Abstracts from the 32nd Annual Gravens Conference on the Environment of Care for High Risk Newborns, in collaboration with the March of Dimes

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The abstracts from the the 32nd Annual Gravens Conference are presented below:

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Gravens2019-1
Online Video-based Supplement for APIB and NIDCAP Education

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Aims: There have been repeated requests by neonatal caregivers for enhanced educational materials to help neonatal caregivers learn and refine neurodevelopmental, brain-protective caregiving techniques. The Edmonton NIDCAP Training Centre Canada has created an on-line video library as a first step in responding to this need.

Video offers several advantages over verbal/written communication and education, and has been shown to improve technical and non-technical neonatal resuscitation skills I. The presentation of large amounts of information in a limited amount of space and time, simplifying complex/abstract concepts, demonstrating how concepts/subjects in motion relate to one another, engaging audience attention and retention of information are enhanced II; all these are educational goals of neurodevelopmentally based training programs such as NIDCAP.

Our experience of video-supplemented education concurs with these findings. Our goals were to a) create this tool, b) present this work at conferences and workshops for feedback from neonatal caregivers, and c) invite collaboration to expand this preliminary work.

Methods: Parents and staff providing care to NICU Infants (N=36), at the Stollery Children's Hospital in Edmonton, Canada, gave written consent for videotaping of caregiving interventions. A variety of caregiving procedures, (clinical examinations including APIB's, diaper changes, needle sticks, procedures, etc.) were captured on video. Videos reviewed by JMT and AN were categorized according to Synactive Subsystems, (for NIDCAP section) III and Systems, Packages or Summary Scales (for APIB section) IV. Many video clips raised questions related to NIDCAP observations and/or APIB examination / scoring and were placed in a separate section, 'Platform for Debate'. Videos in the Platform for Debate section were linked to feedback forms to facilitate e-mail communication with ENTCC, so that viewers can offer their perspectives and insights. All videos were uploaded to a password protected database and website.

Results/Findings: Video captured more detail of caregiving procedures than transcription onto NIDCAP observation sheets. Similarly, video of APIB exams led to more detailed scoring, than the scoring based on examiner's memory. The videos often provided a different view of the infant, compared to that of the observer, thus affording a more complete record of the infant's behavioral patterns. A sample of the educational videos can be viewed by the Abstract Review Committee, at https://stollerynicu.wixsite.com/snapshots We have provided this link as these visuals are our "Results"; the website will be demonstrated "live" during our presentation. We invite discussion and feedback about the user-friendliness and utility of this resource and the possibilities of forming a Working Group to expand this work.

Conclusion and Further Plans:
We will continue to record and upload videos, and welcome others to submit videos for inclusion in this online learning resource. We anticipate that this resource will be used by NIDCAP and APIB practitioners and neonatal caregivers to supplement learning in the area of neurodevelopmental, brain-protective caregiving in the NICU. We hope that the "Platform for Debate" section will serve as a forum for collaborative discussion about the complexities of neurobehavioral observation. We hope that the online communication channel of this resource will enhance the skills of all who strive to provide, individualized neurobehavioral brain-protective care for infants in their nurseries.

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Gravens2019-3

Combatting Compassion Fatigue with Resilience in Neonatal Intensive Care Unit Nurses

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Background and Purpose

The purpose of this project was to combat and prevent compassion fatigue (CF) in Neonatal Intensive Care Unit (NICU) nurses in a particular microsystem by offering an interactive, educational seminar focused on four evidence-based, realistic techniques for building resilience.

Design/Methods

Discussion with the chaplain of the NICU revealed that CF was a current problem with the nursing staff. An evidence-based literature search was conducted to fully understand this phenomenon and to determine its effects on nurses' health, the hospital units, and the patients. To combat this issue, an interactive, educational seminar was held at Nationwide Children's Hospital main campus in Columbus, Ohio to thirty-seven NICU nurses from various NICUs in the area at the Annual Neonatal Retreat in September of 2017. A comprehensive overview on compassion fatigue was provided and four evidence-based, realistic techniques for building resilience were explained with rationale for utilization and demonstrated to the nurses. These techniques are square breathing, the Relaxation Response, meditation, and exercise. A pre-presentation survey was conducted to determine nurses' previous knowledge of compassion fatigue, past/current experiences with signs and symptoms, and current coping methods in use, if any. A post-presentation survey was then utilized to determine the likelihood that nurses will use the techniques for building resilience as well as the effectiveness of the educational seminar. Badge buddies with the techniques for building resilience were given to the nurses, too, to serve as a reminder.

This educational seminar was then presented at a Strategic Partnership meeting at Ohio Health Riverside Methodist Hospital/Nationwide Children's Hospital NICU in February of 2018. Thirty-seven NICU nurses were in attendance, and five of these nurses had previously attended the seminar at the Annual Neonatal Retreat in September. A post-presentation survey was conducted four months post-seminar to determine which, if any, of the techniques for building resilience were being utilized and which, if any, were found to be effective in preventing/combatting compassion fatigue.

Results/Significance

Compassion fatigue has a significant impact on NICU nurses, the hospital unit, as well as the patients and families involved. NICU nurses are often exposed to a high-stress environment with significant traumatic events and eventually, they may be unable to cope or recover. This is when an insidious onset of CF occurs (Berger, Polivka, Smoot, & Owens, 2015). Pre-presentation survey results found that several symptoms of compassion fatigue were prevalent among the NICU nurses. For example, 62% have often felt "on edge," 59% felt anxious, 68% felt sad, 81% felt overwhelmed, and 91% lost sleep due to the effects that their role as a healthcare provider has on their physical and emotional state. Nurses affected often leave their jobs due to the tremendous burden associated. If unaddressed, nurses affected are more likely to deliver poor quality health care, make more medical errors and often neglect bringing empathy to the bedside. Post-presentation survey results revealed that 100% of the NICU nurses answered that they had learned something new about compassion fatigue, and 100% of the NICU nurses answered that they had experienced this before in their nursing career.

Compassion and empathy are core values of nursing (Ledoux, 2015). These values provide nurses with the stamina, hopefulness, soulfulness, and passion in the face of the illness and despair that their patients and families experience. NICU nurses provide care and compassion to the families and infants that they care for and are considered their partners during their healthcare journeys, causing them to be at higher risk for developing compassion fatigue. The importance of recognizing signs and symptoms and preventing and/or combatting compassion fatigue as quickly as possible cannot be understated. Resilience has been shown to be a protective factor against CF and may be used to combat signs and symptoms (Parry, 2017). Post-second seminar survey results revealed that 100% of the NICU nurses utilized at least one of the techniques for building resilience, and all four were found to be effective in preventing/combatting compassion fatigue. Ultimately, the seminar was effective in teaching tools that can be used to optimize nurses' personal health and well-being so that they are able to provide safe, high quality patient care.

Conclusion/Implications for Practice

Education on compassion fatigue is essential for all NICU nurses and nurses on units where it may be likely to occur. Resilience may contribute to improved health of nurses, hospital unit quality and morale, as well as quality and safety of patient care. Best patient outcomes may be achieved when cared for by resilient nurses.

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out.

Learner Objectives

1. Learn about the phenomenon of compassion fatigue, signs and symptoms, and associated consequences.
2. Learn and practice four evidence-based, realistic techniques for building resilience in order to prevent and/or combat compassion fatigue.
3. Develop a strong appreciation for the importance of self-care, building resilience within oneself, and gain inspiration to lead by example!

Gravens2019-6

A comparison of NICU nurses' stress and the quality of their work environment in an open-ward and a new unit of both pods and single-family rooms

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Background and Purpose:
The architectural design of a Neonatal Intensive Care Unit (NICU) may affect the physical and psychological health of newborns, their parents, and nursing staff. (1) Open wards (OW) or bays contain many incubators in one large space which enables nurses to readily monitor fragile newborns. A pod design (i.e., 4 to 10 incubators in one space) can offer more control than an OW over environmental factors that may affect the well-being of infants, staff and parents. Single family rooms (SFRs) may allow greater control over the environment and greater privacy.

Few systematic studies examine how design relates to the well-being of nurses (2-4), and the quality of existing studies is often weak4. Recent studies suggest some drawbacks of SFRs for both infants and parents, prompting some NICUs to consider designs combining both. Research is needed to explore nurses' work experience in units combining pods and SFRs. The purpose of this study was to compare NICU nurses' work stress and the quality of their work environment in an OW and in a new unit of both pods and SFRs.

Methodology:
A pre-post occupancy study was conducted in a level 3 unit before and after transitioning to a new unit of 6-bed pods and SFRs (January 2016). Post-occupancy data were collected one year later (to allow staff to adjust) in the first 3 months of 2017.

Nurses were invited to participate if they were registered nurses, had worked in the unit for at least 3 months, and worked at least one shift per week. 54 nurses completed online questionnaires both pre- and post-transition. They responded to reliable and valid questionnaires assessing nurses' stress, support, ability to provide patient-centered care, perceptions of their work environment quality and of their healthcare team's effectiveness, as well as their work satisfaction. We also monitored adverse events (collected via incident reports) for the year before the transition (2014-15) and compared this to the entire period post-transition (2016-18).

Results:
There were no significant differences in nurse stress, satisfaction, support from colleagues, perceptions of team effectiveness and ability to provide family-centered care between the OW and the pod/SFR unit.

Although there was no significant difference in total work obstacles (Mean = 61.5 versus 58.4), differences were found on three of four obstacle subscales. Scores for total obstacles can range from 22 to 110, thus obstacles were not high in either environment. While nurses reported fewer organizational obstacles (e.g., difficulties obtaining information from colleagues) in the pod/SFR unit; both environmental and technology obstacles were greater in the pod/SFR unit. There was no difference in task obstacles.

There was a reduction in the number of adverse events. The monthly average was 15.3 events in the OW and 8.6 in the pod/SFR unit. Medication, diet and treatment adverse events all decreased (61, 75 & 52% respectively).

Discussion:
Contrary to what we expected based on previous studies, there were only a few differences in nurses' work experience. The timing of assessments is important to consider as we purposefully assessed nurses one year after the transition to allow time to adjust. While nurses found some aspects of the pod/SFR unit optimal, other aspects of the OW were viewed more favourably.

Our findings concerning environmental and technological obstacles are consistent with Smith and colleagues' study of five pediatric critical care units transitioning to SFR design. Nurses reported greater technological obstacles in the pod/SFRs. These include how easy it is to locate equipment/supplies, and how well supplies are stocked.

The distance between isolettes may contribute to greater environmental obstacles in the pod/SFRs. In the former OW unit, isolettes were a few feet apart; whereas in the pod/SFR distances are greater. Studies of SFR units have found that increased walking is an issue for nurses.

Support received from colleagues was no different. The questionnaire we utilized addresses the overall quality of staff relationships; not isolation from other staff. Concerns about isolation was evident in responses to open-ended questions. Nurses in a SFR units have reported that their colleagues are less available, and they are less satisfied with interactions with other team members.

Adverse events may have decreased due to less noise, fewer interruptions while performing tasks and a different system for storage of breastmilk.

Strengths of this study include: the high rate of participation, number of participants, the inclusion of nurses who worked in both units and could compare their work experience in both, and the use of well-established, reliable and valid measures.

Implications:

- Managers should ensure adequate staff to stock equipment and supplies in SFRs.
- There may be fewer organizational obstacles in the pod/SFR due to decreased noise, ease of locating charts, and the ability to gather in small groups at de-centralized stations for report.
- Managers may also want to develop strategies to ease isolation.

Learner Objectives:

1. Understand the impact of NICU design on nurses' stress and work environment, job satisfaction, support from colleagues and managers.
2. Learn about the benefits and limitations of a combined pods/SFRs unit design relative to commonly used open ward designs

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Gravens2019-8

Getting there- a journey to optimal breastfeeding in the NICU using the vehicles of a statewide breastfeeding collaborative and the Baby Friendly Project

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Background: Breastfeeding and use of human milk confer unique benefits to neonate. Nowhere is this statement truer than in the Neonatal Intensive Care Unit (NICU), particularly for the infant that is less than 1500 grams. There are numerous published evidence-based studies that have confirmed the benefits of supplying human milk to the neonate.

The NICU at Winnie Palmer Hospital for Women and Babies joined the Florida Perinatal Quality Collaborative" the Mother's Own Milk Initiative (MOM)" in May of 2016 and began working to optimize the use of mothers' own milk for babies less than 1500 grams admitted to the NICU. At the same time Winnie Palmer Hospital for Women and Babies began their Baby Friendly journey.

Aim / Purpose of the Project: The aim of this project was twofold: 1) improve the time of first pumping in mothers' who have delivered very low birthweight infants (VLBW) babies (<1500grams at birth) to 6 hours or less and 2) achieve Baby Friendly Designation. Design and Methods: We chose our AIM carefully knowing that if we did not get mother's pumping early and often and milk production was not adequate, we could never improve the outcome for increasing breastfeeding in that last week before discharge. Additionally our organization was on the "Baby Friendly Journey". The time of first feeding (within 6 hours of birth) was a key measure of success for Baby Friendly. It seemed logical to begin with the pumping/feeding within 6 hours of birth and combine both projects.

In order to obtain data for both the MOM and Baby Friendly designation, chart reviews of each infant's electronic record needed to be performed. Although our organization had an electronic medical record (EMR), the system in place did not allow for creating reports and all data needed to be retrieved manually. The process was extremely labor intensive taking up to 24 hours/week of dedicated data collection time. Despite not being able to retrieve data by generating reports, the manual process was helpful in that we were able to identify other aspects that needed review and examination for continued success with the project.

The MOM initiative goal was to have 90% of mother's who's infants were born at less than 1500 grams pumping in 6 hours or

less after delivery, while Baby Friendly required 80% of all well newborns have the first feeding initiated within 6 hours. Studies show the sooner the mother begins pumping/feeding the more likely she is to continue. By focusing our work on getting the NICU Moms to pump within the first six hours and the well newborns first feed within six hours we determined we could meet Joint Commission Core Measure PC05 Exclusive Breast Milk Feeding of 52. 9% Results and Outcomes: Participating in the MOM initiative while the organization was on the Baby Friendly Journey completely changed our expectation of when we could get our NICU Moms starting to pump for their neonates. Previously we were satisfied with initiation of pumping as long as it was within 24 hours of birth and usually it was within 12 hours. Because we combined these projects we collaborated with PACU, Baby Assessment Nurses (BAN), L/D Nurses NICU Nurses, NICU Lactation Consultants and the NICU Milk Room Staff. Team members worked together in PACU and L&D to initiate breast pumping, and hand expression. Over the eighteen months of the project we improved our initial pumping within 6 hours from 20% to 92%. For the first time ever we also achieved an exclusive Breast milk feeding rate in the entire hospital of 53%!

Education played a pivotal role in the success of this project. In order to achieve Baby Friendly designation, all team members (including anyone who worked in the organization) received specific breastfeeding education. The number of hours of education required ranged from 1 hour for our environmental services team members to 20 hours for our nursing team members. By combining the work of the MOM and Baby Friendly initiative we were able to educate the organization on the importance of pumping/feeding within the first 6 hours of life.

Implications and Conclusions: Many times when you have ongoing Performance Improvement projects such as the MOM and Baby Friendly the projects have competing priorities. In fact when we first began the work we were advised to keep the projects separate. We found that by combining the work of the MOM and Baby Friendly Initiatives we were able to focus the work for the entire organization on the importance of pumping/feeding within the first 6 hours of life. Winnie Palmer Hospital was Designated a Baby Friendly Facility in August of 2018, and is the largest delivery hospital in the United States to receive the designation!

Learner Objectives:
After reviewing the poster the learner will:
1. Describe the importance of early pumping for successful human milk feeding in the NICU.
2. Discuss the significance of combining the MOM project with the Baby Friendly Initiative to achieve success for the organization.

Gravens2019-9

Comparison of breastmilk production from mothers of premature and mature NICU's babies during the first week in our NICU

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Background: Better understanding of patient satisfaction and improving patient-provider communication could alleviate many problems that face the health care industry today. (Heath, 2017) This is most evident in the Neonatal Intensive Care Unit (NICU) where the tiniest and most fragile patients reside. The NICU is a mysterious place behind locked doors that require special badges and passes to enter. Much like when Dorothy arrived in Oz there is an overload of sensory input. Families are overwhelmed and frightened by the unfamiliar; the amount of equipment, noise and alarms. Families have identified respectful and timely communication important factors affecting parental satisfaction with NICU care. (Martin, D'Agostino, Passarella, and Lorch, 2016)

Behaviors identified as positively impacting patient satisfaction include communicating information in a respectful manner, development of rapport, providing emotional support and respecting the participation of parents in the care of their infant. (Martin, D'Agostino, Passarella, and Lorch, 2016). By focusing on improving these behaviors patient experience scores rise, which leads to an increase in financial performance, compliance with treatment regimens, care outcomes, and patient loyalty.

Aim / Purpose of the Project: Twenty nine of the forty questions on the Press Ganey Survey of patient satisfaction are directly or indirectly related to the ability of the staff to communicate with patients and families. (Press Ganey, 2017). The aim of this project was to significantly improve the NICUs patient satisfaction scores by providing comprehensive communication training to NICU Team Members (TM's).

