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Safety of Cow's Milk-Derived Fortifiers used with an All Human Milk Base Diet in Very Low Birthweight Preterm Infants: Part II

Alan Lucas MD FMedSci, Maushumi Assad MD, MPH,
Jan Sherman PhD, John Boscardin PhD, Steven Abrams MD

Abstract

Recently we published a meta-analysis of morbidity seen with the use of cow's milk derived fortifier (CMDf) rather than human milk derived fortifier (HMDF) in very low birthweight (VLBW) infants. Here, we further analyse these data to estimate the annual population risk of CMDf-related major morbidity in the United States and Canada. The outcome used was a mortality/morbidity index which was positive if the infants had one or more of death, necrotising enterocolitis, sepsis, retinopathy of prematurity or bronchopulmonary dysplasia. Using the risk difference (RD) between the CMDf and HMDF groups we estimated, provisionally, that 4150 additional VLBW infants in the United States and Canada each year, or an additional infant approximately every 2 hours, may be expected to develop a positive mortality/morbidity index in relation to being fed CMDf – over and above the number of infants with a positive index if fed HMDF. We provide an in-depth discussion of the limitations of our estimate. This analysis provides preliminary evidence of the magnitude of population risk of major neonatal morbidity with use of CMDf versus HMDF in VLBW infants in current practice.

Key Words: preterm infant feeding, cow's milk-derived fortifiers, human milk-derived fortifiers, neonatal morbidity, neonatal mortality

Abbreviations: MOM: Mothers own milk, CM: Cow's milk, CMDf: Cow's milk-derived fortifier, PTF: Preterm fortifier, HMDF: human milk-derived fortifier, NEC: Necrotizing enterocolitis, ROP: Retinopathy of prematurity, BPD: bronchopulmonary dysplasia, NICU: Neonatal intensive care unit

Introduction

Recently we published our paper on "Safety of cow's milk-derived fortifiers used with an all-human milk base diet in very low birthweight preterm infants" (1). Here we seek to re-explore these data to quantify further the impact of cow's milk-derived fortifiers (CMDf) on morbidity in very low birthweight preterm infants in the United States and Canada, where the underlying studies were conducted.

Our recent paper (1) included a meta-analysis of 3 studies in 453 preterm infants all fed a base diet of human milk (HM) and comparing CMDf with human milk-derived fortifier (HMDF). Conventionally, we had expressed morbidity outcomes as a risk ratio (RR). For example, the risk of developing necrotising enterocolitis (NEC) in the CMDf group was 3.3 times that in the HMDF group. However, expressing the morbidity data as a "risk difference" (RD)

between the proportion of subjects that had adverse events in the CMDf versus HMDF groups has an important additional clinical application that we had not evaluated in the previous report. For instance, when multiplied by a population size of interest, the risk difference provides an estimate of the number of subjects in that population that might be adversely affected by CMDf over and above that number in the HMDF group. The reciprocal of the risk difference gives an estimate of the number needed to harm (NNH).

Here we have focussed on the risk difference for the most robust of the morbidity outcomes in our recent study: the meta-analysis of the mortality/morbidity index, which was positive if a subject had one or more of the following outcomes: Death, NEC, sepsis, retinopathy of prematurity (ROP), and bronchopulmonary dysplasia (BPD). Our objective has been to use the currently available data to define the number needed to harm and to derive an initial, provisional estimate of the number of VLBW preterm infants each year in the United States and Canada whose death or major neonatal morbidity may be linked to CMDf.

“Our focus here on this overall index rather than on the individual morbidity outcomes reflected an attempt to use the most statistically robust outcome for our present analysis.”

Methods

The three studies in our meta-analysis in the original recent paper were: (1) the randomised controlled trial of O'Connor et al (2) (known as the OptiMoM trial) (2) a subgroup analyses of the RCT by Sullivan and co-workers (3,4) and (3) a subgroup analysis of a study by Assad and co-workers (1, 5) that provided a quasi-experimental pre-post design using HM and a CMDf pre-2012 and HM plus an HMDF post-2012. Our recent paper and the studies, as originally published, provide data on the methods used in each study (1-5). Within each individual study included in our meta-analysis, the CMDf and HMDF groups were well balanced for demographic factors (1); and in each of these three studies, the study design was conceptually similar: a base diet comprising only HM (either mother's own milk [MOM]; or MOM plus donor milk [DM]) and comparing a CMDf versus HMDF.

In each of the studies, the HMDF group received Prolact+ H(2) MF® human milk fortifier (manufactured by Prolacta Bioscience, California, USA) and the CMDf group received Enfamil or Similac

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non-hydrolyzed human milk fortifier (manufactured respectively by Mead Johnson Nutrition or Abbott Nutrition). Feeding protocols in each study are described elsewhere (1-5).

Morbidity outcomes studied here were death, NEC (Bell's stage II or greater), sepsis, ROP, and BPD. The criteria for the diagnosis of NEC and sepsis are described elsewhere (3). These five outcomes were combined in a dichotomous mortality/morbidity index, which was positive if one or more of these individual morbidities present. This index was first used in the O'Connor trial (2), and since the other two studies provided data on the same outcomes, a meta-analysis of this mortality/morbidity index was possible. Our focus here on this overall index rather than on the individual morbidity outcomes reflected an attempt to use the most statistically robust outcome for our present analysis.

“When we re-analyzed the data for the mortality/morbidity index for the risk difference (RD), the chosen random-effects model provided a similar overall value for this as the fixed effect models (RD of 0.13 and 0.14 respectively) with similar significance.”

In our recent study(1), we justified, following the guidance of Borenstein (6), using a fixed-effect model in our meta-analysis of morbidity indices because of the paucity of studies in the analysis, but we noted that a random-effects model gave a similar result. Our fixed effect model effectively treated the three studies as the only ones of interest, but this was not the objective here for a model that should ideally be representative of all studies. Therefore, for this study, focusing on the mortality/morbidity index and using the same software (RevMan 5.3), we selected the now preferred random-effects model, using this to estimate “risk difference.”

Results

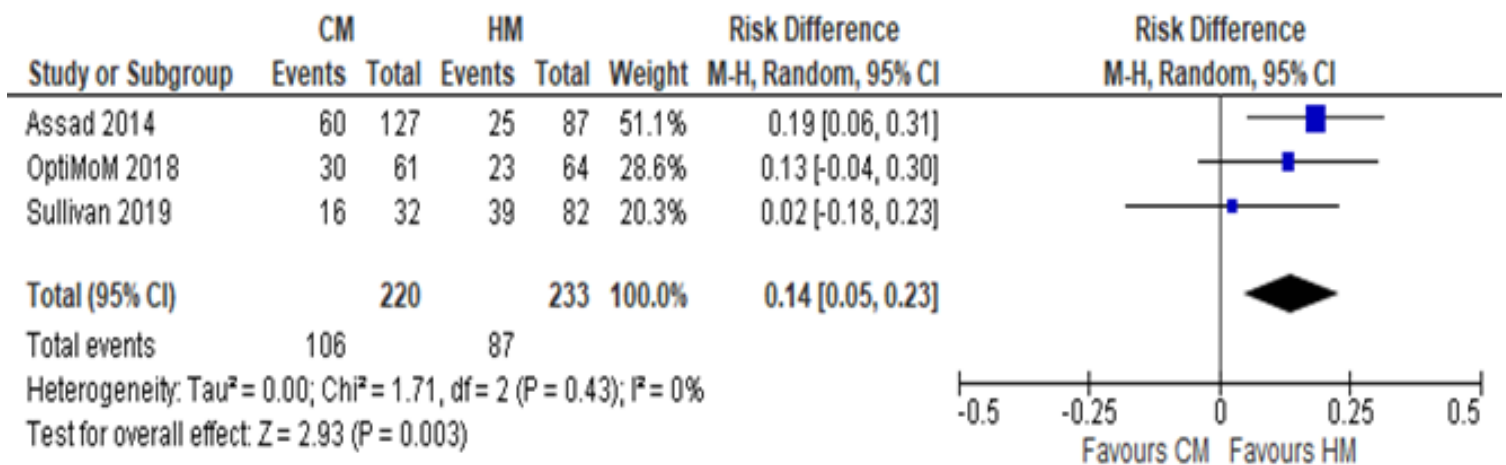


Figure: Meta-analysis of morbidity indices in the O'Connor, Assad, and Sullivan studies. A positive index is defined as one or more of death, sepsis, NEC, ROP and BPD. The index was based on the one published in the O'Connor corrigendum20, and equivalent indices (based on the same 5 outcomes) were derived from raw data in the Sullivan and Assad reanalysis. Note that the O'Connor study is also known as the 'OptiMoM' trial

The meta-analysis is a random effects model for risk difference: CMDF v HMDF

When we re-analyzed the data for the mortality/morbidity index for the risk difference (RD), the chosen random-effects model provided a similar overall value for this as the fixed effect models (RD of 0.13 and 0.14 respectively) with similar significance. The findings for the random-effects model were as follows: risk difference = 0.14 (95% CI: 0.05 to 0.23) P= 0.003 (see figure). The risk difference of 0.14 reflects the fractions of subjects with a positive index in the CMDF group minus the fraction in the HMDF group.

Number needed to harm (NNH)

The reciprocal of this risk difference (the estimated NNH) was 7 (7.1), with a 95% confidence interval of 4 to 25. Thus, from the point estimate, for every seven babies fed on CMDF versus HMDF, one of them would be predicted to die or have one or more of the four severe morbidities.

Provisional population estimates

Given an estimated risk difference of 0.14 or 14% as an absolute percentage, then if our meta-analysis were to comprise studies that are collectively representative of the population (USA plus Canada in this study), this implies that 14% of preterm infants in that population is an estimate of the increased number of infants with a positive mortality/morbidity index in the CMDF group over and above the number with a positive index in the HMDF group.

For instance, the data for the OptiMoM trial by O'Connor et al. included in the figure shows that 30 of 64 (0.49) of the CMDF group had a positive mortality/morbidity index and 23 of 64 (0.36) had a positive index. Thus, the difference known as the “risk difference” (RD) is 0.13, as shown in the figure. If O'Connor's results were applied to a relevant population of, for example, 1000 preterm infants, then 130 (1000 x 0.13) additional infants would be expected to have a positive index if fed CMDF as opposed to HMDF.

Estimations for the USA.

The 12-center Sullivan study(3) indicated that many centers may use <1250g as a cut-off value for using HMDF. However, babies up to 1500g birth weight were given HMDF in the Assad study(5) It is difficult to estimate precisely the number of preterm babies in the USA that might be eligible for the use of HMDF, but it is that

number that is required to estimate CMDF-related morbidity over and above that seen with HMDF. From the National Vital Statistics Report of Martin et al. (2018)(7), we note that all births in the United States approach 3.8 million/year and that 1.38% of these are below 1500g at birth (VLBW). We have assumed that the eligible population for receiving HMDF is close to 1% of all births in the United States – about 38,000 preterm infants based on current live birth rates.

On this basis, a tentatively estimated 5300 (0.14 x 38,000) CMDF-fed babies annually in the USA would have a positive mortality/morbidity index over and above the incidence in the HMDF group but with a 95% confidence interval of 1900 to 8700 babies.

Nevertheless, 30% of this morbidity has already been addressed in the USA, where close to 11,000 VLBW babies are fed annually on HMDF to provide an exclusive HM (EHM) diet (data on the number of babies fed HMDF obtained by courtesy of the manufacturer). Our analysis thus provides a point estimate of 3,700 babies in the United States each year (70% of 5300) who may die or develop one of more major morbidities in relation to use of CMDF rather than HMDF.

Estimations for Canada

The annual number of births in Canada is approximately 373,000(8). Assuming again that the target population of preterm infants represents 1% of births, this would amount to 3730 infants. Our provisional estimate based on the risk difference of 0.14, 522 babies would have a positive mortality/morbidity index related to the use of CMDF over and above the number with a positive index if fed HMDF. However, in 2019, 75 Canadian preterm infants were fed on HMDF (manufacturer's data), leaving a point estimate of around 450 babies in Canada each year who may die or develop major morbidity in relation to the use of CMDF,

“However, we were concerned that this analysis was not an accurate representation of the data. Our own analysis utilized the authors' data on individual morbidities to calculate the average number of adverse events per subject. There were 31 adverse events in 64 subjects fed HMDF (0.48 events per subject); yet, for CMDF there were 45 adverse events among 61 subjects (0.74 events per subject).”

Combined data

Combining the figures for the United States and Canada, an estimated total of 4150 (95% CI 1480, 6800) additional babies in the two countries would have a positive mortality/morbidity index related to the use of a CMDF rather than HMDF.

Discussion

Our provisional analysis for the USA and Canada indicates that with the use of CMDF rather than HMDF, an additional 4150 VLBW preterm infants per year - or on average one additional infant every 2 hours - would develop a positive mortality/morbidity index comprising one or more of the following major adverse outcomes: death, NEC, proven sepsis, ROP or BPD. Such raised morbidity rates in the population in those fed CMDF might not have been intuitively predicted from the risk ratio we reported in the original study that showed an estimated 40% increase in the risk of a positive index in the CMDF group.(1) In terms of number needed to harm (NNH), for every seven babies in our analysis that were fed CMDF rather than HMDF, one of them is estimated to develop one of more of these adverse outcomes. However, these preliminary and tentative figures are based on the few studies of suitable design available, and in this discussion, we examine both the plausibility and limitations of our estimates.

In terms of plausibility, decades of prior research have linked the feeding of cow's milk-derived products with the outcomes that comprise the mortality/morbidity index used here (1-3,5,9-16). Indeed, O'Connor and colleagues (2) conceived this index for their own fortifier trial, included in our meta-analysis, precisely because these were the major neonatal morbidities described with CM products in the past.

Over the past 7-8 years, the recommended practice (17,18) for VLBW preterm infants is to use DM if there is insufficient MOM; and then most commonly to use a CMDF. Given the preponderance of HM in the modern preterm infant diet, it might be questioned whether there was sufficient CM in the diet to cause so many cases of major morbidity. The preterm infant feeding trials of Lucas et al.(11) date back to the pre-fortifier era when babies were fed on HM and quite often a standard infant formula with much lower CM protein content than a preterm formula (PTF), yet NEC and sepsis were recognized CM-related problems at the time. Current use of CMDF may provide around 50% of the protein in the diet – and more than this if significant volumes of DM are used - comparable with the CM intake in past practice.

That CMDF may cause significant morbidity was also shown in an RCT on 276 subjects published in 1996 (19). Both randomized groups received MOM and PTF, but at that time, it was ethical to randomize the infants to a CMDF or not. With a quite modest level of fortification, simply adding a CMDF resulted in a 2.3-fold increased risk of NEC or sepsis

The analysis here raises a broader issue of how the results of meta-analyses may best be presented in different circumstances. The risk ratio (RR) provides a way of capturing the relative impact

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of two interventions on the outcome. But it provides little insight

on how this relates to population incidence of, say, an adverse outcome using one of the interventions rather than the other – and for this, the risk difference (RD) is a most valuable measure. However, extrapolating from limited data to population health may result in more speculative conclusions as noted in the Limitations and Conclusions sections below.

