators, babies receiving KMC within a busy NICU room are probably exposed to more SP events at louder dBa levels. Some investigators have recommended the use of earmuffs for preterm babies to protect them from NICU noise (Duran 2012). It is likely that noise exposure is increased during KMC but the use of earmuffs would prevent babies from hearing the nurturing voice of their mothers.

The Skincubator is a novel, small incubator, designed to attach to the caregiver's torso without any barrier between the parent chest and the baby. The Skincubator creates a concealed environment for SSC with all the advantages of a standard neonatal incubator. The Skincubator does not have a fan or motor and it uses heat generated from the parent body and from the baby's noninvasive respiratory support for internal heat and humidity. For babies requiring invasive ventilation or no respiratory support at all, a humidified noninvasive support system is connected directly to the Skincubator for humidification. In addition, the Skincubator provides excellent noise absorption and has no parallel walls that may reverberate internal noise. Similar to traditional incubators, the Skincubator partially protects the baby against SPs. The Skincubator has a designated small opening between the parent face and the baby's head, to enable the parent to speak to the baby without obstruction.

The Skincubator in a manikin simulation.
The Skincubator reduces alarm noise intensity by 40% but has an opening for direct contact and unobstructed communication between parent and baby.
In the simulation the "mother" wore a shirt, in clinical use, the baby is in full skin to skin contact with the bare-chest parent.

Heart rate: During the Skincubator safety trial, we observed slightly lower mean heart rates during Skincubator sessions compared with traditional SSC t-SSC) 157.2 (149.3–163.7) vs 160.3 (158.0–165) (WSRT p=0.04). This may be an indicator that the babies were less stressed and may be attributable to 1. Babies cared for in the preheated Skincubator may have had less cold stress and better thermoregulation at the start of the SSC session; 2. The partial protection of the baby from alarm noises that increase heart rate and interrupt sleep cycles.

Hypothesis:
We hypothesize that the Skincubator will have less internal noise than a traditional incubator and that the Skincubator will reduce the intensity of SPs generated by NICU monitors.
Additionally, we hypothesize that heart rate will be lower in babies cared for in the Skincubator compared with babies cared for in traditional SSC t-SSC), not only early after transfer when the Skincubator is warmer than t-SSC and the baby has less cold stress but also during the second half of the session, after temperature has stabilized.

Abstract:

Methods: Noise measurements: We have measured the internal noise in a Giraffe Omnibed (GE, Boston, Massachusetts, USA) and in the Skincubator 2.0 model with manikins connected to CPAP with air flow of 10 liter per minute (LPM) at varying PEEP levels. We used the INICU 2 incubator analyzer (Fluke Biomedical, Everett, Washington, USA). The study was performed in a quiet NICU room when the Skincubator was on the body of an adult volunteer. In addition, we measured the internal noise in a standard incubator and the Skincubator when a proximate NICU monitor (VitaLogik 6000, Mennen, Yavne, Israel) was alarming. Heart rate evaluation: We recorded heart rates of preterm infants at one minute sampling intervals during the Skincubator 1.1 safety trial. We then compared the average heart rates during 54 paired sessions of Skincubator care and t-SSC performed on 19 preterm neonates. In order to evaluate whether lower heart rate during Skincubator care sessions is due to less cold stress or due to less noise, we will compare HR during minutes 3–17 of the session and the 15 minutes ending 10 minutes before the end of the session (to study a quiet state before preparing for the transfer of the baby back to the standard incubator). In a representative 60 minute session, we compared minutes 3 to 17 and 36 to 50).

Results: Noise: The internal noise level was lower in the Skincubator than the standard incubator. Noise levels with PEEPs of 5, 6, 7, and 8 cm H_2O were 48, 48, 48.5, and 49 Db in the Skincubator and 53.8, 53.8, 53.8 and 54 DB in the standard incubator. An adjacent monitor alarm resulted in noise level of 71 Db without the Skincubator (reflecting t-SSC) and 69 Db within the Skincubator. Of note, as a logarithmic scale, the change from 71 to 69 represents approximately a 40% reduction in noise intensity. Heart rate: Due to the outbreak of hostilities, several members of our team, including the PI were drafted to the IDF Medical Reserve Forces. We regret that we were unable to finalize the heart rate evaluation before the abstract submission deadline. We will finalize this section prior to the start of the conference. Discussion: We have observed that the Skincubator 2.0 model has lower internal noise than a standard incubator and that it partially protects babies from SPs generated by NICU monitors. We will more rigorously evaluate the internal noise when the clinical Skincubator 2.0 is finalized. The ideal place for performing SSC is probably in a quiet single patient room. In a busy NICU with multiple neonates and monitors in each room, the Skincubator may partially protect the infant from SPs while performing SSC, without blocking the nurturing voice of the parent as there is a small window designated for this purpose that may be opened when the parent speaks to the baby. The protection against SPs may explain the lowered heart rate observed in the Skincubator safety trial. We will provide more details after completing the HR evaluation.

Conclusions: The Skincubator may partially protect babies from SPs while performing SSC without blocking the nurturing voice of the parent. This may have developmental advantages, that we plan to evaluate with randomized controlled trials.

References:

Kuhn P, Zores C, Pebayle T, Hoeft A, Langlet C, Escande B, Astruc D, Dufour A. Infants born very preterm react to variations of the acoustic environment in their incubator from a minimum

signal-to-noise ratio threshold of 5 to 10 dBA. Pediatr Res. 2012 Apr;71(4 Pt 1):386-92. doi: 10.1038/pr.2011.76. Epub 2012 Feb 15. PMID: 22391640.

Als H, Duffy FH, McAnulty GB, Rivkin MJ, Vajapeyam S, Mulkern RV, Warfield SK, Huppi PS, Butler SC, Conneman N, Fischer C, Eichenwald EC. Early experience alters brain function and structure. Pediatrics. 2004 Apr;113(4):846-57. doi: 10.1542/peds.113.4.846. PMID: 15060237.

American Academy of Pediatrics. Committee on Environmental Health. Noise: a hazard for the fetus and newborn. Pediatrics. 1997 Oct;100(4):724-7. PMID: 9836852.

Kuhn P, Zores C, Langlet C, Escande B, Astruc D, Dufour A. Moderate acoustic changes can disrupt the sleep of very preterm infants in their incubators. Acta Paediatr. 2013 Oct;102(10):949-54. doi: 10.1111/apa.12330. Epub 2013 Jul 19. PMID: 23800026.

Duran R, Ciftdemir NA, Ozbek UV, Berberoğlu U, Durankuş F, Süt N, Acunaş B. The effects of noise reduction by earmuffs on the physiologic and behavioral responses in very low birth weight preterm infants. Int J Pediatr Otorhinolaryngol. 2012 Oct;76(10):1490-3. doi: 10.1016/j.ijporl.2012.07.001. Epub 2012 Jul 22. PMID: 22824198.

Learner Objectives:

To know the potential problem of background nosocomial noise within neonatal incubators.

To understand the potential reduction of sound peaks by incubators.

To know about the potential advantage of the Skincubator in reducing exposure to nosocomical noise while not blocking the nurturing voice of the mother.

Gravens 2024-47

Abstract Title: Developing, Implementing, and Evaluating an Anti-bias, Anti-racism, Upstander Course for Neonatal Intensive Care Unit Staff

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Problem Statement:

There are significant racial and ethnic inequities in neonatal outcomes within and among institutions along with wide variations in family experiences. Education about racism, bias, and inequity coupled with upstander training can lead to cultural change. A review of available curricula demonstrated a lack of educational content specifically designed for the neonatal healthcare setting leading us to create a novel anti-racism, anti-bias upstander class designed for neonatal intensive care unit (NICU) staff.

Abstract:

Program: We developed and piloted a unique NICU-specific anti-racism, anti-bias upstander class. This one-hour interactive class includes (1) an introduction to the history of race, (2) defining race as a social construct, (3) an overview of the different types of racism (structural, institutional, interpersonal, and internalized) and bias (explicit and implicit), (4) presentation of published data on racial and ethnic inequities in neonatal outcomes, and (5) upstander training. The focus throughout is on "making the implicit explicit." Time is provided during class for each learner to complete the Harvard Implicit Association Test (IAT) on a personal electronic device. The course guides the learner to a deeper understanding of their individual strengths and biases while connecting them with how those impact patient outcomes and family interactions. This is achieved through a variety of instructional approaches including presenting highlights of current research, group participation, videos, and sharing personal facilitator vignettes of racism and bias. The class is mandatory for patient facing NICU staff of all disciplines including Neonatologists, Hospitalists, Nurse Practitioners, Nurses, Respiratory Therapists, Social Workers, Unit Coordinators, Patient Care Assistants, Research Assistants, Audiology Staff, and Family Programs Staff and volunteers. In order to ensure broad participation and engagement, the course was integrated into existing new hire didactic sessions for Nurses, Respiratory Therapists, and Patient Care Assistants. Additionally, the course is taught as a required adjunct session after NRP recertification courses for existing professional staff. Specialty group sessions have also been implemented for unique work groups including Social Work, Nurse Practitioners, and Hospitalists. Due to the complex nature of the course and in order to promote discussion-based learning, the course is not offered virtually. Course effectiveness was evaluated by conducting pre and post class surveys to evaluate acceptability of the course and assess changes in knowledge, behaviors, and attitudes. Follow up surveys were administered at 3 months to assess retention of knowledge and impact on behavior. Impact and Results: Since July, 2023 there have been 120 participants. Immediately following the course, there was significant increase in knowing the difference between implicit and explicit bias (50% vs. 100%), and in the ability to identify at least two NICU inequities (49% vs. 100%). Learners overwhelmingly found the curriculum meaningful and acceptable by agreeing or strongly agreeing the class was educational, engaging, and would change their approach to patient care (99%, 99%, and 92%). After 3 months, the majority of survey respondents remembered the results of their IAT (87%), agreed or strongly agreed it would change their approach with patients (79%), had tools to address bias (90%), and felt comfortable using those tools (91%).

Conclusions: Survey data demonstrates participants actively engaged with the content and overwhelmingly identified the class as educational. This course is an effective way of meeting the learning objectives. Utilizing a one-hour format limited time available for deeper conversations but was highly effective for reaching a broader audience. Further research is needed to determine if this education has impact on patient outcomes and family experiences.

References:

Fraiman YS et al. A mixed methods study of perceptions of bias among Neonatal Intensive Care Unit Staff. Pediatric research. https://pubmed.ncbi.nlm.nih.gov/36038641/

Fraiman, Y. S. et al. (2022). Implications of racial/ethnic perinatal health inequities on long-term neurodevelopmental outcomes and health services utilization. Seminars in Perinatology, 46(8), 151660. https://doi.org/10.1016/j.semperi.2022.151660

Krieger, N. (2001). A glossary for social epidemiology. Journal of Epidemiology & Community Health, 55(10), 693-700. https://doi.

org/10.1136/jech.55.10.693 Parker, M. G. et al (2022). Promoting human milk and breastfeeding for the very low birth weight infant. Breastfeeding Handbook for Physicians. https://doi.org/10.1542/9781610024433-apph

Profit, J. et al (2017). Racial/ethnic disparity in NICU quality of care delivery. Pediatrics, 140(3). https://doi.org/10.1542/peds.2017-0918

Profit, J. et al (2014). Baby-Monitor: A composite indicator of NICU Quality. Pediatrics, 134(1), 74-82. https://doi.org/10.1542/peds.2013-3552

Sigurdson, K. et al. (2019). Racial/ethnic disparities in neonatal intensive care: A systematic review. Pediatrics, 144(2). https://doi.org/10.1542/peds.2018-3114

Learner Objectives:

At the end of the course participants will identify:

1) The difference between implicit and explicit bias

2) At least 2 NICU inequities

3) Strategies to address racism and bias in real time.

Gravens 2024-48

Abstract Title: Inpatient Early Intervention Services and Therapy Adherence in NICU Graduates

Authors: Carley Preslar, Kara Butler, Alena Calderon, Iesha Smith, Elizabeth Woodcock, Beth Ammons, Brandi Spires, Mobolaji Famuyide

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Problem Statement:

Therapy services (Occupational [OT], Physical [PT], and Speech Therapies [ST]) are widely recommended for Neonatal Intensive Care Unit (NICU) patients after discharge to optimize neurodevelopmental outcomes. These NICU graduates stand to benefit from beginning these outpatient therapy services promptly after NICU discharge (Blackman, 2002; Scherzer et al., 2012; Butera et al., 2022). The Early Intervention Program (EIP) for Infants and Toddlers With Disabilities, or Part C of the Individuals With Disabilities Education Act (IDEA), is a federal grant program that assists states in implementing statewide systems of coordinated, comprehensive, multidisciplinary, interagency programs and making early intervention services available to children with disabilities, aged birth through two, and their families (https://www2.ed.gov/programs/osepeip/index.html). If states choose, children who are "at risk" of developing a delay or special need that may affect their development or impede their education may also be served. The program has legal frameworks to ensure it prioritizes family involvement and education (Blackman, 2002). Families opt in for enrollment into the program, and each state's EIP provides coordination of community-based support of therapy services for these infants/toddlers. Unfortunately, NICU families have many competing medical and psychosocial demands and in some cases a lack of knowledge on infant development, which may create a barrier to therapy adherence (Ying Choo et al., 2019) and program uptake. These barriers to adherence underscore the importance of counselling and education prior to NICU discharge. The NICU at Children's of Mississippi is a level IV unit in an academic medical center, based in a rural and underserved state. An EIP district and limited EIP staff are embedded in the NICU. This allows for program enrollment for eligible infants prior to hospital discharge with a goal of coordinating a seamless transition into community-based services. Due a perceived disparity in outpatient therapy adherence, our group developed a quality improvement (QI) project to increase program uptake and reduce disparity in therapy adherence for eligible infants, at the first NICU developmental follow up clinic appointment.

Abstract:

Methods: The Division of Newborn Medicine at the University of Mississippi Medical Center (UMMC) has a newborn developmental follow up clinic that serves the entire state. NICU graduates return for their first developmental follow up visit at 4 months corrected gestational age and are seen by a neonatologist, therapists, and other support teams as indicated. To obtain baseline data for the QI initiative, a multidisciplinary team performed chart reviews of clinic patients returning for their first developmental clinic follow up appointment. The team reviewed inpatient EIP services (including developmental assessment, parent education, and service coordination) to determine what services optimize adherence to outpatient therapy services (OT PT ST) at the first NICU follow up clinic appointment. They developed a key driver diagram and have identified some change ideas for PDSA cycles.

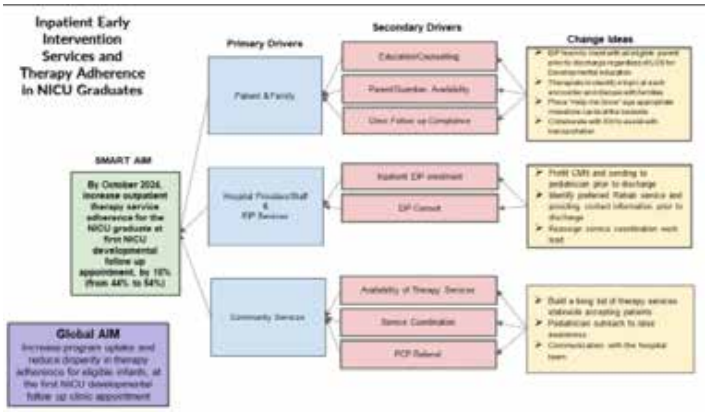
Baseline Data: Over a 6-month period from, April 2023–October 2023, a total of 45 NICU patients who had been discharged and were recommended to receive immediate outpatient therapy were identified. Of the 45 patients, 39 (87%) returned for the clinic appointment and are included in the baseline data (Table 1).

If patients were receiving the therapies that were recommended at NICU discharge, they were considered to be adhering to recommended therapy services. Patients who were recommended to receive outpatient therapy at the time of discharge from the NICU are divided into 2 groups: Group 1) Enrolled into Early Intervention program and received an evaluation and/or EI services during NICU admission (EI Group); and Group 2) No contact with the inpatient EI team, but medical records were sent to PCP to make a referral for therapy (non-EI group). Sixty nine percent of the patients in group 1 (EI group) were receiving outpatient therapy at the time of their first NICU developmental follow up clinic appointment, compared to 26% of those in the non-EI group. Despite exposure to EI services and EIP enrolment in the NICU, 31% of the patients in this cohort were not receiving recommended outpatient therapy services at clinic follow-up. There is a significant relationship between the two groups, NICU graduates in the inpatient EI group (group 1) are more likely than those in the non-EI group (group 2) to adhere to outpatient therapy services, X^2 (1, N = 39) = 6.985, p =.008).

	Group 1 (EI Group) N=16	Group 2 (non-EI group) N=23	Total N=45
Adhered to Therapy	11 (69%)	6 (26%)	17 (44%)
Did not Adhere to Therapy	5 (31%)	17 (74%)	22 (56%)
Total	16 (41%)	23 (59%)	39 (100%)

Conclusion: We present baseline data for a quality improvement project to increase program uptake and reduce disparity in outpatient therapy adherence for eligible infants, at the first NICU de-

velopmental follow up clinic appointment. The data suggests that infants with exposure to the early intervention team, family education, and direct referrals for therapy services prior to discharge have a higher likelihood of adherence to outpatient therapy services at their first developmental follow up clinic visit. To optimize neurodevelopmental outcomes, it is recommended that outpatient therapy services begin promptly after NICU discharge. Our team has begun implementation of this quality improvement initiative and will continue to work on change ideas using PDSA cycles.