Method: We utilized a communication training program that was created specifically to help TMs better communicate with families. Training consisted of 3 parts: initial "train the trainer" simulations, mandatory 2-3 hour interactive workshops on communication techniques and finally patient experience simulations. A unit neonatologist who is skilled in healthcare communication taught all offerings of the workshops to provide consistency. All TM's were trained from November 2017 through January 2018.

The Patient Experience Simulations were conducted by TMs who

completed the train the trainer component mentioned previously. We had a total of 17 trainers to including two Developmentalists, one Lactation Consultant, two Discharge Coordinators, three Educators, six Clinical Assistant Nurse Managers, and three Managers who had bedside care responsibilities and schedule flexibility. The Patient Experience Simulations were a mix of some presentation (brief and debrief) and simulation. Simulation classes were limited to 16. A Discharge Simulation and a Rounding Simulation were chosen as the simulations. All team members participated in both simulations. A comprehensive debrief with a power point presentation finished the simulations. Minimal materials were required. Four simulation rooms (2 for each of the scenarios) were used. To signify the successful completion of the simulations, a gold wrapped candy was awarded to each team member.

Results and Outcomes: Patient satisfaction scores 12 months before intervention were compared to patient satisfaction scores after intervention. Mean scores, percentile, and "top box" scores were analyzed. Overall scores as well as specific nursing and physician categories were examined.

Using data from Press Ganey, overall patient satisfaction scores increased for the 6 months following completion of intervention by 31 percentile points(60%) compared to the 12 months prior to the intervention. Standard nursing overall percentile increased from the 31st percentile during the previous 12 months to the 87th percentile for the 6 months following the intervention. Manner of physician communication increased from the 22nd percentile to the 74th percentile. Overall physician scores increased from the 32nd percentile to the 67th percentile. "Top Box" data showed an increase in 7.4 % compared to 6 months prior to the intervention.

Implications and Conclusions: We conclude that patient satisfaction scores can be significantly improved through extensive communication training. Unlike Dorothy we don't need ruby slippers; our findings provide objective data that reinforce the need for comprehensive communication training.

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6.

Learner Objectives:

At the completion of this oral abstract session the learner should be able to:

1. Discuss the importance of effective communication in the NICU
2. Recognize the opportunity that specific communication training provides for improving patient satisfaction scores
3. Discuss the benefits of communication simulation training for team members in the NICU setting.

Gravens2019-10

Long-term effects of neonatal complications on brain growth at 10 years of age in children born extremely preterm

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Each year over 1800 babies are admitted to the NICU at Winnie Palmer Hospital for Women & Babies, a regional perinatal center. Approximately 10% of admissions are transports via ambulances and helicopters from outlying facilities. The stresses to the baby during transport are extraordinary and cause challenges in providing optimal developmental care.

Resources were available at no cost. Air Methods assisted with vibration measurements in both the ambulance and helicopter using a microvibe, an instrument used for rotor wing vibration balancing. Professional engineering expertise on this project was provided by a neonatal volunteer retired from NASA Kennedy Space Center conducting failure analysis during the space shuttle era.

Exploring the stresses that occur during transport resulted in this process improvement study. Our primary goal was to improve neonatal transport processes and outcomes by minimizing stressors. Sound and vibration were identified as major stressors for both ground and air transports. Light and positioning were also identified as common stressors during neonatal transport. Noise measurements were taken during actual ambulance transports. Vibration measurements were assessed in the ambulance and helicopter using a microvibe device and using various mattress combinations. Vibration data was collected in transport vehicles without patients and did not require IRB approval.

Noise measurements were taken in the ambulance and helicopter; noise levels ranged from 71dB to 92dB. Noise levels were higher in the helicopter than the ambulance. Vibrations measurements were collected using various mattresses. Vibration was lowest in the helicopter using a ROHO custom air chambered mattress with measurement 7Hz. A fluidized positioner actually increased the vibration.

Considerations for Interventions:

- Determining acuity and optimal mode of transportation (i.e. ground, air, fixed wing)
- Consider speed and route if ground transportation
- Position in ambulance
- Positioning of baby
- Use of commercial positioning aides
- Custom air chambered mattress
- Ear Protection

- Light protection

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Learner Objectives: 2-3
1. Recognize the extraordinary stresses to babies and challenges to developmental care during NICU Transport.
2. Identify opportunities to provide optimal developmental care during NICU Transport.

Gravens2019-12

A Longitudinal Study of Resilience, Parental Efficacy, and Child Growth in Primary Caregivers of Growing Premature Infants Discharged from NICU: A Pilot Study

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Background: Birth of a premature baby is usually unexpected as is the baby's admission to the neonatal intensive care unit (NICU). Caregivers are educated on baby care needed during hospitalization and transition to home. Individual characteristics of the primary caregiver such as resilience and parental efficacy may play a role in successful transition to the home environment and subsequent growth and development of the child. This pilot study explored these variables over a 3 month period following hospital discharge.

Purpose: To explore and compare primary caregiver resilience and parental efficacy 1) over time and 2) relationship to child growth of premature infants discharged from NICU.

Design: This study used a longitudinal, comparative design to study primary caregiver resilience and parental efficacy, and child growth over a 3 month period of time beginning at discharge from NICU, at 1 month, and at 3 months.

Methods: To study primary caregiver resilience, the 14-Item Resilience Scale (RS-14) was used. This scale utilizes a Likert format ranging from 1 (strongly disagree) to 7 (strongly agree). Total scores range from 14 to 98 with higher scores indicating higher levels of resilience. Reliability and validity have been reported. Parental efficacy was measured using the Perceived Maternal Parenting Self-Efficacy (PMP-SE) tool; a 20- item questionnaire that involves four factors including 1) care taking procedures, 2) evoking behaviors, 4) reading behaviors or signaling, and 4) situational beliefs. It has demonstrated adequate reliability and validity. The tool utilizes four Likert-type responses; strongly disagree, disagree, agree, and strongly agree. Subjects were recruited when attending the NICU discharge class. Inclusion criteria included primary caregivers of premature infants being care for in level II NICU for at least 24 hours, and plan on being discharged from the level II NICU. They must also 1) speak and understand English, 2) reside in a house, apartment, or condominium, and 3) have an email account and access to a computer. Exclusion criteria included primary caregivers of growing premature infants discharged from level II NICU who do not speak and understand English, do not have established living arrangements, and/or do not have an email account and/or access to it. Also excluded in this pilot study were primary caregivers of premature multiple births and premature infants with long term complications or neonatal abstinence syndrome. The first surveys were collected via paper the day prior to discharge or discharge day. The surveys at 1 month and 3 months were collected via emails that were accessed either through a Smartphone or a computer. A pocket card to record height/length, weight, and head circumference of the infant over time when going to the physician or clinic was used to determine child growth. Subjects supplied this information at 1 and 3 months on the survey sent via email. Subjects received a $10 gift card upon completion of the 3 month survey. Descriptive, comparative (t-test, ANOVA), and correlation Pearson coefficient tests were used to analyze data.

Results: Twelve subjects complete the first two surveys and nine subjects complete all three. Resilience (mean 85.6, 85.17, and 87.5) and parental self-efficacy (mean 68.3, 71.58, and 75) were high throughout the study, but did not change statistically over time. Parental self-efficacy and child's weight were positively correlated at one month (r=-.696, p=0.012).

Clinical Impact: Although caregivers are educated on baby care needed during hospitalization and transition to home, the indi-

vidual characteristics of the primary caregiver including resilience and parental efficacy may play a role in successful transition to the home environment and subsequent growth and development of the child.

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Gravens2019-16

Response of an Incubator-Based Active Noise Control System to a Syringe Pump Alarm

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Technological advances in neonatal intensive care have contributed greatly to decreases in infant mortality. (1,2,11,3–10) The neonatal intensive care unit (NICU) clinical team must provide support of basic functions including temperature and humidity control, nutritional support, and more. However, the mission of NICU care is also to support the healthy infant development. A critical component of healthy development is limiting the noxious noise to which the patient is exposed (12–16) while providing appropriate aural stimulation to promote brain and language development (17,18). In the same way that technology addresses physiologic needs through incubators for temperature and humidity management, it can also be applied to help address these developmental concerns through noise control.

Noise levels in NICUs have been shown to be consistently louder than guidelines provided by the American Academy of Pediatrics (AAP).(19–23) These guidelines stipulate that the noise levels that the hospitalized infants are exposed to should not exceed 45 dB, A-weighted (dBA), averaged over one hour and should not exceed a maximal level of 65 dBA averaged over one second. (24) Noise measured both inside and outside an incubator show guidelines are frequently exceeded throughout the day. (20)

Health risks from noise exposure are many and significant including impact on intellectual development (16,25), the potential for hearing loss, (26,27) impact on growth,16 impact on stress,13,28–30 and a decrease in risk of intra- and peri-ventricular hemorrhage. (25)

Noise levels in NICUs have been shown to be consistently louder than guidelines provided by the American Academy of Pediatrics (AAP). These guidelines stipulate that the noise levels hospitalized infants are exposed to should not exceed 45dB averaged over one hour and should be below 50dB 90% of time. These guidelines are routinely not met.19,20,22,23,31–34 Reducing excessive noise in the NICU has been linked to improved weight gain,16 improvements in the amount and depth of sleep,(35–37) decreased motor responses during nursing interventions, (30,38) improved cognitive development,16,25 and decreased propensity to develop IVH-PVH and hearing loss.25

It is intuitive that increased noise levels will interfere with the sleep of an infant and this correlation is demonstrated in numerous studies.(30,35,37) Adequate sleep is essential for normal development and growth of preterm and very low birth weight infants (39) and can enhance long-term developmental outcomes. (40) The aforementioned data makes a compelling case for a technological solution.

A Neoasis™ system, a novel active noise control system for incubators was evaluated for its ability to attenuate the sound of a Medfusion 3500 syringe pump alarm. A GE Healthcare Omnibed infant incubator was placed in a sound isolation enclosure (WhisperRoom model MDL 4872E) and the Neoasis™ was installed with the incubator per manufacturer's instructions. A 16 bit 44.1kHz digitized recording of the syringe pump alarm was broadcast from a Micca Covo-S speaker, amplified by a PVL30A Speco amplifier. Sound pressure levels were recorded of the alarm tone inside the incubator while the Neoasis™ system was not active and then switched to active.

The alarm tone of the Medfusion 3500 syringe pump consists of a sequence of two tones, 715Hz and 950Hz. The Neoasis™ system reduced the 715Hz tone of the alarm signal by 24dB and reduced the 950Hz tone by 13dB, representing an elimination of 94% and 78% of the alarm noise (Figure 1). Given that the average sound inside a NICU incubator has been measured between 55dBA and 62dBA in clinical use,(20) this attenuation capability could bring the sounds inside the incubator below the recommended guideline of 45dBA for a much greater percentage of the day.

This non-contact technology has the potential to provide a less stressful environment for the hospitalized infant by reducing exposure to excessive sound pressure levels. Increased stress has been linked to a decrease in weight gain velocity.

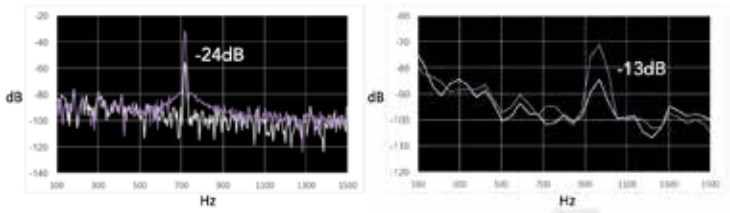

Figure 1. Spectrum plot of 710Hz and 950Hz sound pressure level attenuation

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9. Learner Objectives: 2-3
1. The implications of noise on the hospitalized infant is profound with both acute and chronic sequelae. The noise levels in the NICU routinely exceed guidelines.
2. An active noise control system has the potential to reduce noise levels to which the hospitalized infant is exposed without any patient contact.

Gravens2019-18

Reducing Noise in the Neonatal Intensive Care Unit: A Quality Improvement Project

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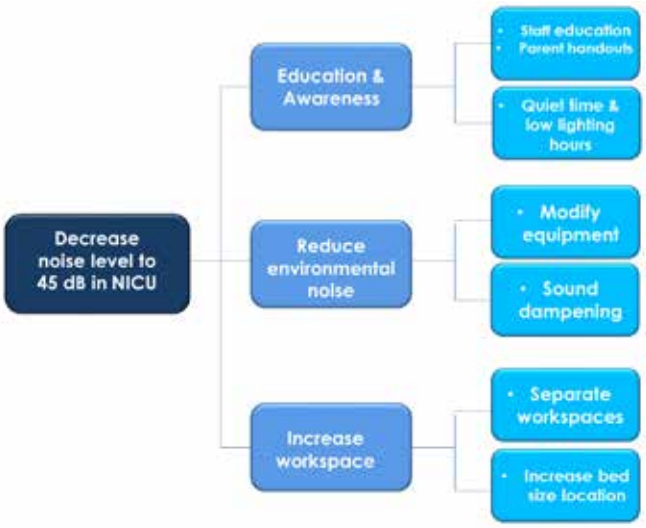
SETTING: St. Luke's Baptist Hospital is a private hospital with a 36 bed Neonatal Intensive Care Unit that is designated as a level III NICU per the 2012 American Academy of Pediatrics guidelines.
BACKGROUND: While meaningful sound (such as parents' voices) stimulates proper development, noise in excess of 45 decibels (dB) can have adverse effects on the growth and neurodevelopment of neonates. Excessive auditory stimulation can also cause cochlear damage. In addition, numerous physiologic changes can be associated with excess noise, including apnea, as well as fluctuations in heart rate, blood pressure, and oxygen saturation. Despite research documenting the negative effects noise has on the developing neonate, infants in the neonatal intensive care unit (NICU) are often exposed to noise that exceeds recommended levels. Through the years, numerous complaints & concerns have been received from staff & visitors regarding the noise level in the St. Luke's Baptist Hospital NICU. In addition, feedback from parents on a routinely administered NICU satisfaction survey has indicated that noise level is an ongoing concern for parents.

AIM: To reduce NICU noise levels by 10% & maintain the accepted range of ≤ 45 dB per guidelines set by the American Academy of Pediatrics (AAP) within an 8 month period of time.

DRIVERS OF CHANGE/INTERVENTIONS: A multidisciplinary team consisting of healthcare providers, support staff, and parents is working to decrease noise levels in the NICU. Decibel meter readings were obtained at four designated locations in the NICU every hour (24 hours a day) for seven days at baseline & after each cycle. Data was collected with a RadioShack Sound Level Meter with capability of measuring sound within a range of 50 – 126 dB with an accuracy of ±2 dB.

Baseline data collection – October 2017
PDSA Cycle 1 ("Awareness and Education") – November 2017:
- Quiet time and low lighting hours (10:00 – 11:00 AM & PM) implemented
- Unit posters displayed
- Staff education provided in the form of in person lecture with PowerPoint
- Educational handouts provided to families of NICU patients
- PDSA Cycle 2 ("Environmental Change") – December 2017:
- Settings for alarm volumes were monitored and decreased as much as possible per unit protocol
- Staff placed personal cellphone ringers on silent and away from patient bedsides
- Unit telephone ringers were set to the lowest volume setting possible
- Automatic paper towel dispensers were replaced with manual dispensers
- Metal soiled linen carts were replaced with carts containing a rubber insert to dampen sound when the cart is opened & closed

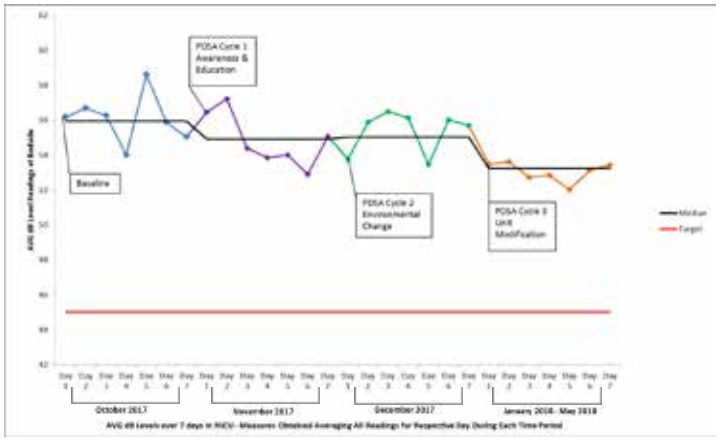
PDSA Cycle 3 ("Unit Modification") – January 2018 - May 2018:
- Square footage per bed space was increased
- Separate work areas provided for staff

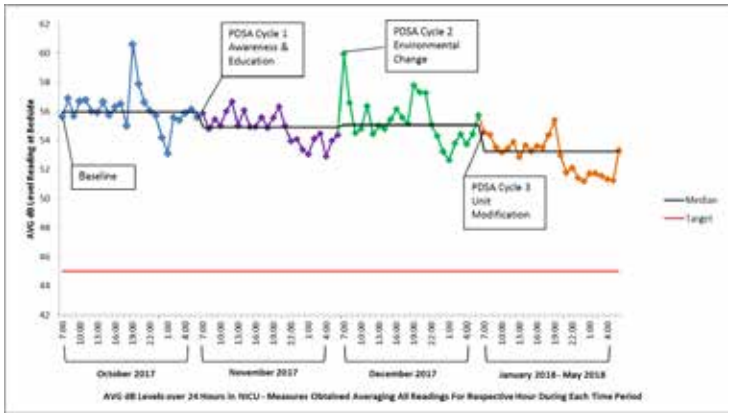


RESULTS: Median decibel meter reading at baseline was 55.95 dB. After PDSA Cycle 1, median reading was 54.92 dB (1.84% decrease from baseline). After PDSA Cycle 2, median reading was 55.04 dB (1.63% decrease from baseline). After PDSA Cycle 3, median reading was 53.21 dB (4.90% decrease from baseline).