Limitations

Our recently published meta-analysis only had three studies that represented the data available to compare fortifier type and hence to explore the safety of current feeding recommendations in terms of mortality or major morbidity. We recognize that as more studies of this type are done, our estimate of the number of preterm VLBW that may be adversely impacted by CMDF may be refined, and the large confidence intervals we are currently seeing may contract.

Although we have used our meta-analytic data to estimate CMDF-related morbidity and mortality both in the United States and Canada, only one of our three studies, the OptiMoM trial of O'Connor et al.(2), was from Canada where the practice may be different. However, the risk difference in this trial alone for the morbidity index (RD=0.13) was very similar to the value for the 3 study meta-analysis as a whole (RD=0.14).

“Our preliminary estimates presented here suggest that although about 30% of smaller VLBW babies in the USA are fed with HMDF, more than 4000 VLBW preterm infants in the United States and Canada each year may either die or develop major morbidity in relation to the use of CMDF.”

The estimated magnitude of the adverse impact of CMDF could have been inflated by the inclusion of milder cases of ROP in the Assad study, though by studying five outcomes collectively in our mortality/morbidity index and having only one of the three centers collecting data on milder ROP cases, such confounding was minimized. In contrast, we have assumed that in modern care, DM would be used in preference to PTF (as in our three studies here); but that is not always the case, and because in those babies who receive both CMDF and PTF, the adverse impact of CM may be somewhat increased, our model may have under-estimated the impact of CMDF. Again, in the Assad study(5), the largest of our studies, bigger babies (up to 1500g birth weight) than those most commonly fed HMDF, were included – and because of the lower morbidity in larger preterm infants, this also would be expected generate a more conservative population estimate of the adverse impact of CMDF. It might be argued that as more modern studies are included, CMDF-related morbidity may decrease. This is not supported by the limited data we have, which indicates that the oldest study data we included (from the Sullivan trial published in 2010 (3) showed the least impact of CMDF on the mortality/morbidity index with a much smaller impact on this index than the most recent study of O'Connor published in 2018 (2). This could relate to a secular trend to increasing accuracy in defining the morbidities studied here.

Conclusions

Our preliminary estimates presented here suggest that although about 30% of smaller VLBW babies in the USA are fed with HMDF, more than 4000 VLBW preterm infants in the United States and Canada each year may either die or develop major morbidity in relation to the use of CMDF. The estimated NNH of only 7 is also a concern. However, these estimates have a broad confidence interval and are based on the surprisingly small number of safety studies of this type. Our provisional analysis has several limitations, and we recognize it is difficult to extrapolate from small studies to large populations. Nevertheless, this field has become important to pursue – and these types of estimation will also need to be done on other populations, where the recommended neonatal feeding practices are similar.

“As data have emerged, it has become clearer that these safety aspects are important to address and quantify. For this reason, we have released these data at an early stage to encourage both further research and discussion on the implications for practice.”

Our study illustrates a larger issue. Because of the broad adverse and beneficial impacts of preterm infant feeding on morbidity, feeding regimes in this sensitive period are helpfully seen as therapeutic interventions where both efficacy and safety are, in general, important metrics. The current recommendations for preterm infant feeding – notably to use DM if MOM is insufficient – were introduced over 20 years ago and have become globally common in the last ten years in part based on key position papers of relevant societies.(17,18) Yet, at the time this guidance was given, there was an absence of randomized trials appropriately designed to address safety in terms of the morbidities examined here, when using CMDF as the sole source of CM – an integral component of this new practice. As data have emerged, it has become clearer that these safety aspects are important to address and quantify. For this reason, we have released these data at an early stage to encourage both further research and discussion on the implications for practice.

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We acknowledge the kind permission of Dr Melinda Elliott for allowing us to reanalyse her raw data for the study by Assad et al. and for retrieving further raw data from the patient records.

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Acknowledgments

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Author Contributions

Professor Alan Lucas conceived and initiated the study; analyzed raw data; and wrote the paper

Dr Maushumi Assad provided her raw data (Assad study) and assisted us with the understanding of her database, She read and commented constructively on the manuscript

Professor Jan Sherman was our advisor on evidence-based medicine. She performed all the meta-analyses and provided the data for figures. She read and advised on the manuscript.

Dr. John Boscardin was our statistician who advised on: the statistical analysis, interpretation of data and data presentation

Professor Steven Abrams key collaborator involved in every aspect of the study and made major intellectual input.

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From the National Perinatal Information Center: The Role of Neonatology within AIM: The Alliance for Innovation on Maternal Health (AIM)

Elizabeth Rochin, PhD, RN, NE-BC

The National Perinatal Information Center (NPIC) is driven by data, collaboration and research to strengthen, connect and empower our shared purpose of improving patient care.

For over 30 years, NPIC has worked with hospitals, public and private entities, patient safety organizations, insurers and researchers to collect and interpret the data that drives better outcomes for mothers and newborns.



“AIM works through state-led hospital and healthcare teams to implement evidence-based patient care “bundles” to standardize maternal care and drive optimal outcomes. As of this publication date, there are 38 states currently enrolled in AIM.”

The Alliance for Innovation on Maternal Health (AIM) was established in 2014 through the US Department of Health and Human Services’ Health Resources and Services Administration (HRSA) Maternal and Child Health Bureau (MCHB). AIM is a recognized national data-driven maternal safety and quality improvement initiative based on multidisciplinary consensus-based practices to improving maternal safety and outcomes. AIM works through state-led hospital and healthcare teams to implement evidence-based patient care “bundles” to standardize maternal care and drive optimal outcomes. As of this publication date, there are 38 states currently enrolled in AIM. Currently, the approved AIM Patient Care Bundles consist of:

- Maternal Venous Thromboembolism
- Obstetric Care for Women with Opioid Use Disorder (OUD)
- Obstetric Hemorrhage
- Postpartum Care Basics for Maternal Safety
- Safe Reduction of Primary Cesarean Section
- Severe Hypertension in Pregnancy
- Reduction of Peripartum Racial/Ethnic Disparities (being rolled into all bundles in 2021)

The National Perinatal Information Center (NPIC) sits on the AIM Executive Committee. The Executive Committee assists the AIM leadership team in reviewing state applications and assists in reviewing state data plans as well as offering overall support of the mission and vision of AIM. Currently, the state application does not request a neonatology resource as a member of the Clinical Champions team. However, the inclusion of neonatology will be a critical source of expertise and support as states continue to and begin implementation of the Obstetric Care for Women with Opioid Use Disorder bundle, one of the most frequently implemented bundles at this time.

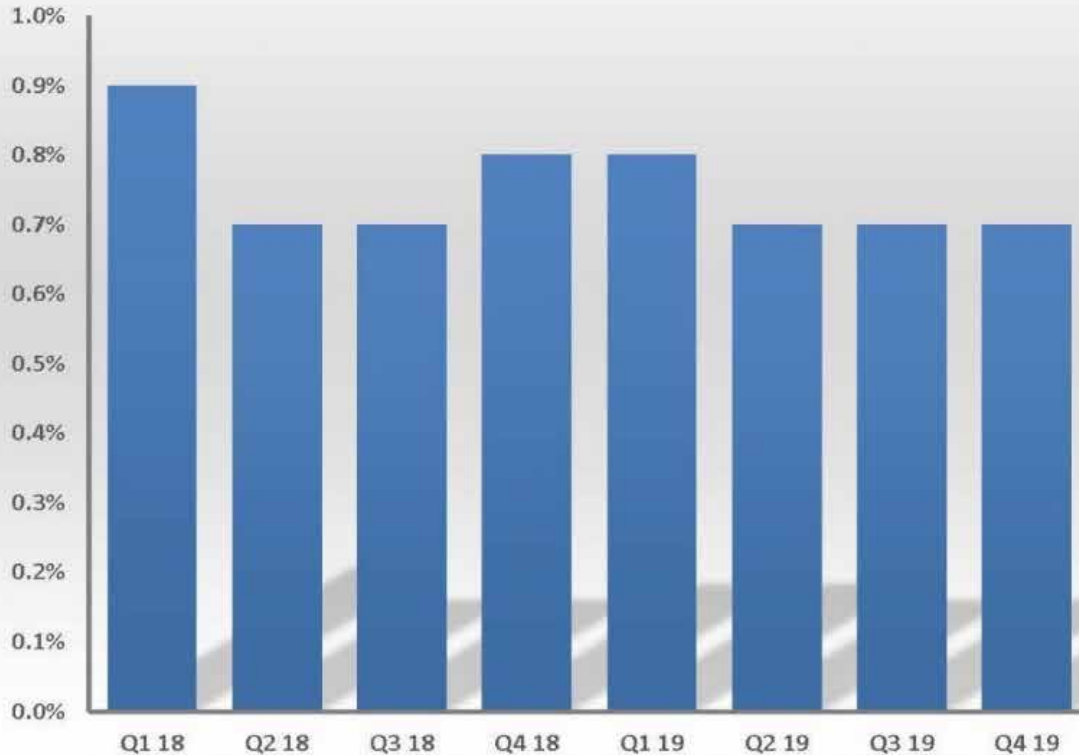
“Currently, the state application does not request a neonatology resource as a member of the Clinical Champions team. However, the inclusion of neonatology will be a critical source of expertise and support as states continue to and begin implementation of the Obstetric Care for Women with Opioid Use Disorder bundle, one of the most frequently implemented bundles at this time.”

The AIM Opioid Use Disorder bundle includes the following multidisciplinary resource recommendations that specifically require the expertise and guidance from neonatologists, particularly in regions that experience a high NICU admission rate associated with NAS:

- Provide staff-wide (clinical and non-clinical staff) education on SUDs.
 - Emphasize that SUDs are chronic medical conditions that can be treated.
 - Emphasize that stigma, bias and discrimination negatively impact pregnant women with OUD and their ability to receive high quality care.
- Establish specific prenatal, intrapartum and postpartum clinical pathways for women with OUD that incorporate care coordination among multiple providers
- Know federal (Child Abuse Prevention Treatment Act – CAPTA), state and county reporting guidelines for substance-exposed infants

Between 2014 and 2016, the opioid epidemic and discussions regarding its impact on pregnancy became a matter of public policy. Krans & Patrick (2016) described the proportion of pregnant women admitted to substance abuse treatment facilities that reported a history of prescription opioid abuse increased from 2% to 28% between the years of 1992 to 2012. The opioid epidemic crosses all racial, ethnic, socioeconomic and geographic boundaries, further highlighting the importance of universal screening and education at all points of a woman’s reproductive lifespan, which is respectful and neutral in its application.

The opioid epidemic has continued to expand and the incidence of



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*Rate of inborns and neonates transferred in from another hospital with withdrawal symptoms from maternal use of drugs of addiction

postnatal withdrawal or neonatal abstinence syndrome (NAS) has also expanded, with current estimates for infants in the US with NAS ranging between 2.6 per 1,000 births to 16.2 per 1,000 births (Hudson et al, 2019). With the increasing emphasis on keeping mothers and at-risk newborns together as a dyad during the immediate postpartum period, it is important to recognize that the most acute care for NAS will take place in the NICU. Ensuring and mobilizing an approach that keeps the mother and family involved in the care of the newborn during a NICU admission requires a strong multidisciplinary team, and added to that the complexity of NAS (including the stigma that exists for women and birthing people with OUD throughout healthcare) requires a unique and neutral approach. These are the conversations that occur within AIM teams and require the expertise and guidance from all parties, including neonatologists and neonatal practitioners, committed to the improvement of the lives of women and newborns experiencing OUD and NAS, respectively.

NPIC recognizes the importance of NAS reporting and tracking for quality and programmatic improvement and has an established online, interactive database (CAIRN: Custom Analytic Interactive Reporting Network) used for NAS metric analysis, in addition to other descriptive and outcome metrics. Based on the NPIC 2018-2019 aggregate data, the rate of NAS (NPIC uses the AIM definition) was between 0.7% to 0.9%, with most of 2018 and 2019 hovering around 0.7%.

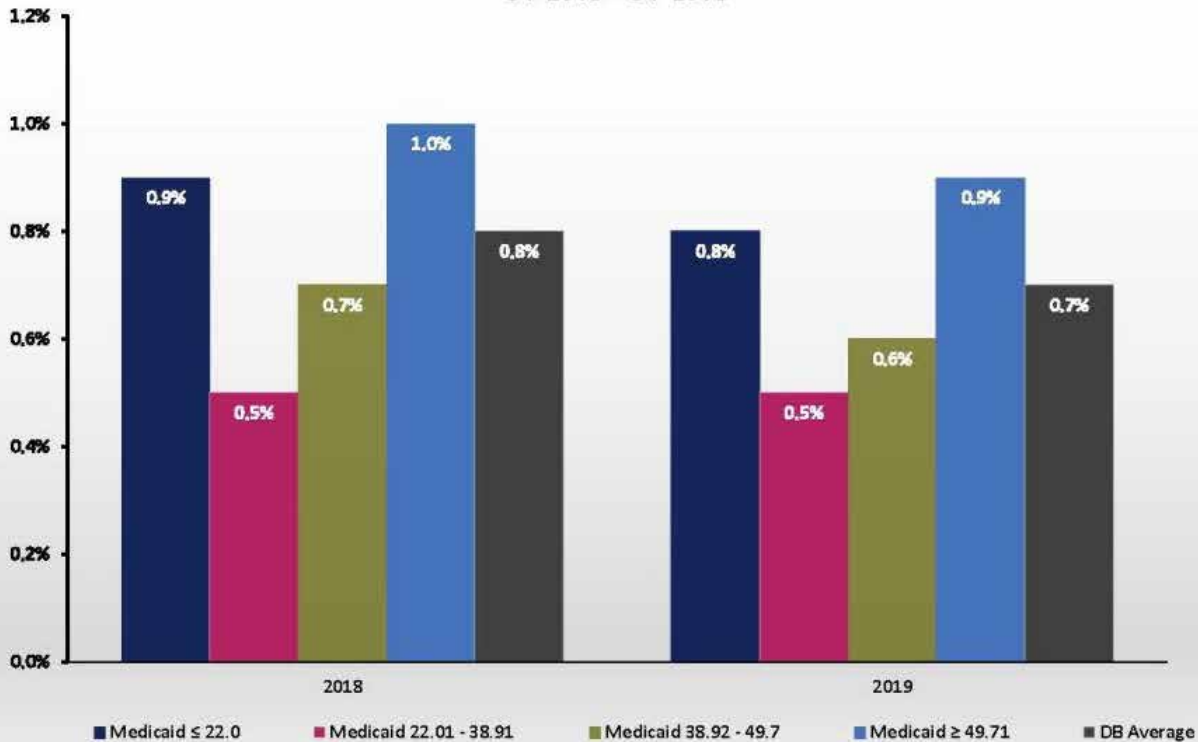
In addition, the NPIC CAIRN platform also reports Medicaid quartiles, and there are notable differences that occur with NAS admissions and the higher Medicaid quartiles (Medicaid \leq 22; Medicaid 22.01 – 38.91; Medicaid 38.92 – 49.7; Medicaid \geq 49.71). More than 80% of newborns experiencing NAS have their care paid for by Medicaid (Centers for Medicare and Medicaid Services, 2018;

Winkelman et al, 2018).