References:

Scherzer, A., Chhagan, M., Kauchali, S., & Susser, E. (2012). Global perspective on early diagnosis and intervention for children with developmental delays and disabilities. Developmental Medicine Child Neurology, 54(12): 10.1111/j.1469-8749.2012.04348.x. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3840420/

Choo, Y., Agarwal, P., How, C., & Yeleswarapu, S. (2019). Developmental delay: identification and management at primary care level. Singapore Med J.,60(3):119-123. doi: 10.11622/smedj.2019025. PMID: 30997518; PMCID: PMC6441684. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6441684/

Blackman, J. (2002). Early Intervention: A Global Perspective. Infants and Young Children, 15 (2); 11-19.

Butera, C., Rhee, C., Kelly, C., Dhollander, T., Thompson, D., Wisnowski, J., Molinini, R., Sargent, B., Lepore, N., Vorona, G., Bessom, D., Shall, M., Burnsed, J., Stevenson, R., Brown, S., Harper, A., Hendricks-Muñoz, K., Dusing, S. (2022). Effect of a NICU to Home Physical Therapy Intervention on White Matter Trajectories, Motor Skills, and Problem-Solving Skills of Infants Born Very Preterm: A Case Series. J Pers Med., 7;12(12):2024. https://pubmed.ncbi.nlm.nih.gov/36556244/

Learner Objectives:

1) Identify barriers to outpatient therapy service adherence for the NICU graduate
2) Recognize interventions that increase adherence to outpatient therapy services

Gravens 2024-49

Abstract Title: Infant Driven Feeding™: Impact on Short and Long- Term Breast Feeding Success, Length of Stay, and Earlier Gestational Age to Full Feeds for Premature Infants

Authors: Renee Bloom MSN, RNC-NIC; Anne Verna BSN, RNC-NIC; Dee Dee Woodyard, MSOT; Stephen Spurr, MB, ChB, FAAP

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Problem Statement:

The study compared short- and long-term outcomes for infants fed via a traditional, volume based, Neonatal Intensive Care Unit (NICU) feeding protocol and infants fed using the Infant Driven Feeding™ (IDF) protocol. IDF approach improves short- and long-term breastfeeding rates, decreases length of stay, earlier gestational age to full oral feeds, and fewer referrals to Speech and Occupational therapy.

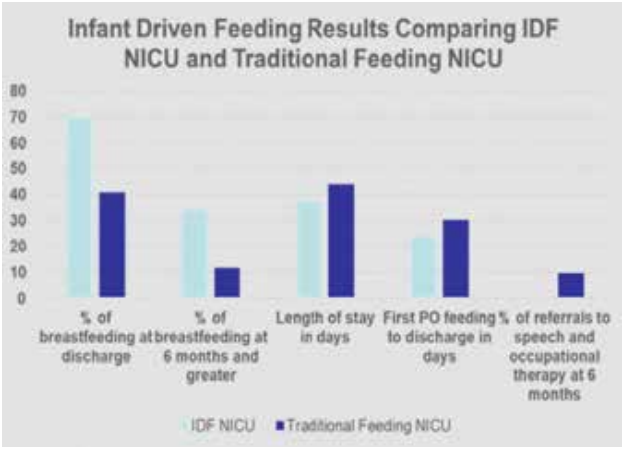
Abstract:

Design: Quasi-experimental study. Settings: Two NICUs, one using traditional feeding methods (control group) the other using IDF™ (intervention group). Participants: Ninety-nine study participants between 28- and 33.6-weeks gestational age; 49 in the traditional feeding group and 50 in the IDF™.

Methods: A retrospective review of electronic health records was conducted. Post-discharge surveys were administered at 3, 6, and 12 months.

Results: The control group's average length of stay (LOS) was 44.1 days compared with the IDF Group LOS of 37.4 days. Days from feeding initiation to discharge were significantly fewer in the IDF group (23 vs. 31 days, p=0.01). The IDF group reached full feeds at an earlier gestational age. Rates of protected breastfeeding, breastfeeding attempts, and breastfeeding at discharge were significantly higher in the IDF group. Infants on the IDF Protocol were 4 times more likely to be breastfeed at 6 months (Odd Ratio 3.9). Referrals to Speech Therapy and Occupational Therapy at 6 and 12 months were significantly higher in the control group (p=0.048 and p=0.05).

Conclusion: The IDF group experienced shorter LOS, earlier gestational age to full oral feeds, increased short- and long-term (>6months) breastfeeding rates, and fewer referrals to Speech and Occupational Therapy.



References:

Casey, L., Fucile, S., & Dow, K. E. (2018). Determinants of Successful Direct Breastfeeding at Hospital Discharge in High-Risk Premature Infants. Breastfeeding Medicine, 13(5), 346–351. https://doi.org/10.1089/bfm.2017.0209

Lane, A., Pacella, J., Beal, J. R., Sahmoun, A. E., Fedo-Rosvold,

S., Bellas, W. M., & Brower-Breitwieser, C. (2021). A cross-sectional analysis of infant-driven and traditional feeding outcomes for neonatal intensive care unit infants. Journal of Perinatology : official journal of the California Perinatal Association, 41(8), 1865-1872. https://doi.org/10.1038/s41372-021-01084-9

McFadden, A., Fitzpatrick, B., Shinwell, S., Tosh, K., Donnan, P., Wallace, L. M., Johnson, E.,MacGillivray, S., Gavine, A., Farre, A., & Mactier, H. (2021). Cue-based versus scheduled feeding for preterm infants transitioning from tube to oral feeding: the Cubs mixed-methods feasibility study. Health technology assessment (Winchester, England), 25(74), 1-146.https://doi.org/10.3310/hta25740

Jiang, X., & Jiang, H. (2022). Factors associated with post NICU discharge exclusive breastfeeding rate and duration amongst first time mothers of preterm infants in Shanghai: a longitudinal cohort study. International breastfeeding journal, 17(1), 34.https://doi.org/10.1186/s13006-022-00472-x

Learner Objectives:

1. Explain the results of a research study comparing Infant Driven Feeding™ and traditional feeding.
2. Describe the advantages of Infant Driven Feeding™ including shorter length of stay and sustained breastfeeding, based on study findings

Gravens 2024-50

Abstract Title: Moving Forward from the Past with Equity, Inclusion and Cultural Humility: Contemporizing the Neonatal Intensive Care Unit (NICU) Family Centered Care Model

Authors: Beatrice Lechner, MD; Katheleen Hawes, PhD, APRN; Stephanie Kukora, MD

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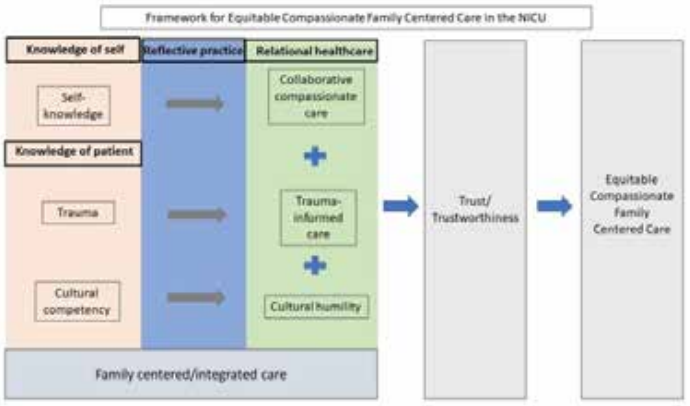
Problem Statement:

1. This is a proposed theoretical framework of NICU Family Centered Care (FCC) to address the lack of the key elements of equitable, inclusive, and culturally humble care in current FCC models.

2. Some families face the additional challenge of race- and ethnicity-based outcome disparities when their infants are in the NICU, which are not addressed within the current family-centered/integrated care framework. The adoption of an updated model of NICU family-centered care that focuses on specific aspects contributing to healthcare disparities may lead to improved parent and infant outcomes in the neonatal ICU.

Abstract:

In this session we will argue that existing NICU family-centered care models, which are currently utilized for provision of psychosocial support to families, lack the key elements of equity, inclusion, and cultural humility. These models were conceived to support families in navigating the stressful life event of an infant's NICU admission. Their development, however, occurred in an era prior to recognition of the medical field's systematic shortcomings in providing equitable care and their impact on disparities in outcomes for marginalized communities; thus, they do not include cultural or equitable healthcare considerations. Subsequent trauma informed care frameworks mention cultural awareness and competence but fail to delve into sufficient detail or provide practical guidance. While cultural competence is recommended in some frameworks, the concept of cultural humility is not explored.



Given the significant neonatal care inequities experienced by various marginalized groups based on race, ethnicity, immigrant status, limited English proficiency status, LGBTQ+ status and others, incorporating the experience of these patients in a thoughtful, targeted manner in family centered care frameworks is of critical importance in order to ensure culturally humble and thus more just and equitable treatment. In this session we will review the past approaches to family-centered care in the NICU and propose a novel, updated framework which integrates knowledge of self and of the patient and reflective practice as key steps necessary for the development of trustworthiness and trust in the patient-provider relationship. We will engage the audience elucidating strategies to improve psychosocial outcomes for marginalized families.

Conclusions: Incorporating equity as an essential building block in the family-centered/integrated care framework will fill a significant gap in our approach to the provision of psychosocial support in the NICU. The addition of cultural humility to the framework will provide a much-needed focus on the current gaps in care that lead to inequitable care in the NICU. Provision of equitable compassionate family-centered, supportive, psychosocial care to NICU families will address gaps that the existing models have omitted. Given the updated model's focus on specific aspects contributing to healthcare disparities, its adoption may lead to improved outcomes for parents and infants.

Selected Bibliography:

Lown BA, McIntosh S, Gaines ME, McGuinn K, Hatem DS. Integrating Compassionate, Collaborative Care (the "Triple C") Into Health Professional Education to Advance the Triple Aim of Health Care. Acad Med 2016; 91(3): 310-6.

Profit J, Edwards EM, Pursley D. Getting to health equity in NICU care in the USA and beyond. Arch Dis Child Fetal Neonatal Ed 2023; 108(4): 326-31.

Sanders MR, Hall SL. Trauma-informed care in the newborn intensive care unit: promoting safety, security and connectedness. J Perinatol 2018; 38(1): 3-10.

Tervalon M, Murray-Garcia J. Cultural humility versus cultural competence: a critical distinction in defining physician training outcomes in multicultural education. J Health Care Poor Underserved 1998; 9(2): 117-25Torr C. Culturally competent care in the neonatal intensive care unit, strategies to address outcome disparities. J Perinatol 2022; 42(10): 1424-7.

Learner Objectives:

1. Explain the results of a research study comparing Infant Driven Feeding™ and traditional feeding.
2. Describe the advantages of Infant Driven Feeding™ including shorter length of stay and sustained breastfeeding, based on study findings

Gravens 2024-51

Abstract Title: Fostering Organizational Trust: Transformative Meeting Strategies for Reducing Healthcare Burnout and Turnover

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Problem Statement/Abstract:

A significant organizational culture issue has emerged where half of healthcare providers report feelings of burnout, leading to turnover within organizations. This not only affects the well-being of healthcare professionals but also jeopardizes the quality of patient care. The current organizational culture in healthcare settings is often strained, with healthcare providers feeling disengaged, overwhelmed, and disconnected. Addressing this challenge is critical, as it not only impacts the morale and productivity of healthcare professionals but also jeopardizes the continuity and quality of healthcare services provided.

Effective meeting management has been identified as a potential catalyst for transforming the healthcare organizational culture. By emphasizing the crucial elements of connection, belonging, and inclusion, these meetings have the power to foster a sense of community among teams. There is a pressing need to reevaluate and redesign the way meetings are conducted. The aim is to create a supportive and inclusive environment where individuals feel valued, connected to their colleagues, and motivated to contribute effectively. Such a transformation can significantly mitigate burnout, reduce turnover rates, and ultimately enhance the overall well-being of healthcare professionals while improving the quality of patient care.

References:

Addressing employee burnout: Are you solving the right problem? | McKinsey. (n.d.). Retrieved October 18, 2023, from https://www.mckinsey.com/mhi/our-insights/addressing-employee-burnout-are-you-solving-the-right-problem

Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. Perspectives on Psychological Science, 10(2), 238-249. https://doi.org/10.1177/1745691615570616

De Zulueta, P. (2015). Developing compassionate leadership in health care: An integrative review. Journal of Healthcare Leadership, 1. https://doi.org/10.2147/JHL.S93724Scharmer, C. O. (2018). The essentials of Theory U: Core principles and applications (First edition). BK, Berrett-Koehler Publishers, Inc., a BK Business book.

Learner Objectives:

1. By the end of the workshop, participants will be able to identify key indicators of organizational trust within a healthcare setting, utilizing a checklist of measurable criteria, including active participation rates, open communication channels, and collaborative decision-making processes.
2. Upon completion of the session, participants will have the skills to implement at least three specific meeting strategies aimed at nurturing trust, fostering belonging, and promoting inclusivity. Participants will be able to measure the effectiveness of these strategies through pre-and-post feedback mechanisms, analyzing changes in team dynamics, and assessing levels of employee engagement.
3. Following the workshop, attendees will be capable of developing a customized action plan for their respective healthcare organizations. This plan will include measurable goals related to trust-building initiatives, quantifiable improvements in employee satisfaction scores, and a decrease in burnout rates. Participants will also learn to create metrics for ongoing evaluation, ensuring continuous improvement in organizational trust and well-being.

Gravens 2024-52

Abstract Title: Bundle Implementation to Reduce Unplanned Extubations in the Neonatal Intensive Care Unit

Author: Marie-Helene Owens MSN, RN, RNC-NIC; Janice Wilson DNP, CRNP, NNP-BC, C-ELBW, FAANP; Barbara Wise PhD, RN, CPNP-AC/PC

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Problem Statement:

In a 46-bed, level III Neonatal Intensive Care Unit (NICU), unplanned extubations (UEs) were identified as a problem negatively impacting neonates. As the 4th highest occurring adverse events across NICUs, UEs can lead to prolonged lengths of stay, increased baseline respiratory requirements, increased risk of subglottic stenosis, vocal paralysis and can even lead to death. Compared to the benchmark of less than 1 UE per 100 patient ventilator days, investigation of unit data from January to March 2023 yielded an average incidence rate of 9.9 UEs per 100 patient ventilator days. The current rate of UEs may be higher due to poor unit tracking.

Abstract:

Program and/or Methodology: A NICU interdisciplinary root cause analysis was conducted which identified the lack of an evidence-based approach to UE prevention, lack of standardization for the care of intubated patients, limited multidisciplinary communication and collaboration as well as no objective UE risk identification process. To guide successful implementation, the Framework of Complex Innovation Implementation was used. This project was implemented between August and December 2023. Prior to and during implementation, 140 nurses, 11 RTs and 15 providers were educated and trained on the evidence-based UE prevention bundle using in person, posted and e-mailed staff education. The prevention bundle included the following elements: use of airway alert crib card, an updated UE form, a formal

UE debriefing process, and an objective risk assessment screen (RAS). Selected bundle components were based upon internal site-specific UE contributory factors as well as consistent UE prevention measures noted in the literature. The QI project measures involved completion and documentation of bedside crib card use each shift, completion of the risk assessment score each shift, completion and documentation of post UE debriefings, submission of the UE report forms and adherence to UE documentation in the EHR. Notable changes to staff workflow with implementation included an additional task for updating or completion of the bedside airways alert crib card, taking 2 minutes to complete. Changes to workflow related to the post UE report form involved an additional 5 to 10 minutes post infant stabilization during which the provider, nurse and respiratory therapist would immediately debrief on the event and write down comments for prevention in real time. Pre-project expectations of notifying the charge nurse, updating the patient chart and submitting a safety MIDAS report continued with this project. Airway alert crib card audits were conducted weekly on both shifts by the project lead and project champions. Only the project lead conducted weekly audits on the submitted UE reports. Project data was collected and stored using the HIPAA-compliant RedCap database software. Exported data was de-identified and plotted in run charts to assess adherence to the use of each bundle element and to identify trends requiring additional education. The project was approved by the UMB IRB and the project site's IRB as quality improvement. Data collection for the project will end by 12/15/2023. Since the project's inception, 131 infants were admitted to the NICU, with 26 requiring intubation at some point during their admission (19.8%). Approximately 50 infants are expected to benefit from implementation of the UE bundle. Weekly bedside audits were completed by the project lead and project champions focusing on adherence to risk calculation and bedside crib card documentation per shift. Weekly audits were also conducted on submitted UE reports which focused on adherence to completion of UE reports, post event debriefing and UE documentation. Quantitative numerical data was collected weekly, reflecting total counts for unit admissions, intubations, and the number of intubated patient days, as well as UE bundle element adherence, completion of RAS scores, number of UE post debriefings, UE documentation in the EHR, use of the updated UE report form, and the overall UE rate percentage. The primary outcome measure is the number of UEs per 100 patient ventilator days, with a goal of less than 1 UE per 100 patient intubation days at the end of the implementation period.

