Gravens By Design: Selected Abstracts from the 34th Annual Gravens Conference on the Environment of Care for High Risk Newborns: Resiliency and Change in the NICU

Robert White, MD

Selected abstracts from the the 34th Annual Gravens Conference are presented below:

Poster Abstracts Table of Contents:

Gravens2021-2

Title: Healthy Soundscape: Creating a safe, developmentally supportive, and sustainable sound environment for preterm infants.

Authors: Maxwell Corrigan, MS, MT-BC, NICU-MT, Orlando Health Winnie Palmer Hospital; Pierce Mooney, BS, Parsound

Background and purpose: Sound is perpetual in the Neonatal Intensive Care Unit (NICU). Everything from lifesaving medical equipment, respiratory devices, incubator motors, personnel voices, refrigerators, cleaning equipment, and doors contribute to collective sound in the NICU (i.e., the NICU Soundscape). Noise is anything unpleasant to the listener. Additive NICU sounds can create a setting that is saturated with noise, loud, and prevents healing and development. The American Academy of Pediatrics (AAP) has published guidelines for acceptable loudness in the NICU, set in place and unchanged since the 1990's. The AAP continues to recommend that NICU's maintain an environment no louder than 45 A-weighted decibels (dBA) on average (leq) and never to have loudness greater than 70 dBA. Noise in the NICU is associated with increased physiological instability, behavioral distress, and long-term developmental problems for preterm infants. Infants constantly disturbed by noise cannot sleep and grow. Solutions exist like reduced motor loudness inside incubators, more individual spaces for infants to help remove them from sound, and staff education to reduce conversation volume. Unfortunately, the newest cutting edge incubators with quieter motors are very expensive and not practical for most NICUs to invest in entire new fleets of beds, adapting to single rooms requires an entire restructuring of a NICU unit or new hospital, and staff education has proved to only have significant effect for short periods. Plus, sound is pervasive and unavoidable in many instances, preterm infants are often in open beds, and access to certain sound like parental voice is vital to early brain development. Healthy Soundscape is a device to reduce noise and promote a healthier sound

environment for patients in the NICU, regardless of bed type or existing sound in the environment. The device integrates three different elements to achieve these ends: sound monitoring, active and passive noise reduction, and controlled positive sound input.

Budget and resources: The research and development of this product was supported through capital investment by the Executive Board at Orlando Health.

Materials and methodology: Healthy Soundscape utilizes wireless over-ear device for each side of the infant head. Unlike other earmuffs used in the NICU, Healthy Soundscape is specifically designed for long-term use and utilizes cutting edge materials, such as silicone-based material for earpads and an antimicrobial exterior, that allows for easy sterilization and extended use for this population. Also, Healthy Soundscape incorporates noise cancelling abilities, a decibel monitoring system, and infant-friendly speakers. The over-ear devices are secured by a standard warming hat or headgear designed for CPAP. The devices operate independently for each ear, as infants are repositioned in a consistent daily schedule. The device can be adjusted or removed when an infant is in sidelying position. Healthy Soundscape is designed for use in preterm infants 24 weeks through 34 weeks corrected gestational age (GA) because this population is at the highest risk without it. The device uses both passive and active noise control to reduce sound entering the infant ear to AAP guideline levels. Embedded microphones constantly monitor the amount of sound at the ear, ensuring loudness at the ear never exceeds unhealthy levels. These microphones augment noise control and generate sound analyses for the healthcare team. Healthy Soundscape has three main operating settings: 1) noise reduction setting for use during infant sleeping and other quiet times, 2) positive sound playback (e.g., recorded maternal singing) for use when infant is of appropriate age, awake, and would benefit from general neurodevelopmental support, and 3) voice filter setting for staff or parents to appropriately talk/sing to the infant. Healthy Soundscape utilizes noise reduction technology concurrently with each setting, providing a safeguard to minimize unwanted noise. This noise cancelling ability is catered specifically to the NICU based on preliminary evidence of loudness (dBA levels) and frequency bands produced in NICU environments and by common equipment in the NICU.

Impact: It has been historically difficult for NICUs to control their soundscape on a large-scale level. Newer NICUs and hospitals can sometimes mitigate noise through the application of individual rooms and staff education with short-term efficacy. Regardless of a NICU's ability to reduce sound to acceptable levels, preterm infants still require a healthy dose of positive sound for neurodevelopment or comfort purposes. Healthy Soundscape targets noise directly at the level of the infant's ears. Furthermore, Healthy Soundscape has the option to track sound metrics that the infant experiences so clinicians can study this data as it relates to infant comfort and development. Finally, Health Soundscape allows for the safe integration of positive sounds, safeguarded against excessive loudness and noise, so infants of the appropriate age and condition can receive vital sound needed for brain development and comfort. Through computer modeling and non-human trials, Healthy Soundscape has shown to be safe and effective in its functions. Next steps include a human clinical trial starting summer of 2021. This study will regard tolerability of the device, ease of use for bedside staff using the device primarily, and clinical outcomes related to comfort, sleep, and growth.

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Almadhoob A, Ohlsson A. Sound reduction management in the neonatal intensive care unit for preterm or very low birth weight infants. Cochrane Database of Systematic Reviews. 2020(1).

Learning Objectives:

1. Audience will learn about the specific parameters of noise and sound that exist in the NICU, including decibel and frequency metrics.
2. Audience will learn about the advances and limitations of current solutions for reducing noise in the NICU.

Audience will gain a detailed understanding of Healthy Soundscape, in terms of technology, functions, clinical use, and future study.

Gravens2021-4

Abstract Title: Therapist Education and Massage for Parent-Infant Outcomes (TEMPO): A feasibility study of a therapist-led program for parents of extremely preterm infants

Authors' names, degree(s), and institution:

Dana McCarty, PT, DPT

University of North Carolina at Chapel Hill and UNC Children's Hospital

Background and Purpose: Physical therapists (PTs) and Occupational Therapists (OTs) play an important role in supporting extremely preterm (EP) infants and their parents through developmentally-supportive care during and after long-term hospital stays. While there is strong evidence that motor interventions improve (e.g., cerebral palsy), or even cure (e.g., torticollis), a number of pediatric conditions, little is known about the influence of parent-delivered motor interventions (PDMIs) in the Neonatal Intensive Care Unit (NICU) on outcomes of EP infants and their parents.

Budget and Resources: The TEMPO study is currently being funded by the National Center for Complimentary and Integrative Health (NCCIH) of the NIH (3KL2TR002490-02S1). It is a 3-year project (2019-2022) with a $256,731 budget.