While the majority of the work within AIM focuses on the mother, it is important to recognize the neonatal and pediatric contributions that will be required to successfully implement the AIM Opioid Use Disorder Bundle. Data collection and interpretation will be key to better understanding of those PDSA initiatives that are successful or require re-evaluation and retooling. Integration of a robust multidisciplinary and interdisciplinary team approach within the AIM Opioid Use Disorder bundle at the outset will provide a strong foundation for the woman and her family to navigate this chronic illness with a committed and compassionate team.

“While the majority of the work within AIM focuses on the mother, it is important to recognize the neonatal and pediatric contributions that will be required to successfully implement the AIM Opioid Use Disorder Bundle. Data collection and interpretation will be key to better understanding of those PDSA initiatives that are successful or require re-evaluation and retooling.”

Perinatal Center Database
NEONATAL ABSTINENCE SYNDROME* (NAS) BY MEDICAID QUARTILE
 CY 2018 - CY 2019



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*Rate of inborns and neonates transferred in from another hospital with withdrawal symptoms from maternal use of drugs of addiction

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No Intensive Admit Code for Infants Older than 28 Days

Edward A. Liechty, MD

You are receiving in transfer a now 45 day old former 28-week PCA infant (Birth weight 1000 g) who was born at a regional Level 4 hospital and required ventilatory management for severe RDS. The infant is now recovered, requiring only 0.5 lpm nasal cannula oxygen flow for occasional apnea/bradycardia spells. His current weight is 1600 g. You are not in the same group practice as the level 4 neonatologists. On admission to your hospital, you perform a complete physical exam and review the ongoing medical issues and plans with the parents. The admission process, including documentation and order completion, takes you 80 minutes; the referring neonatologist sends medical records that require 30 minutes on the day of admission to review.

Correct CPT codes are:

1. Admit day, 99477, 99356; subsequent days 99479
2. Admit day 99233, 99356; subsequent days 99233
3. Admit day 99223, 99356; subsequent days 99479



Answer

- 3.) Admit day 99223, 99356; subsequent days 99479

Even though this infant continues to require intensive care, including continuous cardiac and respiratory monitoring for ongoing apnea, there is no intensive admit code for infants older than 28 days. Therefore, the only option is to use the highest-level hospital initial care code, 99223, which has a typical time of 70 min-

utes. Prolonged service time may be added onto the non-global hospital care codes, provided the total service time exceeds the typical time by at least 30 minutes. In this case, the total time is 100 minutes, so reporting 99356 is justified.

The weight-specific global intensive care codes (99478-80) may be used for subsequent hospital days, even though the infant is older than 28 days, as these are weight but not age-specific. However, if an infant continues to require intensive care after reaching 5000 g, daily hospital care codes (99231-3) must be used.

Answer 1 is incorrect, as 99477 may only be used in an infant less than 29 days of life. Furthermore, 99477 is a global code, and prolonged service codes may not also be reported.

Answer 2 is incorrect as 99233 is for subsequent hospital care services, not initial hospital care services.

ICD-10 codes would include:

- P07.14 Other low birth weight newborn, 1000-1249 grams
- P07.31 Preterm newborn, gestational age 28 completed weeks
- P28.4 Other apnea of newborn
- P27.1 Bronchopulmonary dysplasia originating in the perinatal period

“Note that code from Z38.xx Liveborn infants according to the place of birth and type of delivery is not used for this readmission to your hospital, even though it would have been used in the infant's initial care before transfer to the Level 4 unit. The Z38 codes are used only for the initial hospitalization after birth.”

Note that code from Z38.xx Liveborn infants according to the place of birth and type of delivery is not used for this readmission to your hospital, even though it would have been used in the infant's initial care before transfer to the Level 4 unit. The Z38 codes are used only for the initial hospitalization after birth.

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OPIOIDS and NAS

When reporting on mothers, babies, and substance use

LANGUAGE MATTERS



I am not an addict.

I was exposed to substances in utero. I am not addicted. Addiction is a set of behaviors associated with having a Substance Use Disorder (SUD).



I was exposed to opioids.

While I was in the womb my mother and I shared a blood supply. I was exposed to the medications and substances she used. I may have become physiologically dependent on some of those substances.



NAS is a temporary and treatable condition.

There are evidence-based pharmacological and non-pharmacological treatments for Neonatal Abstinence Syndrome.



My mother may have a SUD.

She might be receiving Medication-Assisted Treatment (MAT). My NAS may be a side effect of her appropriate medical care. It is not evidence of abuse or mistreatment.



My potential is limitless.

I am so much more than my NAS diagnosis. My drug exposure will not determine my long-term outcomes. But how you treat me will. When you invest in my family's health and wellbeing by supporting Medicaid and Early Childhood Education you can expect that I will do as well as any of my peers!

Learn more about Neonatal Abstinence Syndrome at www.nationalperinatal.org



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Risks of separation and trauma



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- H**ELP EXPLORE OPTIONS
- A**SSESS PREFERENCES
- R**EACH A DECISION
- E**VALUATE THE DECISION



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A Tribute to Maria Delivoria-Papadopoulos and William (“Bill”) Meadow

Mark Hudak MD

DR. MARIA DELIVORIA-PAPADOPOULOS (thanks to Ted Rosencrantz, Marilyn Escobedo, and David Burchfield for their help)

“Mark Hudak presents tributes to two neonatologists who helped define and establish the field”

Dr. Maria Delivoria-Papadopoulos passed on September 11 after an 89-year extraordinary life. She was born in Greece and, as a young girl entering adolescence, served in the French underground effort during World War II. She obtained her medical degree in 1957 from the National and Kapodistrian University of Athens, Greece. She trained with Paul Swyer and Henry Levison in Toronto, where she developed her passion for newborn medicine. She was among the first clinicians to use positive pressure ventilation with success in infants with hyaline membrane disease and achieve their intact survival. In an interview with ABC News, she recounted “running up ten stories” at a Toronto hospital on January 9, 1963, to use a ventilator to help a premature baby who was struggling to breathe. “For the first time in this world, a premature baby (who could not breathe on its own) survived.” In her first series of 20 infants with severe respiratory failure ($\text{PaO}_2 < 40$ mm Hg and $\text{PaCO}_2 > 80$ mm Hg on 100% oxygen) treated with positive pressure ventilation, 7 of her infants survived intact. She presented this early work at the 1963 meeting of the Society of Pediatric Research (Delivoria-Papadopoulos, M., Swyer, P. R.: An Experimental Study of the Possibility of Reversing the Biochemical Changes of Terminal Hyaline Membrane Disease by Assisted Ventilation) and published these results in the October 1964 issue of Archives of Diseases of Children (Delivoria-Papadopoulos M, Swyer PR. Assisted ventilation in terminal hyaline membrane disease. PMID 14223550).

“Dr. Delivoria is remembered by her friends and colleagues for her warmth, her humility, her industry, her scientific curiosity, her clinical acumen, her love of babies and families, and for her generous mentorship.”

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This photo shows (left to right) the Toronto team of Henry Levison MD, head nurse Lynn Schoemaker, Paul Swyer MD, and Maria Delivoria-Papadopoulos MD.

Dr. Delivoria-Papadopoulos continued her education at the University of Pennsylvania in Pediatrics and Physiology, where she received a post-doctorate degree in physiology and spent the next 29 years as a faculty member. She has contributed immensely in many diverse areas. Initially, she worked with Thomas Schaffer on lung mechanics and acid-base balance in ventilated lambs. She studied the effect of age and 2-3 DPG levels on red blood cell storage and functions related to oxygen delivery. She became engaged in studying the outcomes and brain function of infants born to mothers addicted to opioids. When I was a fellow, I recall being impressed with her versatility as an early pioneer with Britton Chance at the University of Pennsylvania in using magnetic resonance spectroscopy to correlate changes in brain metabolites and regional blood flow with neurological outcomes.

Dr. Delivoria is remembered by her friends and colleagues for her warmth, her humility, her industry, her scientific curiosity, her clinical acumen, her love of babies and families, and for her generous mentorship. She has worked with many, many clinician-scientists over the years, including (and apologies if I have neglected to put you on this list!) Endla Anday, Vinod Bhutani, Frank W. Bowen, William Fox, Karen Fritz, Jan Goplerud, Dave Hoffman, Lois Johnson, Fola Kehinde, J. Kubin, Peter Marro, Jane McGowan, Om Prakash Mishra, Frank Oski, George Peckham, Roy Schneiderman, Alan Spitzer, Gary Stahl, Barbara Stonestreet, and Ted Rosencrantz.

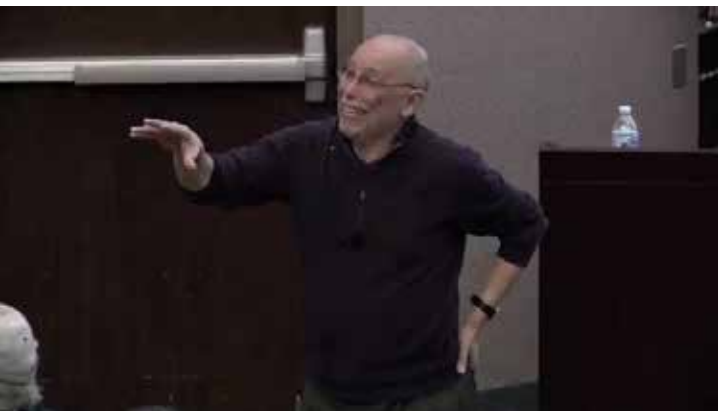
Throughout her distinguished career, she held numerous faculty and hospital appointments in the Philadelphia area. She was an author on about 1,000 publications over her 60-year career. She received too-numerous-to-count professional awards. In 1997 she became only the fifth woman to be honored with the AAP Virginia Apgar Award. The two pictures below show Dr. Delivoria-Papadopoulos at the presentation of her Apgar Award (picture courtesy of Dr. Marilyn Escobedo) and the 2007 Neo Conference receiving a Legends of Neonatology Award (with Dr. Millie Stahlman (l) and Mary Ellen Avery (r) – themselves recipients of the 1987 and 1991 Apgar Awards! – picture courtesy of Dr. David Burchfield).



DR. WILLIAM (“BILL”) MEADOW

The neonatology community lost another luminary almost one year ago when Dr. William (“Bill”) Meadow passed after a long battle with cancer.

I will let the obituary posted by the University of Chicago give you a flavor for who Bill was and what he meant. But I can add that Bill was engaging, often iconoclastic, but always thought-provoking and with a heart worn on his sleeve. I never missed a talk that Bill gave at any meeting I attended. I did have the privilege and the



pleasure of consulting with him about a particularly vexing ethical dilemma a few years ago. Although we had not met in person, he was very generous with his time and advice. By the end of our call, he had made me feel that we had been colleagues forever (and we found common ground as alumni of Amherst College).

Thanks to John Lantos and Michael Schreiber for their recollections in this article.

From:

<https://www.uchicagomedicine.org/forefront/news/william-meadow-obituary>

William L. Meadow, MD, Ph.D., a leading authority on the care of infants born prematurely or with significant health concerns, died at the age of 70 on Saturday, September 14, after battling leukemia for four years. He retired from clinical work but remained an active member of the section of neonatology.

Meadow, working with close colleagues in clinical medical ethics, Mark Siegler, MD, and John Lantos, MD — who is now at Children’s Mercy Hospital in Kansas City, Missouri — was a pioneer in the development of neonatal bioethics, the complex set of medical and personal calculations that guide decision making for parents, physicians and nurses who care for infants born too soon or with significant congenital problems or infections.

“Bill was a teacher in everything that he did,” Lantos said. “He was absolutely committed to students and education, as well as to his patients. He was the only doctor I have ever met who made rounds on each of his patients twice a day, then came back in the evening to make rounds again.”

““Bill would also, once a year, spend a full day as a nurse, with appropriate guidance,” Lantos said. He insisted this was the only way a doctor can know how challenging nursing can be. The NICU nurses “teased him, and questioned his efficiency,” Lantos said, “but they admired and appreciated the effort.””

In their book, [*Neonatal Bioethics: The Moral Challenges of Medical Innovation*](#) (2006), Meadow and Lantos also helped change the way neonatologists weighed the decision to withdraw life support. Before their work, most neonatal authorities tended to focus on what Lantos called the “moment of highest uncertainty.” Meadow gradually convinced neonatologists to be more patient to wait an extra day or two. “This led to much more accurate prognostication,” Lantos explained. “People caught on.”

“Bill would also, once a year, spend a full day as a nurse, with appropriate guidance,” Lantos said. He insisted this was the only way a doctor can know how challenging nursing can be. The NICU nurses “teased him, and questioned his efficiency,” Lantos said, “but they admired and appreciated the effort.”

Meadow had an outstanding career. He graduated *Magna Cum Laude* from Amherst College in 1969, earned his MD in 1974 and his Ph.D. in 1976 from the University of Pennsylvania. He began his pediatrics residency at the Children’s Hospital of Pennsylva-

nia, followed by a year at the University of Chicago Hospitals in 1975 and a year at Children's Memorial, also in Chicago. After completing his residency in pediatrics, he began working as an attending neonatologist and completed fellowships in infectious disease and medical ethics at the University of Chicago Hospitals.

He joined the faculty as an assistant professor in 1981, was promoted to associate professor in 1987, and then full professor of pediatrics in 2001. He took over the neonatology fellowship program in 2003 and was co-director of neonatology from 2005 to 2014.

Meadow lectured extensively throughout North America and Europe on medical and neonatal ethics. He published more than 90 academic papers and 48 book chapters on neonatology and medical ethics, as well as more than 200 scholarly abstracts.

"Bill Meadow impacted more people's lives than anyone I've ever met," said his colleague, UChicago neonatologist Michael Schreiber, MD. One of his strengths was "to show us how to develop a work-life balance. He had a difficult job, but he somehow found the time to make it home for dinner with the family and coach his kids. He inspired us to do the same."

Meadow's standard greeting for faculty, staff, and patient families was "Welcome to the NICU. You're going to love it here." It was merely an icebreaker, but how Meadow introduced the neonatal intensive care unit to new faculty, residents, and medical students, as well as the parents of patients in need.