Impact and Results: To date, 60% (n=3) of UEs had UE reports submitted and 40% (n=2) of UEs had a debriefing held. Since project inception, the overall UE rate is 2.63 which is greatly reduced from the pre-implementation UE average of 9.9. No consistent trends have been identified so far for the UEs. Audits have shown that while 81.8% (n=54) of intubated patients had a crib card at bedside, only 28.8% (n=19) had the RAS completed for the shift.

Conclusions: Preliminary conclusions indicate that a UE bundle including bedside crib cards, a risk assessment screen, post event debriefing and UE reports can be implemented in a level III NICU and may help prevent UEs and improve event tracking. Noted barriers include the difficulty of educating a large staff, short staffing as well as the challenges of gaining consistent interdisciplinary buy in. Strategies and tactics used to address improved and consistent bundle adherence included the sharing of weekly audit data and the celebration of successes with shout outs and personal recognition. End of shift education was conducted to improve consistent bundle adherence, and UE project resources were posted in high traffic areas. With the introduction of the risk assessment screen, conversations about standardization of sedation have been stimulated as another potential area for improvement for this patient population. This QI implementation was geared to meet the specific needs of the institution and as such is not generalizable to other NICU populations, but it may serve as a framework for neonatal UE prevention approaches in other institutions.

References:

Klugman, D., Melton, K. R., Maynord, P. O., Dawson, A. G., Madhavan, G., Montgomery, V. L., Nock, M., Lee, A. J., & Lyren, A. (2020). Assessment of an Unplanned Extubation Bundle to Reduce Unplanned Extubations in Critically Ill Neonates, Infants, and Children. JAMA Pediatrics, 174(6), e200268. https://doi.org/10.1001/jamapediatrics.2020.0268

Mahaseth, M., Woldt, E., Zajac, M. E., Mazzeo, B., Basirico, J., & Natarajan, G. (2020). Reducing Unplanned Extubations in a Level IV Neonatal Intensive Care Unit: The Elusive Benchmark. Pediatric Quality & Safety, 5(6), e337. https://doi.org/10.1097/pq9.0000000000000337

Morii, C. (2016). Prevention strategies for unplanned extubation in NICU - A literature review. Journal of Neonatal Nursing, 22(3), 91-102. https://doi-org.proxy hs.researchport.umd.edu/10.1016/j.jnn.2016.03.007

Nelson, M. U., Pinheiro, J. M. B., Afzal, B., & Meyers, J. M. (2022). Experiences of a Regional Quality Improvement Collaborative to Reduce Unplanned Extubations in the Neonatal Intensive Care Unit. Children, 9(8), 1180. https://doi.org/10.3390/children908118

Neves, V. C., Ribas, C. C., Miranda, B. V., Bitencourt, E., Koliski, A., Lima, M. N., & Carreiro, J. E. (2020). Effectiveness of a bundle to prevent unplanned extubation in a pediatric intensive care unit: A multidisciplinary approach. Pediatric Dimensions. https://doi.org/10.15761/pd.1000201

Learner Objectives:

1. Identify at least 3 evidence-based interventions to prevent unplanned extubations.
2. Identify at least 3 barriers to successful implementation of a preventative unplanned extubations bundle.
3. Identification of at least 3 positive outcomes of successful implementation of a preventative unplanned extubations bundle.

Gravens 2024-53

Abstract Title: Embedding Diversity, Equity, and Family Centered Care into an Orientation Curriculum

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Problem Statement:

Staff who work in the Neonatal Intensive Care Unit (NICU) prioritize family-centered care and interact with diverse patient/family populations. New NICU staff universally arrive with scant knowledge of the impact of the NICU experience on caregivers

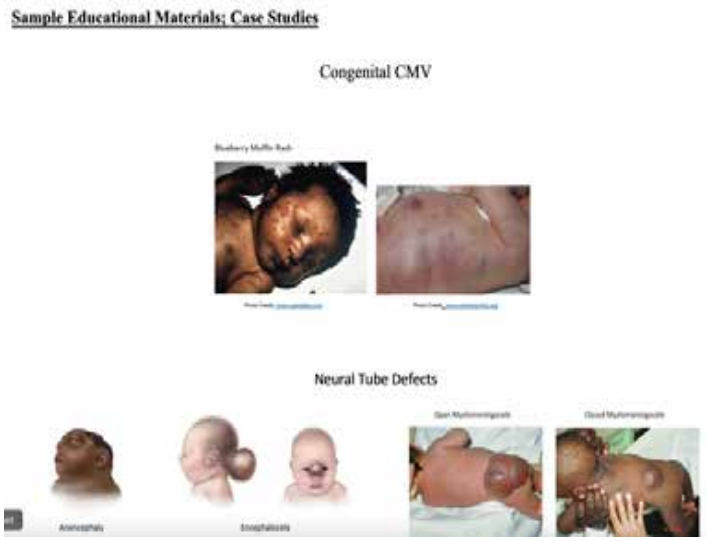
and families as well as lacking racial and cultural competency. These knowledge deficits can significantly impact the family's experience.

Abstract:

Program: The impact of a NICU stay on the caregiver(s) of a newborn is significant and long standing. The quality of the family's experience is inextricably entwined with their interactions with clinical staff. However, collegiate level education programs do not address the unique aspects of the NICU parenting experience. Many clinicians lack racial and cultural competency, which can significantly influence the family's experience and may lead to inequitable outcomes. The concept of racial medical trauma is being increasingly recognized in trauma-informed care frameworks but is not typically part of clinical training or hospital orientation curricula. To provide effective family-centered care in a NICU, a multiracial, multicultural, multigender perspective on parenting is critical. New NICU staff need to be offered specific didactic content to help them understand these concepts, but many hospital orientation programs are inadequate because established hospital educators often lack the training necessary to analyze and revise their current materials to provide a multicultural perspective. For example, if NICU professionals are not taught to perform infant assessments on a variety of skin tones, they may fail to recognize important indicators of clinical deterioration. Microaggressions (i.e., verbal, behavioral, or environmental slights) directed at families and fellow staff members increase stress, decrease trust, impact collaboration, and may cause confusion in the plan of care. After this Unit Based Educator (UBE) completed an upstander training course, a quality improvement project was implemented to evaluate and update the orientation and staff development materials for a 60-bed level 3 NICU. Over the course of 12 months, 21 slide decks, 8 on-line training modules, and 57 case studies/practice reviews were evaluated with an equity-focused lens.

Impact and results: As a result of the review, 7 slide decks and 2 on-line training modules were identified as monocultural; this content was modified with photographs and graphics that depicted diverse populations. Videos of actual families were added to 2 slide decks to present a multicultural perspective.

3 additional slide decks were updated to include information about the family experience in regard to a specific diagnosis.



3 classes were added to the orientation curriculum with the following content: 1. inequities, types of racism, types of bias, and upstander skills; 2. the unique parenting experience in the NICU with a focus on different perspectives; and 3. cross cultural expressions of grief after the loss of a liveborn infant. Racial stratified demographic data, photographs, and graphics were added to case studies, when applicable, to represent diverse populations.

The updated didactic curriculum has been taught to 26 RNs, 2 RTs, and 19 PCAs beginning in July 2021. The updated on-line curriculum has been offered to 51 traveling RN's during the same time period. The stand-alone equity class has been taught to 120 NICU staff members to date. Surveys specific to this content are ongoing. A separate survey was sent to staff in Fall 2023 to determine the impact of the revisions. 100% of respondents stated they agreed or strongly agreed the materials presented were diverse and represented multicultural perspectives.

Conclusions: A review of our NICU's educational materials for staff orientation using an equity lens focused on diversity and multicultural perspectives identified areas of improvement. Modifica-

tion of content was feasible after upstander training. Next steps include asking orientation speakers from other disciplines to evaluate and adjust their content to reflect a multicultural perspective, training additional educators about this approach, and designing an approach to routinely survey staff to ensure diverse perspectives in all of our educational materials.

References:

Akerele, O. et al. (2021). Healing ethno-racial trauma in Black communities. JAMA Psychiatry, 78(7), 703. https://doi.org/10.1001/jamapsychiatry.2021.0537

Cabanas, A. M. et al. (2022). Skin pigmentation influence on pulse oximetry accuracy: A systematic review and Bibliometric analysis. Sensors, 22(9), 3402. https://doi.org/10.3390/s22093402

Cénat, J. M. (2020). How to provide anti-racist mental health care. The Lancet Psychiatry, 7(11), 929-931. https://doi.org/10.1016/s2215-0366(20)30309-6

Chavez-Dueñas, N. Y. et al. (2019). Healing ethno-racial trauma in Latinx immigrant communities: Cultivating hope, resistance, and action. American Psychologist, 74(1), 49-62. https://doi.org/10.1037/amp0000289

Comas-Díaz, L., et al. (2019). Racial trauma: Theory, research, and healing: Introduction to the special issue. American Psychologist, 74(1), 1-5. https://doi.org/10.1037/amp0000442

Massie, J. P. et al. (2019). Patient representation in medical literature. Plastic and Reconstructive Surgery - Global Open, 7(12). https://doi.org/10.1097/gox.0000000000002563

Learner Objectives:

1) Embed caregiver voice in every component of an orientation program
2) Assess images, text, language, and descriptors within current materials to discern equity in representation for minoritized groups and caregiver constellations to eliminate bias.
3) Develop stand-alone equity focused content

Gravens 2024-54

Abstract Title: Acoustic Characteristics of Recorded Mother's Voice During the Preterm Period

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Problem Statement:

Mothers from cultures around the world make innate acoustic modulations when speaking and singing to infants which facilitate learning and emotional connection. Preterm infants, however, experience decreased access to their mother's voice, in part due to systemic barriers to parental presence in the NICU. High-quality recordings of mother's voice may provide an alternative to live mother's voice when mothers cannot be present; however, it is unclear whether mothers of preterm infants can modulate their voice to provide infant-directed language when not with their infant.

Abstract:

In this prospective observational cohort study, mothers of preterm infants (N=44) were recorded speaking and singing in a quiet room outside of the NICU where their infant was not present.

Mothers recorded Twinkle, Twinkle Little Star across three conditions: adult-directed speech (ADSpeech), infant-directed speech (IDSpeech), and infant-directed singing (IDSinging) and were guided in a protocol to simulate the mindset they are in while with their infant. This protocol utilized a modified emotional expression strategy as employed in the Family Nurture Intervention. Mothers also completed the Mother-to-Infant Bonding Scale, Baby Care Questionnaire, and Edinburgh Postnatal Depression Scale to measure bondedness, attunement (reliance on baby cues), and depression. Acoustic parameters frequently assessed in infant-directed language to term and older infants were assessed including fundamental frequency (f_0) metrics, durational contrasts, and relative intensity. Parameters were compared using Friedman's test followed by pairwise comparisons with Bonferroni correction. Acoustic parameters significantly different between speech conditions were then correlated with mothers' questionnaire scores using linear or logistic regression.

Results: Mothers of preterm infants differentially modulate their voices when speaking or singing in an infant-directed style compared to ADSpeech, even when their infant is not present for the recording (Table 2).

Significant differences were found in all acoustic measures except variability of pause time. Pairwise comparisons revealed differences between ADSpeech/IDSpeech with mothers having significantly higher and more variable pitch with a greater range in IDSpeech, but there was no difference in production rate. During IDSinging, mothers demonstrated significantly higher pitch, greater pitch variability, and larger pitch range compared to IDSpeech. They also produced a significantly slower rate with less variability in word duration, likely due to the rhythmic structure of the melody. Lower perceived bondedness, attunement, or depression did not decrease mothers' ability to modulate their voice (all p>.05).

Table 1: Demographics

Maternal Characteristics*	N=44
Maternal Age at Recording	30 (25, 34)
Days Postpartum at Recording	35 (24, 51)
Infant Gestational Age at Birth	28w4d (26w5d, 30w3d)
Infant PMA at Recording	34w2d (32w6d, 35w0d)
Multiples Gestation	5 (11)
Maternal Education	
7-9th Grade	2 (4.5)
10-11th Grade	4 (9)
HS Diploma/GED	11 (25)
Partial College/Trade School	9 (20)
College	6 (14)
Graduate School	10 (23)
Unknown	2 (4.5)
Maternal Employment Status	
Unemployed (>1 year)	1 (2)
Unemployed (<1 year)	8 (18)
Disabled or otherwise unable to work	2 (5)
Part time work (<30 hr/week)	3 (7)
Full time work (>30 hr/week)	17 (39)
Stay at home parent	9 (20)
Student	1 (2)
Unknown	3 (7)
Mother-to-Infant Bonding Scale (MIBS), n(%)[1]	
Score ≤1	33 (83)
Score ≥2	7 (17)
Baby Care Questionnaire (BCQ) – Attunement[2]	3.06 (2.94, 3.24)
Edinburgh Postpartum Depression Scale (EPDS)[3]	5 (3, 9)
Range	0-22

*Median(IQR); n(%)
[1]MIBS: assesses maternal feelings of bondedness with their child (Taylor 2005).
Score ≤1 – considered to be appropriately bonded; score ≥2 – at risk for impaired bonding
[2]BCQ: assesses degree of parental reliance on structure and/or attunement (reliance on baby cues) by assessing parental beliefs surrounding sleeping, feeding, and soothing (Winstanley 2013)
[3]EPDS: ten-question screening tool indicating whether a parent is experiencing symptoms consistent with depression during the first year after birth.
Score ≥10 – risk for postpartum depression (Cox 1987)

Table 2: Acoustic Parameter Comparisons, Median(IQR)

Characteristic	ADSpeech	IDSpeech	IDSinging	Full Model X^2; p-value[1]	ADSpeech/ IDSpeech Z; p-value[1]	IDSpeech/ IDSinging Z; p-value[1]
Mean f0 (Hz)[2]	177 (168, 190)	198 (187, 212)	245 (226, 267)	80.318; <.0001	-4.157; <.0001	-4.797; <.0001
Variability f0[2]	355 (293, 491)	798 (578, 1542)	1443 (1103, 1786)	58.136; <.001	-4.584; <.0001	-2.985; .009
Range f0 (Hz)[2]	121 (100, 153)	158 (134, 198)	186 (160, 207)	35.773; <.001	-3.305; .003	-2.665; .023
Speech Production Rate (seconds/word)[3]	.42 (.37, .47)	.45 (.42, .53)	.77 (.71, .86)	68.045; <.001	-2.239; .076	-5.756; <.0001
Word Duration nPVI[4]	70.42 (65.86, 74.70)	68.88 (64.79, 73.48)	45.76 (43.51, 50.42)	60.545; <.001	.640; 1	6.396; <.0001
Pause Duration nPVI[4]	95.71 (80, 119.80)	106.37 (93.33, 131.94)	112.93 (97.76, 122.23)	3.170; .205	-	-
Relative Intensity (dB)[5]	70 (67, 72)	69 (68, 72)	74 (71, 75)	39.409; <.001	0; 1	-5.437; <.0001

[1]Related-Samples Friedman's Two-Way ANOVA by Ranks, p<.05 significance level; Pairwise Comparisons with Bonferroni correction

[2]f0: Fundamental frequency, the lowest frequency of a periodic waveform; perceived as pitch

[3]Speech Production Rate: measures the rate of speaking/singing including intentional hesitations, pauses, and other emotional expressions

[4]nPVI: normalized Pairwise Variability Index – measurement of average variation in a successive, ordered set of events; used to assess the rhythmic variability of words and intra-phrase pause time

[5]Relative Intensity: Logarithmic transformation of intensity to reflect human perception of loudness

Conclusion: Mothers of preterm infants modulate their voices during elicited IDSpeech and IDSinging. Recordings of mothers' IDSpeech and IDSinging may be a valuable tool for preterm infants in the NICU, particularly when parents are unable to be at bedside; further research is needed to understand how recorded mothers' voice may best facilitate learning, regulation, and emotional connection.

References:

Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. The British journal of psychiatry. 1987 Jun;150(6):782-6. 10.1192/bjp.150.6.782

Taylor A, Atkins R, Kumar R, Adams D, Glover V. A new Mother-to-Infant Bonding Scale: links with early maternal mood. Arch Womens Ment Health. 2005 May;8(1):45-51. doi: 10.1007/s00737-005-0074-z

Winstanley A, Gattis M. The Baby Care Questionnaire: a measure of parenting principles and practices during infancy. Infant Behav Dev. 2013 Dec;36(4):762-75. doi: 10.1016/j.infbeh.2013.08.004

Learner Objectives:

To characterize the acoustic properties of elicited infant-directed speech and singing of mothers of preterm infants during the preterm period.

To correlate mothers' acoustic modulations with the degree of maternal bondedness, attunement, and depression.

Gravens 2024-55

Abstract Title: Is Early Kangaroo Care Safe in Preterm Infants under 28 weeks?

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Problem Statement:

The Kangaroo Care is the basic piece for the care of premature infants. But in the first days of life, there are doubts about its safety and the best way to carry it out in extremely premature infants. We need studies that provide evidence.

Abstract:

Introduction: The protective effects of Kangaroo mother care (KC) on the neurodevelopment of preterm infants are well established, but we do not know whether the KC is safe or not on infants under 28 weeks gestation in the first days of life. Aims: To describe safety in early KC on preterm infants under 28 postmenstrual weeks.