Program, Materials, or Methodology: The Therapist Education and Massage for Parent-Infant Outcomes program (TEMPO) is a structured, therapist-led program developed to train and support parents to deliver PDMIs and massage beginning in the first 4 weeks of life and continuing throughout the first year of life. TEMPO uses weekly educational sessions during hospitalization and digital platforms after hospital discharge to provide education and support until the infant is 12 months old (corrected age). One aspect of this study that is innovative is the inclusion of a secondary parent (usually the biological father). An additional innovation is that the TEMPO program enhances standard care by structuring the nature and frequency of therapist-parent interactions to increase the parent's comfort with massage and mobility activities with their infant. Parents have the option of in-person or virtual education sessions to optimize convenience and regularity of visits.

This was a prospective single group, non-randomized study of 30 infant-parent dyads. The primary objective of this program was to conduct a pilot study to demonstrate TEMPO's feasibility and acceptability (Aim 1). Secondary objectives included refinement of TEMPO to facilitate PDMIs and massage during neonatal intensive care hospitalization and after discharge based on the quantitative and qualitative data from Aim 1, and to use the sample data to estimate population parameters needed for planning a future study.

Regarding outcome measures, the following infant sociodemographic factors are being collected: date of birth, gestational age at birth, birth weight, and race/ethnicity. The following parent factors are being collected via survey: age, race/ethnicity, highest education completed, insurance type. Parent outcome measures include the Acceptability of Intervention Measure (AIM), Feasibility of Intervention Measure (FIM), Patient-Reported Outcomes Measurement Information System Adult Profile Short Form Anxiety (PROMIS-Anxiety), Centers for Epidemiologic Studies Depression Scale (CESD), Parenting Sense of Competence Scale (PSOC), Postnatal Attachment Questionnaire (PAQ) or the Paternal Postnatal Attachment Questionnaire (PPAQ) depending on maternal or paternal status, salivary cortisol pre and post-massage session, and a parent interview. Optional secondary parent measures include the Fetzer Original Attachment Questionnaire-Question 1 only (FOA-1) and the PAQ or PPAQ, depending on maternal or paternal status. The following infant outcome measures are being collected: salivary cortisol pre- and post-massage, Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R Very Short), Test of Infant Motor Performance (TIMP) at hospital discharge, and the Bayley Scales of Infant Motor Development-IV (BSID-IV) at 12 month follow-up.

Our central hypothesis is that parent participation in the TEMPO program will reduce symptoms of anxiety and depression, while increasing parent sense of competence and parent-infant bonding. We anticipate that thee parental outcomes will mediate infant motor outcomes both in the hospital and at follow-up.

Impact or Results: Through this ongoing NCCIH-funded KL2 pilot study, TEMPO has already demonstrated high levels of feasibility and parent acceptability (Aim 1), as well as potential effectiveness. At the time of this proposal, 100% of parents (24/24) approached consented to participate, and all parents of surviving infants remained enrolled for the duration of hospital stay. At discharge, 100% of parents "agreed" or "completely agreed" that TEMPO was feasible and acceptable on the Feasibility and Acceptability Intervention Measures. At 2-month outpatient follow-up, 80% of parents reported doing daily PDMIs, and 100% reported doing massage at least 2-3 times weekly. Furthermore, in mothers for which both pre and post-massage salivary cortisol levels were recorded, 90% had reduced salivary cortisol levels post-massage, indicating a potential neurobiological mechanism for how this intervention alleviates maternal stress. Given high levels of compliance and promising preliminary results, we plan to further define appropriate dosage, frequency, and refinement of the TEMPO intervention in a future pragmatic trial (Aim 2).

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Learner Objectives:

At the end of this presentation, the learner will be able to:

1. Describe a comprehensive parent education program that includes motor and massage activities for extremely preterm infants in the NICU.
2. Describe the benefits of infant massage for parents and extremely preterm infants.
3. Consider implementing portions of TEMPO through creative evaluation of their own NICU's resources, structure, and discipline-specific expertise.

Gravens2021-5

Abstract Title: Emotional closeness among NICU fathers: A descriptive qualitative study

Authors' names, degree(s), and institution:

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Anna Axelin, N, Ph.D., Associate professor, Department of Nursing Science,University of Turku, Finland

Background and Purpose: There are few descriptions of fathers' views of emotional closeness toward their preterm infants in the literature, and the uniqueperception of fathers with an infant in the neonatal unit is not well understood. Understanding closeness from their perspective is essential because they experience the hospitalization of their infant in a different way than the mother, and it may be challenging for them to develop father-infant emotional closeness.This study explored experiences and instances of emotional closeness from theperspective of fathers as well as factors influencing their feelings of emotional closeness during their infant's hospitalization in the neonatal unit.

Methodology: This qualitative descriptive study design employed one-on-one interviews with fathers recruited in a level 3 neonatal unit. The convenience sample was composed of fathers of an infant born at less than 35 weeks gestation and admitted to the neonatal unit. A socio-demographic questionnaire was completed by the fathers to collect information on their characteristics as well as the characteristics of their infant. Fathers also completed a self-report diary every day for two weeks to indicate when they felt emotional closeness andwhat they were doing at the time (i.e., present in the unit, doing skin-to-skin care,holding, involved in infant's care, including feeding, pumping, bathing, diaper change, singing, talking, reading and other). An interview guide was used to conduct semi-structured interviews with the fathers. The questions probed the fathers' perceptions about emotional closeness, when it occurs and the factors favouring or hindering it. Interviews lasting approximately 30 minutes took placeat a location chosen by the father or via Zoom (digital platform), at the time chosen by the participant, after they had completed the self-report diary. The diary completed by each participant was used during the interview to enable the participant to explain the elements indicated and improve the researcher's understanding of participants' perceptions about emotional closeness and when they felt it. The interviews were recorded to permit verbatim transcription by a research team member. The socio-demographic questionnaire and self-report diary were analyzed with descriptive statistics. The interview data were analyzed based on the thematic analysis method. Subsequently, emerging themes and sub-themes were considered according to dimensional analysis, which aims to explain all the elements that constitute and characterize a complex phenomenon.

Results: Eight fathers took part in this study. The participants were 32 years old,on average, and the gestational age at birth of their infant was 29 weeks, on average. All the fathers were salaried employees and married or living with their partner. For seven of them, the infant was their first child, while one father had another child at home. All fathers (100%) reported feeling emotional closeness inthe self-report diary. They reported emotional closeness each and every time they were present in the neonatal unit (100%), when the mother was present (100%), when the mother was involved in care (100%), and most of the time theywere holding the infant or doing skin-to-skin care (87.5%). Identified dimensions of emotional closeness for fathers included the process of emotional closeness, the context in which emotional closeness was felt by fathers, the properties that defined it, the conditions that influenced it and the consequences related to emotional closeness. According to the participants, emotional closeness is a complex feeling that develops over time and is influenced by a multitude of factors. It occurs when fathers were present in the neonatal unit and when they were not. It is part of the father-infant relationship development.