Many new residents were not prepared for his unique approach to the NICU. Intensive care units "can be grumpy places," Lantos explained, "but Bill found ways to lighten the mood, like singing on rounds. He made people, especially parents, feel a little more comfortable."

"Everybody thinks of the NICU as a vast majority of severely premature babies," Lantos said. These often very tiny babies "may be premature," he continued, but "the vast majority of these children go home and do fine."

"He was also a huge family man," said his wife Susan Goldin-Meadow, a professor in the department of psychology at the University of Chicago. "That was really important to him. He made time despite a doctor's schedule. He was extraordinarily generous with his family, and his colleagues really enjoyed working with him."

"But he was also a dedicated physician. He never complained. When the urgent calls came, when his leadership was necessary for the care for a sick child, he got up and went in. He just did it. He enjoyed doing that. He somehow relished odd schedules."

He was a "wonderful, charming man and a surrogate father to much of Hyde Park and the University community," she added. "He could be gruff when needed, but he was loved. He was a great husband."

Four years ago, the University of Chicago held a Festschrift in Bill's honor. You can view this in 3 parts on youtube.com: With best wishes

Part 1 <https://www.youtube.com/watch?v=SwCvt01YAr4>

Part 2 <https://www.youtube.com/watch?v=k5S2JOkQ2Bg>

Part 3 <https://www.youtube.com/watch?v=xdX4noV8qvE>

With best wishes.

Mark Hudak MD

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The author has no conflicts of interests to disclose.

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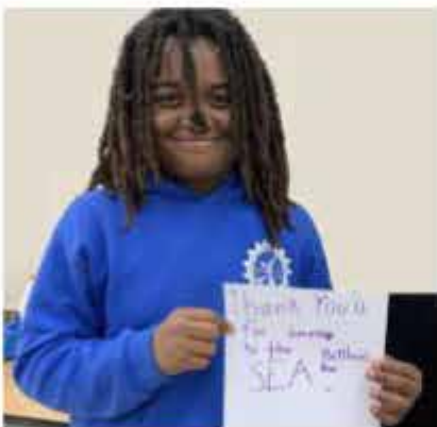
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The Village Son



A Life's Journey

Iranian village to a university professor in the United States of America in this memoir. As a boy, his unruly behavior was sedated by scholastic challenges as a remedy. At age twelve, he left home for junior high school in a provincial capital. At first, a lack of self-esteem led him to stumble, but he soon found the courage to tackle his subjects with vigor. He became more curious about the world around him and began to yearn for a new life despite his financial limitations. Against all odds, he became one of the top students in Iran and earned a scholarship to study medicine in Europe. Even though he was culturally and socially naïve by European standards, an Italian family in Rome helped him thrive. The author never shied away from the challenges of learning Italian, and the generosity of Italy and its people became part and parcel of his formative years. By the time he left for the United States of America, he knew he could accomplish whatever he imagined.

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Fellow Column: A Review of Neonatal Resuscitation

Christopher Day, MD, Jane Huang, DO

Adapted from an educational presentation on 6/23/2020

Objectives:

1. Discuss important physiologic changes vital to a successful transition to extrauterine life
2. Identify infants who qualify for routine care, as well as infants who may need additional resuscitation
3. Review the AHA 2015 NRP guidelines algorithm and related practice cases
4. Discuss the selection of common equipment and settings during neonatal resuscitation

“Circulatory changes with the closure of right-to-left shunts (ductus arteriosus and foramen ovale), decreased pulmonary resistance, increased pulmonary perfusion, and increased systemic pressure”

Transitioning from Intrauterine to Extrauterine Life:

A successful transition is characterized by the following:

- Alveolar clearance - achieved through labor, thoracic squeeze, and initial breath
- Lung expansion - happens when the neonates take an initial breath. Lung expansion also stimulates surfactant release,

which reduces alveolar surface tension and increases lung compliance

- Circulatory changes with the closure of right-to-left shunts (ductus arteriosus and foramen ovale), decreased pulmonary resistance, increased pulmonary perfusion, and increased systemic pressure

Case #1:

You are called to attend a cesarean section of a 38 weeks gestation infant due to failure to progress. At delivery, the infant is noted to be crying and breathing spontaneously. HR was greater than 100 bpm. Limbs are flexed, and the hands and feet are blue. What is the APGAR score?

- A: 5
B: 6
C: 7
D: 8
E: 9

Apgar Scoring:

- It's important to note that APGAR score should not be used to predict individual outcome as it is not an accurate prognostic tool even though there are data of a population based study that showed lower APGAR scores, especially the 5 minutes score, are associated with higher neonatal mortality and morbidity.
- Approximately 90% of neonates have Apgar scores between 7-10 and generally require no further intervention.

Infants Who Qualify for Routine Care:

- Gestational age: ≥ 35 weeks

Indicator		0 points	1 points	2 points
A	Activity (muscle tone)	Absent	Flexed arms and legs	Active
P	Pulse	Absent	< 100 bpm	> 100 bpm
G	Grimace (reflex irritability)	Floppy	Minimal response to stimulation	Prompt response to stimulation
A	Appearance (skin color)	Blue; pale	Acrocyanosis	Pink
R	Respiration	Absent	Slow and irregular	Vigorous cry

- Spontaneous breathing and crying
- Temperature: 36.5 to 37.5°C (97.7 to 99.5°F)
 - Initial hyperthermia may be reflective of maternal fever. Persistent hyperthermia or hypothermia may be a sign of sepsis.
- Respiratory rate: 40-60
 - Tachypnea may be a sign of pulmonary or cardiac disease. Apnea may be a sign of sepsis, neurological impairment, asphyxia, metabolic disorders, or secondary intrauterine drug exposure.
- Heart rate: 120-160
 - Tachycardia or bradycardia may be a sign of cardiac disease, sepsis, metabolic derangements, or other pathology.
- Color: acrocyanosis or pink
 - Central cyanosis may be a sign of pulmonary or cardiac disease.
- Tone: good muscle tone
 - Hypotonia may be a sign of sepsis, neurological impairment, or underlying pathology such as Down syndrome. It can also be secondary to intrauterine drug exposure.

nonreassuring fetal heart rate, or instrumental delivery

Pre-resuscitation Equipment Checklist

Equipment check prior to delivery including but not limited to:

- Preheat radiant warm
- Oxygen blender set to 21%
- Suctioning catheter attached to wall suction, which is set at 80-100 mmHg
- Intubation kit ready
- Right-sized resuscitation bag and mask to provide adequate seal and pressure
- Supplies for placing peripheral IV, UVC, and UAC
- Access to epinephrine and normal saline

The Main Components of Neonatal Resuscitation

- Stabilization
- Ventilation
- Chest Compression
- Administration of inotrope/volume expansion

High-Risk Deliveries (likely to require further resuscitation):

- Maternal conditions – advanced maternal age, maternal diabetes mellitus, hypertension, or eclampsia, maternal drug use, or previous history of stillbirth, fetal loss, or early neonatal death
- Fetal conditions – preterm, postterm, congenital anomalies, or multiple gestation
- Antepartum complications – placental anomalies, oligohydramnios, or polyhydramnios
- Delivery complications – breech presentation, chorioamnionitis, meconium-stained amniotic fluid, antenatal asphyxia with

Case #2:

You are called to repeat C/S delivery of 39 weeks infant. The infant cries spontaneously at birth. You stimulate, dry, and suction the infant, and now you noted moderate respiratory distress with nasal flaring and grunting. You applied pulse ox, which shows SpO₂ 85%. What should you do next?

A: Start PPV

B: Start CPAP

C: Start blowby O₂

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D: Intubate

E: Do nothing

Targeted Pre-ductal SpO₂ After Birth

- 1 minute 60 to 65%
- 2 minutes 65 to 70%
- 3 minutes 70 to 75%
- 4 minutes 75 to 80%
- 5 minutes 80 to 85%
- 10 minutes 85 to 95%
- Remember that immediately post-delivery, the neonate is in active transition from intrauterine to extrauterine circulation, so saturations won't be at 100% right away.
- The pulse oximeter should be placed on the neonate's right hand to detect pre-ductal saturation because the right arm receives blood from the aorta prior to the ductus arteriosus.

Supplemental Oxygen Use:

- Supplemental oxygen is used when neonates have lower oxygen saturations than the targeted preductal saturation
- Recommended starting FiO₂:
 - ≥ 35 weeks gestations: 21%
 - < 35 weeks gestations: 21-30%
- Consider starting CPAP if have labored breathing or if on 100% oxygen yet SpO₂ not at goal

Case #3:

You are called to a delivery of 30 weeks gestation infant secondary to premature rupture of membrane. Amniotic fluid is meconium stained. At birth, the infant did not cry spontaneously and is noted to be limp and apneic. Suctioning and vigorous stimulation were performed, and the infant remained apneic. Pulse ox was applied, and PPV was started at 1 minute of life. At 2 minutes of life, the infant remained apneic, and pulse ox reads 60%. What should you do next?

A: Intubate

B: Start chest compression

C: MR SOPA

D: Give epinephrine

E: Call for fellow/attending

Steps to Correct Mask Ventilation:

- MR SOPA are maneuvers trialed after PPV has failed to improve the neonate's heart rate or apnea. Effective PPV can be assessed by evaluating for good chest rise and bilateral breath sounds.
- M – Mask adjustment

- R – Reposition head to open up the airway
- S – Suction mouth, then the nose. Avoid deeper and vigorous suction, which can cause vagal response and bradycardia
- O – Open mouth to open up the airway
- P – Increase pressure every few breaths until good chest rise is observed. Initial PIP usually starts around 20-25 cm H₂O, and PEEP usually starts around 5-6 cm H₂O. Max PIP for preterm is 30 cm H₂O and for full term is 40 cm H₂O.
- A – Alternative airway, such as intubation

Case #4:

You have been called to the delivery of a 36 weeks gestation infant via emergency C-section for placental abruption and nonreassuring fetal heart rate tracing. On delivery, the infant is cyanotic, apneic, and with poor tone. He undergoes vigorous stimulation, warming, suctioning of secretions, and positioning of the airway. He remains apneic, cyanotic, and poorly responsive, and palpation of the umbilical pulse reveals a heart rate of 84. What is the best next step in resuscitation?

A: Reposition and clear airway, apply SpO₂ monitor, start CPAP

B: Apply SpO₂ monitor, start PPV, consider ECG monitor

C: Insert a nasopharyngeal airway

D: Intubate

E: Start blowby O₂

A Review of the Early Portion of the NRP Algorithm:

- If the infant is term, tone, and breathing or crying, then you are cleaning the child off and returning him or her to the mother to obtain the myriad benefits of early skin-to-skin contact.
- If preterm, hypotonic, apneic, or breathing irregularly without a cry, essentially, we are starting with the classic initial resus-



citation maneuvers: warm, dry, suction, position (airway), and stimulate. A mnemonic to help remember these maneuvers is Dry PaWSS (Dry, Position airway, Warm, Suction, Stimulate).

- If, after your initial efforts, the infant is not improving, then check the pulse; if it is under 100, or if the infant is gasping or apneic, you want to quickly place a pulse oximeter and simultaneously start PPV, or bag-mask ventilation, as well as consider placing EKG leads, especially in situations such as known or suspected congenital heart disease. Per the AHA, if the heart rate is not rising after 15sec or if chest rise is not being accomplished on PPV, you are to run through your MR SOPA corrective measures.
- If, after initial resuscitation, the infant's HR is >100, but breathing is labored, or he or she continues to appear cyanotic, then you are headed off to the right side of the algorithm, where you'll also place a pulse ox but here instead of starting PPV can try repositioning and clearing the airway first, and if those do not work then start CPAP and titrate the FIO₂ as needed.

Case #5:

You are urgently called to the delivery of a 37 weeks gestation infant with no prenatal care. He is apneic, floppy, and cyanotic at birth with HR72. PPV is started; however, adequate chest rise is not noted. Despite attempts at airway repositioning, suctioning, mask adjustment, ventilatory pressure increases, and insertion of a nasopharyngeal airway, chest rise does not improve, and HR falls to 54. What is the best next step?

- A. Insert an oropharyngeal airway
- B. Give epinephrine
- C. Start CPR
- D. Intubate and give PPV
- E. Increase PIP

Assuming that, instead of the persistence of poor chest rise, that attempts at airway management yielded adequate chest rise for 30sec, yet HR still dropped to 54. In this case, what would the best next step be?

- A. Insert an oropharyngeal airway
- B. Give epinephrine
- C. Start CPR
- D. Intubate and give PPV
- E. Increase PIP

A Review of the Later Portion of the NRP Algorithm

- As shown in the early portion of this half of the NRP algorithm, you are performing PPV and MR SOPA for a heart rate between 60 and 100. In our scenario, PPV and MR SOPA have not corrected your heart rate, which has dropped below 60, indicating impending cardiopulmonary collapse if something is not done immediately. It is important to note that, at this point, the algorithm alone does not provide all of the information needed.
- First, as highlighted by the case we just reviewed, you must ask yourself whether adequate chest rise and, therefore, adequate ventilation have been achieved. If not, the next step is

to intubate as quickly as possible and, once accomplished, apply PPV for 30 seconds via your ETT; this is essentially the most that you can do in neonatal resuscitation to ensure adequate ventilation. If this does not correct your heart rate (bring it above 60), then you are starting CPR.

- If you had adequate chest rise on PPV for 30 seconds without having to intubate (such as in the 2nd situation we discussed in Case #5) and your heart rate did not improve above 60, then you are also going to intubate and start CPR rapidly, the only difference being that you are not trialing PPV for 30 seconds before starting CPR, as we already know that adequate ventilation has not fixed the issue. By the time you are intubating or starting chest compressions, your EKG leads should be on, and FIO₂ should be 100%.
- CPR is performed by giving three chest compressions followed by one breath in every 2 seconds. Ideal compression depth is 1/3 the AP chest diameter and the preferred technique, according to the AHA, is the two thumbs-encircling hands technique, as some evidence shows that it may offer some advantages in generating peak systolic pressure and coronary perfusion pressure; the two-finger technique, however, is also acceptable.
- If the heart rate remains below 60 after 60 seconds of chest compressions, then you give epinephrine. The dose is 0.1-0.3mL/kg of 1:10,000 epi IV, or 0.5-1mL/kg endotracheally (which, notably, is less desirable, as it takes ~1min to take effect); you are repeating your epi every 3-5min if HR remains <60. If you are resorting to epinephrine, then you should be wondering why; the AHA states to make sure to consider hypovolemia, in which case you'd give a 10mL/kg NS bolus or pneumothorax, in which case you'd perform a needle thoracostomy. Once HR>60, chest compressions can be stopped, and once HR>100 and the infant is breathing spontaneously and adequately, then PPV can be stopped, as well. Make sure to continue supplemental O₂ until saturations are at goal, too.