Methods: This study is part of a primary randomized parallel clinical trial conducted to evaluate the equivalence or non-inferiority of lateral kangaroo care posture versus prone conventional posture. RCT was conducted at the NICU of the 12 de Octubre University Hospital (Madrid, Spain), from May 2019 to November 2021. A total of 105 infants < 28 GE at birth were assessed for eligibility; 35 of them were excluded, and 70 were enrolled. During their first 5 days of life, all KC sessions were monitored. All infants in KC were inside polyethylene bags to keep humidity and decrease hypothermia risk but keeping the maximal skin-to-skin contact. Ethics Considerations: The Clinical Research Ethics Committee of the Hospital 12 de Octubre approved the study (no. CEIM 19/206). Informed consent was obtained from parents of all subjects involved in the study.

Results: During the study, 285 sessions of KC were taken throughout the first 5 days of life. The main results are shown in Table 1.

Of the 285 sessions studied, 78% took place in a single room (SR) and 22% in an open bay room (OB). An umbilical catheter was carried in 60% of the sessions (168/285) and peripherally inserted central catheter in 58% (165/285). In 5.6% (16/285) of the sessions, children were intubated, and 94,4% were assisted on duopap /cpap. Two of the sessions lasted only 60 min due to temperatures < 36,5ºC and an accidental extubation occurred. In 80% (228/285) transference was performed by a health professional, and in 20% (57/285) by the parents. Ultrasound follow-up detected 8.5% (6/70) of IVH I and 4.3% (3/70) of IVH II. Activity in the room during the kangaroo sessions was measured using the Profile of the Nursery Environment and of Care Components Template Score Sheet. When children were in the SR, the activity was calmer and more quiet (>4–5) than OB (66% vs. 90.3% p< 0.005), as light and noise were softer (6.8 lux vs 3.7 lux p<0.005) and (62 dB vs 58 dB p<0.005).

N=70	Media	DS	Min- Max
EG (wk)	26,2	1,2	24-27,8
Weigth (g)	859 ± 63	196	510-1460
Apgar 5 min < 4	7 (10%)	2,3	2-10
Days of admission	52,17	24	3-141
Sex (male)	46(65,7%)		
C- section	39(55,7%)	8,2	
Hours of life of the 1st KC	38,1		8-99
Duration of KC sessions (min)	130	56	50 – 365
Oxygen saturation	95%	3,4	
Oxygen supplementation %	25,4	8,5	
Heart rate	153	12	
T° 60 min after begining KC	36.7 ºC	0,4	
Infants with apneas during the first KC session, % (n)	30 % (21/70)		

Conclusions: Our findings suggest that extremely preterm infants remain stable during the kangaroo care in their first days of life. The kangaroo care is safe with vascular devices and intubated. All IVH cases were grade 1 or 2. No cases of severe IVH occurred. There are more IVH events in prone kangaroo position than in lateral position. If KC takes place in a single room, children are surrounded by less activity and a more appropriate noise and light level.

CANGULAT study trial registration at clinicaltrials.gov: NCT03990116

Learner Objectives:

- Reflecting on the importance of the first moments in the life of a premature child
- To show that early kangaroo care is possible and safe in extremely premature infants.

Gravens 2024-56

Abstract Title: Zero-separation in intensive care—Neonatal and obstetric healthcare professionals´ expectations, concerns, and educational needs related to mother-newborn: A qualitative study

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Problem Statement:

In preparation for implementing a zero-separation intervention in family rooms for keeping sick newborns, mothers, and partners together, we aimed to include and assess the expectations, concerns, and educational needs of healthcare professionals (HCPs).

Abstract:

Background: Previous studies have demonstrated the beneficial effects of zero-separation for newborns, mothers, and partners (1). However, many of these studies have focused on less intensive settings, necessitating the need for insights into successful implementation in intensive settings. In preparation for implementing a zero-separation intervention in family rooms for keeping sick newborns, mothers, and partners together, we aimed to include and assess the expectations, concerns, and educational needs of healthcare professionals (HCPs). Additionally, we aimed to strengthen collaboration between the neonatal and obstetric departments as part of an implementation process. This study is part of the prospective implementation process and is based on curriculum development principles and implementation theory (2,3).

Methods: Four focus group interviews were conducted in June 2023 with neonatologists, obstetricians, midwives, and nurses (n=21) from the Department of Neonatology (level IV) and the Department of Obstetrics at Copenhagen University Hospital - Rigshospitalet. The data were analyzed using reflexive thematic analysis.

Preliminary Results: Five preliminary themes related to HCPs expectations, concerns, and educational needs emerged. The overarching theme was Building bridges, and the underlying themes were (1) A desire for increased collaborative teamwork, (2) Comfort zone inside/outside, (3) A notion of the other, and (4) Educational needs. Further four preliminary sub-themes were identified.

Conclusion: HCPs support zero-separation in family rooms and emphasize the importance of fostering closer teamwork among neonatal and obstetric departments. Their primary concerns encompass patient safety, the quality of treatment and care, as well as matters related to social security and professional boundaries for HCPs. This knowledge is useful for other departments implementing zero-separation.

References:

1. *Klemming, S., Lilliesköld, S., & Westrup, B. (2021). Mother-Newborn Couplet Care from theory to practice to ensure zero separation for all newborns. Acta Paediatrica. https://doi.org/10.1111/apa.15997*
2. *Damschroder, L. J., Reardon, C. M., Widerquist, M. A. O., & Lowery, J. (2022). The updated Consolidated Framework for Implementation Research based on user feedback. Implementation Science, 17(1), 75. https://doi.org/10.1186/s13012-022-01245-0*
3. *Thomas, P. A., Kern, D. E., & Hughes, M. T. (2022). Curriculum Development for Medical Education: A Six-Step Approach (4th ed.). Johns Hopkins University Press.*

Learner Objectives:

1. Insights into HCPs context concerning implementation of zero-separation in intensive care.
2. Strengthen collaboration between the neonatal and obstetric departments as part of an implementation process.

Gravens 2024-57

Abstract Title: Architectural design, facilities, and family participation in neonatal intensive care units in Spain: a nationwide, multicentre study.

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Problem Statement:

The aim of this study was to assess the architectural design of neonatal units in Spain and to evaluate the impact of this design on the participation of parents in neonatal care. Our working hypothesis is that unit designs are widely variable, and that this can have an impact on the development of developmental strategies and participation of parents in different aspects of care.

Abstract:

Program and methodology: The design and architecture of neonatal units plays a key role in the implementation and success of developmental strategies. The physical environment is a crucial factor for the brain development of newborns, and it is considered a core measure for neuroprotective family-centered developmental care. However, the structural design of neonatal units is frequently outdated and rarely responds to a developmental design. Thus, there is a tendency in Spain to renovate the architecture of NICUs to incorporate evidence into design and to allow the family presence in the units. The aim of this study was to assess the architectural design of neonatal units in Spain and to evaluate the impact of this design on the participation of parents in neonatal care. We designed an observational, multi-centre study including level III neonatal units in Spain (admitting preterm newborns of at least 28 weeks). A web-based survey was sent in February 2023 to all units, with 48 questions organized in 4 sections: general hospital and NICU data, NICU architectural design, facilities and practices, and family participation in neonatal care. The questionnaire was designed jointly by a neonatologist trained in developmental care and an architect specialist in neonatal unit architecture. A descriptive analysis of the data was performed summarizing the individual responses, and comparison between different units were made for outcomes regarding participation of parents in neonatal care.

Results: 64 neonatal units were finally included, with a response rate of 82.1% (64/78), of which 26% (17/64) were level IIIa (admitting preterm infants >28 weeks), 55% (35/64) were level IIIb (admitting preterm infants <28 weeks, neonatal surgery) and 19% (12/64) were level IIIc (admitting preterm infants <28 weeks, neonatal surgery, cardiac surgery, ECMO and pediatric transplant program). Most units were built between 1965 and 1985, and since their opening, 75% (45/64) had been fully or partially renovated, with an upward trend towards more renovation work in recent years (2020–2022) (Figure 1).

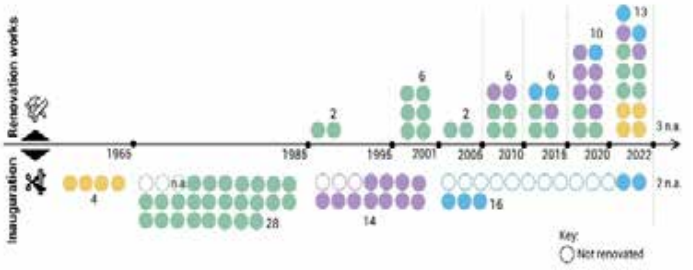

Figure 1 Cronobuilding[R] of Spanish NICUs according to the inauguration and the last renovation years. Data from 2 NICUs was not available for the inauguration. Data from 1 NICU was not available for the renovation period.

Most units (85.9%) had open bay units, while 53.1% had at least 1 individual box, and family rooms, defined as those including enough space and furniture for family members to permanently stay and live with the infant during the admission, were available in 8 units (10.3%). None of the level IIIa units had single-family rooms (SFR) for intensive care patients; in level IIIb units, 9% (3/35) had at least 1 SFR for patients in intensive care, and the percentage rose to 42% (5/12) in level IIIc units (Table 1).

Unit level	Open bay	Individual box	SFR
IIIa	14/17 (82.3%)	7/17 (41.1%)	0/17 (0%)
IIIb	30/35 (85.7%)	21/35 (60.0%)	3/35 (8.6%)
IIIc	11/12 (91.7%)	6/12 (50.0%)	5/12 (41.7%)

Eighteen units (28.1%) had a structured program of family education or parental courses. Units that had single family rooms were more likely to have parental participation in rounds (p<0.01), in safety protocols (p=0.02), in FiO_2 management (p<0.01) and in nasogastric tube feeding (p=0.02). When asked about a hypothetical new design for their units, most respondents stated that they would choose a unit with all individual boxes or family rooms, or a mix of individual boxes or family rooms and open bay rooms with multiple patients.

Conclusion: Widely variable architectural designs and policies can be found in Spanish neonatal units, with most units lacking a developmentally-oriented structural design. The presence of individual or family rooms impacts the participation of parents in neonatal care. Research on the physical environment of NICU could contribute to informing policymakers on the current situation in Spain.

References:

Soleimani F, Azari N, Ghiasvand H, Shahrokhi A, Rahmani N, Fatollahierad S. Do NICU developmental care improve cognitive and motor outcomes for preterm infants? A systematic review and meta-analysis. BMC Pediatr. 2020 Feb 13;20(1):67.

Zanoni P, Scime NV, Benzies K, McNeil DA, Mrklas K; Alberta FICare in Level II NICU Study Team; Alberta FICare™ in Level II NICU Study Team. Facilitators and barriers to implementation of Alberta family integrated care (FICare) in level II neonatal intensive care units: a qualitative process evaluation substudy of a multicentre cluster-randomised controlled trial using the consolidated framework for implementation research. BMJ Open. 2021 Oct 18;11(10):e054938.

Zana-Taïeb E, Sizun J, Kuhn P, Reynaud A; GREEN study group from the French Neonatal Society. Practical recommendations on room sizes for hospitalised newborn infants and their families based on a systematic review of the literature. Acta Paediatr. 2022 Jun;111(6):1109-1114.

Vohr B, McGowan E, McKinley L, Tucker R, Keszler L, Alksninis B. Differential Effects of the Single-Family Room Neonatal Intensive Care Unit on 18- to 24-Month Bayley Scores of Preterm Infants. J Pediatr. 2017 Jun;185:42-48.e1.

O'Callaghan N, Dee A, Philip RK. Evidence-based design for neonatal units: a systematic review. Matern Health Neonatol Perinatol. 2019 Apr 30;5:6.

Mosqueda R, Castilla Y, Perapoch J, Lora D, López-Maestro M, Pallás C. Necessary resources and barriers perceived by professionals in the implementation of the NIDCAP. Early Hum Dev. 2013 Sep;89(9):649-53.

Learner Objectives:

- Learn about the wide variety of different structural designs used in Spanish NICUs.
- Understand how the different architecture and structure of the units can affect the possibilities for parents to participate and get involved in neonatal care.

Gravens 2024-58

Abstract Title: Examining Measures of Family-Centered Care

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Problem Statement:

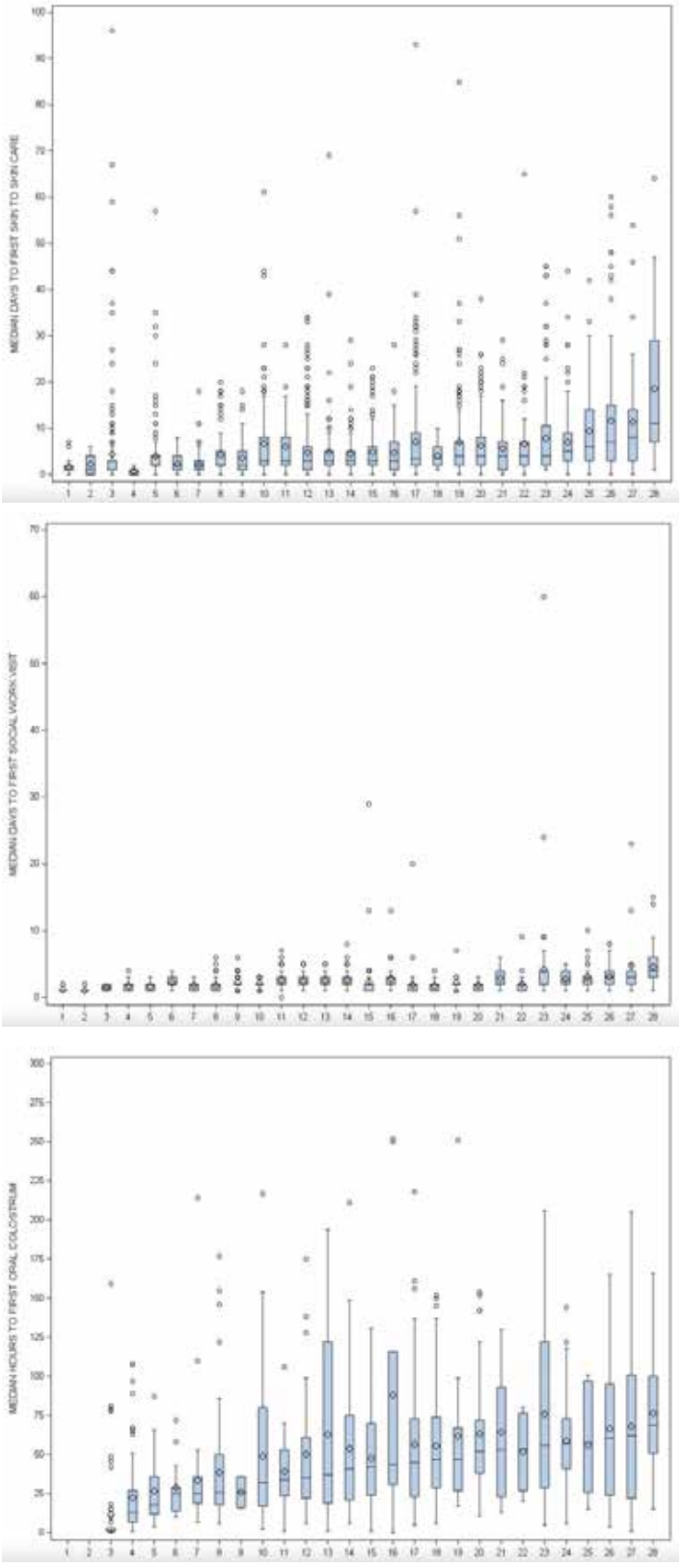
Family-centered care (FCC) has been identified as a principal pathway for mitigating health disparities in NICUs. In a prior Delphi experiment, a panel of experts selected three measures as potential proxies for FCC. Whether sufficient variation across NICUs exist to allow for discrimination of performance is unknown. Objectives: To examine NICU variation in three novel measures of FCC.

Abstract:

Background: Patient- and family-centered care is an approach to the planning, delivery, and evaluation of health care that is grounded in mutually beneficial partnerships among health care providers, patients, and families.(1) FCC integrates families as providers of emotional, social, and developmental support to the infant in a manner that respects each family's innate strengths and cultural values and has been shown to improve infant and family centered care outcomes. (2) FCC has been identified as a principal pathway for mitigating health disparities in NICUs. In a prior Delphi (3) experiment, a panel of experts selected three measures as potential proxies for FCC. Whether sufficient variation across NICUs exist to allow for discrimination of performance is unknown.

Objectives: To examine NICU variation in three novel measures of FCCMethods: We utilized the California Perinatal Quality Care Collaborative (CPQCC) database to examine trends in the three FCC measures among 1519 Very Low Birth Weight (VLBW) infants from 28 NICUs participated voluntarily in pilot study from January 1, 2021 to Aug 31, 2023. These measures included days from NICU admission to first skin-to-skin care, days from NICU admission to first social worker contact, and hours from birth to administering oral colostrum. Restrictions were applied to minimize the effect of outliers and outborn birth. We examined means and medians of each measure across all participating hospitals, among safety net versus non-safety net hospitals, and among white versus non-white infants. We also examined correlations between measures using Spearman rho coefficients.

Results: Among the 28 participating NICUs, 20 (71%) were AAP level 3, 10 (36%) were teaching hospitals, and 13 (46%) were safety net NICUs. Across the 28 NICUs, the median (IQR) days from admission to first skin-to-skin care was 6 (3-10), with a range of 0 to 44 days [Figure 1].