In conclusion, findings of this study contribute to our understanding of the dimensions of emotional closeness for fathers. By knowing more about their perspective concerning emotional closeness, nurses can direct their interventionsto enhance father-infant emotional closeness and they may better understand their experience.

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Flacking, R, Thomson, G, Axelin, A. Pathways to emotional closeness in neonatal units - a cross-national qualitative study. BMC Pregnancy Childbirth. 2016; 16(1). https://doi.org/10.1186/s12884-016-0955-3

Thomson, G, Flacking, R, George, K, et al. Parents' experienc-

es of emotionalcloseness to their infants in the neonatal unit: A meta-ethnography. EarlyHuman Development. 2020; 149 (2020): 105155.

Learner Objectives:

Acknowledge the experience of NICU fathers regarding emotional closenesstoward their infant at the NICU.

Recognize and understand the multiples dimensions of emotional closeness for NICU fathers.

Gravens2021-17

Title: Exploring how to engage and better support parents in the NICU

Authors: Jessica T. Fry, MD[1]; Suzanne Jackson, BSM[2]; Kerri Z. Machut, MD[1]

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2. Project Management Institute, Chicago, IL, and parent research partner

Background and Purpose: Parents who experience having children hospitalized in a NICU report this as a uniquely stressful experience(1), and go on to demonstrate higher rates than other new parents of post-partum depression and post-traumatic stress disorder(2). Three variables have been identified as important in determining which parents will be most negatively affected: pre-existing mental health conditions, the severity of the baby's medical condition and the level of emotional support for parents during the NICU experience(3). We performed a needs assessment of parental support in our NICU with the hypothesis that NICU parents would describe a need for expanded family support, including peer-to-peer support.

Methodology: We performed a prospective, descriptive study to gather perspectives of parents whose children were discharged from our regional NICU regarding their experiences of support and ideas for improvements. Parents were considered eligible for inclusion if their child was approaching discharge after a NICU stay of ≥ 5 days. We excluded parents who were less than 18 years of age and non-English or non-Spanish speakers. Parents were identified by census review/discussion with the unit research coordinator and were approached by study team physicians. At the time of enrollment, parents completed a brief demographic questionnaire. Parents were then given a choice for data collection – either semi-structured phone interview or online survey completed approximately two weeks after discharge. Both study versions included the same questions, which were developed collaboratively by all study team members. Interviews were conducted and recorded by a study physician over the phone, with subsequent third party transcription. RedCap survey link was emailed to parents. We performed a chart review after subjects completed either the interview or survey to collect infant clinical data (diagnosis, birthweight, gestational age, age at admission, length of stay, time interval since discharge, durable medical equipment at discharge). We continued enrollment, data collection, and data analysis until thematic saturation. Our targeted sample size was 20 participants. Interview transcripts and survey answers were coded by study team physicians using NVivo software with conventional content analysis to assess for parental themes. Disputes were resolved through collaborative discussion.

Results: From June to August 2020, 56 parents of 42 infants were approached, and 54 agreed to initial enrollment. Three parents who completed enrollment were not approached for further data collection due to changes in infant clinical status. A total of 22 parents went on to provide provided answers to our semi-structured questions. Characteristics of study parents and their infants are listed in Table 1. When asked to describe types of support that they encountered or desired during a NICU stay, parents reported numerous specific items. Six broad categories of support emerged from parental descriptions: encouragement and assistance from friends or family outside of the NICU setting; material assistance (such as parking, food, and temporary housing) provided through association with the NICU; quality of communication and education provided by NICU staff; relationships made with NICU staff members; programs organized by the NICU to provide parents with emotional support; and connections made with other NICU parents either in person or online. Given that data was collected during the COVID-19 pandemic, parents described the pandemic as adding to feelings of social isolation while in the NICU. Parents described multiple areas where currently available support could be improved, including communication, orientation to all available resources, preparation for hospital discharge, availability of primary nurses, availability of mental health resources, development of a NICU parent "community, " and enhanced support for when they were not able to be present at bedside. The majority of parents (82%) endorsed the idea of providing uniquely family-centered support by engaging "veteran" NICU parents in multiple different roles, including direct peer-to-peer support to provide hope through connection. Throughout our study, parents identified unique and important ways NICUs can support families and build resiliency. With the significant changes brought about by COVID-19 pandemic, these supports are more critical than ever for NICU families.

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2. *Hynan M, Steinberg Z, Baker L, Cicco R, Geller P, Lassen S, et al. Recommendations for mental health professionals in the NICU. Journal of Perinatology. 2015;35(1):S14-S8.*
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Learner Objectives:

1. Define the various types of support parents describe as important during a NICU stay.
2. Identify various ways the COVID-19 pandemic may impact NICU parents experience of support.
3. Discuss the potential development of a "veteran" or "resource" NICU parent program

Table 1: Infant and parent characteristics	
Characteristics	n (%) or median (25th%, 75th%)
Infants	22
Sex, female	8 (36)
Estimated gestational age, completed weeks	36 (34, 37)
Birth weight, kg	2.6 (1.6, 3.0)
Multiple	1 (4.5)
Age at admission, days	2.5 (1, 6.8)
Length of stay at center, days	22 (13, 66)
Birth at co-located delivery hospital	7 (32)
Mechanical ventilation, any	14 (64)
Mechanical ventilation, ≥ 7 days	4 (18)
Surgery, any	11 (50)
Discharge with durable medical equipment	13 (59)
Parents	30 (both parents responded for 8)
Sex, female	22 (73)
Age, ≤ 25 years	7 (23)
Age, 26 - 35	16 (53)
Age, 36 - 45	4 (13)
Age, ≥ 45	3 (10)
Primary language, English	29 (97)
Race, white	17 (57)
Ethnicity, Hispanic	7 (23)
Married or long term partnership	23 (77)
College degree	17 (57)
Employed full-time	15 (50)
Maternity leave, weeks	11 (0, 12)
Have other children	14 (47)

Gravens2021-19

Title: Providing Consistent Developmentally Appropriate Sensory Experiences in a Community Level III NICU

Authors: Malathi Balasundaram, MD[1,2], Stephanie Miller, MD[1,2], Arlene R. Fleming, BSN, RNC-NIC[2], Dharshi Sivakumar, MD[1,2], Melinda Porter, MS, RN, CNS, NNP-BC, C-NNIC[2]. Pediatrics, Neonatology, Stanford University School of Medicine, Stanford, CA[1] and El Camino Hospital NICU, Mountain View, CA [2].