Case #6:

You are attending the delivery of an infant with no prenatal care and of unknown gestational age. On delivery, her weight is estimated to be 1200g. She is apneic at birth and remains so despite your resuscitation efforts. What size ETT and laryngoscope blade will you use for the intubation, and at what depth (at the lip) will you secure the ETT?

- A: 2.5 ETT, 00 blade, inserted to 7.2cm
- B: 3.0 ETT, 00 blade, inserted to 7.5cm
- C: 3.0 ETT, 1 blade, inserted to 7.5cm
- D: 3.0 ETT, 0 blade, inserted to 7.2cm
- E: 2.5 ETT, 0 blade, inserted to 7.2cm

NRP "By the Numbers:"

- This is a list of the common settings and equipment as relates to neonatal resuscitation:
- ETT size:
 - By age: divide gestational age by 10 and round to nearest 0.5 (ex: 27wk = 2.5, 28wk = 3.0)
 - By size: <1 kg = 2.5, 1-2 kg = 3.0, 2-3 kg = 3.5, and >3 kg = 3.5 or 4.0

- ETT insertion depth: weight (kg) + 6
- Laryngoscope blade size: 00 for ELBW (<1kg), 0 for preterm >1kg, 1 for term
- Suction: 8-10Fr catheter set to 80-100mmHg
- Blowby flow: start at 10L/min
- PPV settings: start at PIP: 20-22 / PEEP: 5-6 and titrate by 5/1; RR40-60
- FiO₂ settings (CPAP, PPV): start at 21% for ≥35wks and 28 (21-30)% for <35wks
- Epinephrine dosing: IV 0.1-0.3 mL/kg, endotracheal 0.5-1mL/kg; start at 60sec of CPR, repeat every 3-5min for HR<60
- NS bolus: 10mL/kg
- HR: <60 = CPR, 60-100 = PPV
- SpO₂ goals: >60% at 1min, then at 5% per minute until 5min; after 5min should be >85-90%

Answer Key:

1. D
2. B
3. C
4. B
5. D, C
6. D

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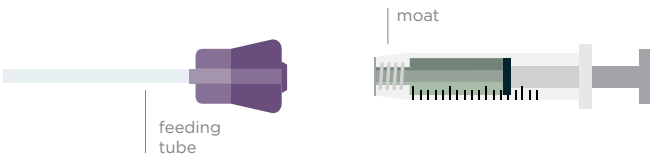
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INFECTION RISK

- The moat design can increase risk for infection if residual breast milk or formula remains in the moat and transfers to the feeding tube.

WORKFLOW ISSUES

- Increased nursing workflow is seen with additional steps for clearing syringe moats, cleaning tube hubs, and using multiple connectors.

Improved standards are important to protect patients from the dangers of tubing misconnections. But we must avoid mitigating existing risks by creating new ones.

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Barb Himes, IBCLC



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"The Covid-19 pandemic has triggered a decline in pediatric vaccination rates across the country, as parents avoid taking their children into clinics or hospitals for fear of coming into contact with the coronavirus."

One of the observations from the virtual 2020 Michigan Maternal Health Summit held in September, hosted by The Michigan Department of Health & Human Services, the Michigan Alliance for Innovation of Maternal Health (MI-AIM) & Maternal Infant Health (1), was that while we are now physically distanced, we are socially connected.

There is something hopeful-sounding in that, but in the maternal and infant health care arena, it is also a call to address change

and look at what being socially connected really means. We do not know how long the Covid-19 pandemic and the efforts to mitigate it will last, but it is fair to say it is likely to last longer than originally thought and that even when it begins to lift, things may still not go back to where they were before.

First Candle is anecdotally learning about shifts in behavior and care approaches through our Straight Talk for Infant Safe Sleep program, which works with health care professionals around the American Academy of Pediatrics' (AAP) safe sleep practices. These include the physical sleep environment for infants, the importance of maintaining maternal wellness visits, the benefits of breastfeeding, and the threat to maternal and infant health from health inequities and implicit bias.

What Is Emerging and Actions to Consider

- More mothers appear to be receptive to infant care information from providers because traditional influences from family members have, in some cases, been interrupted, as extended family members sometimes cannot visit at will due to pandemic distancing. This gives providers an opportunity but also a responsibility to foster a relationship through patient-centered approaches and implicit bias awareness.
- There are indications that breastfeeding is on the rise with mothers and newborns in hospitals before they are sent home. This is believed to stem from mothers having more quiet time due to curtailed visits. This may lead hospitals to reexamine their visitation policies long-term, to build in this "mom time."
- Compliance with wellness visits may be affected due to concerns about onsite clinic appointments and hitches in adapting to telemedicine practices on the part of both patients and physicians. Telemedicine, or telehealth, is here to stay and offers both benefits and challenges around accessibility, scheduling and providers learning how to develop a personal, "high touch" (as opposed to a "high tech") approach.
- The pandemic underscores the importance of paternal involvement throughout the birth process while at the same time, making it harder in some cases for this to happen. Some fathers may have jobs that cannot be done from home, may not be able to take time off, and may be dealing with their own concerns around Covid-19 exposure in the workplace.

As we noted in July's issue (2), paternal involvement has been



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shown to have a positive effect on maternal health behaviors and reduced risk of preterm birth, low birth weight, and infant mortality up to one year after birth, so efforts to work around limitations and incorporate them matter.

Patient-Centered Care

Another theme from the Michigan Summit (3) was the critical importance of a patient-centered approach. There can be an unwitting tendency on the part of providers to enter the patient-provider relationship as the expert, losing an opportunity to form a productive bond of mutual understanding with the patient and her partner.

In a regional qualitative survey presented at the Summit, respondents reported feeling a lack of relationship with healthcare providers and implicit bias. Perceptions included being rushed or dismissed during appointments; being judged by socioeconomic status or the number of children; and medical conditions not being addressed, which subsequently worsened.

Patients who appear to be non-compliant trigger the need to look further and determine if this is due to obstacles that can be addressed. Has she or her partner lost their job due to the pandemic? Are they making ends meet? Do they have transportation or online access? Can they get time off work? Are there problems or dangers in the relationship? Is she dealing with the consequences of adverse life experiences? There can be a veil to be lifted on non-compliance.

First Candle is also seeking to lift the veil as it advances its initiative to provide community feedback to the AAP as it develops the latest update to its Safe Sleep Guidelines, due to be released in 2021. A key part of this is convening community task forces in three states, including parents, grandparents, in-home health care providers, social service agencies, and doulas. They will share feedback on the Guidelines, the challenges and objections that exist in adopting them, and the role systemic racism plays in maternal and infant health and adoption of infant safe sleep practices. The AAP revisions will then be shared with the task forces, who will explore the best ways of effectively disseminating this information to their communities. These sessions were to be in person and will now have to be virtual, and extra care will need to be taken to create a personal connection throughout.

We realize that the Covid-19 crisis adds to the challenges the healthcare community is dealing with as providers work to improve health outcomes for mothers and babies. We do not yet know the extent of the economic impact as the pandemic continues, nor of the further threats to our population's health. And when a crisis like this occurs, it strains a system that is already trying to

stop mortality and morbidity resulting from health inequities due to racial and socioeconomic bias. Technology will play a bigger role, but with its great benefits will also come new challenges to work through.

However, as a presenter at the Michigan Summit summed it up: "We do the best we can until we know better, and then we do better."

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Disclosure: The author is the Director of Education and Bereavement Services of First Candle, Inc., a Connecticut not for profit 501c3 corporation.

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Center for
Research, Education, Quality & Safety

The Survey says RSV



What you need to know about RSV

RSV stands for **Respiratory Syncytial Virus**

RSV is a **Really Serious Virus**

WHEN IS RSV SEASON?

Typically RSV season runs from November - March. But it can begin as early as July in Florida and end as late as April in the West.

Protect babies and families this RSV season
Educate. Advocate. Integrate.

National Perinatal Association

Consult the CDC's RSV Census Regional Trends to learn more www.cdc.gov/rsv/census/tech/rsv-surveillance.html

www.nationalperinatal.org

5 THINGS

YOU CAN DO
TO CELEBRATE



NICU AWARENESS

1

Educate Yourself

Did you know that more than half of the babies admitted to NICUs were not born prematurely? See our fact sheets.

2

Post on Social Media

See examples at nicuawareness.org and nationalperinatal.org/NICU_Awareness

3

Recognize NICU Staff

Let them know the difference they are making in our babies' lives. Write a note, send an email, or deliver a gift to show them that you appreciate them.

4

Share Your Story

Most people have never heard of a NICU before. Let others know about the extraordinary care that NICUs provide.

5

Join Our Community

Get involved. Become a member of our organizations and share your talents.

This project is a collaboration between



www.nicuawareness.org

www.nationalperinatal.org/NICU_Awareness



Raising Global Awareness of RSV

Global awareness about respiratory syncytial virus (RSV) is lacking. RSV is a relatively unknown virus that causes respiratory tract infections. It is currently the second leading cause of death – after malaria – during infancy in low- and middle-income countries.

The RSV Research Group from professor Louis Bont, pediatric infectious disease specialist in the University Medical Centre Utrecht, the Netherlands, has recently launched an RSV Mortality Awareness Campaign during the 5th RSV Vaccines for the World Conference in Accra, Ghana.

They have produced a personal video entitled “*Why we should all know about RSV*” about Simone van Wyck, a mother who lost her son due to RSV. The video is available at www.rsvgold.com/awareness and can also be watched using the QR code on this page. Please share the video with your colleagues, family, and friends to help raise awareness about this global health problem.



RAM® Pressures: What You See is Not What You Get

Rob Graham, R.R.T./N.R.C.P.

I dedicate this column to the late Dr. Andrew (Andy) Shennan, the founder of the perinatal program at Women's College Hospital (now at Sunnybrook Health Sciences Centre). To my teacher, my mentor and the man I owe my career as it is to, thank you. You have earned your place where there are no hospitals and no NICUs, where all the babies do is laugh and giggle and sleep.

RAM® cannulae have been available to clinicians for several years. They have been used as an alternate interface to conventional continuous positive airway pressure (CPAP) interfaces, especially where there is evidence of compromised skin or nasal septal integrity and a primary interface for high flow (HF) administration.

Debate rages around whether or not this device delivers "real" CPAP, whether HF delivers real pressure, and, if so, how much. Intuitively clinicians have increased the set CPAP pressure to compensate for an assumed pressure loss through the prongs, but there is no data indicating how much it should be increased.

"Debate rages around whether or not this device delivers "real" CPAP, whether HF delivers real pressure, and, if so, how much. Intuitively clinicians have increased the set CPAP pressure to compensate for an assumed pressure loss through the prongs, but there is no data indicating how much it should be increased."

A study comparing different interfaces, including RAM®, revealed increased pressure setting requirements for both CPAP and non-invasive positive pressure ventilation (NIPPV), but the settings used were minimal. (1) Typical RAM® settings have been 2 cmH₂O higher than "conventional" CPAP pressure, but some babies do not seem to tolerate the interface at those pressures. Pressure may be increased to clinical effectiveness, but again we have (to the best of my knowledge) no idea as to what the limits are to either CPAP or HF settings; or how linear the delivered vs. set pressures

are as pressure or flow is increased. One study compared delivered oropharyngeal pressure obtained with conventional CPAP vs. RAM®, and it showed significantly lower pressure delivery with the latter interface, as well as greater breath to breath pressure variation. (2) To roughly estimate the delivered pressure through RAM® cannulae and assess the linearity of delivered pressure, I conducted a bench study using a Sechrist® Airway Pressure Monitor Model 400 and a Drager Babylog VN-500® ventilator set on either CPAP or oxygen therapy mode. (see Figure 1).

Pressure lines of equal length and diameter were used with the RAM® prongs inserted into the pressure lines. One line was left open to the air to simulate normal anatomical leakage. (Without the second pressure line measurements at the prongs themselves was zero). Measured pressure at the nasal prongs from the first pressure line was taken using each of the three-prong sizes: preemie, infant, and newborn.

"Measured pressure at the nasal prongs from the first pressure line was taken using each of the three-prong sizes: preemie, infant, and newborn."

Pressures were measured stepwise from CPAP of 7 - 15 cmH₂O, and high flow settings of 4 - 12 lpm. The ventilator could not provide flow higher than 12 lpm without pressure dumping. The resulting measurements are charted for CPAP in figure 2 and HF in figure 3.

A CPAP level of less than 5 cmH₂O is generally regarded as ineffective and is not used in the unit in which I practice. It is generally accepted that naturally occurring PEEP in spontaneously breathing, non-intubated patients is at least 2 cmH₂O, as a result of pressure generated by chest recoil against a closed glottis. While I could find no reference to support this, it stands to reason some physiologic PEEP must be present to prevent alveolar collapse and "sticky atelectasis". Maintaining alveolar patency is important to preserve surfactant function. It is possible this pressure is less in the premature infant due to decreased chest recoil.

In clinical practice, I would not use a CPAP level of less than 5 cmH₂O. These results indicate that a set CPAP level of less than 7 cmH₂O or a HF flow rate of less than 5 - 6 lpm using the RAM® interface would deliver sub-therapeutic pressures. Delivered pressure increased linearly with increasing set CPAP pressure (but not stepwise), and setting CPAP at double the pressure, did not double the delivered pressure. Delivered HF pressures increased exponentially with increasing flow rates to the limit of the ventila-

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tor's ability to do so without pressure dumping.

In CPAP mode, delivered pressure showed a small but consistent decrease in delivered pressure as prong size increased; however, this was not the case in HF mode. Ideally, intra-nasal or esophageal pressures should be measured to determine in vivo pressures and to determine the effects of spontaneously breathing on delivered pressure. This would require ethics approval and consent. That said, these measurements could be used as a guide for pressure setting in conjunction with clinical response and appear to match the 60-70% pressure delivery with RAM[®] found in another study. (3) The study also found that with a leak of >50%, negligible pressure was delivered to the simulated lung.

In intubated, conventionally ventilated patients, it is becoming accepted that the upper inflection point of the pressure-volume loop

represents the point of optimal PEEP.(4) If these measurements could be reliably taken while on non-invasive CPAP, it would greatly aid in establishing a proper CPAP level.

“In CPAP mode, delivered pressure showed a small but consistent decrease in delivered pressure as prong size increased; however, this was not the case in HF mode.”