Figure 1. Decibel Sound Level in a Level 3 NICU – 7 Day dB Audit Reported at 4 Time Intervals

Figure 2. Decibel Sound Levels in a Level 3 NICU – 24 Hour dB Audit Reported at 4 Time Intervals





DISCUSSION: Slight decline in sound was noted after PDSA Cycle 1 (especially during shift change which was a targeted area for improvement). The decline was sustained after PDSA Cycle 2, then further improvement was noted after PDSA Cycle 3. During PDSA Cycle 3, all data points were below the baseline median & a continuous decrease was demonstrated. These results are statistically significant & suggest that the trend is related to a change in process. It is evident that the most notable reduction in noise levels occurred after increasing overall unit dimensions & square footage per bed space during PDSA Cycle 3. In order to sustain & further decrease noise levels in the unit, it is apparent that education must be ongoing for noise reduction to remain a priority for staff and upon admission, it will be necessary to provide education for new parents/families regarding noise reduction and the importance of meaningful sound. In addition, it is important to note that the ambient baseline noise level in an empty room in the unit is 51-52 dB. Because of this, the structure of the facility must be considered when attempting to reduce noise levels in the future. Specifically, the noise from the air conditioning system, medical air outlets, and pneumatic tube system must be addressed with the structural engineering department of the hospital in order for noise levels to decrease further towards the goal of 45 dB.

KEY WORDS: noise reduction, NICU design, noise levels, auditory development, brain development, noise damage, neuroprotection

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LEARNER OBJECTIVES:
1. Identify common contributors to noise level in the NICU.
2. Identify ways to reduce noise in the NICU.

Gravens2019-19

Spiritual Struggles in Relation to Parents' Mental Health and Well-Being Post-Neonatal Intensive Care Unit Discharge

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Background and Purpose: Parents who experience the unexpected hospitalization of their infant following birth may struggle with stress and mental health during the neonatal intensive care unit (NICU) stay and post-discharge.(1-4) Having a child is a life-altering situation, but when the birth of that child is accompanied by an unexpected NICU stay, parents may call into question foundational views in life that are often fortified by religious and/or spiritual beliefs. (5) Thus, parents' spiritual struggles, particular with meaning, in the face of this stressful life experience can have implications for their emotional state. (6) The purpose of this study was to explore parents' experiences of spiritual struggles in relation to anxiety, depression, stress, and well-being after leaving the neonatal intensive care setting.

Budget and Resources: This study was funded in part by the Children's Miracle Network awarded to GMB and KKD and NIH-R01DK099350 awarded to KKD.

Methodology: In this study, 177 parents (125 mothers, 50 fathers, and 2 non-biological fathers with a mean age of 31.45 years) of infants who were hospitalized in the NICU for a mean of 34.63 days (range 5-203) and were born at the mean age of 32 weeks gestation completed questionnaires post-NICU discharge. Following IRB approval, names of mothers who had preterm births in 2015-May 2016 were collected from the Pennsylvania Bureau of Health Statistics. Approximately 1013 mothers were sent self-report questionnaires for themselves and their partner to complete and return to the primary investigator. One hundred and twenty families returned questionnaires (rate of 11.8%) per this method and five families returned questionnaires after responding to the study posting on Studyfinder. The self-report questionnaires completed for this study included general and religious/spiritual demographic questionnaires, the Spiritual Struggles Scale7 to assess spiritual struggles with meaning, Penn State Worry Questionnaire (8) to assess anxiety, CESD-R (9) for a measure of depression, Stanford Acute Stress Reaction Questionnaire (10) revised for reflections on the NICU experience, and Satisfaction with Life scale11 for an assessment of cognitive well-being.

Results: Data from parents indicated significant positive correlations between spiritual struggles, specifically with meaning, in relation to depression ($r = .38$, $p < .001$), anxiety ($r = .48$, $p < .001$), and acute stress related to the NICU experience ($r = .32$, $p < .001$). Significant inverse correlations were noted between cognitive well-being and spiritual struggles in meaning ($r = -.38$, $p < .001$). Further, higher levels of parents' acute NICU related stress was significantly positively correlated with increased depression ($r = .53$, $p < .001$) and anxiety ($r = .46$, $p < .001$), and inversely related to levels of well-being ($r = -.39$, $p < .001$). Linear regression analyses were conducted to determine the unique contributions of spiritual struggles in association with parents' experiences of worry, depression, and well-being post-NICU discharge. These hierarchical linear regressions models included gender and age in step 1, stress related to the NICU in step 2, and spiritual struggles in step 3, predicting separately to either anxiety, depression, or cognitive well-being. For all three models, spiritual struggles (specifically with meaning) remained a significant predictor of parents' depression, anxiety, and lower levels of cognitive well-being.

Conclusions: These findings indicate that parents who experience increased stress related to their NICU experience have higher rates of depression, anxiety, and lower cognitive well-being months after NICU discharge. Those parents who reported greater struggles with a challenged sense of life meaning as reflected through their spirituality also had more difficulty with their emotional and cognitive well-being. These findings have salient implications for the importance of parents' psychological and spiritual supports while in the NICU and post-discharge.

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Learner Objectives: 1. List how religious and spiritual struggles can have adverse effects on parental mental health post-NICU discharge. 2. Identify how to support parents in dealing with stress and mental health challenges post-NICU discharge.

Gravens2019-20

Volunteer Cuddlers as Developmental Care Partners in the NICU

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Purpose

To describe the development of a program for swaddled holding by volunteer cuddlers, specifically for very-low-birth-weight (VLBW) infants on bubble- CPAP (b-CPAP) support.

Background

Skin-to-skin (STS) holding is the gold standard in the NICU, with ample research showing improved parent-child bonding, physiological stability, stress tolerance, behavioral organization, and movement quality. In addition, daily holding as part of pre-feeding activities can help to progress state and cardiorespiratory endurance while promoting non-nutritive sucking (NNS). Some parents have limited availability for STS holding for a variety of reasons. Therefore, other strategies that can provide some degree of benefit similar to STS are needed. There is minimal research examining the effects of STS vs swaddled holding or the role of NICU cuddlers.

In this NICU, the volunteer cuddler program was first developed to help busy nurses hold stable infants during gavage feedings. However, the cuddler orientation program does not include specific training related to neuroprotection for VLBW infants or techniques to safely transfer and hold infants on bubble- CPAP, leading to some infants who do not receive the benefits of being held.

Budget: This was a PDSA project and all work was completed within scheduled work hours.

Program

We started with providing education to a select group of cuddlers that included: 1) neurodevelopmental considerations for preterm infants, including sensory systems development and age appropriate stimulation, 2) basics of b-CPAP, and 3) technique for transferring an infant on b-CPAP and positioning for swaddled holding. Cuddler competencies were assessed by the PT or RCP at bedside. We also conducted a staff survey to determine receptiveness to utilizing volunteer cuddlers in the Small Baby Unit.

The pilot program began with one infant and the response was overwhelmingly positive. Additional cuddlers were then educated to safely hold small babies who were not on b-CPAP support. Barriers were identified and addressed as they arose (staff resistance, inconsistent identification of eligible infants, identification of trained cuddlers, etc).

Results

Over an 18 month period, 28 infants were included in the program. The average gestational age (GA) at birth was 25 weeks. Average post menstrual age (PMA) at initiation of swaddled holding was 31 weeks. Over the 18 month period, the average PMA at initiation of cue based feeding decreased from 36 weeks to 35 weeks; the average PMA at time of discharge decreased from 39 weeks to 36 weeks. The average Test of Infant Motor Performance (TIMP) Z- score at discharge was .2 standard deviations above the mean for adjusted age, indicating motor skills within normal limits for the adjusted age. There were no adverse responses observed or reported. Future plans are to include intubated infants in the program.

Implications for Family Support

This program is an innovative approach to providing neurodevelopmental supportive care to very-low-birth-weight (VLBW) infants whose families are not available on a consistent basis. It could lead to improved quality outcomes with minimal resource utilization.

Learner Objectives

1. Identify potential barriers to consistent skin-to-skin or swaddled holding with preterm infants on bubble CPAP support.
2. Critique a program that utilizes volunteer cuddlers to provide swaddled holding to preterm infants on bubble CPAP support.

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Gravens2019-22

Parents Demonstrate Heightened Emotional Arousal by Skin Conductance and Stress/Coping Behaviors while Telling their Personal NICU Story

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Background: Having a newborn that requires intensive medical care not only influences parents' perceptions of their birth experience, but continues transforming their perceptions of parenting even after leaving the neonatal intensive care unit (NICU).(1,2) Parents' elevated stress, depression, and anxiety symptoms while infants are in the NICU are well documented.(3-8) Parents deem the NICU environment as stressful and traumatic, due to the perceived loss of the parental role and the uncertain health status of their infant. (4,5,8) The ongoing struggle to find meaning in an unexpected life event, such as a newborn's need for intensive care following birth, could lead to a negative cyclical trajectory that continues to influence the familial system well beyond the newborn period.(5-10) Transformative Learning Theory explains learning through interpretation of life situations influenced by environmental, personal, and relational contexts that contribute to adaptive coping processes.(1,2) This study aims to examine the psychophysiological processes of stress and coping measured by skin conductance and behaviors observed through the transformative lens of parents telling their personal story of having a newborn hospitalized in the NICU following birth.

Hypotheses: 1: Parents' emotional arousal as demonstrated by skin conductance would increase during stress tasks including mental preparation, telling their NICU story, and completing a verbal math challenge. 2: Emotional arousal as demonstrated by stress/coping behaviors would increase during stress tasks. 3: Parents reporting depression/anxiety would demonstrate higher emotional arousal by skin conductance and stress/coping behaviors (i.e., flight) than those who did not report depression/anxiety.
Budget and Resource: This study was funded by the Children's Miracle Network awarded to GMB and KKD and NIH-R01DK099350 awarded to KKD.

Methodology: An observational study on thirty parents (21 birth mothers and 9 fathers, median age 33 years) who had an infant in the NICU (current median age 14 months) were enrolled. Each observation, conducted between 12 to 6 pm, consisted of a 10-minute baseline where the participant rested quietly, then completed 15-minutes of stress tasks using a modified Trier Social Stress Test (TSST) where parents were asked to mentally prepare their narrative, tell their experience of having a newborn in the NICU, and complete a verbal math challenge. (11) This was followed by a 20-minute recovery phase. Post recovery, surveys were administered on physical/mental health and perceived stress. Parents were given resources and suggestions for stress management. Referrals to mental health services were offered when indicated. Skin conductance, also known as electrodermal activity (EDA), was measured continuously starting at baseline through recovery by two palmar electrodes to detect sympathetic-mediated sweating during emotional arousal.(12) EDA was analyzed off-line using the MindWare® Mobile Impedance Cardiograph (MindWare® Technologies, Gahanna, OH). EDA mean of peaks (MP) measured in micro-Siemens (μS) depicts the amplitude of skin conductance fluctuations with an increase in amplitude indicating heightened sympathetic reactivity to an event stimulus.(13) Video-recorded behaviors during mental preparation and stress tasks were coded using an abbreviated Ethological Coding System for Interviews (ECSI) by trained research technologists with inter-rater reliability of 85%.(14) ECSI, a validated assessment of stress and coping behaviors (including facial expressivity and upper body movements) reports an overall behavioral composite score or distinct subcategories (i.e., prosocial, flight, assertion, displacement, and relaxation).(14)

Data analysis included comparisons between parents with self-reported depression/anxiety vs. non-depression/anxiety parents. Non-parametric Wilcoxon Signed Rank Tests evaluated differences in EDA (i.e., baseline, stress, and recovery), and Mann-Whitney U tests evaluated group differences.

Results: On average, median EDA mean of peaks (MP) doubled from baseline to stress (mental preparation, narrative, math challenge) and continued to increase an additional 12% during recovery (*p ≤ 0.01; Figure 1A). Total stress/coping behaviors (ECSI) more than doubled from mental preparation to stress tasks (narrative, math) (*p ≤ 0.01; Figure 1B).

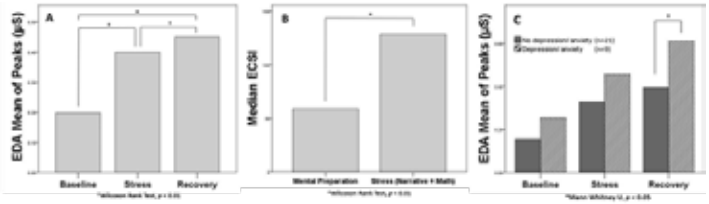

Figure 1: Skin conductance and behaviors in relation to stress (N = 30).

There was a significant between group median difference for EDA MP between depression/anxiety parents (n = 9) and non-depression/anxiety parents (n = 21) during recovery; the depression/anxiety group showed higher sympathetic reactivity than the comparison group (*p ≤ 0.05; Figure 1C). The ratio of ECSI flight behaviors over total ECSI for all participants showed on average flight behaviors occurred 39% of the time. This ratio was the same for the non-depression/anxiety parents; while parents reporting depression/anxiety displayed flight behaviors 43% of the time. However, this group difference did not reach statistical significance.

Conclusions: These findings support the hypotheses that parents

of former NICU infants experienced heightened emotional arousal measured by skin conductance (EDA) and behaviors (ECSI) during stress tasks including telling their personal NICU story. Average responses for all parents showed that emotional arousal measured by skin conductance continued to increase beyond the stress tasks into the recovery phase. Further, parents who reported depression/anxiety showed significantly higher emotional arousal at recovery compared to parents who did not report depression/anxiety.

Implications for Family Support: Our findings highlight the importance of supporting the mental health of parents of former NICU infants; as a third of the parents in our study reported feeling depressed and/or anxious several months after the infant's transition home from the hospital. We encourage care providers and family members to assist parents in expressing their feelings surrounding their traumatic lived experiences and to support them to find meaning in their coping processes. These supports include assisting families in allocating resources for stress management and appropriately referring them for mental health services when indicated.

Learner Objectives:

1. Understand the long-term impact of having had a newborn infant in the NICU on parental stress, coping, and mental health.
2. Identify methods to measure emotional arousal.
3. Consider how primary care providers and family members can support the mental health of parents of former NICU infants after hospitalization.

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Gravens2019-23

Postpartum maternal communication during The Golden Hour is key: How well are we doing?

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Background and Purpose: Mothers whose newborns are admitted to the Neonatal Intensive Care Unit (NICU) are likely to face more challenges regardless of the gestational age of their baby. In an effort to alleviate some stress, immediate and effective communication from the NICU team is important. Data from our 2016-2017 patient satisfaction survey showed that our percent top box scores for post-delivery communication was low (44% n=48) when compared to other categories. NICU team initiated two main quality improvement projects involving post delivery maternal communication and discussion and encouragement of early hand expression of colostrum as a part of a Family Centered Care Program (FCCP).

Methods:

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Settings: We are a 20 bed community level 3 NICU with an approximate delivery volume of 4200 newborns/year and average of 450 NICU admissions per year. We aimed to target post delivery maternal communication and early hand expression of colostrum for the mothers of all babies admitted from the Labor and Delivery (L&D).

Mechanism: Based on feedback from our Family Advisory Board (FAB) members, we made a concerted effort to update not just the fathers/partners, who often accompany infants to the NICU, but the delivering mothers as well, within one hour after delivery. This was accomplished by requesting that the admitting physician, bedside nurse, or nurse manager return to L&D to update the mother. In this way, the partner is not tasked with the burden of updating the mother post-delivery and the mother has the opportunity to personally ask questions of the medical staff caring for her infant.

We initially communicated our patient satisfaction scores with the NICU staff. This was then followed up with email communication to staff about the new family communication processes. We created "smartphrases" in our Electronic Health Record (EHR) for physicians to easily document completion of this communication in the admission note. We audited all (n=188) of the admission notes between Sep 2017-2018 and instituted multiple interventions during this time (Figure 1).

Through more thorough communication, we also focused on improving maternal milk supply with the goal for mothers to express colostrum shortly after delivery, which evidence supports will increase breast milk production1. During prenatal consultation the Neonatologist emphasized the importance of establishing maternal milk supply and provided the parents with a video2 on how to perform hand expression of colostrum. The mother was offered the opportunity to view the video at her own pace. Working with our L&D nurse educator and staff, we identified "champions" to help educate RNs and mothers and to assist with the actual hand expression. After delivery, L&D nurses began to document hand expression of colostrum within an hour after delivery for all NICU admissions (figure 2). Next, we plan to work with our lactation consultants to perform competency skill assessments of hand expression for all L&D staff.