Background and Purpose: When an infant is premature, their protective intrauterine environment is replaced by the Neonatal Intensive Care unit (NICU) where they experience procedural touch/handling, movement, strong smells, sounds, lights, frequent nociceptive pain, and disruption of sleep during their critical sensory development stage[1]. The mismatch of underdevelopment and intense NICU environment may cause physiologic instability, adversely affect growth and development, and ultimately impact long term neurodevelopmental outcomes.[1] Providing appropriate positive sensory experiences can potentially optimize brain development and reverse the high rates of morbidity among high risk infants.[2,3] Studies defining the sensory interventions are related to tactile, auditory, vestibular, visual, olfactory, taste, and kinesthetic sensation.[1] We implemented quality improvement (QI) work to focus on three sensory interventions (tactile, auditory, taste).

Budget and Resources: $16,360 grant from Hope to Health, El Camino Health Foundation.

Program, Materials, or Methodology: We are a 20-bed Community Level 3 NICU with approximately 3900 deliveries and 400 NICU admissions per year. Our Family Centered Care (FCC) team performed a literature search and addressed sensory interventions in three areas:

1. Tactile: Early Skin to Skin Care (SSC) and "Out of the Box" (OOTB) time (swaddle hold plus SSC). Our goal was for earlier first SSC time and increased total OOTB time by 20%. We collected baseline data from the electronic health record (EHR) of all forms of tactile stimulation focusing on SSC and swaddle holding. An educational board was posted in the NICU that outlined evidence based best practices along with step-by-step instructions and photos on how to safely transfer critically ill infants to allow for first holding within 48 hours. All MDs, RNs, and RTs were asked to review the content. Informational handouts regarding the benefits of SSC and a personalized keepsake "First Hold Certificate" for parents were created. Nurses and RTs were trained on how to safely transfer intubated infants to parents for SSC. Once education was completed, staff were encouraged to document the time spent (minutes in a range) performing SSC and swaddle holding each time these events occurred. Figures 1 and 2 show the improvement in time to first hold for infants ≤ 30 weeks and 30-35 weeks, and Figure 3 shows average minutes per day each baby had OOTB time.
2. Taste: Our goal was for earlier first oral colostrum care. During prenatal consultation the neonatologists emphasized the importance of establishing maternal milk supply and provided the parents with a video on how to perform Hand Expression (HE). We focused on improving maternal milk supply with the goal that mothers would express colostrum shortly after delivery. We formed a team of HE champions in L&D on each shift. The champions worked with a lactation consultant who developed hands-on skills training and a hand expression competency checklist. All L&D nurses then completed the competency items with the champions. The training included real time assistance with actual hand expression. NICU and Mother Baby Unit (MBU) nurses were also recruited and trained in the same manner to disseminate a consistent message and continuous reinforcement of HE during the postpartum period. Figure 4 shows the decrease in time for infant to receive first colostrum.
3. Auditory: Our goal was to read to babies to provide positive vocal exposure for 10 mins/shift (total of 30 mins/day) for all admissions. Reading was done by either parents or staff. We recruited interested staff to become part of our Reach Out and Read (ROAR) program. We designed a book bag, decided which books to include in the bag, and obtained a grant to fund the program for one year. We also created a parent brochure, staff information letter, crib card reminder, and decorated the existing library for a launch party in February 2020. We gave ROAR book bags to all NICU admissions starting July 2020. Figure 5 shows the average minutes "read to baby" time which is close to the goal of 30 mins/day.

Barriers to the project were the time involved in creating committees, training the staff, creating EHR flow sheets, the dissemination of information about the new flow sheets and how to document accurately, and time spent collecting and interpreting data from the EHR. We overcame the barriers by lengthening the time to complete the project.

Impact or Results: Our baseline mean for initial SSC for 30-35 week infants was 27 hours of life (HOL) which decreased to 12 HOL (see Figure 2) and for ≤ 30 weeks decreased from 174 HOL to 65 HOL (Figure 1). We achieved our goal to improve OOTB time from 89 to 153 minutes per day (Figure 3). We improved the time to receive first oral colostrum from 22 HOL to 8 HOL (Figure 4). We improved "read to baby" to 17 minutes per day for all