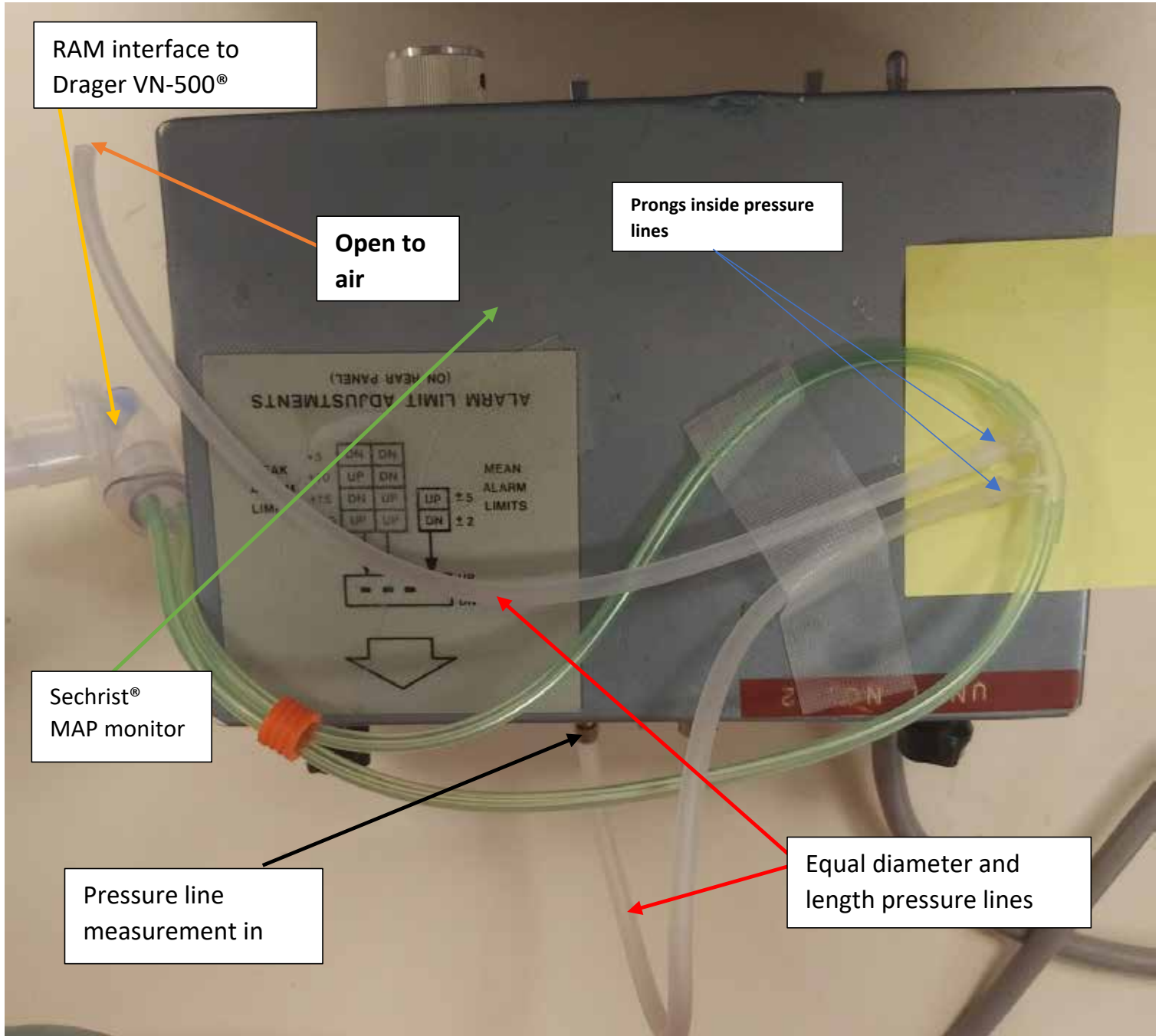
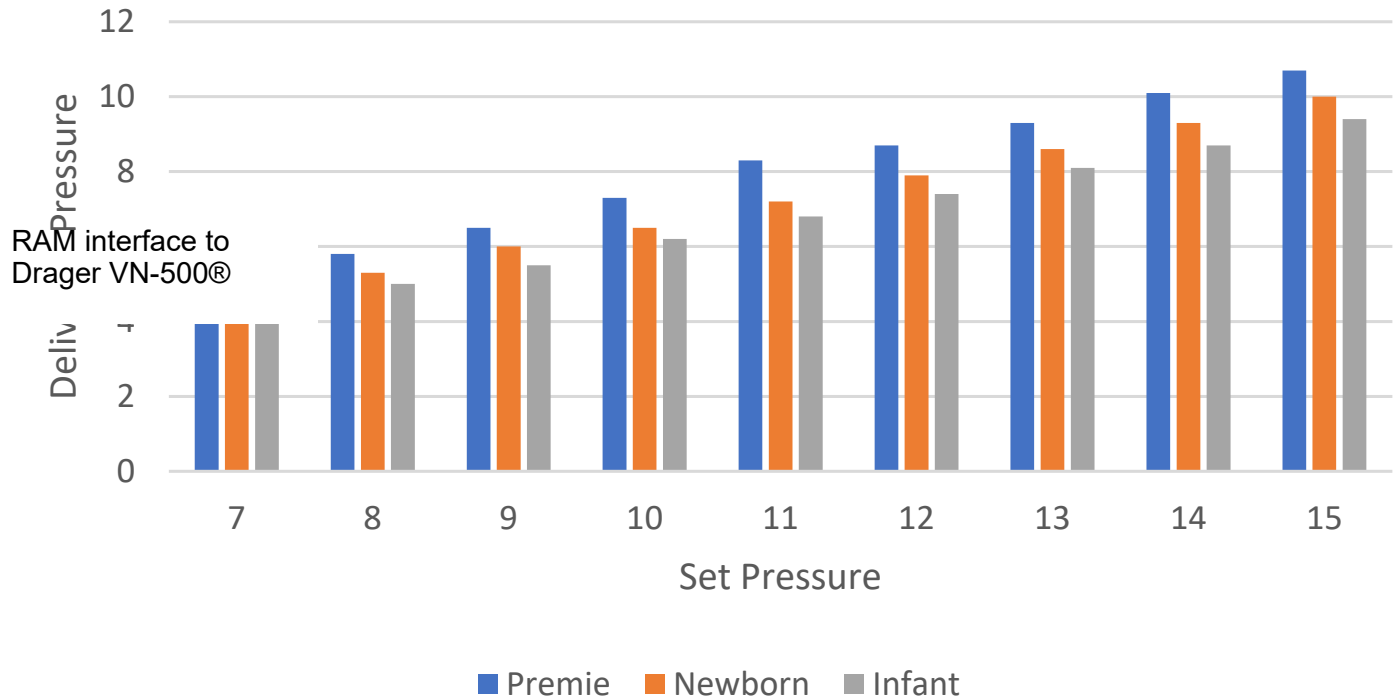


Figure 1: pressure measurement setup

RAM CPAP Pressure Set vs Delivered cmH_2O



Prongs inside pressure lines

RAM High Flow Set Flow vs Measured Pressure cmH_2O

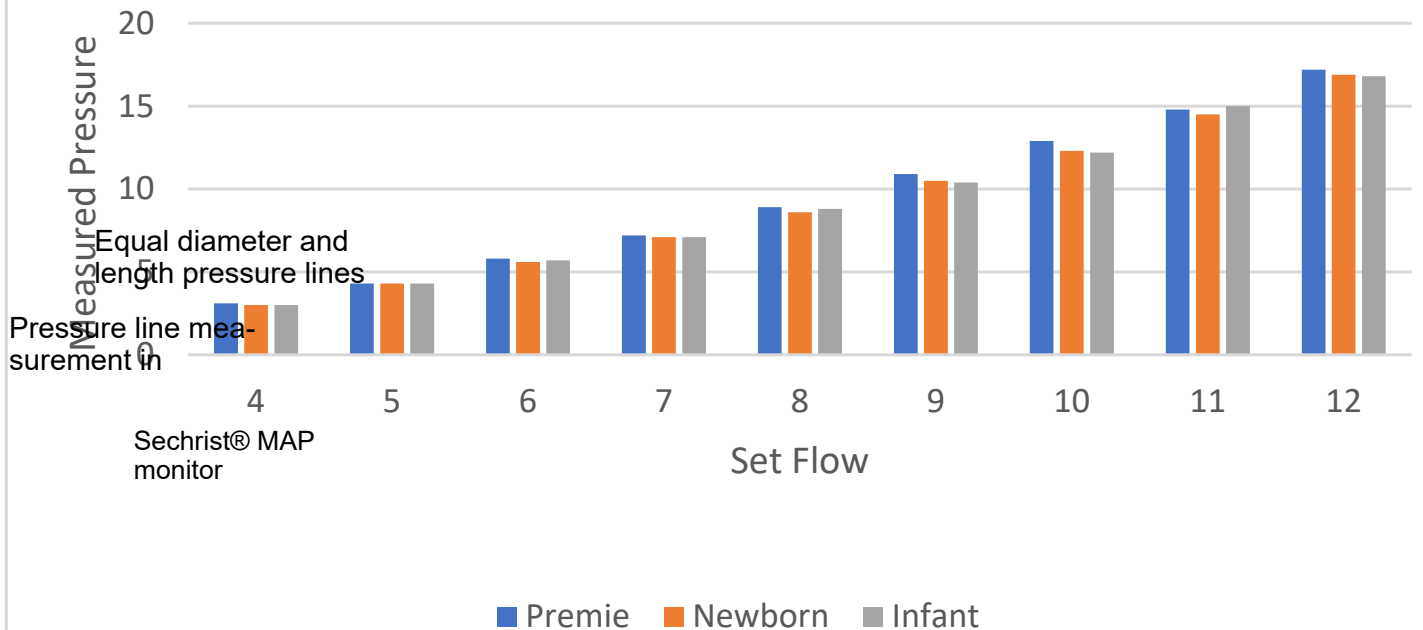


Figure 2: CPAP set vs delivered pressure from RAM cannulae

Figure 3: High flow RAM cannulae delivered pressure

Electrical diaphragmatic impedance (EDI) has been used clinically to guide optimal PEEP levels in mechanically ventilated patients and has predicted the likelihood of successful extubations. (This was done during initial evaluation in a study setting). EDI holds great promise for providing aid to clinicians in finding proper CPAP levels in intubated and non-intubated patients. This is a relatively new technology and is not readily available in many NICUs at present.

In summary, RAM® cannulae are widely used in clinical practice and are a viable option to other interfaces. Clinicians must be aware of, and compensate for, the delivered pressure difference. Clinicians must also take into account the limitations of flow and pressure delivery to improve success.

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Disclosures: The author receives compensation from Bunnell Inc for teaching and training users of the LifePulse HFJV in Canada. He is not involved in sales or marketing of the device nor does he receive more than per diem compensation. Also, while the author practices within Sunnybrook H.S.C. this paper should not be construed as Sunnybrook policy per se. This article contains elements considered "off label" as well as maneuvers, which may sometimes be very effective but come with inherent risks. As with any therapy, the risk-benefit ratio must be carefully considered before they are initiated.

NT

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Thirteen-year-old Emily Rose Shane was tragically murdered on April 3, 2010 on Pacific Coast Highway in Malibu, CA. Our foundation exists to honor her memory.

In Loving Memory

August 9, 1996 - April 3, 2010



Each year, the Emily Shane Foundation SEA(Successful Educational Achievement) Program provides academic and mentoring support to over 100 disadvantaged middle school students who risk failure and have no other recourse. We have served over 700 children across Los Angeles since our inception in the spring of 2012. Due to the COVID-19 outbreak, our work is in jeopardy, and the need for our work is greatly increased. The media has highlighted the dire impact online learning has caused for the very population we serve; those less fortunate. **We need your help now more than ever to ensure another child is not left behind.**

Make a Difference in the Life of a Student in Need Today!

Please visit emilyshane.org

Sponsor a Child in the SEA Program

The average cost for the program to provide a mentor/ tutor for one child is listed below.



1 session_____	\$15
1 week _____	\$30
1 month_____	\$120
1 semester_____	\$540
1 year_____	\$1,080
Middle School_____	\$3,240

The Emily Shane Foundation is a 501(c)3 nonprofit charity, Tax id # 27-3789582. Our flagship SEA (Successful Educational Achievement) Program is a unique educational initiative that provides essential mentoring/tutoring to disadvantaged middle school children across Los Angeles and Ventura counties. All proceeds directly fund the SEA Program, making a difference in the lives of the students we serve.

In Memorium: Sister Jeanne Marie Meurer

Maryanne F. Laffin, RN, FNP, CNM, LM, MS, FACNM

The National Perinatal Association (NPA) is an interdisciplinary organization that strives to be a leading voice for perinatal care in the United States. Our diverse membership is comprised of healthcare providers, parents & caregivers, educators, and service providers, all driven by their desire to give voice to and support babies and families at risk across the country.

Members of the NPA write a regular peer-reviewed column in *Neonatology Today*.



"We are sad to share the passing of Sister Jeanne Marie Meurer, who was born in 1930 in Minnesota and died recently at the age of 90"

We are sad to share the passing of Sister Jeanne Marie Meurer, who was born in 1930 in Minnesota and died recently at the age of 90.

Sister Jeanne, as she was known, was a leader in perinatal health care. She helped establish nurse-midwifery as a profes-

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Sister Jean Meurer
CNM, Missouri

sion and initiated the graduate program of nurse-midwifery at Saint Louis University in the 1970s.

She earned her bachelor's (1955) and her

"On an international level, she studied maternal nursing and midwifery in Norway, Denmark, Sweden, and Finland under a World Health Organization (WHO) fellowship. Later in her career, she traveled to Egypt as a nursing consultant for the United States Assistance International Development. She taught maternal child health in Jamaica."

master's in nursing service administration (1962), both through Saint Louis University; and her masters in maternity nursing with a certificate in midwifery through Columbia University, New York (1970). She was certified in nurse-midwifery through

the American College of Nurse Midwives (1971) and became a fellow (FACNM) in 1994. She earned a master's in pastoral studies through the Aquinas Institute of Theology (1998).

Her long career included working as head nurse of St. Mary's Health Center's Labor and Delivery and Nursery and as a pediatric supervisor at the Cardinal Glennon Children's Medical Center. She supervised obstetrics and taught in the School of Nursing, both at St. Mary's Hospital in Madison, Wisconsin

Sister Jeanne was a trailblazer in Missouri. She taught at Saint Louis University (1970-82) and was the first nurse-midwife to practice in Missouri. She opened the first nurse-midwifery service in the state of Missouri (1971-82). In 1972 Sister Jeanne began the graduate program of nurse-midwifery at Saint Louis University.

On an international level, she studied maternal nursing and midwifery in Norway, Denmark, Sweden, and Finland under a World Health Organization (WHO) fellowship. Later in her career, she traveled to Egypt as a nursing consultant for the United States Assistance International Development. She taught maternal child health in Jamaica.