The median (IQR) days from admission to first social worker contact was 2 (1–2) with a range of 1 to 4 days [Figure 2].

The median (IQR) hours from birth to first oral colostrum was 35 (25–46) with a range of 1 to 91 hours [Figure 3].

Safety net NICUs had a median (IQR) hour to first oral colostrum of 40 (20–72) versus 34 (17–67) in non-safety net NICUs (p=0.03) and safety net NICU had a median (IQR) day to first skin to skin 6 (3–14) versus 5 (2.5–10) in non-safety net NICUs (p<0.001). We found no significant difference between safety net NICUs and non-safety net NICUs for days to first social worker visit. We also found no significant differences in any of the measures by race/ethnicity. At the NICU level, there was a nonsignificant correlation between time to first skin-to-skin and first oral colostrum (spearman rho = 0.257, p=0.27).

Conclusions: In this sample, we found clinically significant variation across NICUs in days to first skin-to-skin care and hours to first oral colostrum, and non-safety net NICU babies had received first skin-to-skin care and oral colostrum sooner than safety net NICUs allowing us to discriminate performance in these important potential proxy indicators of quality FCC. High performance in one measure doesn't correlate with high performance in another.

References:

1. *Committee on Hospital Care and Institute for Patient- And Family-Centered Care. Patient- and family-centered care and the pediatrician's role. Pediatrics. 2012 Feb;129(2):394-404. doi: 10.1542/peds.2011-3084. Epub 2012 Jan 30. PMID: 22291118.*
2. *O'Brien, Karel et al, A pilot cohort analytic study of Family Integrated Care in a Canadian neonatal intensive care unit. BMC Pregnancy Childbirth, Volume 13 Suppl 1:S12, 2013*
3. *Linstone HT, Murray. (1975). The Delphi Method: Techniques and Applications. The Delphi Method: Techniques and Applications. vol 10.2307/3150755. 1975.*

Learner Objectives:

1. To share the way to measure FCC practices to improve FCC care
2. To learn the variability in the FCC practices across NICUs in three selected measures

Gravens 2024-59

Abstract Title: Reducing Neonatal Central Line Infections with the Implementation of a Maintenance Bundle

Authors: Taylor Burrier, BSN, RN; Neena Jube-Desai, MD, MBA; Carol O'Neil; Madelyn O'Neil, DNP, CRNP

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Problem Statement:

Central Line-Associated Bloodstream Infections (CLABSIs) were identified as a concern in a large academic-level IV Neonatal Intensive Care Unit (NICU), as evidenced by CLABSI rates exceeding the standardized infection ratio (SIR) for four of ten quarterly reports. To reduce CLABSIs in the neonatal population, the Centers for Disease Control and Prevention (CDC) recommends bundled interventions; maintenance bundles are not utilized in this NICU.

Abstract:

Purpose: As a part of infection prevention and control practices, this quality improvement (QI) initiative aims to implement a central line maintenance bundle adapted from The Joint Commission's daily central line checklist for the neonatal population to eliminate CLABSI rates and promote safety through early identification of central venous catheter (CVC) management needs.

Methods: A central line maintenance bundle was adopted over a 15-week implementation period. To achieve process measure goals, in-person education sessions and module-based instruction on bundle components and Aseptic Non-Touch Technique (ANTT) were utilized, unit champions were prepared, and daily chart audits were conducted. Daily chart audits identified the number of patents with CVCs and monitored quantitative data, including checklist compliance and performance of individual bundle components. Bundle components include assessment of the CVC during interdisciplinary rounds, use of Curos caps, assessment of dressing and initiation of prompt change, proper tubing care, and adherence to ANTT during medication administration and tubing changes. Nurses completed the central line bundle by scanning a QR code linked to REDCap during night and day shifts. One hundred forty-eight nurses, 15 attending, and four fellows were educated on the central line bundle.

Preliminary Results: Approximately 3,328 central-line days were observed during the 15-week implementation period, which included the adoption of the central line maintenance bundle. Following implementation, central line bundle compliance has increased by an average of 33 percent during day shifts and 14 percent during night shifts. When looking at individual bundle components, the results indicate 58.3% compliance with the assessment of the line during interdisciplinary rounds, 99.6 percent compliance for the use of disinfecting Curos caps, 90.7 percent compliance for dressing integrity and prompt dressing changes, 99.6 percent compliance for tubing labeling, and a 50.7 percent adherence to ANTT®. Also, CLABSI rates decreased by 100 percent compared to quarterly data before implementation.

Preliminary Conclusion: Preliminary findings suggest the implementation of a central line maintenance bundle has shown promising early results in the NICU, with a consistent increase in compliance and a notable 100 percent reduction in CLABSI rates. However, it's important to note that incomplete bundle compliance data currently limits conclusive findings. Further analysis is needed to assess the sustainability of these improvements and their impact on patient outcomes.

Discussion: During the implementation of the central line maintenance bundle in the NICU, several significant barriers emerged that presented challenges. One prominent obstacle was the initial resistance to change among the nursing staff, who were accustomed to their existing practices. Introducing new procedures and protocols was met with some skepticism and hesitation. To address this, the project lead initiated a targeted approach that included open dialogues with the nursing staff, involving them and providing them with a platform to voice their concerns and suggestions. This collaborative approach helped build a sense of ownership and trust, leading to increased acceptance of the bundled intervention. Another barrier faced was requiring nursing staff to scan a QR code rather than having the maintenance checklist seamlessly integrated into the Medication Administration Record (MAR) system. This barrier presented challenges as it disrupted the established workflow of the nursing staff, requiring them to access a separate system and initiate an additional step during their daily routines. Regrettably, this barrier could not be fully addressed within the 15-week implementation period due to the complexities of integrating a new process into the existing MAR system. However, recognizing the significance of this issue and its impact on nursing efficiency, efforts are ongoing to develop a solution. Work is underway to integrate the central line maintenance

bundle directly into the MAR system, aligning it with nursing workflow and minimizing disruptions. This approach aims to enhance efficiency and ensure seamless adoption and compliance with the maintenance bundle, ultimately supporting our mission to reduce CLABSI rates and promote patient safety.

References:

Arnts, I., Schrijvers, N., Flier, M., Groenewoud, J., Antonius, T., & Liem, K. (2015). Central line bloodstream infections can be reduced in newborn infants using the modified Seldinger technique and care bundles of preventative measures. Acta Paediatrica, 104(4), e152-e157. https://doi-org.proxy-hs.researchport.umd.edu/10.1111/apa.12915

Bierlaire, S., Danhaive, O., Carkeek, K., & Piersigilli, F. (2021). How to minimize central line-associated bloodstream infections in a neonatal intensive care unit: a quality improvement intervention based on a retrospective analysis and the adoption of an evidence-based bundle. European Journal of Pediatrics, 180(2), 449-460. https://doi-org.proxy-hs.researchport.umd.edu/10.1007/s00431-020-03844-9

Hamza, W. S., Hamed, E. A.-T. M., Alfadhli, M. A., & Ramadan, M. A.-M. (2022). A multidisciplinary intervention to reduce central line-associated bloodstream infection in pediatrics and neonatal intensive care units. Pediatrics & Neonatology, 63(1), 71-77. https://doi-org.proxy-hs.researchport.umd.edu/10.1016/j.pedneo.2021.08.010

Payne, V., Hall, M., Prieto, J., & Johnson, M. (2018). Care bundles to reduce central line-associated bloodstream infections in the neonatal unit: a systematic review and meta-analysis. Archives of Disease in Childhood -- Fetal & Neonatal Edition, 103(5), F422-F429.

Learner Objectives:

- Identify key components of the maintenance bundle that can effectively reduce CLABSI rates.
- Share best practices and insights gained from the project with colleagues and peers.

Gravens 2024-60

Abstract Title: Implementation of Ultrasound Technology for Peripheral Intravenous Catheterization in the NICU

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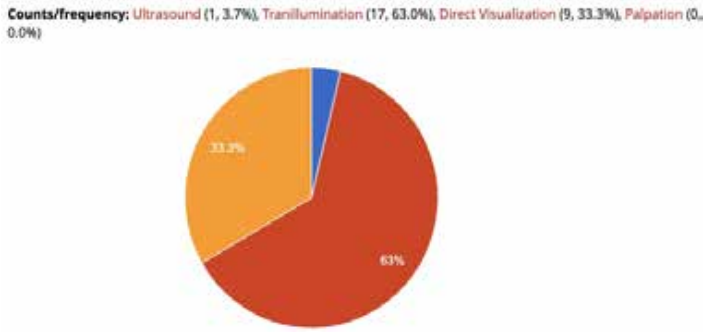
Problem Statement:

Neonates admitted to the neonatal intensive care unit (NICU) require vascular access to deliver life-saving medications, nutrients, and/or antibiotics. In a 26 bed, Level III NICU, 27% of PIVs placed required three or more attempts. Chart audits revealed poor and inadequate documentation of PIV attempts. The limited documentation and interviews revealed the number of attempts ranged from 1 to 12. Multiple attempts reduce venous access and may lead to the need for central line placement, requiring a more invasive line with a heightened risk of infection.

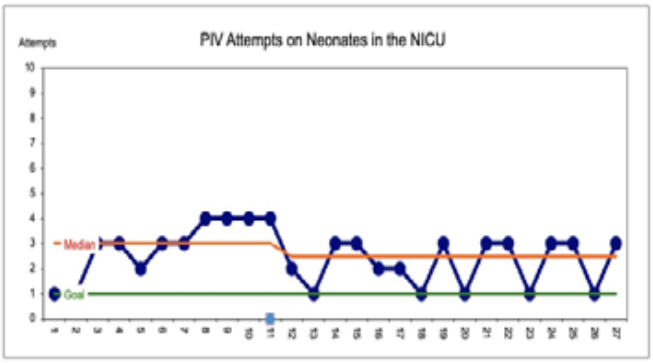
Abstract:

Methodology: This quality improvement (QI) project will be implemented over a 15-week period in the Fall of 2023 and is expected to impact 147 babies in the NICU, whose average daily census is 20 with a max census of 26. Fifteen nurses (RN) will be trained on ultrasound-guided peripheral IV catheterization (USGPIVC). Pre and post-test surveys will be administered to measure current and gained knowledge of UGPIVC trained RNs. Training completion certificate and practical skills sign-off will be collected for proof of competency. A buddy badge will be worn to identify competency in USGPIVC. After simulation training RNs will demonstrate proper US technique and vessel identification to project lead or NICU RN educator. Infants needing a PIV will have an RN trained in USGPIVC place the PIV and document the placement in the patient's electronic health record (EHR). RNs participating will be paid their hourly rate for didactic and simulation time and receive a course completion certificate, a buddy badge, and a weekly UGPIVC Team email. The project lead will conduct weekly chart audits on all patients needing a PIV to retrieve project data, including audit date, MRN, post-conceptual age in days at PIV placement, weight in grams at IV placement, the technique used in IV placement, and the number of PIV attempts. Data will be collected and stored in HIPAA compliant database software using a side-by-side screen method in a private location by project lead at MMC. The project lead will analyze project data with aggregate reporting to site stakeholders for monitoring, feedback, reinforcement, and discussion of the quality improvement effort. Privacy protections will comply with expected privacy and confidentiality measures during all patient encounters in the HIPAA-covered entity. Breeching of project data will be mitigated by having the project lead electronically enter all data into REDCap, a HIPAA compliant center, password protected server, and accessible only to the project lead and project faculty. No other hardware devices or programs will be used for data storage. Identifiers will be coded as "identifiers" within the REDCap system. If downloading the data is necessary, the identifiers will be removed before downloading. This QI project has been submitted and approved by the University of Maryland's IRB.

Impact and Results: One hundred percent of the fifteen nurses met all training expectations and received a Buddy Badge to identify their USGPIV. Preliminary results identified that 27 peripheral IV attempts occurred. Successful PIV placement occurred 3.7% (n=1) by ultrasound, 63% (n=17) by transillumination, and 33.3% (n=9) by direct visualization, and zero placements by palpation.



There has not been a decrease in the number of attempts. Peripheral IV documentation was improved after chart audits revealed poor or inadequate documentation on PIV attempts.



Conclusions: Preliminary data indicates that successful US-assisted IV cannulation rates remain low despite formal education and simulation. On average, neonates undergoing PIV insertion had greater or equal to 3 attempts. The use of USGPIVC was reviewed at daily huddles with reminder emails and updates. Transillumination continues to be the most successful method for IV cannulation in this setting. Additional individual US technique sessions were offered to the original cohort of nurses trained in USGPIVC. Barriers encountered included multiple simultaneous admissions, high patient acuity and high patient census that made it difficult to prioritize USGPIVC expertise and access. The USGPIVC experts also found it difficult to use a relatively new technique when multiple provider observers were in the room at the time of the PIV insertion. With a steep learning curve for technique, it is thought the success rates with US will increase over time with practice.

References:

Berlanga-Macías, C., Díez-Fernández, A., Martínez-Hortelano, J. A., Sequí-Domínguez, I., Saz-Lara, A., Pozuelo-Carrascosa, D., & Martínez-Vizcaíno, V. (2022). Ultrasound-guided versus traditional method for peripheral venous access: An umbrella review. BMC Nursing, 21(1), 307. https://doi.org/10.1186/s12912-022-01077-9

Mitchell, E. O., Jones, P., & Snelling, P. J. (2022). Ultrasound for Pediatric Peripheral Intravenous Catheter Insertion: A Systematic Review. Pediatrics, 149(5), e2021055523. https://doi.org/10.1542/peds.2021-055523

Vinograd, A. M., Chen, A. E., Woodford, A. L., Fesnak, S., Gaines, S., Elci, O. U., & Zorc, J. J. (2019). Ultrasonographic Guidance to Improve First-Attempt Success in Children with Predicted Difficult Intravenous Access in the Emergency Department: A Randomized Controlled Trial. Annals of Emergency Medicine, 74(1), 19-27. https://doi.org/10.1016/j.annemergmed.2019.02.019

Learner Objectives:

By the end of this presentation the learner will understand how the Conceptual Framework of Complex Innovation Implementation was used to implement ultrasound technology in the NICU and understand the facilitators, barriers, and impact of this QI project.

Gravens 2024-61

Abstract Title: Specificity of cortical responses of preterm infants to their recorded mother's voice

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Problem Statement:

Mother's voice, the most salient auditory stimulus in utero, facilitates the earliest development of hearing, language, and emotional connection; after birth, characteristic acoustic modulations of mothers' infant-directed speech (IDSpeech) and singing (IDSinging) further facilitate this learning and development. In preterm infants, however, early separation between mothers and infants leads to decreased exposure to mother's voice; the extent to which this early separation impacts preterm infants' perception and differentiation is unclear.

Abstract:

Methods: 50 mother/preterm-infant dyads were enrolled in this prospective cohort study. Mothers were recorded speaking and singing "Twinkle, Twinkle Little Star" across three conditions: adult-directed speech (ADSpeech), elicited infant-directed speech (IDSpeech) and infant-directed singing (IDSinging). Mothers were recorded in a quiet room off the unit and guided through a protocol to simulate the mindset they have when with their infant. Mothers of multiples were recorded one time, and the recording was used for each of that mother's infants.

Between 34w0d–36w6d PMA, infants underwent high-density EEG during passive exposure to their mother's voice recordings. Infant EEGs were conducted with the infant in quiet-alert or drowsy states, laying supine in their crib/isolette with the speaker 15 cm superior to the infant's head. A sound-level meter was placed at infant ear level and used to monitor the volume throughout (peaks <60 dBA). Recording presentation order was randomized to minimize habituation bias, and EEGs were conducted when mothers were not present in the NICU to minimize potential for confounding. EEG recordings were segmented to extract three 10-second segments for analysis: initial ten seconds, middle ten seconds, and final ten seconds. Resulting segments were reviewed for artifact. Power spectral density and asymmetry were measured at the anterior frontal (F3/F4) and posterior temporal (T5/T6) scalp locations across the full frequency spectrum (.3-40 Hz) and in the preterm infant alpha band (3-5 Hz). Two a priori comparisons using three-way repeated-measures ANOVA models were planned: the first comparing ADSpeech and IDSpeech and the second comparing IDSpeech and IDSinging. Both models included gestational age at birth (EGA) and time segment as covariates. A second set of data-driven analyses was conducted comparing only the first time 10s segments with EGA as a covariate. All analyses were conducted in IBM SPSS Statistics (Version 28) with two-sided significance levels set to $p < 0.05$.

Results: Significant differences between ADSpeech and IDSpeech were found at the T6 scalp location overlaying the right temporal cortex ($F(1, 1.986E\text{-}8) = 4.736$, $p=.038$). In the first time segment, alpha-band temporal asymmetry was significantly greater during IDSinging compared to IDSpeech ($F(1, .184) = 5.378$, $p=.027$) with greater cortical responses observed in the right hemisphere compared to the left during IDSinging. For all conditions, cortical response was greatest during the initial ten-second segment and was not sustained over the two-minute voice recording.

Conclusion: Despite the disruptions of preterm birth, preterm infants between 34–36w PMA demonstrate distinct cortical responses to their mother's recorded voice, particularly in response to elicited IDSpeech compared to ADSpeech. Recording mothers'

infant-directed language may be a valuable tool in the NICU to increase language exposure and infants' access to their mother's voice, even when parents cannot be present for the recording process. However, coaching in infant-directed speech may drive the value of this intervention. Additional research comparing preterm infant cortical responses during live versus recorded mother's voice is needed as well as further investigation into passive versus active, contingent exposure to mothers' voice recordings.