Most barriers to implementation have stemmed from disseminating information about new changes and time lag of creating EHR flowsheets.

Impact: Tracking our goal to update mothers within one hour after delivery via chart audit of all admissions from L&D, we raised our rates of maternal communication from 25% (Sep 2017- Apr 2018) to 65% (Jun 2018- Sep 2018). Our rates of hand expression within one hour after delivery improved from 31% to 68% mid-intervention, prior to creating our team of champions and the addition of a designated place to document in our EHR. We are currently tracking family's experiences through post-discharge patient satisfaction surveys.

Budget and resources: iPads were donated by a member of our FAB which were used to educate parents about hand expression.

Implications for family support: Our goal is for parents and families to feel well supported during their NICU journey and to improve breast milk supply and feeding at the time of discharge.

Learner objectives:
To recognize the importance of communicating with the mother after delivery for every NICU admission
To learn about new ways to support families during their NICU journey, with hopes of taking ideas back to their own unit for implementation

To understand the importance of early hand expression of colostrum and improving breast milk supply and feeding

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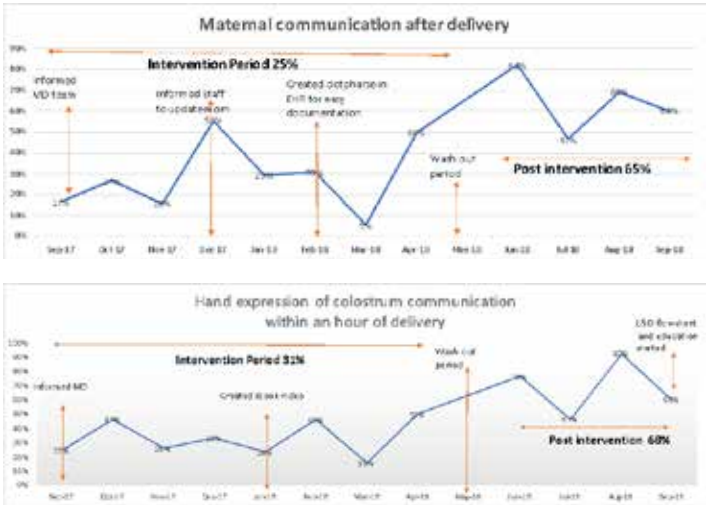

Gravens2019-24

Family Centered Care Program in a Community Level 3 NICU: From Womb to NICU and Beyond...

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Background and Purpose: Parents whose babies are admitted to Neonatal Intensive Care Units (NICUs) are subject to a variety of stresses, which in turn can lead to worsened outcomes for the infants. A formal Family Centered Care Program (FCCP) was started in 2016 as a Quality improvement project by nurses and physicians in order to provide psychosocial support to NICU families. The program begins at the time of a mother's admission to antepartum and continues beyond discharge of the infant from NICU. The aim of this program is to help families navigate the experience using multiple modalities and methods with the goal of lessening the psychosocial distress associated with admission to an intensive care unit.

Program: We embarked upon creating a program to better support our parents when the unthinkable happens, admission of their baby to a NICU. The FCCP was created using the National Perinatal Association interdisciplinary work group's recommendations. (1) Below is a description of the multifaceted approach we used to develop our program, from antepartum admission, to NICU stay, through discharge and beyond:

Antepartum: During prenatal consultation the Neonatologist supplements their visit to the parents by providing an iPad with preloaded content to review at their own pace. This includes a NICU tour video, stories written by former NICU parents with pictures of their infants from birth through years after discharge, information and videos on how to perform hand expression and the importance of establishing maternal milk supply, as well as information about visitor guidelines and procedures.

Delivery: Parents are invited to be present during infant resuscitation, stabilization and bedside procedures. Based on feedback from our Family Advisory Board (FAB) members, we made a concerted effort to update not just fathers/partners, who often accompany infants to the NICU, but mothers as well, within one hour after delivery. We have focused on improving maternal milk supply with the goal for the mothers to attempt to express colostrum within one hour of delivery. Working with our Labor & Delivery (L&D) nurse educator and staff, we now have champions to help educate RNs and mothers, assist with the actual hand expression, and document in the Electronic Health Record (EHR).

NICU stay: We encourage unrestricted parental presence in the unit. We were able to obtain parent badges to allow easier access into the locked unit. We strongly encourage early kangaroo care (2) even in sick infants. We implemented a six stage Developmental Care Path (3) that considers both the cardiorespiratory stability and physiologic maturity of the infant on a continuum to allow for change in infant status. This tool outlines which types of developmental interventions are appropriate and when. It also serves as a mode of communication between care providers and families. In addition, a bedside binder was developed with educational materials, resources, and a keepsake section for parents to track milestones and collect mementos. An "arts and crafts" team creates and delivers handmade artwork using the infant's footprints monthly. We have staff-led monthly parent support group meetings to answer questions and offer support. Parents receive a baby friendly artistic "Parent Communication" letter from their infant but composed by the physician reflecting the infant's past week's course. A "parental comfort" team has been developed that provides snacks for families in the NICU, improved the accommodations of the parent lounge, and is now working on funding for weekly massage therapy for parents. We have implemented an Infant Driven Feeding (IDF) program that offers opportunities for in-depth parental education and infant-parent bonding around feeding.

Discharge: Discharge education starts at the time of admission when a discharge checklist is placed at every infant's bedside. At their own pace, parents are able to review educational content created by our FCCP team on iPads via the iBook app. Audits are performed to make sure this tool is being used. This checklist supplements and eases the discharge day teaching process. If parents would like to review discharge teaching at home, it is available on our website.

Beyond: Based on feedback from FAB, a team was created to contact parents for follow up within one week after discharge. Every year, families are invited to join us for an annual reunion. For families who wish to give back, they may decide to contribute by becoming a member of our FAB a year after discharge. We meet with our FAB quarterly to update them and receive feedback about current projects. We are currently in the initial planning stages to build and implement a Peer to Peer Buddy program, which includes a social worker and a mood disorder psychologist, to offer further support and guidance to NICU families.

Most barriers to implementation have stemmed from disseminating information about new changes and from the staff resistance to change.

Impact: Feedback from parents and our FAB members indicates that families appreciate the weekly "Parent Communication" letter and monthly bedside keepsakes. We measured our goal of updating mothers within one hour after delivery via chart audit of all admissions from L&D, we raised our rates of prompt maternal communication from 25% to 65% and rates of hand expression within one hour after delivery from 31% to 68% mid-intervention. This was prior to creating our team of champions and the addition of a place to document in our EHR. We are currently tracking family's experiences through post-discharge patient satisfaction surveys.

Budget and resources: iPads were donated by a member of our FAB. Our Hospital Foundation assisted with the purchase of Kangaroo chairs and licensing rights for the "Empower Program" offered by DandleLION. Hospital Administration is supporting the establishment of our Peer to Peer Buddy program.

Implications for family support: Our goal is for parents and families to feel well supported during their NICU journey.

Learner objectives:

To recognize the importance of developing a FCCP in every NICU To learn about new ways to support families during their NICU journey, with hopes of taking ideas back to their own unit for implementation

To understand the importance of including parents in the implementation of a FCCP

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Graven2019-25

Path to home starts at birth: benefits of consistent, early discharge teaching using technology as a supplemental resource.

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Background and Purpose: Often times, families feel that they are not adequately prepared for discharge from the Neonatal Intensive Care Unit (NICU) with their high-risk infant. This in turn contributes to poor infant outcomes, heightened family anxiety, and increased health-care utilization after discharge (1,2) American Academy of Pediatrics (AAP) guidelines (3) provide a basis for NICU discharge programs. The quality of discharge teaching has proved to be the strongest predictor of discharge readiness, and is important to develop a comprehensive discharge preparation program.(1) Our 2016-2017 patient satisfaction survey results showed top box of 54% (n=59) in "consistency of staff teaching." We created a comprehensive discharge teaching taskforce as a part of our Family Centered Care Program (FCCP).

Methods:
Setting: We are a 20 bed community level 3 NICU with an approximate delivery volume of 4200 newborns per year with average of 450 NICU admissions per year.

Mechanism: Discharge teaching was started at the time of NICU admission when a discharge checklist (DC) was placed at every infant's bedside. At their own pace, parents were able to review educational content created by our FCCP team on iPads via the iBook application. Parents would then initial to sign off completion of each topic on the checklist (figure 1). This discharge teaching tool was designed to supplement and ease the teaching process on the day of discharge. The discharge content within the iBook has an easily navigated table of contents (TOC). We intentionally matched the discharge education TOC with the nurses' Electronic Health Record (EHR) teaching documentation for an easy workflow. We did not place the discharge checklist at the bedside for readmissions or for infants staying less than 48 hours, as the amount of content was deemed too extensive for parental review during their short hospital stay.

Random audits were performed between April and September 2018 to assess this tool's usage by parents. Audits included checking for the presence of the DC at the bedside and for 100% completion of the content by parents (Figure 2). These audits showed an improvement in the frequency (%) of the presence of the checklist at the bedside over the course of the first 6 months of implementation, however revealed that the 100% completion rate went down. This was presumably due to the delivery and admission of more ELBW babies which resulted in parents reviewing the contents at a slower pace. When the FCCP team reviewed the DC for these ELBW infants after discharge, a 100% completion rate was found. There were several improvements made to the process in the first 6 months after implementation. These included publishing of the discharge teaching content on the hospital website for parents to review from home during the hospitalization as well as after discharge; providing the website link to parents by staff during face-to-face and in written discharge instructions and the placement of the DC at the bedside for all admissions, regardless of duration of stay. This last change was based on parent feedback, thus allowing all parents to ask questions and review any partial content of their choosing. Additionally, nurses were then able to educate parents about the existence of the teaching instructions on the hospital website, even for short stay admissions.

Barriers to implementation have stemmed from disseminating information about new changes to staff, delay in uploading the content into the iBook due to hospital IT security concerns, resistance to including the checklist at the bedside as a part of nursing workflow, and delayed recognition that re-admitted families are often the most in need of consistent and in-depth discharge teaching.

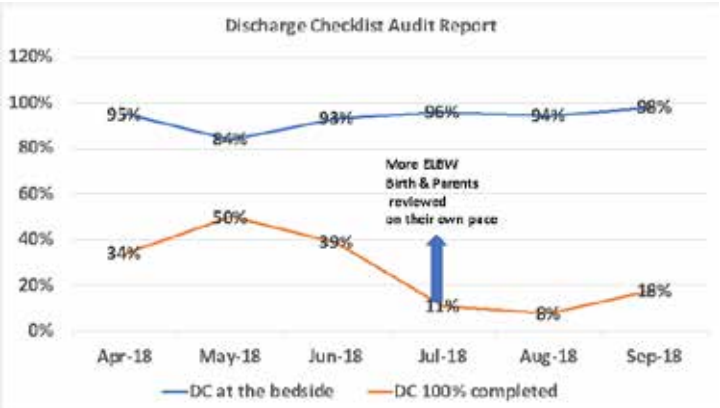
Impact: Nurses felt that this tool improved the workflow on the day

of discharge, making teaching easier for parents as they had seen content previously and were able to ask better informed questions. We hope to see an improvement in our patient satisfaction scores this year.

Discharge teaching checklist

DOL Discharge teaching started _____

Discharge teaching	Date & Initial
Introduction	
Taking a temperature	
Bulb syringe use	
Bathing	
Diaper changing	
Cord care	
Newborn screening tests	
Preterm baby screening tests	
Tips and Tricks	
Breast milk for preterm baby & Feeding your baby @ home	
Post circumcision care	
Putting your baby to sleep	
Tummy time	
Comforting your baby	
CPR	
Immunizations information	
Pets @ home	
Discharge medication administration	
Follow up appointments	
When to call Pediatrician	
Safety tips	



Budget and resources: iPads were donated by a member of our Family Advisory Board (FAB) which were used to educate parents about discharge teaching.

Implications for family support: Our goal is for parents and families to feel well supported during their NICU journey and to help better prepare them for discharge by delivering consistent information.

Learner objectives:

To recognize the importance of discharge readiness and guide families through the discharge teaching process, starting at the time of NICU admission

To learn about new ways to support families using technology to enhance discharge teaching, ideally resulting in the sharing of ideas for implementation in many NICUs

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Graven2019-26

NIC-C Nightshift Happiness Squad Decreases Stress and Increases Coworker Connectedness

Alison Kovacs MSN, RNC-NIC, CBC, Erin Coleman BSN, RN

Background

Existing studies have focused on night shift work and its "interference with circadian chronobiological rhythm." An article entitled, Night Work and the Risk of Depression (2017) defined night shift as work between the hours of 11pm and 6am. The authors list several possible biological disturbances throughout the article: "sleep disruption, fatigue, diminished well-being, and risk of serious disease such as heart disease and breast cancer to mention a few." The article further explains that the circadian rhythm impacts physiological metrics such as heart rate, body temperature, blood pressure, and hormone levels such as melatonin and cortisol. In addition to affecting physiological vital signs an interruption to circadian rhythm can also cause psychosocial strain, less healthy behavior, and impacted mental health. An article published by Laura Lyall et al. (2018) found that "disrupting the body's internal clock- such as by doing regular night shifts- has been linked to increased risk of depression and reduced all-round wellbeing." This was "the largest such study ever conducted" on over 91,000 people ages 37-73. Participants wore a wrist accelerometer as well as completed questionnaires. Researchers found that people with "interrupted circadian rhythms had an increased risk of depression and bipolar disorder, as well as feeling less happy and more likely to say they felt lonely."

Purpose

The Children's Hospital of Philadelphia (CHOP) Neonatal/Infant Intensive Care Unit (N/IICU) leadership team for NICU Central (NIC-C) decided to attack this problem. Although we would be unable to intercept the problem of interrupted circadian rhythm and necessity of shift work we could focus on increasing general happiness and decrease the feeling of loneliness among CHOP N/IICU employees. The team worked together to brainstorm ideas that would attract staff to come together in a safe, on site location during night shift. This time would be spent with positive staff interaction, snacks, and entertainment. Two organized events were held in June of 2018.

Hypothesis

Short surveys were given to all attendees upon admission to our events. Staff were asked to report levels of stress and level of co-worker connectedness before and after the events. As a team, we hypothesized that we would observe decreased levels of stress and increased levels of co-worker connectedness upon the completion of each event.

Nightshift Happiness Squad events were run from 10pm to 2am on two nights in June in a conference room on the unit. The only costs were covered by the leadership team running the events in the form of food and decorations.

The NIC-C Nightshift Happiness Squad began in June of 2018. The goal of this project was to create activities on the unit to which bedside nurses, respiratory therapists, senior nurse aids, and inpatients clerks could "escape" for a break to grab a snack and decompress with friends and colleagues. We hypothesized that of staff members would benefit from these activities in lowered stress and increased levels of co-worker connectedness. This group decided to focus on night shift opportunities that were harder to come by due to safety and staffing during the "off" shift hours in comparison with NIC-C day shift leadership, who had the ability to bring staff outside for meals and conduct mindfulness activities.

To begin, these events were advertised via email and screensavers played throughout our 98 bed unit. A conference room on the unit was reserved. Leadership nurses came up with fun ideas and purchased food, decorations, and created photo booth props. Our first event was a Friends Marathon, titled NIC @ Night. We utilized Netflix to play back to back 20 minute episodes of Friends for a 4 hour block of time. Popcorn and candy were available. Staff were invited to bring their meals as well. Our second event was a re-airing of a Phillies vs. Yankees baseball game from earlier that evening. We titled our second event Phillies, Phranks, and Phun. Guests were served hotdogs and soft pretzels. Short surveys were given to all attendees upon admission to our events. Staff were asked to report levels of stress and level of co-worker connectedness before and after the events.

We did not experience any barriers to implementing these events however we knew that not all staff would be able to attend the event due to acuity, importance, and safety in regards to patient care. Unit estimated staffing matrix recommends the usage of 74 nurses per shift which usually is not achieved. Respiratory therapists, senior nurse aids, and inpatients clerks were also invited. Their roles fluctuate in number so it is difficult to determine the total number of staff present on the unit during the date and times of the events. We were also unable to determine if each attendee submitted their surveys upon leaving.

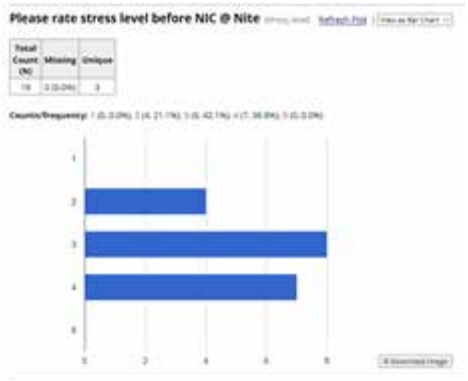
Attendees were given short surveys upon entering each event. Each survey had three questions. Attendees were asked to circle a number on a 1-5 Likert scale depicting their current social/emotional status pre and post event. Our team collected 19 completed surveys from Event #1 and 17 completed surveys from Event #2.