Figure 1

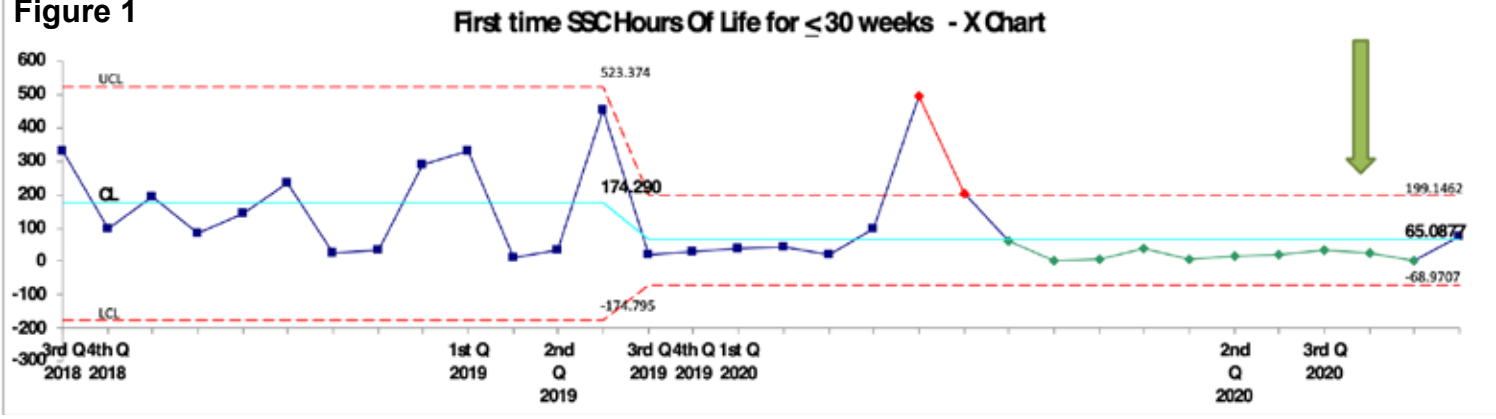


Figure 2

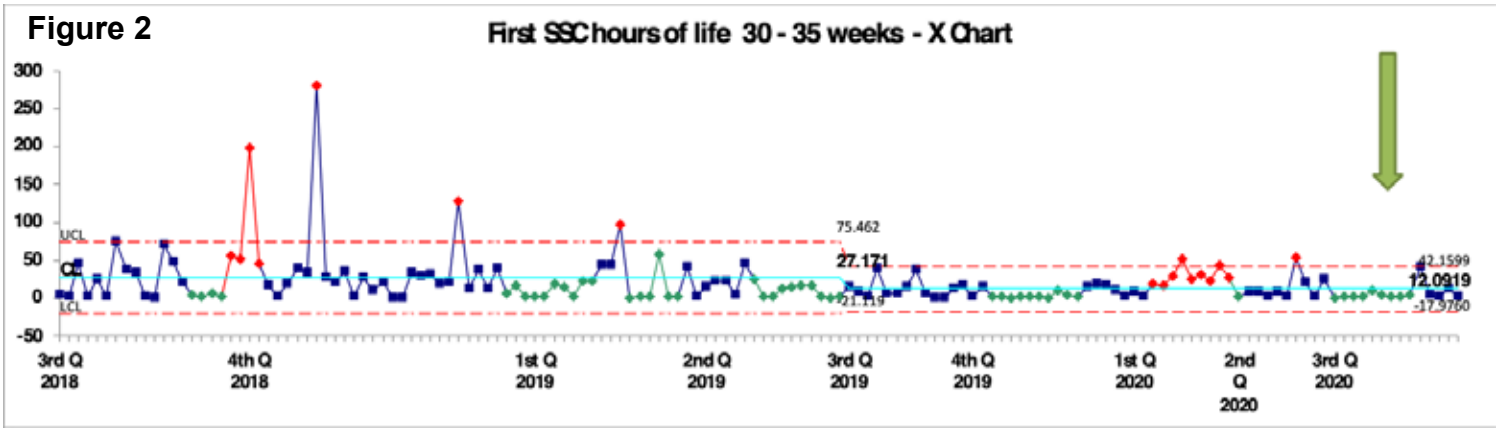


Figure 3

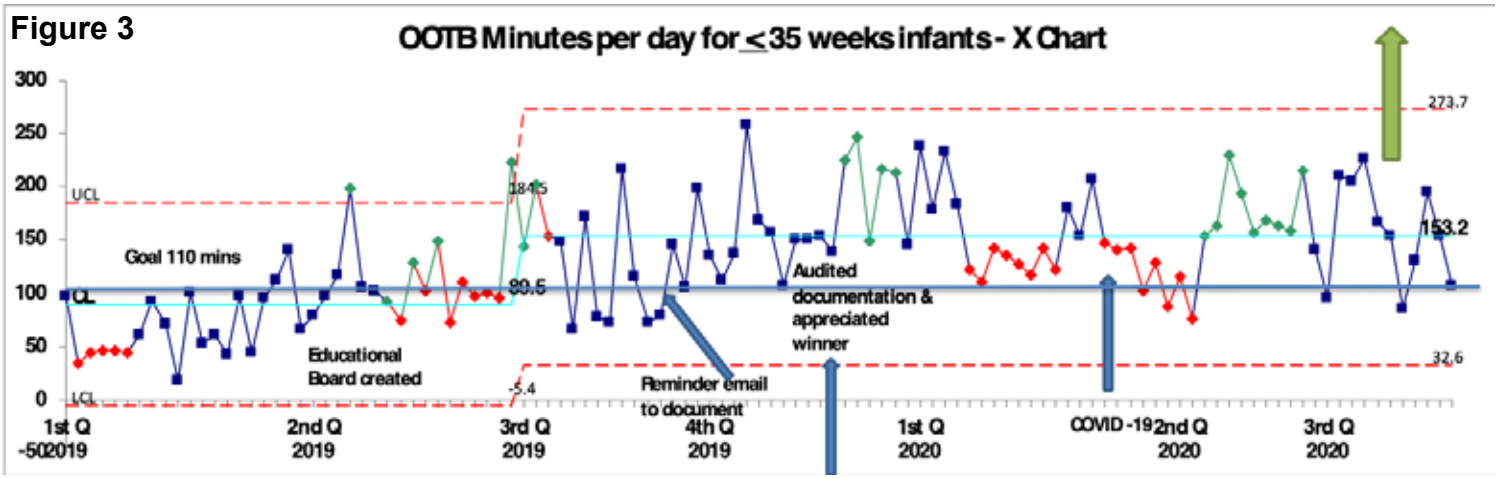


Figure 4

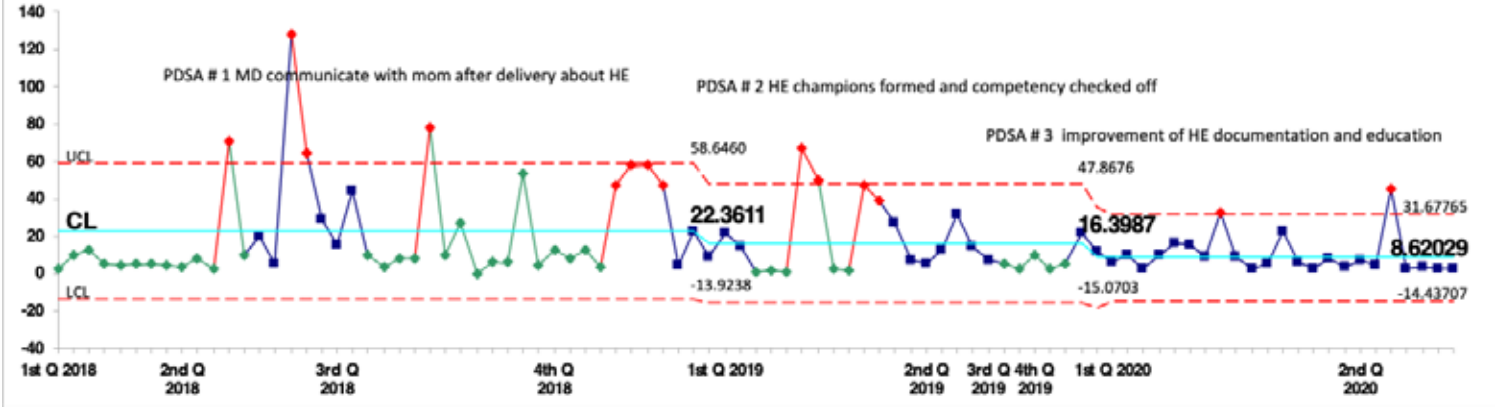
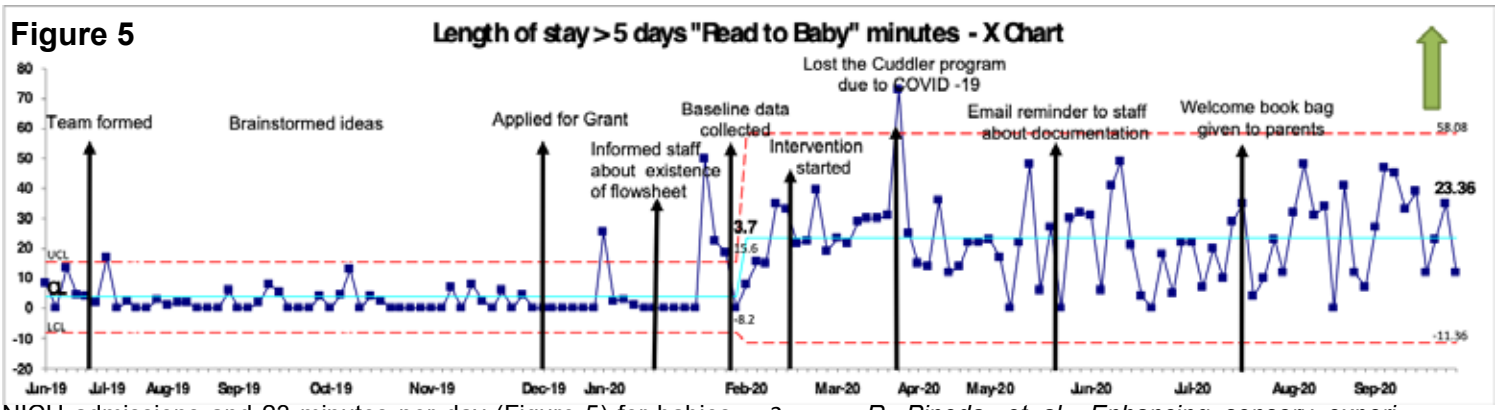