Table 1 - Infant Demographics

Characteristic	N = 50
Multiple Gestation[1]	13 (26)
Birth weight (g)[2]	1,110 (873, 1,656)
Race[1]	
White	35 (70)
Black	12 (24)
Asian	1 (2)
More than one race	2 (4)
Ethnicity[1]	
Non-Hispanic	47 (94)
Hispanic	3 (6)
Female Sex[1]	25 (50)
GAB[2]	28w4d (26w5d, 30w3d)
PMA at EEG[2]	36w2d (35w6d, 36w5d)
CPAP at EEG	11 (21)

[1]n (%)
[2]Median (IQR)

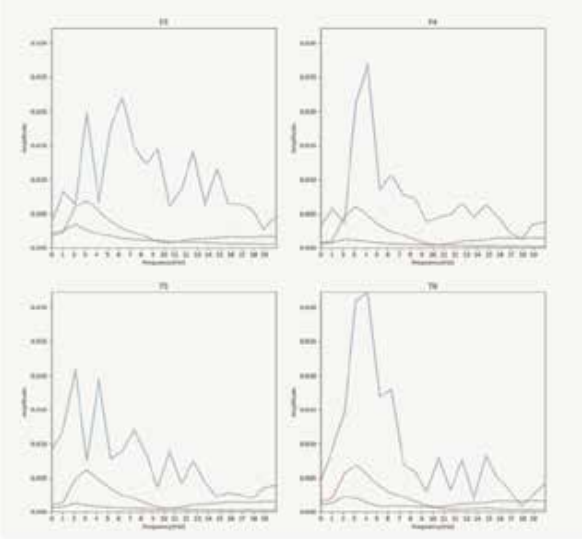

Figure 1 – Grand Mean Amplitude of spectral responses across recording conditions at each scalp location (F3, F4, T5, T6) for the first 10 seconds of exposure

Notes:
Color Key: Red – ADSpeech; Blue – IDSpeech; Green – IDSinging
Panels depict frontal (F3/F4) and temporal (T5/T6) left and right scalp locations. The x-axis for frequency is expressed in Hz from 0-20 Hz. The y-axis for amplitude is expressed in units of μV from .00-.03 μV.

References:

Kjeldsen CP, Emery L, Simsic J, He Z, Stark AR, Neel ML, Maitre NL. Contingent Mother's Voice Intervention Targeting Feeding in Hospitalized Infants with Critical Congenital Heart Defects. Children. 2023 Sep 30;10(10):1642.

Richard C, Jeanvoine A, Stark AR, Hague K, Kjeldsen C, Maitre NL. Randomized Trial to Increase Speech Sound Differentiation in Infants Born Preterm. The Journal of Pediatrics. 2022 Feb 1;241:103-8.

Caskey M, Stephens B, Tucker R, Vohr B. Adult talk in the NICU with preterm infants and developmental outcomes. Pediatrics. 2014 Mar 1;133(3):e578-84.

Williamson S, McGrath JM. What are the effects of the maternal voice on preterm infants in the NICU? Advances in Neonatal Care. 2019 Aug 1;19(4):294-310.

Learner Objectives:

1. To assess preterm infants' ability to differentiate between adult- and infant-directed speech as measured by cortical response
2. To assess preterm infants' ability to differentiate between infant-directed speech and singing as measured by cortical response

Gravens 2024-62

Abstract Title: The Power of Women's Voices: Reclaiming Dignity in Birth and NICU Care Across Gender, Race, and Class

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Problem Statement:

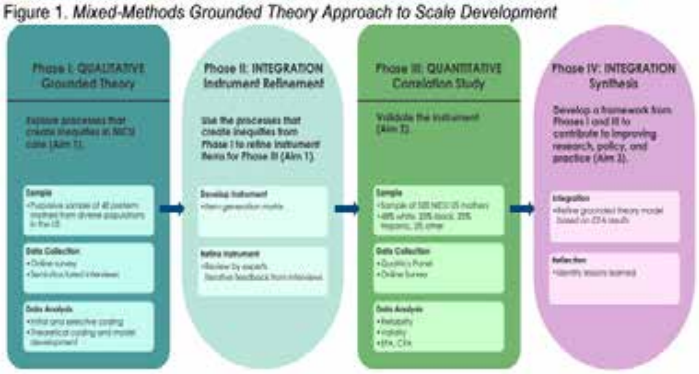
To what extent do institutionally driven mechanisms play a role in women's subjective experiences of trauma around birth and NICU care? How do women's experiences of equitable and respectful maternity care vary based on race, class, gender, culture, and social status?

Abstract:

Women have an increased risk of poor health outcomes due to gender-specific factors, such as social status, violence, and poor socioeconomic conditions. During the perinatal period, maternal stress, quality of obstetric care, and untreated mental health can also put women at risk. The quality of obstetric care significantly impacts both mother and child's health outcomes. However, disparities based on race, class, gender, culture, and social status make it difficult to address these issues. There are ongoing efforts to evaluate biological, sociodemographic, and behavioral characteristics associated with preterm birth and maternal mortality. However, there is a lack of reliable data to track progress. In neonatal emergency care, medical intervention necessary for the infant's and/or the mother's survival often results in a power imbalance, effectively removing maternal agency. This imbalance is compounded by time in the neonatal intensive care unit (NICU), where mothers are exposed to various ongoing and reoccurring stressful and traumatic events. While not all NICU mothers develop trauma, studies from various disciplines found consistent factors influencing the development of PTSD. The direct implications of untreated mental health are a significant concern for maternal morbidity and mortality. However, a PTSD diagnosis is limited by its inability to capture trauma resulting from any individual, policy, or practice within the institution. Additionally, there is no consensus within or between disciplines on what constitutes traumatic birth, birth trauma, or psychological trauma resulting from childbirth, limiting the construct's utility to determine who and how trauma results in psychiatric distress. For this paper,

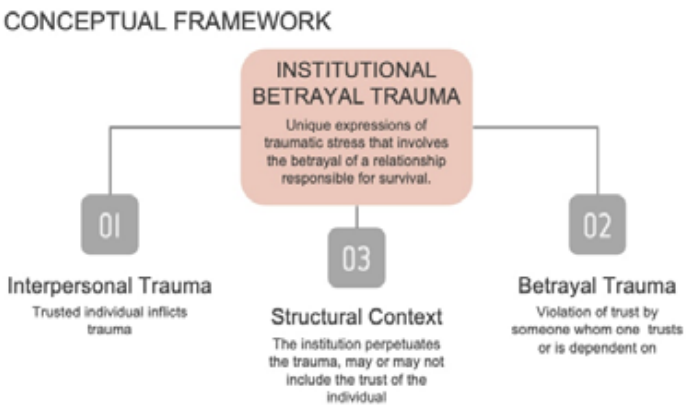
birth trauma refers to a woman's subjective experience of feeling unimportant, disempowered, or betrayed by actual or perceived medical threats resulting in prolonged psychological distress into the perinatal period and beyond. Preventable social determinants like birth trauma, cumulative trauma, and structural racism have a long-term impact on maternal experiences and are influenced by cultural ideologies of the medical birth model. Young Black women across the socioeconomic spectrum are two times more likely to give birth prematurely than any other group of women. Obstetric practices that are sanctioned through institutionalized care make certain groups more susceptible to harm and constitute a form of gender-based violence. Naming institutional practices such as obstetric violence or obstetric racism have been slow to integrate into maternal health research. This presents challenges to capture the overlapping and interdependent systems of discrimination and disadvantage that influence women's access to respectful, dignified, and compassionate birth care. As a response, this paper is part of a more extensive exploratory study with two primary goals. The first is to develop a new NICU instrument that addresses the institutional mechanisms driving women's experiences of stigmatized, inequitable, and discriminatory obstetric and NICU care. The second is to adopt a dynamic definition and shared conceptual understanding of psychosocial birth trauma. Both are necessary to progress clinical effectiveness and translate knowledge into effective practice. The larger project uses a mixed-method grounded-theory (MM-GT) model outlined by Howell Smith et al., designed in four development phases (see Figure 1).

Figure 1. *Mixed-Methods Grounded Theory Approach to Scale Development*



The initial qualitative phase explores inequitable care and is used in the second phase to develop the new scale. The third quantitative phase assesses the psychometric properties of the new scale. The final phase integrates qualitative and quantitative models to advance a new framework. The qualitative study includes one-hour semi-structured interviews with 40 NICU mothers. This paper examines the first two phases of instrument development. Twelve of the 40 interviews were used in the initial scale development, the Institutional Betrayal Questionnaire-NICU (IBQN). The IBQN is a checklist of experiences that may have occurred in obstetric or NICU care and measures experiences of institutional betrayal trauma. Institutional Betrayal Trauma (IBT) is a unique form of trauma that can occur on three different levels of experience (see Figure 2): interpersonal trauma (trusted individual manipulates and engenders feelings of betrayal, shame, and guilt), betrayal trauma (violation of trust from someone whom one is dependent on), and institutional trauma (trauma perpetrated by any individual, policy, or practice within the institution). IBT is relevant for two reasons.

Figure 2. *Institutional Betrayal Trauma Conceptual Framework*



First, institutions that perpetuate trauma create a false sense of trust and dependency, which can lead to betrayal even when individuals mistrust the institution. Secondly, due to this dependency, people who have experienced institutional betrayal may ignore or be blind to harmful practices. As a theoretical framework, IBT via the IBQ provided the language to address the power structures that marginalize women and contribute to racial discrimination.

From the data, two critical patterns emerged worth noting. The first is that for almost all the mothers interviewed, their stories of trauma began before the NICU and often before entering the hospital. The importance of this pattern indicates that trauma experience was not limited to only the birth experience or the NICU but rather traversed the whole prenatal, birth, and postnatal periods. This highlights the importance of continuity of care between obstetrics and the NICU. Second, women described numerous experiences of obstetric violence and care encounters that amount to IBT but did not self-select those items on the IBQ-NICU. This follows patterns found in prior IBT research.

ID	Did you know before this questionnaire	Actively support you	Admitting	Apologizing	Believing you	Allowing you a say in care	Treated as an important member	Environment safe to discuss	Recognizing this is a problem	BEFORE NICU trusted	AFTER NICU trusted
101.01	1	1	0	0	1	1	1	1	0	5	5
103.01	1	1	2	3	1	3	1	1	1	5	5
104.01	2	1	0	0	0	1	1	3	3	3	5
105.01											
106.01	1	2	2	2	2	3	2	2	2	5	5
107.01	2	2	2	2	3	1	1	2	2	3	3
108.01	1	2	3	2	1	1	1	3	3	1	1
109.01	3	1	3	3	3	1	1	1	1	4	4
110.01	3	1	3	3	1	1	1	3	3	4	4
111.01	3	1	3	3	1	3	1	1	1	5	5
112.01	1	1	0	0	0	1	1	1	0	4	5
117.01	1	1	3	2	1	1	1	1	1	5	4

ID	Not protecting you	Unpleasant medical care seemed common	Negative experience seemed more likely	Difficult to report negative nurse experiences	Difficult to report negative doctor experiences	Responding inadequately to concerns	Mishandling protected information	Covering up adverse medical procedures (infant)	Denying your experience in some way	Punishing you for reporting negative NICU experiences	Experiences might affect NICU reputation
101.01											
103.01											
104.01											
105.01											
106.01											
107.01		1	1	1	1	1					
108.01	1	1						1			
109.01											
110.01											
111.01											
112.01											
117.01									1		

The crisis women face around birth care is a call for researchers to ask what questions urgently need to be asked and what solutions might also be offered. Instead of accepting uncritically what the medical community and discourse present about NICU mothers' experiences, a critical feminist perspective recognizes

the gendered, social, and cultural norms that play a role in women's access to reproductive care, human rights violations, and government-sponsored sexual violence. Ultimately, addressing obstetric-related challenges requires resources and policies that encourage healthcare practitioners to prioritize the subjective experience of mothers. By taking a critical feminist approach (which positions race and gender at the forefront) to birth narratives, the voices of NICU mothers shape, strengthen, and remake a new NICU instrument that quantitatively measures how violations of trust at the system level contribute to trauma. [Note: This study is part of a larger project in progress—"Mothers of the NICU: How Race, Class, Gender, Culture and Status Shape Experiences of Hospital Birth Care."]

References

1. World Health Organization. *Millennium Development Goal 5-Improving Maternal Mental Health.*; 2008. doi:WHO\MSD\MER\08.01
2. Beck AF, Edwards EM, Horbar JD, Howell EA, McCormick MC, Pursley DM. The color of health: How racism, segregation, and inequality affect the health and well-being of preterm infants and their families. *Pediatr Res*. 2020;87(2):227-234. doi:10.1038/s41390-019-0513-6
3. Bryant A, Worjoloh A, Caughey AB, Washington E. Racial and obstetric disparities in obstetric outcomes and care: Prevalence and determinants. *Am J Obstet Gynecol*. 2010;202(4):335-343.
4. Shin H, White-Traut R. The conceptual structure of transition to motherhood in the neonatal intensive care unit. *J Adv Nurs*. 2007;58(1):90-98. doi:10.1111/j.1365-2648.2006.04194.x
5. Flacking R, Ewald U, Nyqvist KH, Starrin B. Trustful bonds: A key to "becoming a mother" and to reciprocal breastfeeding. Stories of mothers of very preterm infants at a neonatal unit. *Soc Sci Med*. 2006;62(1):70-80. doi:10.1016/j.socscimed.2005.05.026
6. Byrne V, Egan J, Mac Neela P, Sarma K. What about me? The loss of self through the experience of traumatic childbirth. *Midwifery*. 2017;51:1-11. doi:10.1016/j.midw.2017.04.017
7. Kersting A, Dorsch M, Wesselmann U, et al. Maternal posttraumatic stress response after the birth of a very low-birth-weight infant. *J Psychosom Res*. 2004;57(5):473-476. doi:10.1016/j.jpsychores.2004.03.011
8. Boorman RJ, Devilly GJ, Gamble J, Creedy DK, Fenwick J. Childbirth and criteria for traumatic events. *Midwifery*. 2014;30(2):255-261. doi:10.1016/j.midw.2013.03.001
9. Beck CT. Birth Trauma: In the eye of the beholder. *Nurs Res*. 2004;53(1):28-35. doi:10.1097/00006199-200401000-00005
10. Beck CT. Post-traumatic stress disorder due to childbirth: The aftermath. *Nurs Res*. 2004;53(4):216-224. doi:10.1097/00006199-200407000-00004
11. Bryant RA, Edwards B, Creamer M, et al. The effect of post-traumatic stress disorder on refugees' parenting and their children's mental health: a cohort study. *Lancet Public Health*. 2018;3(5):e249-e258. doi:10.1016/S2468-2667(18)30051-3
12. Simpson M, Catling C. Understanding psychological traumatic birth experiences: A literature review. *Women Birth*. 2016;29(3):203-207. doi:10.1016/j.wombi.2015.10.009
13. Bower KM, Geller RJ, Perrin NA, Alhusen J. Experiences of racism and preterm birth: Findings from a pregnancy risk assessment monitoring system, 2004 through 2012. *Womens*
14. Isobel S, Goodyear M, Foster K. Psychological trauma in the context of familial relationships: A concept analysis. *Trauma Violence Abuse*. 2019;20(4):549-559. doi:10.1177/1524838017726424
15. Denham AR. Rethinking historical trauma: Narratives of resilience. *Transcult Psychiatry*. 2008;45(3):391-414. doi:10.1177/1363461508094673
16. Davis-Floyd RE. The technocratic body: American childbirth as cultural expression. *Soc Sci Med*. 1994;38(8):1125-1140. doi:10.1016/0277-9536(94)90228-3
17. *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health: Commission on Social Determinants of Health Final Report.*; 2008.
18. Block BP, Holditch-Davis D, Miles MS. Life course theory as a framework to examine becoming a mother of a medically fragile preterm infant. *Res Nurs Health*. 2009;32(1):38-49. doi:10.1002/nur.20298
19. Davis DA. Introduction. In: *Reproductive Injustice: Racism, Pregnancy, and Premature Birth*. New York University Press; 2019:1-26.
20. Davis DA. Obstetric racism: The racial politics of pregnancy, labor, and birthing. *Med Anthropol*. 2019;38(7):560-573. doi:10.1080/01459740.2018.1549389
21. Howell Smith MC, Babchuk WA, Stevens J, Garrett AL, Wang SC, Gaetterman TC. Modeling the Use of Mixed Methods–Grounded Theory: Developing Scales for a New Measurement Model. *J Mix Methods Res*. 2020;14(2):184-206. doi:10.1177/1558689819872599
22. Smith C. Institutional Betrayal Questionnaire - Healthcare. Published online 2015.
23. Smith CP. *First, Do No Harm: Institutional Betrayal in Healthcare*. Dissertation. University of Oregon; 2016.
24. Cohen LR, Hien DA, Batchelder S. The impact of cumulative maternal trauma and diagnosis on parenting behavior. *Child Maltreat*. 2008;13(1):27-38. doi:10.1177/1077559507310045
25. Cromer LD, Gray ME, Vasquez L, Freyd JJ. The relationship of acculturation to historical loss awareness, institutional betrayal, and the intergenerational transmission of trauma in the American Indian experience. *J Cross-Cult Psychol*. 2018;49(1):99-114. doi:10.1177/0022022117738749
26. Smith CP, Freyd JJ. Institutional betrayal. *Am Psychol*. 2014;69(6):575-587. doi:10.1037/a0037564
27. Kennedy M. Introduction: Responses to the coronavirus crisis. *Fem Media Stud*. 2020;20(6):879-882. doi:10.1080/14680777.2020.1796225
28. Parmar PK, Jin RO, Walsh M, Scott J. Mortality in Rohingya refugee camps in Bangladesh: historical, social, and political context. *Sex Reprod Health Matters*. 2019;27(2):39-49. doi:10.1080/26410397.2019.1610275

Learner Objectives:

1. Participants will be able to describe how centering race and gender in birth narratives can positively contribute to understanding unjust care.
2. Participants will be able to identify policies and practices that promote discrimination and obstetric/medical violence during emergency birth and subsequent NICU care.
3. Participants will be able to identify how respectful and dignified care encounters can return agency and empower women during birth and NICU care.