Event #1.
Questions:

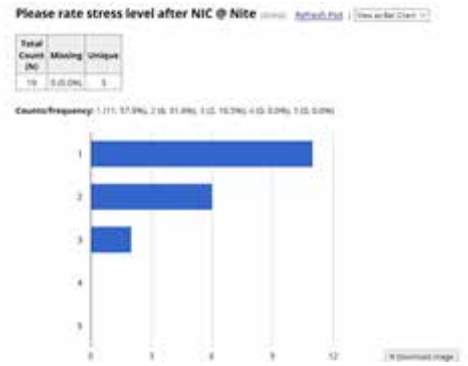
1. Please rate stress level before NIC @ Nite (Likert Scale 1(no stress)-5(high stress))
2. Please rate stress level after NIC @ Nite (Likert Scale 1(no stress)-5(high stress))
3. Do you have any other suggestions for group events?

Results for Event #1

Pre-survey



Post-survey



Result: Event attendees lowered their stress. Pre-survey average feeling of stress equaled 3.15 compared to a decreased result of 1.5 average post event. Attendees no longer ranked themselves above a Likert level 3 post event.

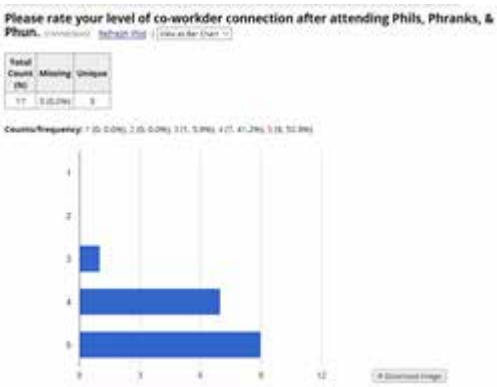
Event #2
Questions:

1. Please rate your level of co-worker connection before attending Phils, Phranks, & Phun. (Likert Scale 1(disconnected)-5(strongly connected))
2. Please rate your level of co-workder connection after attending Phils, Phranks, & Phun. (Likert Scale 1(disconnected)-5(strongly connected))
3. Do you have any other suggestions for group events?

Results for Event #2

Pre survey

Post survey



Result: Event attendees increased their co-worker connectedness. Pre-survey average feeling on connectedness equaled 4.11 compared to an increased result of 4.47 average post event. Attendees no longer ranked themselves below a Likert level 3 post event.

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This project focused on the unit nursing and ancillary staff. This project did not focus on patients' families, however, patients may receive higher quality care from nurses who are less stressed, happier, and feeling cohesive with their co-workers.

1. Upon viewing this poster learners will be able to identify three risks of nightshift work.
2. Upon viewing this poster learners will we able to define physiologic and social impact of interrupted circadian rhythm.
3. Upon viewing this poster learners will be able to describe the beneficial results of social events held on the unit during nightshift.

Gravens2019-27

Implementing a Primary Rehabilitation Therapy Model in the Neonatal Intensive Care Unit

Erica Moss, Master of Science in Occupational Therapy, cNIDCAP, Children's Healthcare of Atlanta, Scottish Rite, Sonika Tataria, Doctorate of Physical Therapy, Children's Healthcare of Atlanta, Egleston

Background and Purpose:

The role of rehabilitation therapists in the Neonatal Intensive Care Unit (NICU) is constantly evolving. Therapeutic involvement is guided by evidence based practice to promote optimal developmental outcomes in this fragile population. Research indicates that developmental and family-centered care provides the best framework for improving neonatal outcomes. (1) Research also indicates that inconsistency of nursing care in the NICU can have detrimental effects on the neonate and his or her family. These effects include increased length of stay, increased respiratory support, and delays in planned discharges. (2) Inconsistent bedside nursing care is related to poor family satisfaction, which results in decreased parent and infant bonding and parental difficulty in recognizing infant cues and providing adequate support.(2) As a result, many centers have adopted a relationship based care model of primary nursing. This model positively affects therapeutic relationships between families and nurses. (3) To our knowledge, no studies have investigated the impact of a primary rehabilitation therapy model in the NICU.

The purpose of this project was to investigate the benefits and limitations of a primary rehabilitation therapist model in the NICU as experienced by nursing staff.

We hypothesize that the success of the model of primary nursing may support a similar model of primary therapy. A primary rehabilitation model will work to further enhance the patient/family care

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of specific developmental needs of each infant and family. It will also provide rehabilitation therapists the tools necessary to support and engage the NICU nurses in the care of the infants and their families on a more individualized basis. These changes to the rehabilitation model may further optimize developmental outcomes of infants in the NICU and beyond.

Budget and Resources:

The development and implementation of the primary rehabilitation therapy model in the NICU is an ongoing effort requiring the collaboration of two NICU rehabilitation teams at Children's Healthcare of Atlanta. The development of the rehabilitation survey for nursing staff required the collaboration of two neonatal therapists with occupational and physical therapy backgrounds. This required a time commitment of approximately 8 hours a month for 3 months. Designated hours were set aside for each therapist to complete tasks associated with this project. The resources used included relevant research and published materials.

Program, Materials, or Methodology:
The primary rehabilitation model at Children's Healthcare of Atlanta (CHOA) at the Egleston and Scottish Rite campuses was implemented in 2015 and was developed based on the research indicating the positive outcomes for infants and their families when nurses adopted a primary care nursing model in the NICU. Literature review did not reveal rehabilitation specific research to support the rehabilitation primary model.

Each infant admitted to the NICU receives automatic occupational and physical therapy orders. The rehabilitation department assigns each infant to either an occupational or physical developmental therapist. The assigned therapist becomes the infant's primary therapist and visits with the patient and family between 2 to 4 times per week throughout the patient's hospital admission. If other disciplines are warranted as the infant grows, the primary therapist consults the appropriate specialty.

After several years of implementing this model, the rehabilitation department is satisfied with the extent of individualized care it is able to provide for each patient and family. To justify research to determine if this model of rehabilitation therapy should become standard for any NICU, we surveyed the NICU nursing staff to investigate how they perceived the implementation of a primary rehabilitation model in the NICU. An anonymous survey was sent out via email to all NICU nurses. The survey included 7 multiple choice questions related to nursing satisfaction and perception of whether the therapists are better able to meet the developmental needs of infants and families in the NICU using the primary therapy model. Additionally, the survey included an area for comments to provide feedback on the rehabilitation program

The survey was completed by a total of 128 NICU nurses during a 3 week period. When asked if nurses believe rehabilitation therapists in the NICU have an improved understanding of the developmental needs of the infants using the primary model of therapy, 91.4% of respondents reported that they either strongly agree or agree while only 8.6% reported that they neither agree or disagree, or disagree. Similarly, when asked if rehabilitation therapists have an improved understanding of caregivers needs in regards to developmental training in the NICU using the primary

experience by allowing therapists to have a better understanding

model of therapy, 86.7% or respondents either strongly agreed or agreed while only 13.3% neither agreed or disagreed, or disagreed. Some nurses indicated in their comments that the primary model of therapy in the NICU helps familiarize them with the patient because of the consistency of care of the rehabilitation therapists while others nurses indicated concerns that care was not consistent between all available rehabilitation therapists at the hospital.

Impact or Results
The completed nursing survey overwhelmingly demonstrated positive feedback of the primary rehabilitation model that has been implemented in the NICUs at CHOA. The primary rehabilitation therapy model improves a therapist's ability to identify developmental needs of patients and families, thus improving a therapist's ability to provide both social and emotional support to families during and after their NICU admissions. This survey provides a platform for future studies to determine if primary rehabilitation models improve caregiver satisfaction and developmental outcomes of infants hospitalized in the NICU. This research can guide transformative change in rehabilitation models in NICUs throughout the world.

Implications for Family Support:
Developmental therapists in the NICU (OT and PT) play a vital role in the NICU at CHOA. Patients are followed for all developmental needs and therapists work closely with families to ensure caregivers are supported and involved in all aspects of care. Therapists write family centered goals and meet with parents in person or via phone weekly.

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Learner Objectives:

1. The learner will reflect on current delivery models of nursing and rehabilitation.
2. The learner will be able to develop a model of rehabilitation that promotes a therapists better understanding of developmental, social, and emotional needs of infants and caregivers in the NICU
3. The learner will identify strengths and areas of opportunities that arise with the primary model of rehabilitation.
4. The learner will identify avenues for future research in rehabilitation models in the NICU

Gravens2019-29

Nurses' Knowledge, Attitudes, and Perceived Self-competency Regarding individualized Developmental Care in the Neonatal Intensive Care Unit

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Cohen Children's Medical Center of NY

Abstract
Background: Premature infants are at a greater risk for developing cognitive and motor developmental delays. Researchers have investigated developmentally supportive interventions to improve outcomes and decrease negative effects of the NICU. Majority of successful interventions are based on the Theory of Individualized Developmental Care (IDC). IDC is a collection of evidence-based practices that include adapting care practices based on infant's behavioral and developmental state, involving parents in infant's care, and providing an environment that minimizes over stimulation of the infant.

Purpose: To describe NICU nurses' knowledge of IDC, attitudes towards IDC, how knowledge and attitudes affect their perceived competency, and to identify correlations. Study findings may lead to improved implementation of IDC and help increase positive outcomes for premature infants and family.

Methodology: IRB approval was obtained from both The CUNY Graduate Center and Northwell Health System for proposed research. A correlational quantitative design was used for the study. An electronic survey was developed and piloted and then sent to a convenience sample of 114 NICU nurses with at least 2 years' experience in a NICU working full or part time in a NICU in a large health system in the Northeast. All results were anonymous with no identifiers collected. Invitation to participate in survey was sent to all potential participants. A follow-up email containing letter of introduction, internet consent, and REDcap-(Research Electronic Data Capture) survey link were sent 4 days after initial email, 7 days after second email and 7 days after third email. Informational flyers were sent to all NICU Nurse Managers and Educators and hung in staff lounge or other appropriate areas. Data was collected via REDcap electronic survey. Descriptive statistics and Cronbach's alpha were computed. Spearman correlation coefficient for relationship between Individualized developmental care knowledge, attitudes and perceived self-competency and between each domain and ordinal variables on interest were computed. Partial correlation coefficients for relationship between 2 domains, while controlling for the effect of the third were also computed. Mann-Whitney or Kuska-Wallis test for associations between knowledge and demographics were were computed. Main outcome measures where correlations between knowledge, attitudes and perceived self-competency, and correlations between knowledge and attitude and knowledge and perceived self-competency.

Analysis/Results: There were significant moderate positive correlations between knowledge, attitudes, & perceived self-competency. When adjusting for knowledge there was a significant correlation between attitude and competency ($p=0.013$). There was a significant association between knowledge and years of practice ($p=0.0149$) and individualized developmental care received an in service ($p<0.0001$).There is a positive correlation between levels of knowledge & attitude, ($p=0.0007$), between knowledge & self-competency, ($p=0.0051$), & between attitude & self-competency, (0.0011).

Implications for Practice: Based on positive correlation between knowledge, attitudes, and perceived self-competency providing education regarding individualized developmental care may lead to improved attitude and self-competency. These improvements may lead to improved positive outcomes for infants & families. Based on results of research the NICU has increased resources for developmental care especially in providing education to staff and families. A class on proper positioning and developmental interventions for infants has been developed and being implemented for parents along with increased funding for new developmental positioning devices in the NICU.

Implications for Research: Further studies to validate validity and reliability ofr survey are needed. Observational studies to compare perceived competency to care actually provided, a national survey of different regions, levels, or size NICUs, and what level of knowledge regarding individualized developmental care are optimal ae also needed. Further qualitative studies on nurses' views and experiences with implementing individualized developmental care are also needed to improve the body of knowledge regarding individualized developmental care in the NICU.

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Objectives:
At the end of this presentation the learner will be able to:
State two correlations between knowledge, attitudes and perceived self-competency.
Describe the relationship between individualized developmental care in the NICU and positive outcomes for neonates and their family.

Gravens2019-30

Building walls. Building relationships. Tearing down hierarchies. A journey towards fully integrating families in neonatal care.

Tanya Bishop, BScN RN, MHM; Teresa Johnson, MSW, RSW; Leah Whitehead, BJ (H), University of King's College; Darlene Inglis, R.N., BScN, MN

Team affiliation NICU IWK Health Centre, Halifax, Canada.

Background and Purpose:
In light of the many advances in neonatal care, health care providers (HCP) and parents continue to express concern about the socioemotional development of infants due to the lack of close physical contact to their parents. When parents are fully integrated into everyday care significant benefits ensue, not only for the infant, but for the family and conceivably for society at large. HCP's have reported feeling more satisfied in their roles when they help move parents from a place of isolation, dependency and helplessness, to a place of inclusion, confidence, and competence.

The trend towards Family Centered Care (FCC) has helped to promote parents to be more present in the NICU. FCC philosophy has prioritized the importance of parents as partners and decision makers and raised awareness regarding poorer outcomes when infants are separated from their parents. Based on narratives of families, the achievement of FCC has varied and efforts have often failed to bring to light how relationships of power, oppression and control may be the main impediments inhibiting HCPs from moving from the traditional model of care delivery.

Most recently, the Family Integrated Care (FIC) paradigm has been recognized as a more comprehensive approach to greater parent inclusion and involvement in the NICU. Concerns remain that uptake of this model will fall short unless HCPs are truly committed to challenging taken-for-granted oppressive care practices that inhibit parents from becoming equal collaborators in their infant's care. Neonatal HCPs must recognize that they are situated in an ideal position to either facilitate or impede intimacy between parents and their infant. This workshop brings together an interdisciplinary neonatal group involving clinicians, a parent and manager. The aim will be to present three essential areas to consider when integrating FIC in the NICU: 1) optimizing the physical environment; 2) embedding a Parent Partner Program; and 3) integrating change management to transform care.

At the completion of this workshop, learners will be able to:
1. List steps involved in operationalizing a single-family room at a Canadian tertiary-level NICU.
2. Describe two key ways in which authentic collaboration and connection has made a difference in the lives of families and ultimately baby outcomes in the NICU through a Parent Partner program.
3. Identify a road map for change management to transform the NICU and how it operationalized and constructed the FIC model

Speaker #1: Tanya Bishop, RN, BScN RN, MHM
Title: Operationalizing a single-family room NICU

To promote and support close contact and family involvement, our team has focused on the need for physical NICU environments where every baby and family can appreciate a private, comfortable environment where intimacy and relationships will be fostered. During the transition from a traditional open-bay design to a single-family room (SFR) design, we met many challenges, with staff apprehension identified as the most significant. This session will present highs, lows, and learnings from our journey of transitioning to single rooms. Key topics will include: site visit impact, family/staff/design team engagement strategy, role and outcomes of simulation, and a comprehensive alarm management approach. We will also share the unique insights gained from our multi-phase transition and present our strategies to accommodate the hybrid year spent

with infants and families admitted to both single family rooms and open-bay sites.

Speakers #2: Teresa Johnson & Leah Whitehead
Title: Building a Parent Partner Program

Courage. Joy. Fear. Hope. Connection. The birth of a child is often an emotional time for families. For those whose infants require neonatal intensive care the transition to parenthood becomes much more complex. Few understand this more than NICU parents themselves. Together, two mothers of babies born prematurely, and NICU Social Workers, collaborated to plan, develop and implement a Parent Partner Program in a Canadian tertiary level NICU. This program was built from the ground up with parent volunteers working steadily alongside NICU HCPs to provide support in the form of one-to-one conversations, family snack and chats, and creation of brief, dynamic relational orientation videos featuring parents informing parents. With the main goal being building relationships and supporting parents to feel more secure in a foreign environment, the program has grown to be a thriving network of 22 parent volunteers led by a unit-employed Parent Partner who has been involved in the recruitment of new volunteers and guiding the directions of organizational decisions being made in the NICU. The aim of this workshop is to provide the rationale for and steps to consider regarding the creation of a highly functioning Parent Partner Program fully embedded within the NICU that is able to address structures, processes and policies. The importance of building strong partnerships among healthcare providers and parents, need for open communication and a willingness to illuminate and reveal the pervasiveness of power that occurs in the everyday taken-for-granted activities encompassing both language and cultural practices that currently exist within the NICU will be discussed. Lastly, a review of the parent partner program's contributions and next steps will be presented.

Speaker #3: Darlene Inglis
Title: Transforming the NICU
In addition to structural and program changes, the inclusion of change management, most notably a philosophical paradigm shift in care beliefs, is an essential and often overlooked component of sustained integration of families as equal partners in neonatal care. Together as administrators, parents, physicians and staff, we have created a road map for change management to help us transform the NICU. The aim of this workshop will be to share this roadmap with participants. Specific ways in which this NICU operationalized and constructed the FIC model through staff education and human resource practices from interviewing and hiring to performance development and management will be described. Valuable insights will be discussed that raise consciousness through thoughtful engagement and discourse aimed to result in change within the NICU to consequently improve neonatal care by fully incorporating families. The importance of revealing the invisible and complex hierarchical structures that shape today's health care system will be addressed. In the words of Dr. Seuss, "Sometimes the questions are complicated, and the answers are simple".