Figure 5



NICU admissions and 23 minutes per day (Figure 5) for babies who stayed in the NICU > 5 days. Our results are limited by the small number of very low birth weight babies in our cohort, and might be hard to generalize to larger academic NICUs. We'd like to continue our sensory work by focusing next on reducing pain using positive touch while administering painful procedures and reducing the noise level in our unit.

Acknowledgement: Jody Charles, RN, MSN, NE-BC (Nursing Manager); Family Advisory Board

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Learner Objectives:

1. To recognize the importance of developing standardized consistent sensory integrated developmental care in every NICU.
2. To learn about new ways of tracking family centered developmental care time provided in every NICU.
3. To educate parents about the benefits of providing sensory integrated developmental care.
4. and discipline-specific expertise.

Gravens2021-20

Abstract Title: Therapist Education and Massage for Parent-Infant Outcomes (TEMPO): A feasibility study of a therapist-led program for parents of extremely preterm infants

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Background and Purpose: Physical therapists (PTs) and Occupational Therapists (OTs) play an important role in supporting extremely preterm (EP) infants and their parents through developmentally-supportive care during and after long-term hospital stays. While there is strong evidence that motor interventions improve (e.g., cerebral palsy), or even cure (e.g., torticollis), a number of pediatric conditions, little is known about the influence of parent-delivered motor interventions (PDMIs) in the Neonatal Intensive Care Unit (NICU) on outcomes of EP infants and their parents.

Budget and Resources: The TEMPO study is currently being funded by the National Center for Complimentary and Integrative Health (NCCIH) of the NIH (3KL2TR002490-02S1). It is a 3-year project (2019-2022) with a $256,731 budget.

Program, Materials, or Methodology: The Therapist Education and Massage for Parent-Infant Outcomes program (TEMPO) is a structured, therapist-led program developed to train and support parents to deliver PDMIs and massage beginning in the first 4 weeks of life and continuing throughout the first year of life. TEMPO uses weekly educational sessions during hospitalization and digital platforms after hospital discharge to provide education and support until the infant is 12 months old (corrected age). One aspect of this study that is innovative is the inclusion of a secondary parent (usually the biological father). An additional innovation is that the TEMPO program enhances standard care by structuring the nature and frequency of therapist-parent interactions to increase the parent's comfort with massage and mobility activities with their infant. Parents have the option of in-person or virtual education sessions to optimize convenience and regularity of visits.

This was a prospective single group, non-randomized study of 30 infant-parent dyads. The primary objective of this program was to conduct a pilot study to demonstrate TEMPO's feasibility and acceptability (Aim 1). Secondary objectives included refinement of TEMPO to facilitate PDMIs and massage during neonatal intensive care hospitalization and after discharge based on the quantitative and qualitative data from Aim 1, and to use the sample data to estimate population parameters needed for planning a future study.

Regarding outcome measures, the following infant sociodemographic factors are being collected: date of birth, gestational age at birth, birth weight, and race/ethnicity. The following parent factors are being collected via survey: age, race/ethnicity, highest education completed, insurance type. Parent outcome measures include the Acceptability of Intervention Measure (AIM), Feasibility of Intervention Measure (FIM), Patient-Reported Outcomes Measurement Information System Adult Profile Short Form Anxiety (PROMIS-Anxiety), Centers for Epidemiologic Studies Depression Scale (CESD), Parenting Sense of Competence Scale (PSOC), Postnatal Attachment Questionnaire (PAQ) or the Paternal Postnatal Attachment Questionnaire (PPAQ) depending on maternal or paternal status, salivary cortisol pre and post-massage session, and a parent interview. Optional secondary parent measures include the Fetzer Original Attachment Questionnaire-Question 1 only (FOA-1) and the PAQ or PPAQ, depending on maternal or paternal status. The following infant outcome measures are being collected: salivary cortisol pre- and post-massage, Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R Very Short), Test of Infant Motor Performance (TIMP) at hospital discharge, and the Bayley Scales of Infant Motor Development-IV (BSID-IV) at 12 month follow-up.

Our central hypothesis is that parent participation in the TEMPO program will reduce symptoms of anxiety and depression, while increasing parent sense of competence and parent-infant bonding. We anticipate that thee parental outcomes will mediate infant motor outcomes both in the hospital and at follow-up.

Impact or Results: Through this ongoing NCCIH-funded KL2 pilot study, TEMPO has already demonstrated high levels of feasibility and parent acceptability (Aim 1), as well as potential effectiveness. At the time of this proposal, 100% of parents (24/24) approached consented to participate, and all parents of surviving infants remained enrolled for the duration of hospital stay. At discharge, 100% of parents "agreed" or "completely agreed" that TEMPO was feasible and acceptable on the Feasibility and Acceptability Intervention Measures. At 2-month outpatient follow-up, 80% of parents reported doing daily PDMIs, and 100% reported doing massage at least 2-3 times weekly. Furthermore, in mothers for which both pre and post-massage salivary cortisol levels were recorded, 90% had reduced salivary cortisol levels post-massage, indicating a potential neurobiological mechanism for how this intervention alleviates maternal stress. Given high levels of compliance and promising preliminary results, we plan to further define appropriate dosage, frequency, and refinement of the TEMPO intervention in a future pragmatic trial (Aim 2).