Gravens 2024-63

Abstract Title: Splanchnic and cerebral oxygenation during oral feeding near discharge as an early biomarker of later problematic feeding in high-risk infants

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Problem Statement:

Splanchnic to cerebral oxygen ratio (SCOR) has been found to be a reliable marker of detecting changes in mesenteric blood

flow related to pathophysiologic conditions in high-risk infants [1-3]. However, this measure has not been investigated during oral feeding. The purpose of the study was to examine SCOR patterns prior to, during and after oral feeding in high-risk infants near discharge and its relationship with feeding outcomes at 1- and 2-months post-term age (PTA).

Abstract:

Program and/or methodology: This is a secondary analysis of data from a larger study that is prospectively examining trajectories of symptoms of problematic feeding in hospitalized infants at risk for a chronic feeding disorder from discharge through 24 months PTA (R01NR018192; PI: Thoyre). Infants were recruited from a level 3 NICU at a regional hospital in the Southeast. In this analysis, we used pre-discharge data collected near the time of discharge and post-discharge data collected at 1- and 2-months PTA from 95 infants. Pre-discharge data include: 1) SCOR data continuously collected from 30 minutes prior to, during, and after feeding while infants were fed by breast or bottle; and 2) feeding/medical history data extracted via chart review. Post-discharge data were collected via online surveys where parents report their child's: 1) symptoms of problematic feeding (Neonatal Eating Assessment Tool) [4-8], 2) gastrointestinal function (Infant Gastroesophageal Reflux Questionnaire-Revised & Infant Gastrointestinal Symptoms Questionnaire) [9, 10], and 3) sleep patterns and concerns. Data analysis was performed in SPSS and SAS. Specifically, we used K-means cluster analysis to identify distinct patterns of SCOR prior to, during and after feeding. ANOVA and Fisher's exact test were used to look at the associations of the cluster membership with infant medical and feeding profiles as well as with feeding outcomes at 1- and 2-months PTA.

Impact and Results: We identified three groups of infants (clusters) who share a common SCOR pattern prior to, during and after feeding. In Cluster 1 (Low SCOR; n=33), infants demonstrated SCOR values slightly increasing with feeding and decreasing during post-feeding period and also had generally lower SCOR values overall (50-70%). Cluster 2 infants (Medium SCOR; n=38) showed a similar SCOR pattern as those in Cluster 1 but had slightly higher SCOR values throughout the observation (70-80%). Cluster 3 infants (High SCOR; n=24) demonstrated SCOR values increasing with feeding and remaining with an increased SCOR during the post-feeding period. Also, this group of infants had the highest SCOR values ranging from 80–100%, which may indicate sufficient oxygen support to the gut throughout the observation. When we compared infant feeding/medical profiles between the clusters, compared to Cluster 3, infants in Cluster 1 and 2 were significantly less mature and smaller at birth, had a higher proportion of African American infants, and received milk with increased caloric density during the observation. When following up at 1- and 2-months PTA, Cluster 2 had significantly higher parent reports of feeding and gastrointestinal (GI) problems compared to other Clusters.

Conclusions: We found three subgroups of infants who exhibited three distinct patterns of SCOR in response to oral feeding; each group had different infant and feeding profiles with Cluster 3 having the least biological constraints. Each group was also associated with different levels of feeding and GI problems post-discharge at 1- and 2-months PTA with Cluster 2 having more severe problems. Our findings suggest that SCOR patterns in response to oral feeding may serve as an early physiologic indicator to inform both short-and long-term feeding problems in high-risk infants. Our findings can be enhanced by continuing to track infants at later ages to examine how SCOR patterns can be associated with longer-term feeding outcomes. Also, better understanding of how healthy, full-term infants regulate hemodynamic changes during feeding will help to better interpret SCOR patterns in high-risk infants.

References:

1. *Bailey, S.M., Hendricks-Munoz, K.D., Mally, P. (2013). Splanchnic-cerebral oxygenation ratio (SCOR) values in healthy term infants as measured by near-infrared spectroscopy (NIRS). Pediatr Surg Int, 591, 591–5.*
2. *Martini S, Aceti A, Beghetti I, Faldella G, Corvaglia L. (2018). Feed-related Splanchnic Oxygenation in Preterm Infants with Abnormal Antenatal Doppler Developing Gut Complications. J Pediatr Gastroenterol Nutr. 66(5), 755-759.*
3. *Corvaglia L, Martini S, Battistini B, Rucci P, Faldella G, Aceti A (2017). Splanchnic Oxygenation at First Enteral Feeding in Preterm Infants: Correlation with Feeding Intolerance. J Pediatr Gastroenterol Nutr. 64(4), 550-554.*
4. *Pados, B. F., Thoyre, S. M., Estrem, H. H., Park, J., & McComish, C. (2018). Factor structure and psychometric properties of the neonatal eating assessment tool—bottle-feeding (NeoEAT—Bottle-Feeding). Advances in Neonatal Care, 18(3), 232-242.*
5. *Pados, B. F., Thoyre, S. M., Estrem, H. H., Park, J., & McComish, C. (2018). Factor structure and psychometric properties of the Neonatal Eating Assessment Tool-Breastfeeding. Journal of Obstetric, Gynecologic & Neonatal Nursing, 47(3), 396-414.[add citations for NeoEAT - Mixed feeding]*
6. *Pados, B. F., Park, J., & Thoyre, S. M. (2019). Neonatal Eating Assessment Tool-Bottle-Feeding: Norm-reference values for infants less than 7 months old. Clinical Pediatrics, 58(8), 857-863.*
7. *Pados, B. F., Park, J., & Thoyre, S. M. (2020). Neonatal Eating Assessment Tool—Breastfeeding: Reference values for infants less than 7 months old. Journal of Human Lactation, 36(2), 236-244.*
8. *Pados, B. F., Johnson, J., & Nelson, M. (2021). Neonatal Eating Assessment Tool—Mixed Breastfeeding and Bottle-feeding: Reference values and factors associated with problematic feeding symptoms in healthy, full-term infants. Journal of the American Association of Nurse Practitioners, 33(11), 938-946.*
9. *Orenstein, S. R. (2010). Symptoms and reflux in infants: Infant Gastroesophageal Reflux Questionnaire Revised (I-GERQ-R)—utility for symptom tracking and diagnosis. Current gastroenterology reports, 12, 431-436.*
10. *Riley, A. W., Trabulsi, J., Yao, M., Bevans, K. B., & DeRusso, P. A. (2015). Validation of a parent report questionnaire: the infant gastrointestinal symptom questionnaire. Clinical pediatrics, 54(12), 1167-1174.*

Learner Objectives:

1) Understand physiologic responses related to stress during oral feeding in high-risk infants
2) Describe patterns of splanchnic to cerebral oxygen ratio (SCOR) that are associated with short-term and long-term feeding problems in high-risk infants
3) Discuss the potential role of this measure as an early biomarker of feeding problems in high-risk infants

Gravens 2024-64

Abstract Title: Implementation of a CPAP Bundle for Standardization of Care and Skin Protection

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Problem Statement:

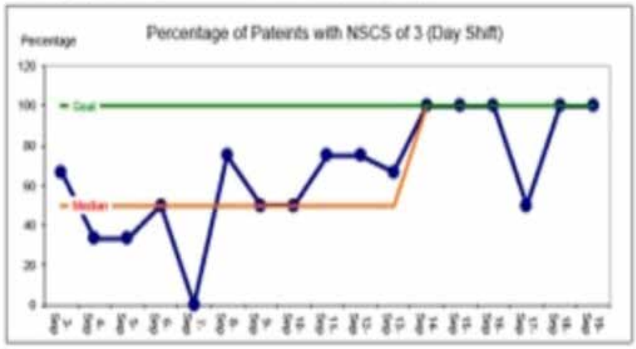
A chart audit report from a 35-bed, level IV NICU, in the mid-Atlantic region found that 18 patients between January–June 2023, managed with nasal CPAP, had observable incidents of facial skin breakdown. This finding, combined with a lack of protocolized nursing care for infants on CPAP, highlighted the need for an initiative to standardize preventative nursing care for reduction of facial skin breakdown.

Abstract:

Program and/or Methodology: A CPAP bundle was created using evidence-based literature that supports five core elements: 1) proper size selection of headset, mask, and prongs per the manufacturer's recommendations; 2) application of a hydrocolloid, silicone gel, and/or foam preventative dressing; 3) removal of CPAP apparatus and skin assessment performed and documented every 3-4 hours; 4) rotation of mask and prongs performed and documented every 6 hours; and 5) facial massage performed and documented every 12 hours. IRB approval was obtained, designating the project as quality improvement. Prior to implementation, 65 nurses were provided education on the CPAP bundle and desired documentation for all nursing staff. Weekly audits of the bundle components and documentation in the electronic health record (EHR) were performed using, a HIPAA compliant, REDCap CPAP Bundle Chart Audit Tool. Data collection will continue for a 15-week implementation period, ending December 2023. Quantitative data was used to create bar charts showing the percentage of documentation on bundle elements and run charts to observe any changes, over time, in percentage of infants with a neonatal skin condition score (NSCS) of 3. A NSCS of 3 indicates no skin breakdown is present. The score can range from 3–9 and is scored on erythema, breakdown, and dryness.

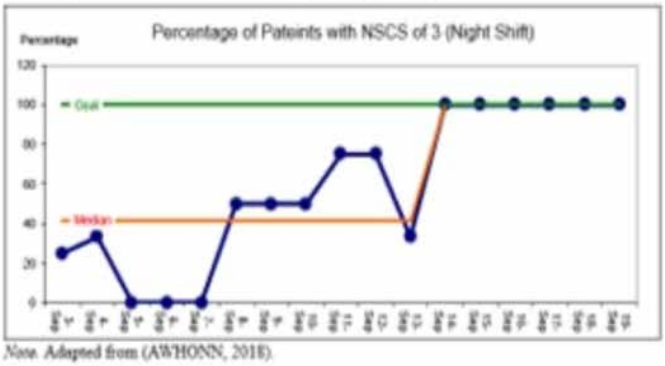
Impact and Results: Preliminary data has included 9 patients, managed with the CPAP headset, during the implementation period. Data entry was made for day shift and night shift for each day, for each patient on CPAP. A total of ninety-five documentation entries were entered. Preliminary data indicates that every 3-4 hours facial assessment was appropriately documented 80% (n=76), mask and prong rotation was documented appropriately 71.6% (n=68), and a preventative dressing in place was documented 96.8% (n=92). Mask size was only documented 2.1% (n=2), prong size only 2.1% (n=2), and facial massage was only documented 2.1% (n=2). The type of preventative dressing used, and size of headset was documented 0%. NSCS scores ranged between 3-5 with erythema or facial breakdown documented 27.4% (n=26) as an explanation for an abnormal score. By week 4, the percentage of infants with an NSCS of 3 increased from 46% to 100%.

Percentage of Patients on CPAP device with NSCS of 3: Day Shift



Note. Adapted from (AWHONN, 2018).

Percentage of Patients on CPAP device with NSCS of 3: Night Shift



Note. Adapted from (AWHONN, 2018).

Conclusions: Preliminary findings suggest that implementation of an evidence-based skincare CPAP bundle in a level IV NICU increases the percentage of infants managed on nasal CPAP with a NSCS of 3, minimizing skin breakdown. Of the 5 bundle elements, documentation of preventative dressing application was the most successful. Lack of consistent documentation of three of the bundle elements: mask/prong size, facial massage, and type of preventative dressing used suggests a need for further education and consultation with IT to reformat the EHR for ease of data entry. Several strategies were implemented to improve adherence to the skin care bundle including attaching crib cards to each bedside, presenting current project data to staff, and providing EHR images for the missing elements of documentation.

References:

AWHONN. (2018). Neonatal Skin Care: Evidence-Based Clinical Practice Guideline. Association of Women's Health Obstetric and Neonatal Nurses.

Badr, L. K., Zeineddine, M. H., Abbas, H., & Charafeddine, L. (2016). NeoSeal to Prevent Nasal Injury in Preterm Infants Receiving Oxygen Therapy. Neonatal Network, 35(4), 228-233. https://doi.org/10.1891/0730-0832.35.4.228

Bashir, T., Murki, S., Kiran, S., Reddy, V. K., & Oleti, T. P. (2019). "Nasal mask" in comparison with "nasal prongs" or "rotation of nasal mask with nasal prongs" reduce the incidence of nasal injury in preterm neonates supported on nasal continuous positive airway pressure (nCPAP): A randomized controlled trial. PLOS ONE, 14(1), e0211476. https://doi.org/10.1371/journal.pone.0211476

Günlemez, A., Isken, T., Gökalp, A. S., Türker, G., & Arisoy, E. A. (2009). Effect of silicon gel sheeting in nasal injury associated with nasal CPAP in preterm infants. Indian Pediatrics, 47(3), 265-267.

https://doi.org/10.1007/s13312-010-0047-9

Imbulana, D. I., Owen, L. S., Dawson, J. A., Bailey, J. L., Davis, P. G., & Manley, B. J. (2018). A Randomized Controlled Trial of a Barrier Dressing to Reduce Nasal Injury in Preterm Infants Receiving Binasal Noninvasive Respiratory Support. The Journal of Pediatrics, 201, 34-39.e3. https://doi.org/10.1016/j.jpeds.2018.05.026

Jabraeili, M., Mahallei, M., Arshadi, M., Mohammadpoorasl, A., Shamshiri, A., Salimi, Z., & Karimipoor, S. (2017). The Efficacy of a Protocolized Nursing Care on Nasal Skin Breakdown in Preterm Neonates Receiving Nasal Continuous Positive Airway Pressure. Int J Pediatr, 5(1), 4217-4225. https://doi.org/4217-4225

Ngaisah, S. N., & Rustinah, Y. (2022). Hydrocolloids reduce nasal injuries in infants receiving CPAP: a systematic review. JNKI (Jurnal Ners Dan Kebidanan Indonesia) (Indonesian Journal of Nursing and Midwifery), 9(4), 263. https://doi.org/10.21927/jnki.2021.9(4).263-272

Rezaei, P., Jafari-Mianaei, S., Sadeghnia, A., & Heidari, Z. (2021). Protective Dressings, Injury, and Device Failure in Preterm Infants Receiving Nasal Continuous Positive Airway Pressure: A Randomized Controlled Trial. Advances in Skin & Wound Care, 34(9), 1-6. https://doi.org/10.1097/01.asw.0000767344.37591.b6

Learner Objectives:

The learner will be able to understand the elements of the evidence-based CPAP bundle.

The learner will be able to evaluate effectiveness of an evidence-based CPAP bundle on standardization of nursing care and change in neonatal skin condition.

Gravens 2024-65

Abstract Title: Get in the Zone: Integrating Relationship-based Care into Neonatal Therapy Service Delivery

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Problem Statement:

Problem & Importance: Developmental Neonatal Therapies in the NICU have the potential to provide preventative, proactive, supportive, and therapeutic care for infants, families and staff in the NICU. Traditional rehabilitation models of intervention and workflow do not meet the unique needs of the NICU where in-the-moment, collaborative and supportive care is most effective for individual and system-wide integration of developmental care practices. Presentation will focus on how this relationship-based model differs from the traditional model and how positive outcomes were achieved within a large, multi-level NICU using case studies and examples of role integration changes made in the new model.

Abstract:

Program/Methodology:

Baseline condition: Neonatal Therapy Program in July 2013 at Nationwide Children's Hospital, a then 90-bed Level III and IV NICU, operated under traditional rehabilitation model featuring:

- Deficit-based referral process
- Average onset of services >30 days
- Team engaged with 70% of eligible infants
- Average frequency = 2x/week total (PT and/or OT)
- Productivity (billed/worked hours) = 36%
- Poor collaboration between therapy and nursing, no participation in rounding - nursing/provider customer service survey with only 75% favorable responses
- No method of reflective supervision in place for therapists

Improvement opportunities identified:

- Promote preventative care model:
    - Enhance staff knowledge/skill
    - Decrease time to referral - OT/PT added to admission order set
- Improve workflow and enhance efficiency:
    - Developed primary therapist role with identification of methods to make discipline-specific referrals as needed
    - Organized caseloads into geographic zones of 10-12 beds per therapist
- Enhance collaboration and real-time intervention with novel zone care delivery model characterized by therapist being staffed into the zone for continuous hours (vs intermittently coming in around care times) to
    - be present to staff, families and infants as a resource throughout the day
    - improve efficiency in providing services
    - improve follow-through with therapy recommendations and integration into daily care routines
    - enhance participation in rounds and general information sharing
    - positively impact both short- and long-term neurodevelopmental outcomes by ensuring sensitive, family-centered care is provided by all caregivers

Team established core competencies based on the NIDCAP/Synactive Theory (Als, 1982) and an Infant Mental Health Framework (Gilkerson, 2012)

Impact and Results:

Implementation: August 2014 - present. Unit has expanded to 130-beds with addition of Speech-language pathologists included as primary therapists in the zone model. All data is administrative data collected monthly.