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Gravens2019-31
Supporting and Enhancing NICU Sensory Experiences (SENSE): a guideline for positive, appropriate, and developmentally-timed sensory exposures in the NICU

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Background and Purpose:
The NICU environment can have deleterious effects on early brain structure and function. Although preterm infants are susceptible to negative and poorly timed external stimuli, they should be in utero and experiencing multidimensional sensory exposures, which drive early brain development. Instead, high-

risk infants in the NICU are exposed to invasive and painful medical interventions and lack positive and consistent forms of sensory exposures, which are critical for optimizing development. Parenting an infant in the NICU is challenging, and many parents do not know how or when to engage with their infants. While the use of sensory exposures, such as skin-to-skin care and massage, have been related to better parent and infant outcomes, most interventions are implemented inconsistently and/or for short periods of time in the NICU.

Budget and Resources:
This project was supported by the Betty and Gordon Moore Foundation and the University Research Strategic Alliance. SENSE is copyrighted by the Washington University Office of Technology Management. It has been made available for clinical and research applications at-cost. Hospitals can implement SENSE with a designated SENSE administrator (PT, OT, SLP, nurse) who educates and supports families to provide the sensory exposures and ensures infants tolerate the guideline as described.

Program, Materials, or Methodology:
To maximize the benefit of positive sensory exposures in the NICU, we have developed a structured sensory-based guideline titled Supporting and Enhancing NICU Sensory Experiences (SENSE), which includes specific doses and targeted timing (based on PMA) of interventions such as massage, auditory exposure, rocking, holding, and skin-to-skin care. The guideline was developed with the intention of optimizing parent engagement while providing the infant with positive sensory exposures to improve infant development and mother-infant interaction. A rigorous process of protocol development included: an integrative review that outlined 88 articles on sensory-based interventions that were used with preterm infants to improve outcome, expert input from a multidisciplinary group of 108 health care professionals that defined sensory interventions implemented across different NICUs, 3 multidisciplinary focus groups that provided a critical review of the guideline, and interviews with 20 mothers of preterm infants who gave input on feasibility of implementing the SENSE guideline. In this workshop, we will share the specific guideline on auditory, tactile, vestibular, kinesthetic, olfactory and multi-modal stimulation for preterm infants in the NICU as well as discuss implementation strategies that include early parent empowerment, educating on infant behavioral cues, modifying the intervention based on infant needs, use of a sensory support team, and timing appropriate sensory interventions.

Impact or Results:
The goal of the SENSE intervention is to engage parents in providing consistent, positive, developmentally appropriate sensory exposures to their infants across NICU hospitalization to improve the early parent-infant relationship and optimize outcomes. The results of a pilot study of SENSE that included 30 preterm infants compared to 50 historical controls will be discussed. In this pilot study, more parent confidence was observed in the SENSE group. In addition, the results of a randomized controlled trial of 70 preterm infants who received the SENSE intervention or standard of care will be discussed. Embedded in this trial, results that demonstrate how the SENSE intervention resulted in improved engagement among those with high social risk will be discussed.

Implications for Family Support:
The SENSE intervention is an implementation strategy aimed at supporting parents in providing appropriate sensory exposures to their infants in the NICU. Many parents do not know what to do, how to do it, and when to do sensory exposures with their infants. The SENSE interventions gives a concrete guideline to empower parents, while the implementation strategy enables individualization based on unique needs of each infant.

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Learner Objectives:
1. Participants will identify appropriate auditory, tactile, vestibular, kinesthetic, olfactory and multi-modal exposures for preterm infants at different PMAs.
2. Participants will identify important factors related to implementation of the SENSE intervention.
3. Participants will understand current evidence related to the SENSE intervention.

Gravens2019-37
NICU Infant Positioning Project

Lee Ann Perry, MSOT, OTR, NTMTC at McLane Children's NICU in Temple, TX; Lauren Olson, MOT, OTR at McLane Children's NICU in Temple, TX; Ruth Wilkerson, OTR, CNT, NTMTC at Early Childhood Intervention

Background and Purpose: When a baby is born early, they enter a gravity filled world before developing physical strength to pull themselves into flexion. Preemies rely on caregivers to provide neuromotor support to improve muscle tone and

prevent musculoskeletal deformity. This is where infant positioning comes in. There are so many products on the market and methods for swaddling infants. The occupational therapists decided to start a quality improvement project to see how well the infants in our NICU were being positioned. Our aim statement: To provide education for nurses/staff in order to improve infant positioning, thereby promoting a developmentally supportive environment in the NICU. We planned to meet this aim statement by scoring positioning; the highest score each infant could receive was a 12. We established a goal of 10/12 and our stretch goal being 11/12.

Budget and Resources: positioning devices as needed; ordered through NICU department

Program, Materials, or Methodology: We used a scoring tool to objectively measure the quality of infant positioning and objectively track progress. This tool allowed us to score infant positioning in 6 areas: shoulders rounded, hands touching face, hips aligned and flexed, lower extremities softly flexed, head in midline, and neck in slight flexion with the opportunity to score a 0, 1, or 2 for each item. The highest possible score was 12. Random monthly infant positioning audits in our NICU revealed positioning deficits due to a lack of positioning devices and staff knowledge. A score of 7.87 for the month of January 2016 was calculated with 115 infants being scored. This led to a need for education and expanding our supply of positioning devices. Data was collected from January 2016 to August 2017; approximately 1600 infants were randomly scored over 18 months. During that time, education was provided such as in-services at nursing staff meetings, individual 1 on 1 training, buttons were distributed to promote positioning awareness were distributed, and new positioning devices were ordered. Poster presentations demonstrating developmentally supportive positioning were left in the break room. Staff members completed a positioning skills check off. Top performers were rewarded during random monthly audits.

Impact or Results: Overall, we observed an upward trend in infant positioning scores since implementing education to staff and increasing our repertoire of positioning devices with a score of 10.65 in August of 2017. The occasional decreases in scores made us realize the importance of providing continual education opportunities for new staff members and frequently refreshing our supply of devices as products wear out and/or disappear in the laundry.

Learner Objectives:
1. Describe developmentally appropriate infant positioning in the NICU.
2. Explain the benefits of developmentally appropriate infant positioning in the NICU.

Gravens2019-38

A pilot study: Pediatricians' ratings of infants' who had varied medical diagnoses related to disability and their expected advice for the infants' parents.

Robin Lynn Treptow, Ph.D. Ph.D. Candidate, Fielding Graduate University

Background and Purpose: A prejudice rooted in subtle cognitive processes that operate outside awareness is called an implicit bias. This bias may be based on a person's physical traits, e.g., a racial-linked, as shown in recent findings of medical providers' bias against minority children. Racial-linked bias ties into Down's (1866) use of ethnic traits to group children who had intellectual disability and evidence mounts for implicit bias against persons with Trisomy 21 (T21) who have physical markers suggestive of a DS phenotype. What people say about persons with T21 (e.g., positive expressions) often fails to match their internal views (e.g., negative perceptions). Such discrepancies exist even among those who care for such persons, e.g., doctors, and the biases extend towards children with the condition. But, what people think about babies with problems may affect how the babies learn and grow over time. Thus, this pilot study explored pediatricians' bias against intellectual disability, i.e., a commonly expected outcome for persons with T21, what they expected babies with vague signs of T21 or of other disability-related conditions to do as they grew up, and the advice they thought they might give the infants' parents.

Institutional grants, crowd sourcing, and scholarships totaling about $3000 funded this pilot research. Costs were primarily for recruitment, i.e., purchase of contact emails, $20 Amazon.com Gift Card incentives, and travel to solicit participants at a neonatal conference.

Program, Materials, or Methodology: This randomized, controlled pilot study joined implicit association test (IAT) and vignette methods to look at biases related to persons with intellectual disability in a neonatal setting. An IAT, i.e., a specialized survey using reaction times to measure unconscious biases, was built using IATGEN software for the Qualtrics® online research platform. The IAT was embedded into a Qualtrics® vignette survey involving hospitalized case examples of a few-days-old infant and his parents. Pediatricians with varied backgrounds and recruited from a variety of settings (N = 56) did the IAT with a subset of these (N = 51) doing the vignette survey. Most were white (86%), and female (66.6%); all respondents had a medical degree. Doctors were randomized to rate an infant with vague signs of T21, cerebral palsy (CP), fetal alcohol effects (FAE), or meconium aspiration syndrome (MAS). They listed advice they thought they might give to the infant's parents and provided data on their training and experiences related to developmental disabilities. Recruitment barriers, i.e., low response rates, were addressed by networking sampling methods, in-person recruitment, and incentives. Levels

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of implicit bias against persons with intellectual disability, ratings of infants, ratings of the infants' parents, and expected advice for parents were the primary outcome variables.

Impact or Results: Most pediatricians (93%) had high levels of negative implicit bias against persons with intellectual disability on the IAT. Vague signs of a T21 diagnosis described in the vignettes predicted pediatricians' lower ratings of infant potential with the largest effect sizes for pairings with MAS, as compared with CP and FAE. Thus, as compared to MAS, T21 means were lower ($p < .001$) for expected no disability traits (e.g., brainy, quick-witted; dCohen = 0.89) and projected accomplishment of daily living skills across childhood, adolescence, and adulthood (dCohen = 1.64, 2.47, and 1.70, respectively)—and higher for traits linked to intellectual disability (e.g., slow learner; dCohen = 3.05). In contrast, early socioemotional skills were rated higher for T21 than for CP ($p = .01$, dCohen = 0.56). Later socioemotional skills did not differ for T21 as compared to any other infant condition. Finally, using responses to vignettes pediatricians offered less reassuring advice to parents of the infant in the T21 condition as compared to those of the MAS, but not the CP or FAE, control infant. This study closed gaps in the healthcare implicit bias literature on negative bias towards T21 in neonatal settings and lays groundwork for research in infants' early milieus (e.g., hospitals, early intervention agencies) taking into account the potential developmental impact of early and negative diagnosis-based bias.

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Implications for Family Support. This study's results could be used to design training programs to identify and make medical providers aware of biases they might have against intellectual disabilities or about very young infants' potential based on vague signs of a medical condition, which might help them to offer families a more hopeful picture of what these infants might be able to do as they grow up.

Learner Objectives: Participants will (1) list two potential developmental impacts of implicit bias in neonatal settings; and (2) name one way that identifying and reducing such bias might better support families of infants with disability-related diagnoses.

Gravens2019-41

MyNICU: Be a part of the team. A quality improvement initiative using online technology to connect NICU families to their baby.

Beth Israel Deaconess Medical Center, Boston, Massachusetts, United States Sarah Evjy, RN, BSN, MyNICU Project Leader, sevjy@bidmc.harvard.edu Molly Wylie, NICU Family Program Manager, Scott Devlin, BIDMC Health Care Quality Karen Waldo, NICU Clinical Advisor Kathy Tolland, NICU Clinical Director

BACKGROUND AND PURPOSE:

The Beth Israel Deaconess Medical Center is a tertiary care center with approximately 5,000 deliveries per year & roughly 1,000 NICU admissions. Our NICU is a fast-paced 48-bed, semi-private room unit comprised of 32 Level II and 16 level III infants. We promote family-centered care in our NICU by educating parents to be involved in their baby's bedside care. The parents are part of the decision making process by attending daily rounds and family meetings. One of the greatest challenges we face in implementation of family-centered care is parent separation from their child. Our goal is to improve the families overall NICU experience by keeping them as connected, informed and educated as possible. To achieve this goal, we developed a secure online resource that provides parents valuable information and daily updates to understand
their baby's ongoing care during their NICU stay. This web-based application is called MyNICU and went live in our unit in December, 2017.

BUDGET AND RESOURCES:
Our original budget of just under $20,000 was provided to us by the Gordon and Betty Moore Foundation Grant whose focus was on family engagement in the critical care setting. This grant originally funded a web-based application called MyICU which was rolled out in all BIDMC adult ICU's in July 2016. Remainder of this grant money was

given to our NICU to develop a tailored, web-based application to improve parent engagement and connectedness.

METHODOLOGY:

Pre-Launch:

-MyICU launched in BIDMC adult ICU's in July 2016. MyICU has been under-utilized by the adult ICU families. Enrollment relied on providers and included a paper-based consent.

-MyNICU project team endeavored to make MyNICU enticing to families. Electronic enrollment and consent streamlined sign-up process, removed barriers, and took the burden off staff.

-CribNews was previously created as an opt-in daily progress note offered to our NICU families. CribNews now incorporated into MyNICU enrollment process.

-Content for MyNICU was created, enhanced and displayed by project team. Former NICU parents consulted to give valuable input.

Launch:

-Educate staff regarding MyNICU's value to parents and staff.

-Educate staff on how and when to introduce parents to MyNICU. Educate providers to introduce MyNICU during antepartum consults.

-Staff encouraged to include MyNICU in daily workflow.

Post Launch:

-MyNICU support team to review daily MyNICU enrollment report.

--Determine which families have not yet enrolled in MyNICU

--Follow up with families who have not enrolled

-Weekly team meeting to review feedback and address issues.

On-Going Interventions:

-Quarterly MyNICU parent feedback survey sent to users.

-Analyze data to determine areas of improvement or enhancement.

IMPACT AND RESULTS:

MyNICU went live in our unit on December 12, 2017. Data from the most recent NICU Parent Satisfaction Survey (Figure 1) compared results pre and post MyNICU launch. There is a notable decrease from 29% to 25% in parents stating they were not provided enough information during their baby's NICU stay. We are hopeful that this decrease is related to the launch of MyNICU, thus providing parents with the information they previously may have been lacking.

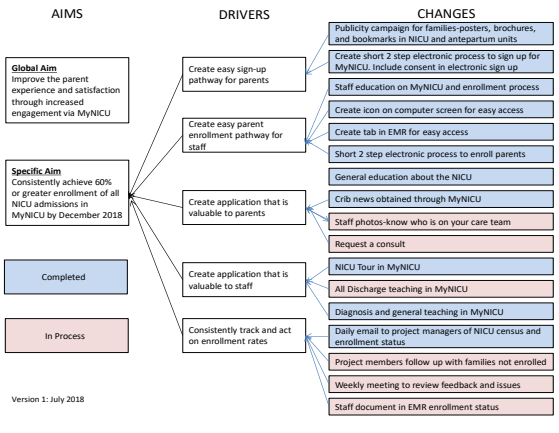
The most recent MyNICU parent feedback survey (Figure 2) states that 89% of parents feel that MyNICU has provided them with quick, easy access to information that has helped them stay informed and involved with their baby's care. 57% have found MyNICU to help streamline the communication between the parents and their baby's care team. 92% of parents state that MyNICU has improved their overall NICU experience.
MyNICU enrollment data shows that we have a median family enrollment rate of 59.5% (Figure 3). With this data, we looked at barriers of enrollment. One barrier was the parents who were not anticipating an extended NICU stay i.e. their baby was born close to term. Another large barrier was our non-English speaking families. At times, 20% of our patient population are from non-English speaking families. Unfortunately, MyNICU is currently only available in English.

MyNICU usage data has shown that parents are logging in 1000- 2000 times per month (Figure 4). Using an average number of 30 enrolled families, parents are logging in roughly 1-2 times every day. Our hope for MyNICU was that parents would find value in daily use of this application.

This collective data is complementary to our specific aim of a consistent family enrollment rate of 60% by December 2018 (Driver Diagram). Our data also supports our global aim that MyNICU will have a positive impact on parent satisfaction and their overall NICU experience.

IMPLICATIONS FOR FAMILY SUPPORT:
MyNICU has become a standard part of the family-centered care offered in our NICU. MyNICU has provided parents with the tools they need to stay informed, educated and connected to their baby's care. Parent feedback has helped us determine how to enhance content and functionality within MyNICU. We plan to incorporate MyNICU into a self-guided discharge teaching tool, where identified material can be "pushed" to parents specific for each baby. We would love to translate MyNICU for our non-English speaking families which would greatly impact the quality of the application for our families. We are optimistic that MyNICU will continue to improve parent satisfaction and their overall NICU experience.

LEARNER OBJECTIVES:
Identify how online technology can be used to improve NICU



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parent satisfaction and the families overall NICU experience. Understand how online technology can be used to enhance communication between the parents and the care team.

Identify how online technology can be used to provide parents valuable information to understand their babies care; thus, empowering them to be educated members of their baby's care team.