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Learner Objectives:

At the end of this presentation, the learner will be able to:

1. Describe a comprehensive parent education program that includes motor and massage activities for extremely preterm infants in the NICU.
2. Describe the benefits of infant massage for parents and extremely preterm infants.
3. Consider implementing portions of TEMPO through creative evaluation of their own NICU's resources, structure, and discipline-specific expertise.

Gravens2021-28

Abstract Title: More Psychologists Needed in the NICUs Across the Country: A national survey's results

Authors' names, degree(s), and institution:

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Background and Purpose:

Consultation and therapy provided by doctoral level, uniquely trained psychologists in Neonatal Intensive Care Units (NICU) is a growing field. Psychologists provide great value in a NICU setting because of the knowledge and training they have on Perinatal Mood and Anxiety Disorders, Infant and Early Childhood Development, and Infant Mental Health, or the power of the relationship between an infant and their caregiver. NICU psychologists can meet the needs of both the infant and the parent(s) as they experience a life altering traumatic event.

While psychologists in the NICU may seem like an obvious choice, there are few NICUs across the country that have a dedicated psychologist to meet the ongoing needs of families in the NICU. As members of the National Network of NICU Psychologists (NNNP), one of our missions is to expand the service of NICU psychology in NICUs across the nation. We recognize this will help families to reach their highest potential despite the unfortunate incidence of a NICU hospitalization and the medical needs or complications that may follow.

Budget and Resources:

We did not have a budget for this project. We donated our time, in kind. We administered an electronic survey using google forms.

Program, Materials, or Methodology:

In order to make a case for units without a dedicated psychologist, we wanted to look at the psychology services provided by US News and World Reports' top hospitals. We pulled a list from 2015-2019 of hospitals that ranked in the top 50 institutions for the specialty of Neonatology. We obtained a list of 67 national hospitals. From this list, we filled in contacts that included psychologists, social workers, nursing directors, parent coordinators, or administrative staff. The survey was sent to these contacts who were given a month to respond to the 19 question survey. They were sent two reminders over the course of survey timeline, in addition to the initial email invitation. There were no incentives provided for the completion of the survey.

There were two main limitations to the project. The first was that there were 14 institutions that were ranked in the US News and World Reports top 50 hospitals however, we were unable to locate an appropriate contact to send the survey. Additionally, of the 53 institutions that received the survey only 16 completed the survey. It is worth noting that all of the institutions that responded to the survey had psychology services available in their NICU at varying capacities.

Impact or Results:

With the data collected, we hope to encourage and support new NICU psychologist positions across the country. US News and World Reports now acknowledges having a dedicated NICU psychologist as a quantifiable asset contributing to the overall score of a Neonatology Division. The results from this survey will be used to construct an advocacy tool that others can use to demonstrate the need, the importance, and the foundational structure for a NICU psychologist position. These results will also be written up in a manuscript to highlight the psychology services currently provided by several US News and World Reports top ranking hospitals in Neonatology.

The survey was sent to 53 respondents and we received 16 responses from 15 different institutions. It is worth noting that all respondents had psychologist services available in the NICU in some capacity. About 69% respondents have a dedicated psychologist for the NICU and of these there was considerable variability in percentage of FTE dedicated to neonatology, (n=5) had 100% of time; (n=2) 80-90% time; (n=2) 30% time; (n=7) 10-20% time allocated. Strikingly, 36% (n=4) indicated psychology services were restricted to outpatient follow-up clinic. Ninety four percent (n=15) of respondents work in an environment with a Fetal Care Center (FCC) affiliated with a children's hospital, and 40% (n=6) have a psychologist dedicated to a FCC. The majority of providers (69%) are billing for services with health and behavior codes being the prominent method (n=9) and also psychotherapy codes (n=2). All respondents indicated having social work support dedicated to the NICU. Psychology training experiences in the NICU are offered at half of the institutions (n=8), with 75% of these opportunities being at the doctoral or post-doctoral level.

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Learner Objectives:

1. Identify range of psychology services available across sample of fetal care and level 3-4 NICUs
2. Discuss opportunities for further growth within the field of NICU psychology to ensure adequate support for infants and families, during and after their NICU experience.

Gravens2021-32

The Use of Telemedicine for Assessment of Neurodevelopmental Delays During the 2020 COVID-19 Pandemic

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Presentation Preference: Oral Abstract Session and/or Poster

Presentation

Background and Purpose:

Coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization on March 11, 2020. As stay at home orders were instituted in-person scheduled visits at the University Hospital neurodevelopmental follow-up (PREMIEre) program declined.

The PREMIEre program has provided follow through care for high risk infants discharged from the level IV Neonatal Intensive Care Unit (NICU) at University Hospital in San Antonio, TX since 1979. The population is majority Hispanic from San Antonio and surrounding Texas and Mexico regions. Criteria for follow through care are infants born ≤ 32 weeks gestational age (GA) and/or ≤ 1500g birthweight, as well as infants at high risk for neurodevelopmental delays (ex. meningitis, hypoxic ischemic encephalopathy, stroke). The children are monitored for developmental progress until 3-5 years of age. The staff consists of 2 neonatologists, 1 Pediatric nurse practitioner, 1 psychologist, and 3 case managers. Four staff are certified in performing the Prechtl General Movements Assessment (GMA), 6 in the Hammersmith Infant Neurological Evaluation (HINE), 3 in the Bayley Scales of Infant Development (BSID) and 1 in the Differential Ability Scales (DAS).

The GMA, based on visual Gestalt perception from video recordings of infant's body movements from birth to 20 weeks corrected gestational age (cGA), has a 95-98% sensitivity of risk for cerebral palsy (CP) during the fidgety timeframe. The HINE is used for early CP identification in infants 2-24 months; a score < 56 at 3 months has a 90% sensitivity and predictability of CP. Beginning Spring 2019 we integrated the GMA and HINE into our clinic's neurodevelopmental testing algorithm. In January 2020 we transitioned from the BSID-III to the digital format of the BSID-IV and BSID-IV Social-Emotional and Adaptive Behavior (BSID-IV SOEM ADBE). The Vineland-3 Adaptive Scales (Vineland-3) is a caregiver-completed questionnaire that provides additional information on social and adaptive behavioral domains of the child.

The COVID-19 pandemic brought progress to a halt. Supporting neurodevelopment of our most fragile patients is important, more so during a pandemic. Many of our families have difficulties providing neurodevelopmental activities their children need with school closures and virtual therapies. In Summer 2020 we developed a process of telemedicine-based visits. We hypothesized that telehealth visits, although limited in physical interaction with children, could help identify neurodevelopmental delays to allow for continued referral for services, and maintain family support.