In 1982, she began Ruskin Migrant and Community Health Service, a federally funded nurse-midwifery program for migrants, Florida. In 1998 she co-founded Woman's Place, a safe drop-in haven for women suffering from domestic abuse, co-directing until 2006. She served on the St. Louis County Domestic and Family Violence

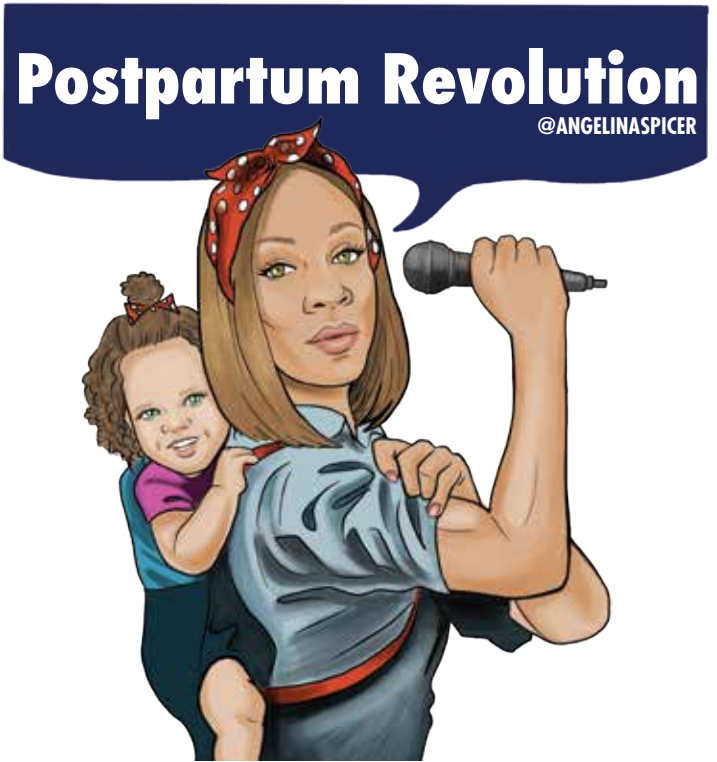
lence Council. She was intensely involved in the community and political affairs, especially environmental, migrant, and ecological concerns. In 2014 she received the "Legend in Nursing" Award from the March of Dimes.

Sister Jeanne was a Fellow of the American College of Nurse-Midwives, as well as a Vice-President. In 2002 she was the recipient of ACNM's prestigious Hattie Hemschemeyer Award.

Sister Jeanne was an Emeritus President of the National Perinatal Association and worked tirelessly in promoting perinatal care to families.

Disclosure: The National Perinatal Association www.nationalperinatal.org is a 501c3 organization that provides education and advocacy around issues affecting the health of mothers, babies, and families.

NT



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NATIONAL PERINATAL ASSOCIATION

Update: **CORONAVIRUS**
COVID-19



According to the CDC
Breast milk provides protection against many illnesses.

KEEP GIVING YOUR BABY YOUR MILK
even if you're sick.

THERE ARE RARE EXCEPTIONS. ASK YOUR HEALTHCARE TEAM.



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SHARED DECISION-MAKING PROTECTS MOTHERS + INFANTS

DURING COVID-19

KEEPING MOTHERS + INFANTS TOGETHER

Means balancing
the risks of...

- **HORIZONTAL INFECTION**
- **SEPARATION AND TRAUMA**



EVIDENCE

We encourage families and clinicians to remain diligent in learning **up-to-date evidence**.



PARTNERSHIP

What is the best
for this unique dyad?

SHARED DECISION-MAKING

- S**EEK PARTICIPATION
- H**ELP EXPLORE OPTIONS
- A**SSASS PREFERENCES
- R**EACH A DECISION
- E**VALUATE THE DECISION



TRAUMA-INFORMED

Both parents and providers
are confronting significant...

- **FEAR**
- **GRIEF**
- **UNCERTAINTY**

LONGITUDINAL DATA

We need to understand more about outcomes for mothers
and infants exposed to COVID-19, with special attention to:

- **MENTAL HEALTH**
- **POSTPARTUM CARE DELIVERY**



NEW DATA EMERGE DAILY. NANN AND NPA ENCOURAGE PERINATAL CARE PROVIDERS TO ENGAGE IN CANDID CONVERSATIONS WITH PREGNANT PARENTS PRIOR TO DELIVERY REGARDING RISKS, BENEFITS, LIMITATIONS, AND REALISTIC EXPECTATIONS.

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NICU Awareness

Did You Know?

Most NICU babies have special needs that last longer than their NICU stay. Many will have special health and developmental needs that last a lifetime. But support is available.

Learn about the programs in your community. Seek out other families like yours. Then ask for help. Working together we can create a community where our children will grow and thrive.

Special Health Needs

Babies who have had a NICU stay are more likely to need specialized care after they go home. **Timely follow-up care is important.**

NICU babies have a higher risk for re-hospitalization. So every medical appointment is important. Especially during cold and flu season when these babies are especially vulnerable to respiratory infections.

Who Can Help

- pediatricians
- neonatal therapists
- pulmonologists
- neurologists
- gastroenterologists
- cardiologists
- nutritionists
- CSHCN - Programs for Children with Special Health Care Needs

Special Developmental Needs

Any NICU stay can interrupt a baby's growth and development.

Needing specialized medical care often means that they are separated from their parents and from normal nurturing.

While most NICU graduates will meet all their milestones in the expected developmental progression, it is typical for them to be delayed. This is especially true for preterm infants who are still "catching up" and should be understood to be developing at their "adjusted age."

Who Can Help

- IBCLCs and lactation consultants
- Early Childhood Interventionists
- developmental pediatricians
- occupational therapists (OTs)
- physical therapists (PTs)
- speech therapists (SLPs)
- WIC - Special Supplemental Nutrition Program for Women, Infants, and Children
- social workers and case managers

Special Educational Needs

Every child has their own unique developmental needs and **every student has their own unique and special educational needs.**

Take advantage of the services and support that can meet your child where that are and help them reach their future educational goals.

Call your local school district to request a free educational evaluation. Learn about all the available programs and support.

Who Can Help

- Preschool Program for Children with Disabilities (PPCD)
- Special Education programs under the Individuals with Disabilities Education Act (IDEA)
- educational psychologists
- speech therapists (SLPs)
- occupational therapists (OTs)
- reading specialists



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The Gap Baby: An RSV Story



A collaborative of professional, clinical, community health, and family support organizations improving the lives of premature infants and their families through education and advocacy.



The National Coalition for Infant Health advocates for:

- **Access to an exclusive human milk diet** for premature infants
- **Increased emotional support resources** for parents and caregivers suffering from PTSD/PPD
- **Access to RSV preventive treatment** for all premature infants as indicated on the FDA label
- **Clear, science-based nutrition guidelines** for pregnant and breastfeeding mothers
- **Safe, accurate medical devices** and products designed for the special needs of NICU patients

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The Case for Expanding the Midwifery-led Model of Care

Michelle Winokur, DrPH, and the AfPA Governmental Affairs Team, Alliance for Patient Access (AfPA)

The Alliance for Patient Access (allianceforpatientaccess.org), founded in 2006, is a national network of physicians dedicated to ensuring patient access to approved therapies and appropriate clinical care. AfPA accomplishes this mission by recruiting, training and mobilizing policy-minded physicians to be effective advocates for patient access. AfPA is organized as a non-profit 501(c)(4) corporation and headed by an independent board of directors. Its physician leadership is supported by policy advocacy management and public affairs consultants. In 2012, AfPA established the Institute for Patient Access (IfPA), a related 501(c)(3) non-profit corporation. In keeping with its mission to promote a better understanding of the benefits of the physician-patient relationship in the provision of quality healthcare, IfPA sponsors policy research and educational programming.



While the novel coronavirus has rocked the country's health and economic systems, we cannot let it overshadow other public health issues that existed prior to it, and that will continue beyond it. One such issue is poor maternal and child health outcomes, the topic of a new Institute for Medicaid Innovation resource report. The report highlights an intriguing potential solution: expanding the midwifery-led model of care.

“While the novel coronavirus has rocked the country’s health and economic systems, we cannot let it overshadow other public health issues that existed prior to it, and that will continue beyond it. One such issue is poor maternal and child health outcomes, the topic of a new Institute for Medicaid Innovation resource report.”

[“Improving Maternal Health Access, Coverage, and Outcomes in Medicaid”](#) defines midwifery-led continuity of care as care provided when the midwife leads the “planning, organization, and delivery of care given to a woman from initial booking to the postnatal period.” It can occur in a variety of practice settings including freestanding or alongside birth centers as well as hospitals and clinics.

In contrast, traditional obstetrical care is usually provided in a hospital setting by a medical doctor, and it typically involved intensive monitoring. While that level of care may be appropriate for high-risk pregnancies, the report points out, low- to medium-risk women may be better served by midwifery-led care. But expanding midwifery-led care can be challenging for state Medicaid agencies, and Medicaid managed care organizations, coordinating care for Medicaid recipients.

Midwifery-led care can benefit both the patient receiving care and the health care system. The report references a review that found “lower rates of cesarean deliveries, preterm births, and interventions such as labor induction and regional anesthesia, and higher rates of breastfeeding.” Overuse of unnecessary medical interventions are expensive, so reducing them can help lower costs. Integrating the use of midwives can also reduce clinical burnout on physicians.

“To ease the burden of developing a midwifery-led care approach, the Institute of Medicaid Innovation’s report answers specific, critical questions about variations in access and coverage between the Medicaid population and commercially insured patients, about billing codes and quality measures, and emergency payment and contracting approaches, among others.”

To ease the burden of developing a midwifery-led care approach, the Institute of Medicaid Innovation’s report answers specific, critical questions about variations in access and coverage between the Medicaid population and commercially insured patients, about billing codes and quality measures, and emergency payment and contracting approaches, among others. The report also features case studies that identify best practices, innovative initiatives, and lessons learned in making midwifery-led care more available.

The community of Hope, a nationally accredited birth center that is linked to a large Federally Qualified Health Center (FQHC) in Washington D.C., offers an example of an alternative payment model that makes midwifery-led care more accessible. By joining the birth center with an FQHC, the organizations have been able to share fixed costs. Beyond financial savings, though, the part-

nership has brought midwifery-led care to the community through a trusted organization—the FQHC. Even though most women who get prenatal care at Community of Hope deliver at hospitals, the case study points out, “families continue to visit the clinic for their ongoing health needs after birth.”

Baby and Company, a Nashville-based for-profit company, developed as a network of private equity-backed, freestanding birth centers, provides an example of how some Medicaid payment and contracting provisions can impact the profitability of the midwifery-led model. It encountered insurmountable financial and regulatory barriers that forced the Company to close all but one birth center. Baby and Company’s experience underscores the importance of statewide policies that increase access to and support the sustainability of freestanding birth centers.

“By leveraging the opportunities identified in the Institute for Medicaid Innovation report, policymakers can help make the business case, increase awareness, and clear a policy path for expanding midwifery-led care.”

Research indicates an opportunity to improve maternal health outcomes through expanded use of the midwifery-led model of care. By leveraging the opportunities identified in the Institute for Medicaid Innovation report, policymakers can help make the business case, increase awareness, and clear a policy path for expanding midwifery-led care.

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Still a Premie?

Some preemies are born months early, at extremely low birthweights. They fight for each breath and face nearly insurmountable health obstacles.

But that’s not every preemie’s story.

Born between 34 and 36 weeks’ gestation?

STILL A PREMIE

Just like preemies born much earlier, these “late preterm” infants can face:

Jaundice Feeding issues Respiratory problems

And their parents, like all parents of preemies, are at **risk for postpartum depression and PTSD.**

Born preterm at a “normal” weight?

STILL A PREMIE

Though these babies look healthy, they can still have complications and require NICU care.

But because some health plans determine coverage based on a preemie’s weight, **families of babies that weigh more may face access barriers and unmanageable medical bills.**

Born preterm but not admitted to the NICU?

STILL A PREMIE

Even if preterm babies don’t require NICU care, they can still face health challenges.

Those challenges can extend through childhood, adolescence and even into adulthood.

Some Premies

- Will spend weeks in the hospital
- Will have lifelong health problems
- Are disadvantaged from birth

All Premies

- Face health risks
- Deserve appropriate health coverage
- Need access to proper health care

NCJIH National Coalition for Infant Health
 Protecting Access for Premature Infants through Age Two
www.infanthealth.org

Babies are just tiny adults, right? So ... half?

Infants need drugs tested and approved just for them.

Center for Clinical Trials
Analysis

NC/ITP
National Coalition
for Infant Trials



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Heart Rate Characteristics Monitoring and Viral Infection in the Neonatal Intensive Care Unit

William E King, MS, Jose Perez, MD

Background

There is a growing appreciation of the prevalence, morbidity, and mortality of viral infections in neonatal intensive care units (NICUs). Studies have found that 7-55% of premature infants tested positive for viruses (1-5). Outbreaks of viruses in NICUs have been described, including adenovirus (6-8), coronavirus (9), echovirus (10), herpes simplex virus (HSV, 11), influenza (12), parainfluenza (13,14), respiratory syncytial virus (RSV, 15), rhinovirus/enterovirus (16-20), and rotavirus (21), while cytomegalovirus (CMV, 22) and respiratory viruses (23) have been detected among NICU patients undergoing sepsis evaluation. A viral infection is associated with a longer duration of mechanical ventilation (1) and length of stay (1,5,24), prolonged antibiotic exposure (5), as well as a greater risk of bronchopulmonary dysplasia (1,5) and mortality (24-26). Viral infections can be difficult to differentiate from bacterial infections without appropriate testing, which may contribute to unnecessary exposure to antibiotics (10).

Heart Rate Characteristics monitoring (HRC; aka HeRO monitoring, Medical Predictive Science Corporation, Charlottesville, Virginia) has been proven to decrease all-cause NICU mortality (27), mortality after infection (28), mortality at 18-22 months (29), mortality-or-severe-cerebral-palsy at 18-22 months (29), and NICU length of stay (30). The probable mechanism was earlier detection of infection, leading to earlier and more effective intervention (28). Indeed, the Heart Rate Characteristics index (HRCi; aka HeRO Score) has been shown to predict sepsis (31-41), UTI (42), NEC (43,44), meningitis (42), respiratory decompensation (45), extubation readiness (46,47) and death (48-52), and is associated with cytokines (53-55).

No previous attempts have been made to characterize the predictive ability of HRC monitoring to assess viral infection apart from other infections.

Methods

We analyzed 2989 Very Low Birth Weight (VLBW) patients enrolled in the HeRO randomized controlled trial (27). Briefly, patients at nine NICUs were randomized shortly after birth or transfer to one of two arms: either standard of care or standard of care plus HRC monitoring. There were no mandated interventions other than displaying the hourly HRC index to clinicians for those patients randomized to the HRC-display arm. Demographic and clinical variables were tracked for each patient, including all blood, urine, CSF, respiratory, peritoneal, and other cultures with their results.