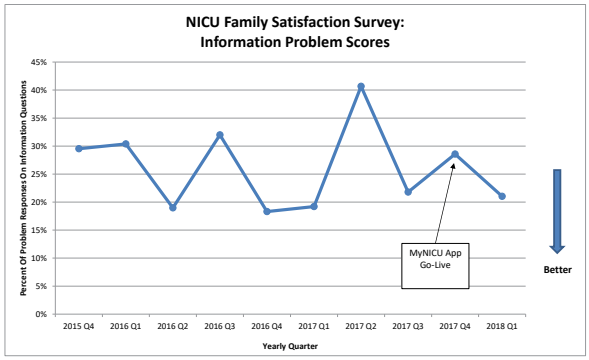

Figure 1

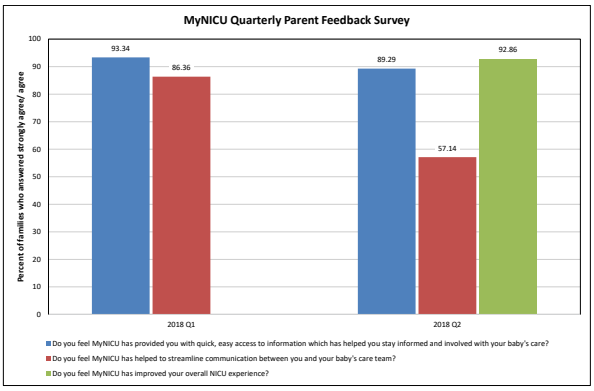

Figure 2

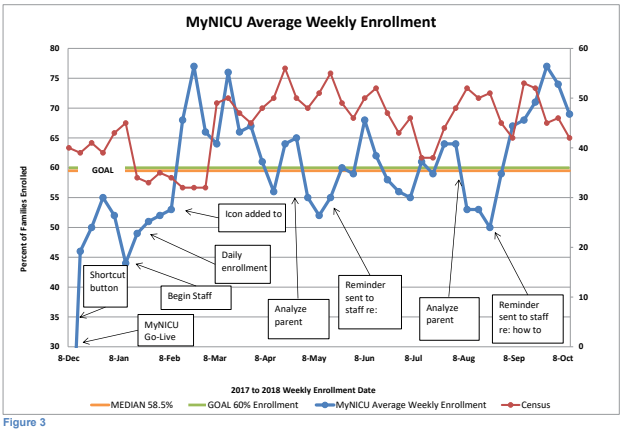

Figure 3

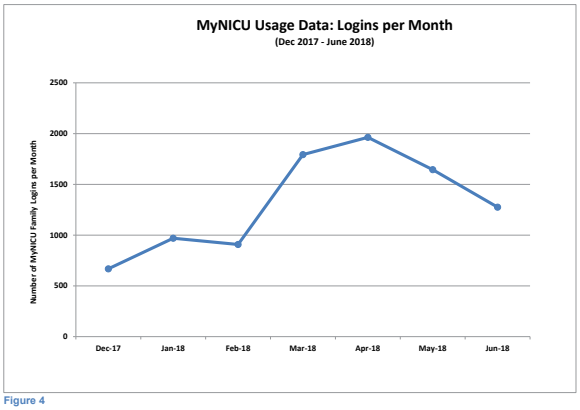

Figure 4

Gravens2019-42

On The Cusp of Life and Death, Choose Life

Dr. Stephanie Wellington, Physician, Certified Professional Coach, Stephanie@NurturingMDs.com, New York

The Neonatal Intensive Care Unit positions us to live on the cusp of life and death. Studies show that parents of NICU babies are adversely impacted by the NICU hospitalization. Psychologically they have increased rates of anxiety, insomnia, depression, and post-traumatic stress disorder.

These same stressors exert their effects on the medical team. As we enter the discussion of periviability, which challenges the medical team to produce optimal outcomes for infants who previously would not have been resuscitated, the pressure mounts.

How does a doctor in training, a mother with a baby in the NICU, or a seasoned physician meet the challenges of living on the edge of life and death? This talk takes a journey through human vulnerability which is often overlooked in the quest for the latest in research and technology to support these tiny patients.

Through case stories, participants will

- Learn how a neonatologist blended life coaching with medicine to shift from compartmentalization, a common mode of dealing with the stress and death in medicine, to detached involvement and reignite her passion and purpose.
- Gain insight into how a mother's past pregnancy losses dramatically contributes to her inability to connect and receive support from the nurses, doctors, and her family. Along her journey she experiences the power of releasing her past in order to be present for her daughter in the NICU.
- Discover the shift in perspective as a future neonatologist's vulnerability is not a sign of weakness but an opportunity to deepen and accept her humanity.

Biography

Dr. Stephanie Wellington recieved her medical degree at The

Ohio State University College of Medicine. She completed her Pediatric Residency and Neonatal Fellowship training at New York University School of Medicine. Her desire to support families in the NICU guided her to become a Certified Professional Coach from the Institute for Professional Excellence in Coaching (iPEC). She is a writer, speaker, and facilitator of NICU parent support groups. Her love of coaching has expanded and she hosts workshops and private coaching for physicians and medical professionals courageous enought to live into the highest vision for their life and career.

Gravens2019-45

Swallowing Dysfunction in The NICU – Silent Aspiration is Common, but Therapeutic Compensations Can Help

Pamela Dodrill, PhD, CCC-SLP; Katherine Gibson, MS, CCC-SLP; Brigham and Women's Hospital, Neonatal Intensive Care Unit, Boston Kayla Hernandez, MS, CCC-SLP; Reza Rahbar, MD; Boston Children's Hospital, Department of Otolaryngology, Boston

BACKGROUND: Modified barium swallow (MBS) studies are performed to evaluate swallow function and determine risk of aspiration (fluid/ food entering the lower airway). Infants rely on fluid for both hydration and nutrition. If an infant displays airway penetration or aspiration on regular liquids during the study, the feeding therapist may trial certain interventions during the procedure to see if they assist swallowing and airway protection. The most common interventions trialed during infant MBS procedures include modifying how the bolus is delivered - such as use of different feeding equipment (e.g. slower flowing bottle nipples) and positional changes (e.g. side-lying position versus reclined) – and/or making modifications to the bolus itself (i.e. thickened liquids).

AIMS: We aimed to describe the proportion of NICU infants referred for MBS who are found to aspirate, the proportion of those who aspirate who demonstrate silent aspiration (i.e. no cough in response to aspiration), as well as to investigate the effectiveness of common interventions trialed during MBS procedures.

METHODS: This was a retrospective review of 3 years' worth of MBS studies from a large Level III NICU.

RESULTS: Greater than 85% of NICU infants referred for MBS were found to aspirate. Approximately 95% of NICU infants who are found to aspirate on MBS demonstrated silent aspiration. Common sub-groups of NICU infants who silently aspirate include those with chronic lung disease, congenital heart defects, hypoxic brain injury, and congenital syndromes (e.g. trisomy 21). Interventions trialed were able to effectively mitigate aspiration risk in many infants, allowing them to continue to feed by mouth with these therapeutic compensations in place.

CONCLUSION: Many NICU infants referred for MBS display silent aspiration, but the use of therapy interventions, such as slower flowing bottle nipples, side-lying position, and thickened liquids, can allow many of these infants to feed safely.

3 LEARNING OBJECTIVES

At the end of this talk, participants will be able to:

- Describe how milk flow can impact on suck-swallow-breath coordination
- List 3 potential benefits of horizontal milk flow
- Describe 3 potential signs or symptoms that may indicate aspiration risk

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Gravens2019-46

Home enteral feeding for NICU graduates: Developing and implementing Clinical Practice Guidelines

Pamela Dodrill, PhD, CCC-SLP; Katherine Gibson, MS, CCC-SLP; Kathleen Powers, RN; Debra Marks NP; Kathleen Murphy, NP; Carmina Erdei, MD Brigham and Women's Hospital, Neonatal Intensive Care Unit, Boston

BACKGROUND: The establishment of oral (per os, PO) feeding competence is a challenge for most infants born prematurely. Unlike full-term infants, who are almost always able to safely and successfully PO feed from birth, most preterm infants will require some duration of enteral tube feeding (per gavage, PG) until they mature sufficiently and are medically stable enough to feed fully PO. Historically many NICUs would not consider discharging home infants who continue to require PG feeds to meet their nutritional requirements. More recently, an increasing number of NICUs have begun to allow select infants and families to transition to home with a feeding tube in situ, under the principle that the home environment is optimal for ongoing infant growth and development. It remains unclear (a) which patients would benefit most from this option, and (b) how can this process be optimized to support safe transition to home, meet the medical and developmental needs of high risk infants,

and provide adequate support to their families.

AIMS: The aims of this study were: (1) Describe our process for developing and implementing evidence-based clinical practice guidelines for home PG feeding, (2) Describe the characteristics of infants who left our NICU on PG feeds, and (3) Describe potential obstacles and difficulties encountered by infants and families during this process.

METHODS: A chart review was conducted for infants admitted to a large Level III NICU in 2016-2018.

RESULTS: Approximately 10-15 infants per year are discharged home from our NICU on PG feeds. Approximately 40% of these infants were discharged following gastrostomy (G-tube) placement, with the remainder having a nasogastric (NG) tube in situ. Infants were on average 44/40 weeks at the time of discharge. More than 90% of these infants were born ≤30/40 weeks GA. The most common co-morbidities were IUGR, RDS, BPD, and PDA. Of note, approximately 75% of those who went home on PG feeds were on thickened feeds due to demonstrated aspiration risk and/or gastro-esophageal reflux management.

A large group of multidisciplinary clinicians from our NICU, the partnering children's hospital, and the primary care team collaborated in this process. Our experience indicates that infants can successfully discharge home with PG feedings, provided that: (a) the infant is otherwise physiologically stable and medically ready for discharge home; (b) the family is able to undergo training, achieve competency in using required medical equipment, and is agreeable to contingency planning, and (c) appropriate support and outpatient follow-up and coordination of care is in place. Potential obstacles and difficulties were identified, including opportunities for more streamlined medical decision-making, enhanced parent training and support in the NICU, and improved coordination of care with outpatient services. Proposed strategies to help address these will be discussed.

CONCLUSION: Evidence-based, multi-disciplinary clinical practice guidelines can result in improvements in staff consistency, quality of patient care, and improved patient and family experience. Effective partnership between a large number of multidisciplinary health care providers and families is critical for home enteral feeding to be a viable option.

LEARNING OBJECTIVES
At the end of this talk, participants will be able to:
- Describe the process involved in developing evidence-based multi-disciplinary clinical practice guidelines in the NICU
- List 3 important feeding topics that should be discussed with families of NICU infants prior to discharge
- List 3 common feeding challenges experienced by preterm infants post-NICU discharge

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Gravens2019-47
Integrated Feeding Therapy Adds Value to NICU Follow-Up Programs

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BACKGROUND: Many NICU graduates continue to display feeding, growth, and developmental challenges post-discharge. Most NICU follow-up programs do not have feeding therapy as an integrated part of their multi-disciplinary team. We have found that even many infants considered at low-risk of later feeding difficulties end up presenting with significant issues that benefit from feeding therapy input within the broader NICU Follow-up Program umbrella.

AIMS: To describe feeding difficulties encountered in a NICU Follow-Up Program.

METHODS: Retrospective data was collected on infants attending NICU Follow-Up Program over a 12-month period. Any high-risk feeders (e.g. those discharged on tube feeding) were referred to specialist multi-disciplinary feeding clinics, with specialist physicians (e.g. GI, pulmonology), nutrition, and feeding therapy. Any low-risk feeders attending NICU follow-up clinic had their feeding screened by the clinic feeding therapist.
RESULTS: Our clinic follows more than 150 infants per year and provides more than 900 occasions of service. Greater than 80% of infants attending the clinic met the criteria for feeding therapy services. These are babies who otherwise would not have been reviewed by feeding therapy, unless the parents self-referred into a specialty feeding clinic. Common issues encountered include: concerns regarding swallow safety and aspiration risk, work of breathing during feeding, inefficient feeding, and or other concerning feeding behaviors. Interventions offered include: providing advice regarding changing bottle nipples and preparing thickened feeds, facilitating MBS and referral to sub-specialty providers, and providing advice regarding appropriate feeding equipment, seating, and strategies. Parents reported that the feeding therapy services are valued, and that the integrated framework of the clinic visits

saves them time and stress.

CONCLUSION: Many preterm infants considered at low-risk of later feeding difficulties end up presenting with significant issues that benefit from feeding therapy input. Our clinic data shows that integrated feeding therapy adds value to NICU follow-up programs, and provides improved multi-disciplinary, patient- and family-centered care for preterm infants.

3 LEARNING OBJECTIVES
At the end of this talk, participants will be able to:
- List 3 common feeding challenges experienced by preterm infants post-NICU discharge
- List 3 potential interventions that feeding therapists can offer as part of NICU follow up programs
- List 3 important feeding topics that should be discussed with families of NICU infants prior to discharge

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Gravens2019-48
Pediatric Feeding Disorder: Consensus Definition and Conceptual Framework

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BACKGROUND: Most preterm and other medically complex infants display feeding difficulties in the NICU, and a large number of these infants continue to display difficulties well beyond their NICU stay. Pediatric feeding disorders require comprehensive assessment and treatment of four closely-related, complementary domains: medical, nutrition, feeding skill, and psychosocial. Despite inherent multiple underlying mechanisms and need for multidisciplinary care, previous diagnostic paradigms have typically defined feeding disorders using the lens of a single professional discipline, with each professional discipline suggesting its own approach.

AIMS: To use the framework of the World Health Organization's International Classification of Functioning, Disability, and Health to develop diagnostic criteria for "Pediatric Feeding Disorder" (PFD).

METHODS: A multi-disciplinary expert group was convened, a comprehensive literature review was performed, and a unifying diagnostic term is proposed.

RESULTS: "Pediatric Feeding Disorder" (PFD) is defined as impaired oral intake that is not age-appropriate, and is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction.

The proposed diagnostic criteria for Pediatric Feeding Disorder includes: A disturbance in oral intake of nutrients, inappropriate for age, lasting at least 2 weeks and associated with 1 or more of the following:

Medical dysfunction, as evidenced by: Cardiorespiratory compromise during oral feeding; Aspiration or recurrent aspiration pneumonitis.

Nutritional dysfunction, as evidenced by: Malnutrition; Specific nutrient deficiency; or significantly restricted intake of one or more nutrients resulting from decreased dietary diversity; Reliance on enteral feeds or oral supplements to sustain nutrition and/or hydration.

Feeding Skill dysfunction, as evidenced by: Need for texture modification of liquid or food; Use of modified feeding position or equipment; Use of modified feeding strategies.
Psychosocial dysfunction, as evidenced by: Active or passive avoidance behaviors by child when feeding or being fed; Inap-

propriate caregiver management of child's feeding and/or nutrition needs; Disruption of social functioning within a feeding context; Disruption of caregiver-child relationship associated with feeding.

CONCLUSION: The proposed diagnostic criteria for PFD use a conceptual framework that goes beyond disease-oriented or unilateral diagnostic paradigms, recognizing PFD as causing dysfunction in at least one of four closely-related, complementary domains. These criteria will enable pediatric practitioners to better characterize the needs of patient populations (including preterm and other medically complex infants, and their families), and promote the use of common, precise, terminology necessary to advance clinical practice, research, and healthcare policy.

3 LEARNING OBJECTIVES

- Outline the new proposed definition of pediatric feeding disorder
- List the four domains that need to be considered in a child with pediatric feeding disorder
- List three potential benefits of a new unifying definition for pediatric feeding disorder

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Gravens2019-54

Catalysts for change: The impact of lighting, noise, and design on perceptions of the NICU environment

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Background and Purpose:
Neonatal Intensive Care Units contain some of the most fragile and vulnerable patient populations. Many NICU babies have little ability to regulate their own bodily systems, heightening the importance of their immediate environment in their development.

Recent longitudinal studies inform us that what impacts these fragile babies today, has a long lasting impact on them (Pineda, R., et al, 2014). Add to that, an increasing concern for Neonatal Abstinence Syndrome babies who's needs are mixed in terms of acuity and in parent-child bonding (MacMullen, N. J., Dulski, L. A., & Blobaum, P., 2014; Indian Health System, n.d.). Support for all these babies is not limited to their physical and cognitive needs, but also extends to their parents, grandparents and other loved ones, along with staff, whose constant vigilance of them often result in missed breaks and needed self-care. So what impact does their surrounding environment have on all these users?

The Recommended Standards for Newborn ICU Design [White et al. 2013] include recommendations for all aspects of NICU design including layout, materials, lighting and acoustics. The Facilities Guidelines Institute (2018) also provides minimum standards for NICU design. Most of these recommendations are based on best practice both in design and operations. Few studies exist to enable evidence based design decision making

in this field. This research study is a pre/post study that was conducted when a NICU in an academic medical center was redesigned from an open bay NICU to a private room NICU to evaluate some of these standards. Specific areas of interest were lighting, acoustics, layout and design elements.

White et al. (2013) included recommendations for NICU ambient, procedure, and support area lighting. The Illuminating Engineering Society (IES) has also published limited recommendations for NICUs in the Lighting for Hospitals and Healthcare Facilities Recommended Practice RP-29-16. Many of the recommendations in IES RP- 29-16 are from the Recommended Standards for Newborn ICU Design. Both documents recommend cycled lighting for newborns about 28 week's gestation or older.

According to White [2013], there has been no demonstrated benefit of cycled light except for after 28 weeks gestation, when there is some evidence of a potential benefit. This is similar to the conclusion of Morag and Ohlsson [2016], who after systematically reviewing the relevant literature regarding NICU cycled light for preterm and low birth weight infants, found only a few outcomes that reached statistical significance, including cycled light resulting in a shorter stay versus continuous bright light or near darkness; however, Morag and Ohlsson also stated that the quality of evidence for cycled light was low.