Program/Methodology:

Our team worked together to problem solve and develop a plan such that neurodevelopmental monitoring continued. We considered tests that could be conducted virtually and remain valid and reliable. We took into account parent capabilities, language barriers, and staff availability. We elected to use the virtual HINE (vHINE), GMA, Ages and Stages Questionnaire (ASQ-3), BSID-IV SOEM ADBE and Vineland-3. The ASQ-3 was administered via phone and the BSID-IV SOEM ADBE and Vineland-3 could be administered electronically. Our previously in-person weekly clinic meetings were converted to video.

For our patients, a GMA was obtained prior to NICU discharge and again via WebEx video meeting at 3-4 months cGA along with a vHINE. If normal, we would schedule the next visit for 1-year cGA; if abnormal, we had a follow-up vHINE in 3-4 months. For the vHINE instructions were reviewed with the family prior to scheduled visit. During the visit a caregiver is given step by step verbal instruction with use of a doll prop on how to perform the exam and the health care provider observes and scores. An ASQ-3 is also performed to complete the assessment.

For patients ≥12 months, we initially trialed the Vineland-3 and subsequently, transitioned to the BSID-IV SOEM ADBE and ASQ-3 for children ≥12 months, but < 3 years old and the Vineland-3 for children 3-5 years old.

Results:

We have had 123 visits completed. We have performed 22 GMAs (2 poor repertoire and 20 positive fidgety) and 37 vHINEs (mean score 63.3 ±5.5, 2.3 ± 1.8 asymmetries). Parents completed 67 ASQ-3s, 47 Vineland-3s, and 23 BSID-IV SOEM ADBEs. In the Vineland-3 13 communication, 14 daily living skills, 11 socialization, 16 adaptive behavior, and 15 motor skills scores were moderate-low to low. In the BSID-IV SOEM ADBE 13 communication, 9 daily living skills, 11 socialization, 9 adaptive, and 8 social-emotional scores were low-average to extremely low. Twenty-nine patients referred for additional services, mainly speech therapy. Three patients were identified as potentially being at high risk for development of cerebral palsy (CP). We recognize the vHINE has not yet been validated as a tool for identifying early CP. Furthermore, there is the possibility of inaccurate reporting by caregivers on the questionnaires.

Conclusions:

Challenges met during this process include lack of family access to internet and technology, family's limited time to complete questionnaires and telehealth visits, technological difficulties for caregivers and staff, and family resistance to virtual therapy visits. Our clinic staff also dealt with transition to a new electronic medical system. Additionally, clinic faculty had to ensure the telehealth format would translate well for learners (students, residents, and fellows).

There is no replacement for in-person visits and the ability of a provider to perform a physical exam and neurodevelopmental testing. But we have found benefits to this unique telehealth-based model. Compliance has improved. We are able to reach families who live in rural Texas communities and Mexico. In the future, telemedicine could be considered as a tool for follow through of families who have difficulty completing in-person visits and would otherwise be lost to follow-up. We have shown feasibility in the setting of a pandemic and that telemedicine can be useful in assessment and management of neurodevelopment of a high-risk pediatric population.

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Gravens2021-43

Abstract Title: Parents' Infant Feeding Decision-Making Experiences in the Neonatal Intensive Care Unit (NICU): A Proposed Feminist Poststructural Exploration.

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Background & Purpose: Ensuring optimal nutrition for premature and/or critically ill infants is a key concern for NICU healthcare providers given the impacts of early nutrition on short and long-term health outcomes[1,2]. Feeding trajectories for NICU infants are diverse and influenced by a myriad of factors, many of which lie outside of the family's control. In a breast(chest)feeding-dominant culture, NICU parents are tasked with making complex infant feeding decisions, such as whether to breast(chest) feed, express their own milk, provide donor milk, formula feed and many combinations of these methods. Coupled with other stressors of NICU parenthood, the additional expectations related to infant feeding decisions may impact long-term parental mental health. Notably, the distinct pressures to breast(chest) feed can lead to destructive feelings of anxiety, guilt, and shame,[3,4]. Adding to these complexities, the ongoing COVID-19 pandemic has generated conflicting information about lactation safety and family presence in the NICU, particularly if a parent tests positive for COVID-19[5]. Consequently, NICU parents and care providers are now navigating infant feeding-related decisions during increasingly complicated times. As such, the proposed critical qualitative study will use a Feminist Poststructural (FPS) approach to address the overarching research question: *What are the experiences of parents related to their infant feeding decisions in the NICU setting?* The objectives are to explore and deconstruct:

- How the socio-cultural, political, institutional and gendered understandings of infant feeding influence NICU parents' feeding-related decisions.
- The influence and impact of 'outsiders' (e.g., the NICU healthcare team, other family members and/or friends) on NICU parents' infant feeding decisions.
- How NICU parents navigate relations of power relative to their infant feeding decisions.
- The impacts of the COVID-19 pandemic as perceived by parents relative to their infant feeding decisions while admitted to the NICU.

Methodology: Guided by a feminist poststructural (FPS)[6] framework, the experiences of ~10 to 12 purposively-sampled NICU parents whose infants were admitted to a mixed Level II/III NICU in Atlantic Canada will be explored via in-depth, semi-structured, individual, face-to-face interviews. The use of a FPS framework in nursing research offers the ability to understand, challenge and change the personal, social and institutional 'status quo' practices in various settings[7]. It supports the critical exploration of relations of power, agency, and language while also identifying areas requiring action and change[8,9]. In order to understand NICU parents' infant feeding decisions, Discourse Analysis (DA) will be used to interpret their verbatim interview transcripts. DA is considered to be a cornerstone of FPS methodology[7]. Using an iterative process, the interviews, analysis and interpretation will occur concurrently. Throughout the proposed study, NICU Parent Partners and other key unit stakeholders, including direct care RNs, clinical nurse specialists, lactation consultants, neonatologists and the NICU leadership team will be active collaborators in the research process. An audit trail and ongoing researcher reflexivity practices will be employed throughout.

Potential Impact: A review of current scholarly discourses demonstrates that in-depth, critical explorations of NICU infant feeding decision-making are lacking. Existing literature in this area largely focuses on decision-making processes more broadly, with decisions related to infant feeding either briefly mentioned or only forming a very small portion of a larger study. To the best of our knowledge, none have applied a feminist poststructural approach to explore NICU parents' infant feeding decision-making experiences. Ultimately, it is anticipated that using this dynamic lens will offer a novel approach to NICU infant feeding research, supporting actions to empower parents in their infant feeding decisions as well as to inform future intervention studies[6]. Lastly, it is anticipated that the participant narratives emerging from the proposed exploration will provide timely insight into parents' feeding experiences in the wake of the global COVID-19 pandemic.

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