- Admission referrals on all infants - primary therapist triages for support needs and ensures infant and family have appropriate supports to provide preventative and therapeutic care as needed
- Average onset of services is within 3 days
- Average frequency is 3x/week with less duplication of services
- Productivity = 47% (budgeted at 45%)

Zoning/primary therapy model has increased staff satisfaction

- for all - 98% favorable rating on customer service survey to nursing and providers
- Active multidisciplinary developmental care teams/quality improvement projects supporting NIDCAP-based care that supports family engagement and family-centered care
- Monthly reflective supervision for all therapy staff provided

Conclusions:

The zoning model of developmental therapy support is a paradigm shift from the traditional model of utilization within the health-care system. Skilled therapy that attends to the dynamic, individual and

relationship-based needs of each infant, family and staff person in real-time has been shown here to be feasible and effective. The zoning model demonstrates two core competencies that promote successful integration of therapies within a NICU setting: NIDCAP/Synactive Theory based care and Infant Mental Health engagement practices. Potential barriers considered and outcomes:

- Therapists worried that infants would not be followed by the same therapist from admission to discharge
    - Once zoning model began, therapists preferred this model for the following reasons:
        - Opportunity to develop a relationship with families from the start of admission was more satisfying and had more direct impact on parental engagement
        - Time management improved significantly and even with billable time increasing, there was more time for other project work and unit engagement
- Nursing initially was resistant to therapist being present for all of the care times
    - Therapists utilized their infant mental health engagement skills to engage nurses empathetically and support a gradual integration of their input
    - Nursing quickly realized the power of the integrated model and during the initial COVID-19 pandemic when therapies were asked to step away from direct care, nursing adamantly advocated for therapies to return bedside
- Over-utilization of therapy services was a worry of administrators
    - A tool was developed to demonstrate "just-right" application of services based on both biomedical and psychosocial risk factors
    - Actual frequencies did not go up as much as anticipated due to less need to directly provide therapy intervention when parents more engaged and/or when bedside staff engaged in providing developmentally supportive care more effectively

References:

Craig, J. W., & Smith, C. R. (2020). Risk-adjusted/neuroprotective care services in the NICU: the elemental role of the neonatal therapist (OT, PT, SLP). Journal of Perinatology : Official Journal of the California Perinatal Association, 40(4), 549-559. https://doi.org/10.1038/s41372-020-0597-1

Gilkerson, L., Burkhardt, T., Katch, L. E., & Hans, S. L. (2020). Increasing parenting self-efficacy: The Fussy Baby Network® intervention. Infant mental health journal, 41(2), 232-245. https://doi.org/10.1002/imhj.21836

Khurana, S., Kane, A. E., Brown, S. E., Tarver, T., & Dusing, S. C. (2020). Effect of neonatal therapy on the motor, cognitive, and behavioral development of infants born preterm: a systematic review. Developmental medicine and child neurology, 62(6), 684-692. https://doi.org/10.1111/dmcn.14485

Legendre, V., Burtner, P. A., Martinez, K. L., & Crowe, T. K. (2011). The evolving practice of developmental care in the neonatal unit: a systematic review. Physical & occupational therapy in pediatrics, 31(3), 315-338. https://doi.org/10.3109/01942638.2011.556697

Moody, C., Callahan, T. J., Aldrich, H., Gance-Cleveland, B., & Sables-Baus, S. (2017). Early Initiation of Newborn Individualized Developmental Care and Assessment Program (NIDCAP) Reduces Length of Stay: A Quality Improvement Project. Journal of pediatric nursing, 32, 59-63. https://doi.org/10.1016/j.pedn.2016.11.001

Ross, K., Heiny, E., Conner, S., Spener, P., & Pineda, R. (2017). Occupational therapy, physical therapy and speech-language pathology in the neonatal intensive care unit: Patterns of therapy usage in a level IV NICU. Research in developmental disabilities, 64, 108-117. https://doi.org/10.1016/j.ridd.2017.03.009

Learner Objectives:

1. Attendee will list 3 benefits of an integrated neonatal therapy program in the NICU
2. Attendee will identify 2 recommended core competencies of a neonatal therapists in the NICU to promote best outcomes

Gravens 2024-66

Abstract Title: How to foster meaningful connections with families, and why it matters: Lessons from my life-threatening pregnancy and premature birth journey

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Problem Statement:

My abstract will be unique when compared to others, as I am creating a presentation based on my lived experiences as a survivor of a life-threatening pregnancy, and as a mother of a micro preemie. The problem I am looking to address is the disconnect between nurses and parents in the neonatal setting. I address this by using my personal story and experiences to make suggestions on how staff can build trust and respect with parents, in gentle and genuine ways, so that meaningful connections are made with each member of a baby's care team, thus increasing patient outcomes and parent satisfaction.

Abstract:

I would like to say that my pregnancy and delivery story is unique and that I am the only person to have experienced both pregnancy trauma and an extended NICU stay, but unfortunately that is not the case. I was diagnosed with placenta previa within a few weeks of conception. As the bleeding continued and the pregnancy advanced, so did the complications, and I hemorrhaged for the first time at 17 weeks gestation. My life changed forever that day. I was forced to endure 6 weeks of bed rest, both in and out (mostly in) of the hospital, accompanied by four life-threatening hemorrhages and countless units of blood to stay alive. My life, and my pregnancy almost ended on four different occasions during hemorrhages, with the last one occurring at 23 weeks gestation and causing my daughter's extremely premature birth. All of this trauma happened to me before my daughter was even born, and I was then catapulted onto the NICU rollercoaster. My body and mind were consumed with the NICU.

I was not able to hold my daughter for over a month. I watched strangers feed her through a tube, prick her heels, change her diapers, and comfort her when she was scared or in pain. That is the reality of a NICU parent. It took many compassionate and experienced nurses to guide me to be the parent I needed to be.

They gave me the skills I needed to partner with them, so that we could be a team in my baby's care plan. NICU parents persevere because we have to, but we are broken. Many of us have experienced a great deal of pregnancy and birth trauma before we entered the NICU, and our ability to trust our baby's medical team is very low. Physicians, nurses and therapists that create the time and space needed to gain the trust and respect of a NICU parent will keep it, allowing for the meaningful connections and strong partnerships needed for increased patient outcomes and parent satisfaction.

References:

1) *Misty D. Reis, Gwen R. Rempel, Shannon D. Scott, Barbara A. Brady-Fryer, John Van Aerde,Developing Nurse/Parent Relationships in the NICU Through Negotiated Partnership,Journal of Obstetric, Gynecologic & Neonatal Nursing,Volume 39, Issue 6,2010*

2) *Brødsgaard, A, Pedersen, JT, Larsen, P, Weis, J. Parents' and nurses' experiences of partnership in neonatal intensive care units: A qualitative review and meta-synthesis. J Clin Nurs. 2019; 28: 3117-3139.*

3) *Maxwell, Jazmine and Merritt, Linda and Urbanosky, Cameryn, Exploring the Relationship between NICU Nurses and Fathers of Premature Infants.*

4) *Fegran, Liv & Helseth, Sølvi. (2008). The parent-nurse relationship in the neonatal intensive care unit context - Closeness and emotional involvement. Scandinavian journal of caring sciences. 23. 667-73. 10.1111/j.1471-6712.2008.00659.x.*

Learner Objectives:

1) At the close of this presentation, participants will be able to better identify with a NICU parent, and gain insight into what it's like to have experienced birth trauma and the trauma associated with having a NICU baby, and how these impact trust and decision-making.

2) At the close of this presentation, participants will gain insight into the mind of a NICU parent who must watch from the sidelines as strangers provide life-saving therapies and comfort care to their baby.

3) At the close of this presentation, participants will be given advice on how to gain the trust and respect of a NICU parent and keep it, forming the meaningful connections and strong partnerships needed for increased outcomes and parent satisfaction.

Gravens 2024-67

Abstract Title: To Err is Human: Improving the Way we Honor our Bedside Mistakes and Support Our Team Do the Same

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Problem Statement:

Healthcare providers who work in the NICU are not immune to making errors, many of which negatively affect our occupational stress, emotional wellbeing, and overall quality-of-life. When unintentional errors do occur, there is little support to help us deal with the impact, often affecting the quality of care we provide to our patients and their families, as well as how we show up for our team members.

Abstract:

"To err is human" is a popular phrase we hear in healthcare, however, it does not seem to help anyone after an error was made. Admitting that a child or family was potentially hurt by one of your mistakes is a personally daunting experience, and one that may haunt you for years. In truth, we all have regrets, but how you self-reflect on your mistakes and use them to make conscious improvements to your practice is exactly how we can honor that experience and release any guilt or shame we may feel. This lecture will be conversational in nature, as the presenter will share some stories of her least successful infant-parent, and inter-professional interactions. Each story will be followed by audience polling on the most striking error (to improve upon awareness skills), as well as a review of the evidence emphasizing the impact of that mistake. Six evidence-based strategies will be discussed to help healthcare providers honor their mistakes, as well as how to show compassion and forgiveness towards their co-workers' mistakes.

An emphasis on trauma-informed care and the shared mission to help infants and their families will direct the audience towards clear steps to avoid future occurrences, improve success at the bedside and release guilt or shameful thoughts. This lecture will have a strong focus on neurodevelopmental care, family-centered care, inter-professional practices, ethics, self-love and forgiveness. Audience members will have an opportunity to share some of their mistakes and seek support from their peers in order to honor their errors and promote self-growth.

References:

Winning AM, Merandi JM, Lewe D, Stepney L, Liao NN, Fortney CA, et al. (2017). The emotional impact of errors or adverse events on healthcare providers in the NICU: The protective role of coworker support. Journal of Advanced Nursing.

Marran, J. E. (2021). Supporting staff who are second victims after adverse healthcare events. Nursing Management, 28(2).

Robertson, J. J., & Long, B. (2018). Suffering in Silence: Medical Error and its Impact on Health Care Providers. Journal of Emergency Medicine, 54(4), 402-409. https://doi.org/10.1016/j.jemermed.2017.12.001

Sirriyeh, R., Lawton, R., Gardner, P., & Armitage, G. (2010). Coping with medical error: a systematic review of papers to assess the effects of involvement in medical errors on healthcare professionals' psychological well-being. Quality and safety in health care, 19(6), e43-e43.

Tawfik DS, Profit J, Morgenthaler TI, et al. Physician Burnout, Well-being, and Work Unit Safety Grades in Relationship to Reported Medical Errors. Mayo Clin Proc. 2018;93(11):1571-1580. doi:10.1016/j.mayocp.2018.05.014

Ko, C. J., Kim, R., Fortin, A. H., Spak, J. M., & Hafler, J. P. (2021). Relationship-Centered Care in the Physician-Patient Interaction: Improving Your Understanding of Metacognitive Interventions. Cutis, 107(6), 320-324.

Drigas, A., Papoutsi, C., & Skianis, C. (2021). Metacognitive and Metaemotional Training Strategies through the Nine-layer Pyramid Model of Emotional Intelligence. International Journal of Recent Contributions from Engineering, Science & IT (iJES), 9(4), 58-76.

DeLong, L. B., & Kahn, J. H. (2014). Shameful secrets and shame-prone dispositions: How outcome expectations mediate the relation between shame and disclosure. Counselling Psychology Quarterly, 27, 290-307. http://doi.org/10.1080/09515070.2014.908272

Cohen, T. R., Wolf, S. T., Panter, A. T., & Insko, C. A. (2011). Introducing the GASP scale: a new measure of guilt and shame proneness. Journal of Personality and Social Psychology, 100, 947. http://doi.org/10.1037/a0022641

Learner Objectives:

Participants will be able to:

Describe the negative effects of errors on occupational stress, emotional wellbeing, and overall quality-of-life for healthcare providers in who work in the NICU.

Summarize important foundational theories to incorporate into their practice in attempts to improve upon any mistakes (i.e., neurodevelopmental care, family-centered care, trauma-informed care, inter-professional practices, self-reconciliation).

List clear, evidence-based strategies to increase awareness and to take responsibility of a mistake, as well as how to take action for improvements at bedside, and find forgiveness with themselves and co-workers.

Gravens 2024-68

Abstract Title: Impact of the Environment on Infants in the Intensive Care Nursery

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Problem Statement:

In infants in the Intensive Care Nursery, do private patient rooms compared to open-bays impact patient outcomes? This statement is important as many Intensive Care Nurseries around the world are changing the layout of their unit from an open-bay layout to private patient rooms as a result of new evidence.

Abstract:

The environment of an Intensive Care Nursery (ICN) can significantly impact infant outcomes. This study was conducted to determine which ICN design, open-bay unit or private patient rooms, lead to improved patient outcomes. Research was conducted by reviewing literature in online databases with key words such as "intensive care nursery design," "open-bay intensive care nursery," "single family room intensive care nursery," and "infant outcomes." Five studies were chosen, which included three systematic review studies and two quasi-experimental studies. These five articles provided qualitative and quantitative results of infant outcomes in open-bay units compared to private patient rooms. O' Callaghan et al. (2019) reviewed 29 articles; Soleimani et al. (2020) reviewed 16 articles; Jones et al. (2023) reviewed 44 articles, Puyana-Romero et al. (2020) did a study in an ICN to compare noise levels in two different rooms, and Puumala et al. (2020) observed 9,995 ICN patient encounters. The main outcomes presented in these studies were a decrease in mortality and morbidity rates in infants that stayed in an ICN with single family rooms, compared to those that were in an open-bay unit. The studies also revealed that healthcare providers play a huge role in making the environment suitable for a vulnerable infant. The results of this research proved that all Neonatal Intensive Care Units should transform from open-bay units to single family rooms. Infants that are in these units are developmentally vulnerable, with brain development continuing in the extra-uterine setting (O' Callaghan et al., 2020). Private patient rooms positively impact weight gain, feeding tolerance, and infection prevention. At two years old, decreased motor scores, language scores, and brain development were noted in infants that were in an open-bay ICN (Soleimani et al., 2020). Hospitals should provide bedside nurses with electronic devices that route bedside alarms to the primary nurse to decrease noise stimulation (Jones et al., 2023). Absorbant features should be utilized when constructing a new unit, as it can decrease noise levels by 5% (Puyana-Romero et al., 2020). Another study revealed that single family rooms have an increase in positive outcomes in preterm infants compared to term/post-term infants (Puumala et al., 2020). In conclusion, single family rooms compared to open-bay units in the ICN positively impact patient outcomes. Some healthcare providers still advocate for open-bay units, as it can aid in communication between staff and allow for observation of multiple infants at once. As mentioned above, healthcare providers must still make an effort to provide non-stimulating voice and noises to promote learning and proper development. If this does not happen in single family rooms, the infant can be delayed in development at a later age. These barriers can be overcome by new technology, such as wireless communication devices and alarms being routed to the bedside nurse on this device. High quality patient care, alongside modern technology, can be bolstered through the design and layout of an ICN.

References:

Jones, C. W., Moya, F., & Lynch N. (2023). Unintended consequences of the Neonatal Intensive Care Unit environment: Integrative review of single-family room unit design. Advances in Neonatal Care: Official Journal of the Neonatal Association of Neonatal Nurses, 23(2), 151-159.

O' Callaghan, N., Dee, A., & Philip, R. K. (2019). Evidence-based design for neonatal units: a systematic review. Maternal Health, Neonatology, and Perinatology, 5(6).

Puyana-Romero, V., Nunez-Solano, D., Hernandez-Molina, R., & Jara-Munoz, E. (2020). Influence of the NICU on the acoustic isolation of a neonatal incubator. Frontiers in Pediatrics, 8(588).

Puumala, S. E., Rich, R. K., Roy, L., Reynolds, R., Jimenez, F. E., Opollo, J. G., & Brittin, J. (2020). Single-family room Neonatal Intensive Care Unit design: do patient outcomes actually change? Journal of Perinatology: Official Journal of the California Perinatal Association, 40(6), 867-874.

Soleimani, F., Rostami, F. F., Nouri, J. M., Hatamizadeh, N., Sajedi, M. N., & Norouzi, M. (2020). Impacts of the design of a Neonatal Intensive Care Unit (single-family room care and open-ward care) on clinical and environmental outcomes. Crescent Journal of Medical and Biological Sciences, 7(1), 1-6.

Learner Objectives:

1. Identify current evidence-based practice on the layout of an Intensive Care Nursery.
2. Compare the difference of infant outcomes in an open-bay unit vs. private patient rooms.
3. Identify environmental factors in an Intensive Care Nursery that can impact patient outcomes.

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