White et al. (2013) included recommendations for infant, staff and parent areas to be design to produce minimal background noise and to contain and absorb much of the transient noise created. The combination of continuous background sound and transient sound in any of these areas shall not exceed an hourly Leq of 45 dB and an hourly L10 of 50 dB, both A-weighted, slow response. As well, transient sounds or Lmaxshall not exceed 65 dB, A-weighted, slow response. Recommendations for heating, ventilation and air conditioning, along with material use are provided to help meet these recommendations.

Raman (1997) noted that sudden and loud noise leads to physiological and behavioral disturbances including sleep disturbance, motor arousals, such as startles, crying, hypoxemia, tachycardia, and increased intracranial pressure. Increased intracranial pressure can further contribute to intra-ventricular hemorrhage (Raman, 1997). Brown (2009) studied the effect of noise on preterm infants by reviewing many articles and concluded that lower levels of noise in the NICU may improve physiologic stability of preterm infants and long-term outcomes. Stevens et al (2010) reported significantly less sound and noise in the NICU after conversion from a conventional open-bay layout to a single-patient room layout.

Much research in this area is still needed. This study evaluated the prior open bay floor plan with the new NICU unit that houses 3 neighborhoods of 14 private rooms each with

a 24 hour architectural light scheme. This presentation brings together the owner, the architectural teams and the researchers to discuss the results and lessons learned.

Methodology:
This study followed a mixed-method approach wherein surveying via questionnaires were used to evaluate user perceptions. Lighting measures and acoustic readings were used to support the questionnaire responses. Most of these methods have been previously tested for reliability and have been used during pre- and post-occupancy evaluations during other facility assessments. The mixed-method approach led to triangulation of findings and helped to inform lessons learned.

Impact or Results:
NICU LIGHTING
The majority of the luminaires in the new NICU patient rooms were white-tunable, changing in both spectral power distribution (known as the spectral power distribution, SPD) and intensity (amount of light). Occupants do not have control over the change in color temperature throughout the day; however, have control over the intensity of the white-tunable lighting.

The response to the lighting in the NICU is also being gathered through the surveys and through the lighting control system. The control system records every change in the lighting system, whether programmed or initiated by an occupant in the space. This data is being collected for every patient room. The initial data shows that there are more changes between 8 pm and 8 am than during the day, indicating that the programming of the lights during the day is meeting the needs of the occupants. Further analysis is needed to understand if there are changes to the lighting that could be more beneficial for the occupants during the evening hours. Initial analysis of the survey data from staff in the old NICU shows that the staff generally found the lighting to hinder their work, and that the light level and control of the lights was most important to the staff. Further analysis of the old and new NICU survey data is ongoing.

Learner Objectives:

1. Describe why NICU babies need special environmental considerations and how they can be accomplished using design features.
2. Examine how research findings can help inform design decision making.
3. Discuss how the findings inform the future of NICU design—includes audience participation.

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Gravens2019-56

Implementation of Infant Driven Feeding Protocol in a Level IV Neonatal Intensive Care Unit

Patty Macho, PhD, RNC-NIC, BC, Melisa Mancuso, MS, Diane Shimborske, BSN, RNC-NIC

Purpose
To successfully transition infants from gavage feeding to oral feeding based on readiness cues and not on gestational age or volume of feeding.

Background
Premature infants need to be able to coordinate sucking, swallowing and breathing while maintaining homeostasis in order to successfully oral feed. Conventional methods for successful feeding was based on quantity and duration of feeding not quality. Infants and parents found feedings to be stressful and frustrating due to force feeding.

Design
Infant Driven feeding protocol was initiated after a literature review and staff had completed an online education module and received one on one in-service. Laminated scoring tool and visual reminders placed at bedsides and scoring changed from paper to electronic medical record. Education incorporated into biweekly rounds on all shifts with daily reminders for infants being scored. Chart audits completed and results distributed to staff. Parent education done at bedside and incorporated into baby care classes. The main obstacle to implementation was staff resistance to implementing a new protocol that they believed would be more time consuming than conventional feeding method. Obstacle was overcome by education and sharing positive results with staff. As more staff became aware of the positive outcomes of infant driven feedings-obtaining full po feedings earlier with improved weight gain and decreased length of stay resistance disappeared. A culture change occurred in the NICU where all infants that qualify are now fed using infant driven feeding protocol that is initiated by the nurses-not the medical staff. A second barrier to successful implementation was the need to first score on paper then free text the score in the electronic medical record. A separate parameter was created and added to the EMR which has decreased the time for charting and helped eliminate nurses' resistance to charting score and following protocol.

Outcomes
In 2017 infants reached full oral feeds at a younger gestational age-10 days younger, than in 2016. In 2017 average length of stay decreased by 4.1 days compared to 2016 with subsequent decreased hospital costs. Parents expressed less frustration and stress related to feedings and expressed increased satisfaction with parenting skills. Parents have increased knowledge of readiness to feed and disengagement cues when feeding infants and increased knowledge of need for gavage feedings vs po feeding.
Implementation: All infants transitioning from gavage to oral feedings are scored using the infant driven feeding scale. Based on score oral feedings are either attempted or feeding gavage. Disengagement cues determine length of nippling.

Implications:
Infant Driven feedings should be implemented for all infants transitioning from gavage to oral feeding. Staff and parents need education and support on protocol and how to identify readiness to feed and disengagement cues. Parents need to be supported during feedings.

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Objectives:
At the end of this presentation the learner will be able to:
1. Describe readiness to feed cues and disengagement cues.
2. Verbalize understanding of infant driven feedings in the NICU.
3. State 2 barriers to successful implementation of infant driven feedings and methods to overcome barriers.

Gravens2019-61

B.S.A.F.E.

Tamie Hotchkiss, BSN RN- Registered Nurse III, Patricia Sulecki, RN- Registered Nurse II, Jineen Flagg, MSN RN- Assistant Nurse Manager, Susan Foster, MSN RN, NEA-BC- Nurse Manager, NICU, Kathleen Moran, MSN RN, IBCLC- Milk Bank Coordinator, Deborah Tuttle, MD- Neonatologist, Stephen Pearlman, MD- Neonatologist, Christiana Care Health System

Program, Materials, Barriers
- Existing Electronic Systems do not integrate
- Full Time Equivalents – Budget Restraints
- Paper Process

Background & Purpose
In the Neonatal Intensive Care Unit (NICU) at Christiana Care, more than 100,000 breast milk feedings were administered in January 2017-December 2017. Breast milk administration errors are considered a serious safety event, with risk of harm to the

baby from exposure to blood borne pathogens which may transmit disease when ingested. Between 2003 and February 2017, the NICU experienced twelve breast milk administration errors. This can lead to costly lab testing, emotional distress for parents and feelings of stress and failure among staff. The goal of the BSAFE project is to reduce errors to zero, in the NICU, by June 2017.

Intervention(s): A multidisciplinary team of key stakeholders (nursing, providers, milk bank technicians) was identified, the team met weekly over the course of one month and individually reviewed each documented error, the preceding factors and shift events/assignments in order to ascertain the workload and stress level of the environment in which the error occurred. A survey was developed and given to staff in order to determine what the barriers, concerns and process perceptions were. We also spent time trouble shooting (via RCA) preventable errors and areas of opportunity for process improvement in the milk administration pathway from first receiving the milk to actual administration. An education plan was developed and implemented (80% of staff was trained within one week) including: a new process of double verification (involving another staff member or parents/caregivers) in additional to the already utilized Mothers Own Milk System (MOMS) used to scan in and scan out breast milk as well as a recommitment letter signed by all staff acknowledging the importance of correctly administering breastmilk. We created unit signage and individual bed-space signs to encourage families and visitors as well as the nursing team to utilize the double verification system for safety which we named "BSAFE" for:

- Breastmilk
- Scan (milk)
- Ask (staff or caregiver)
- Feed (right milk)
- Every time

Results/outcomes: The BSAFE initiative successfully reduced our breast milk error rate from twelve to zero for 20 months, from February 2017 to October 2018 (and counting) as a unit; the NICU celebrates milestones of remaining error free.

Conclusion: The BSAFE initiative improved patient safety as well as patient outcomes in the unit by incorporating all caregivers and providers in the second verification process as well as refocusing staff nurse attention to the importance of safe milk administration. Ongoing review of the process, education for new staff and sharing our process at the biweekly Women and Children's service meetings are important next steps for this project. Continued random audits are completed to ensure compliance with the BSAFE process.

Gravens2019-62

Lessons of Transformation: Learning from 30 years of NICU planning and design

Cynthia Sparer, MPA, Sr. Vice President, Operations Yale New Haven Hospital, and Executive Director, Yale New Haven Children's Hospital, Laura Poltronieri, AIA, Principal, Poltronieri Tang & Associates

Background and Purpose

This presentation will analyze the planning and design concepts driving the design of over a dozen NICU design projects over the last 30 years. We will discuss, with input from multiple clinicians, how they helped their institutions transform their NICU models of care. The presentation will highlight the key concepts and ideas behind the planning and design of each unit and provide post occupancy findings for each project. We will discuss how clinical care leaders at each facility led transformative change, and in partnership with the design team gave shape to evolving NICU design concepts. The workshop will culminate in a list of recommendations regarding a design process that supports transformation in design.

Program, Materials, or Methodology

This workshop will create a forum to trace how NICU planning and design has transformed from open ward NICUs in the mid 1980's to single family rooms designs, some now with couplet care rooms, and other innovative new programs and facilities supportive of family care taking with their neonates. The facilities and projects discussed will include but not be limited to NICUs at:

- Geisinger Medical Center
- New York – Presbyterian Morgan Stanley Children's Hospital
- Children's Hospital Wisconsin
- Shawn Jenkins MUSC Children's Hospital
- Yale New Haven Health
- Primary Children's Hospital, Intermountain Healthcare
- St Louis Children's Hospital/BJC
- Penn State Children's Hospital, Hershey Medical Center
- Nicklaus Children's Hospital
- OHSU Doernbecher Children's Hospital
- British Columbia Children's Hospital

Impact or Results

- o NICU design has transformed dramatically over the last three decades, due to ground breaking NICU projects that learn from each other in order and continually lead to the "next generation" of projects.
- o A dynamic planning process outline that empowers facilities to accomplish transformative NICU design through the planning process

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Implications for Family Support
- The ways families are supported in the NICU both physically and programmatically have transformed dramatically over the last thirty years. This workshop will identify and trace key transformations in family support practices at the dozen NICU's at key medical centers across the country.

Learning Objectives
1. Learn how clinicians and patient and family advocates directly transformed the design of a dozen NICU projects over the last three decades.
2. Understand the importance of integrating site visits, during the planning process and how the planning and design innovations at individual institutions then leads to transformation in subsequent unit designs.
3. Understand the importance of integrating POE data from previous projects into the planning process of new units in order to lead to important transformation.
4. Understand the data required to lead to transformative NICU design.

Gravens2019-63

Finding the Suite Spot

Susan Foster, MSN RN, NEA-BC- Nurse Manager, NICU Christiana Care Health System

Program, Materials, Barriers
- New Building Rooms Designed as Single Patient Rooms
- Changing Service Line Leadership
- Inadequate understanding of Couplet Care
- Financial Cost of Construction Changes

Background & Purpose

The Neonatal Intensive Care Unit at Christiana Care Health Systems is a 72 bed, level 3 unit built in the late 1990s. The three patient pod format was cutting edge at the time of its design, however, with the ever increasing acuity, infection prevention concerns, patient experience expectations and incredible patient care advances, the time to build a new NICU had come. In an effort to advance and optimize the Women and Children's service line, the decision to build a new Women and Children's Tower became a reality.

The incredibly large undertaking was presented to parent advisors, leadership, providers and staff as an opportunity to redefine care in the mid-atlantic area; to develop a destination for care. Along with many ideas and options to reinvigorate and expand the care we deliver, the idea of couplet care was thrown onto the table as a unique idea to better serve our families.

Intervention(s)

Fast forward 2 years, leadership changes, approved building plans and a reconvening of building development teams. An interdisciplinary team of providers, staff and parent advocates from the NICU met to discuss room design in the new Women and Children's Tower. The idea of couplet care had been one of the integral parts for moving forward. With a NICU room size of 315 square feet, including a full bathroom, the challenge to define what successful couplet care might look like became quite daunting.

Understanding the purpose and benefits of couplet care, the team was committed to identifying a path forward. There could be no structural changes, rooms had to remain adaptable for all types of patients and a large learning curve, understanding and buy in of the significance of couplet care needed to be achieved.

Members of the group met with other Level III NICUs who had built new units, studied the European couplet care model and attended the 2018 Gravens Conference which presented a multitude of information around Couplet Care. Armed with the information that was obtained, we were able to go back to leadership with square footage ranges and requirements, the requested room adaptability, and mandated minimal change costs.

Results/Outcomes

The NICU will sit on two floors, 40 rooms per floor. The fourth floor will be single patient rooms with the ability of one parent to spend the night. The third floor will be a mix of 10 single patient Continuing Care (NAS) Nursery rooms, a large group care room, and 10 Couplet Suites. The Couplet Suites will be two single patient rooms with a large 7 foot interior opening/door between the two rooms. The post-partum NICU mom will occupy one room; her neonate will occupy the other. This gives mom the privacy that she may require/desire and the opportunity to step away from the infant's bedside, while also allowing for full participation in the infant's care. Our hope is that it allows for compromise around visitation, infection prevention and patient acuity. When the suite is not in use, the option to close off the two rooms via an opaque door allows for both rooms to be utilized independently as patient rooms.

Conclusion:

What began as a "pie-in-the-sky" idea was able to develop into an intentional, evidence based space that allows the closeness and participation of parents in the care of their newborn. Encourages interdisciplinary and collegial discussion and lays the groundwork for continued advances towards greater adaption of family based and developmental care of the newborn. The initial idea of creating a center that is a destination where young families can be cared for as a family in a nurturing, cutting edge environment now has the opportunity to develop.

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Bringing Babies and Parents Together: Jet ventilation and skin to skin, a multidisciplinary approach

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Background and Purpose: "Very preterm births raise unique issues for parents and for healthcare services. The birth may be fast and unexpected, and parents may be immediately separated from their baby. The birth of very preterm baby is often an exceptionally stressful and traumatic time for parents" (Arnold, et al., 2013). With this, at the Fraser Health Authority (FHA) Royal Columbian Hospital (RCH), we were posed with a problem of the jet ventilator circuit box being placed close to the infant's head and therefore the infant was not being held skin to skin due to the constraints of the circuit box tubing. Understanding and applying the concepts and theory of Trauma-informed Age Appropriate Care (TiAAC) in the RCH Neonatal Intensive Care Unit (NICU) and in an attempt to reduce the exposure of stress and trauma (Coughlin, 2014) we wanted to safely secure the circuit box outside of the incubator and provide skin to skin care for these babies.
Budget and Resources: We worked together within a multidisciplinary approach. Leaders from nursing, respiratory therapy and occupational therapy took a lot of time and effort to lengthen the tubing to allow the box to move, but ensure that the ventilator pressures were still being delivered to the infant. We created a shelf to secure the box outside of the incubator. We then put together a program to safely transfer infants to their parents for skin to skin care.

Program, Materials, or Methodology: The largest barrier to implementation in the FHA RCH NICU was the safety of the infant and the concern of extubation. Once everyone felt the length of tubing was sufficient enough and the apparatus we created to hold the circuit box was secure, we made it standard for all infants on the jet ventilator to have the circuit box outside of the incubator. It was transferring the infants for skin that was the most complicated. We created evidenced based guidelines for skin to skin care, a stability criteria and a clear step by step program on how to transfer the infant. We then practiced repeatedly, making adaptations to the program. When we implemented we did not expect such positive results with having the circuit box outside the incubator and, once stable, how frequently and safely infants were being held skin to skin. If we knew this, we would have collected data earlier and kept track of all of our PDSA cycles. We were awarded a grant in which quality improvement data was collected and reviewed to demonstrate how our program is a safe and effective way to provide TiAAC to our most vulnerable patients through skin to skin while on the jet ventilator at FHA RCH NICU. The data we collected includes; how many times they were skin to skin with their parent, oxygen requirements, TCO2 readings and if there any safety incidents such as extubation. We reviewed 19 charts. Based on the chart reviews, S2S while on HFJV is a safe practice in FHA RCH NICU with the equipment and processes we have implemented.

The biggest result/accomplishment is that through the diligent development of our program to safely reunite babies and parents is that it has become the norm in our unit. The impact it has had on families and our patients has been exponential. Some infants would have gone their entire life without being held. And now through our program they are being reunited with their parents in a safe and supported way.

Family Implications: It has given parents confidence in caring for their baby in a time where it can be very stressful, traumatic and life changing. Allowing skin to skin while on the Jet ventilator creates a quiet space for parent and baby to connect amongst the noise and chaos of the NICU environment. We want to share our work with others and to help other units facilitate the reunion of families.

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Learner Objectives:
- What TiAAC is in the NICU and how stress and trauma can impact infants
- Importance of Skin to Skin are as an intervention
- How to transfer an infant skin to skin while on a jet ventilator

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