Among all HRC index scores in the RCT database, cases were defined as HRC index scores in the 24-hour period immediately preceding culture of any type (blood, urine, CSF, respiratory, peritoneal, or other) with a result coded as CMV, HSV, RSV, or Other Viral. For each Other Viral code, the Comments field was examined manually, and an automated script was developed. Other Viral results containing the string "herpes" were re-coded as HSV. Other Viral results containing the strings "para," "flu," or "rota" were coded accordingly, whereas those where the Comments text entered by the research nurse included "urea," "myco," "hemophilus," or "haemophilus" were discarded from the analysis. All strings were converted to uppercase prior to matching, and the match for "para" was performed and coded prior to matching/

coding for "flu."

"We analyzed 2989 Very Low Birth Weight (VLBW) patients enrolled in the HeRO randomized controlled trial (27). Briefly, patients at nine NICUs were randomized shortly after birth or transfer to one of two arms: either standard of care or standard of care plus HRC monitoring."

We defined control (well patient) data as those scores, not within ± 10 days of any blood, urine, CSF, respiratory, peritoneal, and other cultures, regardless of the result. HRC index scores within ± 10 days of culture were ignored from this analysis unless they were defined as cases.

Analyses were performed with cases defined as a specific virus (CMV, HSV, Rotavirus, RSV, Parainfluenza, or Influenza) and as grouped by Order, then Class where the number of cases was small.

For both cases and controls, we analyzed the highest HRC index score in each 24-hour period (HeROMax24). We compared the distributions of HeRO scores between cases and controls using a two-tailed student t-test, setting significance at $p < 0.05$. We also calculated the area under the curve of the receiver operating characteristics curve (AUC ROC) with 95% confidence intervals. For the assessment of Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, and Risk Ratio, we defined a threshold of HeROMax24 > 2.0 . All calculations were performed in R (R Core Team) (56).

Results

"For both cases and controls, we analyzed the highest HRC index score in each 24-hour period (HeROMax24). We compared the distributions of HeRO scores between cases and controls using a two-tailed student t-test, setting significance at $p < 0.05$."

Baseline demographics of the patient population were described elsewhere and were not different between the two arms (27).

Cases	n	ROC (CI)	Sens	Spec	PPV	NPV	Risk Rat	p
HSV	4	.910 (.822-.999)	50%	92%	.07%	99.99%	11.7x	.10
CMV	7	.708 (.479-.936)	43%	92%	.10%	99.99%	8.8x	.16
Order Herpesvirales	11	.781 (.625-.938)	45%	92%	.17%	99.98%	9.7x	.035
Rotavirus	2	.846 (.544-1.00)	50%	85%	.02%	99.997%	11.7x	.49
Class incertae sedis	13	.791 (.655-.928)	46%	92%	.20%	99.98%	10.0x	.034
RSV	6	.755 (.552-.959)	50%	92%	.10%	99.99%	11.7x	.13
Parainfluenza	4	.795 (.633-.956)	25%	92%	.03%	99.99%	3.90x	.18
Class Monjiviricetes	10	.771 (.639-.903)	40%	92%	.13%	99.98%	7.79x	.045
Influenza	7	.884 (.778-.989)	71%	92%	.17%	99.99%	29.2x	.016
All Viral	30	.806 (.729-.883)	50%	92%	.50%	99.96%	11.6x	.0011

Table 1. Predictive statistics comparing the maximum HeRO Score in the 24 hours prior to positive viral culture against maximum HeRO Score in 24 hours periods for controls. Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, and Risk Ratio were all calculated at a threshold of HeRO > 2.0. Rows with significant results are bold.

Controls included a total of 37,768 days of HRC index scores. Table 1 details the results of these analyses. Positive viral cultures were rare in this population, with 30 positive results among 2989 patients. In each of the analyses, there was a trend toward higher HeRO Scores among the viral-positive cases when compared to controls. The trend was statistically significant whenever the number of cases was greater than seven, and non-significant whenever there were fewer. HeRO scores were statistically significantly higher for All Viruses, Influenza, Class Monjiviricetes, Class incertae sedis, and Order Herpesvirales. HSV, CMV, RSV, Parainfluenza showed non-significant trends toward higher HeRO

Scores. The AUC ROC was .806 (.729-.883) for All Viral infections, Sensitivity was 50%, Specificity 92%, Positive Predictive Value .50%, Negative Predictive Value 99.96%, Risk Ratio 11.6x, p=0.0011. The boxplot in Figure 1 shows the range across all cases of each individual's maximum HeRO Score in the 24 hours prior to culture, with Controls for comparison. Figure 2 shows the trend in the range of each individual's maximum HeRO Score for the ten days before and after a positive viral culture compared with ranges of individual maximum HeRO Score in 24-hour periods for controls. HeRO Score rose dramatically, beginning four days prior to culture.

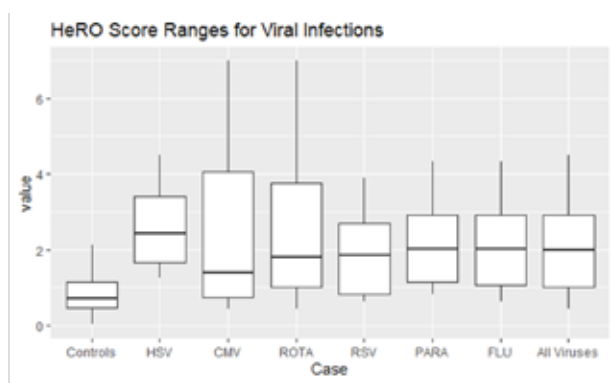


Figure 1. Boxplot of HeRO Score Ranges for Viral Infections. The box represents the 25th and 75th percentiles, the bold line represents the median. The whiskers represent 1.5x the IQR.

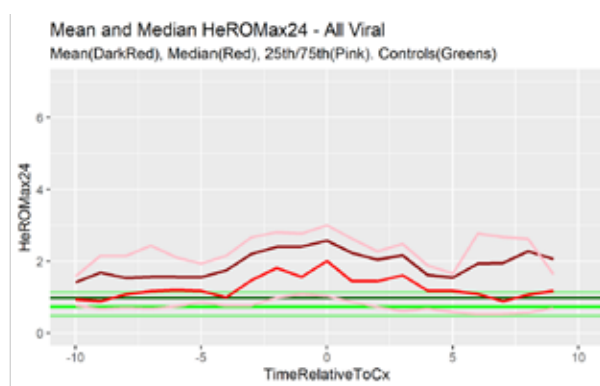


Figure 2. HeRO Scores for 10 days before and after positive viral infections (red) versus controls (green).

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Discussion

We found the HRC index to have excellent predictive characteristics for viral infections, similar to other previously described forms of infection. There are several important implications of this result. First, clinicians ordering a sepsis workup subsequent to an elevated HeRO score should consider including viral testing. A positive viral result could be used to initiate appropriate therapy and reduce unnecessary antimicrobial exposure in cases that might otherwise be considered clinical sepsis.

Second, given the nature of viral outbreaks within NICUs, HeRO monitoring acting as a NICU-wide surveillance system may improve the timing of diagnoses on an individual basis and earlier recognition of a viral outbreak within the NICU itself, leading to greater containment and reduced morbidity and mortality.

Third, in an era of increased global trade, supply chains, and travel, viral epidemics may become increasingly prevalent. Worldwide surveillance systems are challenged by variations in resources, availability, consistency of testing, terminology, and patient populations' heterogeneity. A worldwide network of HeRO-monitored NICUs would offer a unique signal among a cohort of relatively homogeneous patients where unexpected deviations from expected patterns in HeRO Score distributions may indicate increased incidence and transmission among the local community, perhaps prior to this signal manifesting through traditional means of surveillance.

Weaknesses of the current study include the retrospective nature of the analysis and the small number of positive viral cultures limiting our ability to provide statistically significant results for many individual types of viruses. Strengths of this analysis include a large number of patients at a geographically disperse set of NICUs conducted over a six-year period, as well as the consistency of results—both between types of viruses as well as comparing viruses to other forms of infection.

Conclusion

Heart Rate Characteristics monitoring has clinical utility in the assessment of viral infections in the NICU. Clinicians may be able to reduce unnecessary antibiotic exposure and improve therapy for symptomatic patients.

“Heart Rate Characteristics monitoring has clinical utility in the assessment of viral infections in the NICU. Clinicians may be able to reduce unnecessary antibiotic exposure and improve therapy for symptomatic patients.”

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- Hospitalization
- Lifelong health complications
- Death

for infants and young children



ACCORDING TO A NATIONAL SURVEY, Specialty Health Care Providers say:

- 80% They treat RSV as a priority, "often" or "always" evaluating their patients
- 77% RSV is the "most serious and dangerous" illness for children under four
- 77% Barriers to access and denials from insurance companies limit patients' ability to get preventive RSV treatment



But Parents are Unprepared.

- 18% Only 18% know "a lot" about RSV
- 22% Only 22% consider themselves "very well" prepared to prevent RSV



RSV EDUCATION & AWARENESS CAN HELP

After parents learned more about RSV, they were:

- 65% "More concerned" about their child contracting the disease
- 67% Likely to ask their doctor about RSV



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BY JENNÉ JOHNS

AUTHOR | SPEAKER | ADVOCATE



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Case Report: Extremely Premature Infant without Spontaneous Movements Born to a Mother following COVID-19 Infection

Shaina Khan Lodhi, MD

Delivery Course:

The neonatal intensive care unit (NICU) team was called to the delivery of an infant at 24 weeks of gestation. The mother had been transferred from a referring hospital with complaints of decreased fetal movements. There was a non-reassuring fetal heart rate due to absent variability and a low biophysical profile (BPP) of 2/8 on the first examination at the birth hospital, so the decision was made to proceed with an emergent C-section.

“At the time of delivery, NICU was present in an anteroom next to the operating room due to isolation for COVID-19. The infant was limp and non-vigorous, with a heart rate of <100, and positive pressure ventilation (PPV) was started immediately on arrival to the warmer.”

Of note, the mother had tested positive for COVID-19 two weeks prior to the delivery.

Neonatal Resuscitation:

At the time of delivery, NICU was present in an anteroom next to the operating room due to isolation for COVID-19. The infant was limp and non-vigorous, with a heart rate of <100, and positive pressure ventilation (PPV) was started immediately on arrival to the warmer. The infant was noted to have a previously undiagnosed cleft lip and palate on the left, which made ventilation difficult. Despite adequate PPV, the heart rate did not improve. Endotracheal intubation was challenging, and the infant was successfully intubated at 14 minutes of life. The heart rate increased immediately following intubation; however, the infant's saturations remained low, 20-30% while on 100% oxygen with PPV. The infant was transferred to an isolation room in the NICU, where he was placed on a high-frequency jet ventilator, with improvement in the saturation and the color of the infant. However, the infant's tone remained extremely poor, and no spontaneous movements or breathing effort was noted.

Apgar scores were:

- 1 (0 color, 0 reflex, 0 resp, 0 tone, 1 HR) **at 1 minute.**
- 1 (0 color, 0 reflex, 0 resp, 0 tone, 1 HR) **at 5 minute.**
- 1 (0 color, 0 reflex, 0 resp, 0 tone, 1 HR) **at 10 minute.**
- 3 (0 color, 0 reflex, 1 resp, 0 tone, 2 HR) **at 15 minute.**
- 4 (0 color, 0 reflex, 2 resp, 0 tone, 2 HR) **at 20 minute.**

Assessment:

Birth weight:	955 g	(99th percentile)
Birth length:	32.5 cm	(69th percentile)
Birth head circumference:	23.8 cm	(90th percentile)

This male infant was large for gestational age and, on the exam, appeared very edematous. Modified Ballard examination was consistent with a gestational age of 24 weeks. Unilateral left cleft lip and palate was noted, without any other evident anomalies. The infant was profoundly hypotonic with no spontaneous movements, and no reflexes were elicited.

Review of Maternal Records:

On further review of maternal records and discussion with the mother, it was revealed that the mother had symptoms of an upper respiratory infection 2.5 weeks prior to delivery and then had a worsening cough and shortness of breath. She was hospitalized for two days but did not require ventilator support. She tested positive for COVID-19 during this hospitalization. Due to her hospitalization and COVID-19 positive status, she was unable to go for her scheduled fetal anatomy scan. Besides the positive COVID-19 test, prenatal tests were unremarkable.

She had noticed a lack of spontaneous fetal movements three days prior to the delivery. She had gone to the referring hospital the same day, and although the initial BPP was reassuring, all the subsequent ones were low, at 2/8, scored for amniotic fluid index. Delivery was offered but declined initially. The mother received a 2-day course of steroids, after which delivery was offered again and accepted. However, the parents requested to be transferred to a center better equipped to care for extremely premature infants, which had prompted a transfer to the birth hospital.

Hospital Course:

In the NICU, the infant was started on total parenteral nutrition and continued on the high-frequency jet ventilator. Due to persistently low arterial blood pressures, a dopamine drip was initiated and titrated. Antibiotics were initiated after obtaining a blood culture. A head ultrasound was done on the first day of life, given the prolonged resuscitation and lack of spontaneous activity in the infant, and showed slightly prominent ventricles without evidence of intracranial hemorrhage. Cerebral and renal near-infrared spectroscopy (NIRS) was started per protocol.

Due to the findings of cleft lip and palate, echocardiography and abdominal ultrasounds were ordered to look for other congenital anomalies. The echocardiogram was normal, and abdominal ultrasound demonstrated some free fluid adjacent to the liver. A chromosomal microarray was sent.

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At 20 hours of age, the infant continued to have profound hypotonia and a lack of any spontaneous movements or respiratory effort. The mother of the infant was updated in person regarding these findings. The infant was transitioned from the high-frequency ventilator to a conventional ventilator on the assist control/volume guarantee mode. Amplitude integrated electroencephalography (aEEG) was initiated. SARS-COV2 RNA test done from a nasopharyngeal swab for the infant at 24 hours of life was negative.

At 42 hours of age, there was no improvement in the neurological exam. There continued to be no spontaneous movement or respiratory effort, and the infant remained severely hypotonic. He was not reactive to exam or painful stimuli. Both pupils were dilated and fixed. Cerebral NIRS was mostly above 85%, and aEEG demonstrated a burst suppression pattern with a severely suppressed background. Given these findings and prenatal history, the parents decided to transition to comfort care. The infant was extubated in the mother's arms and passed away soon after, at 47 hours of age.

Post-mortem results:

An autopsy was performed and was significant for an infant between 24-26 weeks' gestation with a unilateral cleft lip and palate, moderate facial hirsutism, small body cavity effusions, heavy lungs with congestion, edema, and patchy mild airspace hemorrhage, and mild congestive hepatosplenomegaly.

Placental pathology demonstrated moderate to marked decidual arteriopathy with fibrinoid necrosis, low placental weight for gestational age (<10th percentile), parenchyma with accelerated villous maturation for gestational age, and trivascular umbilical cord and membranes with no significant inflammation. The combination of decidual arteriopathy, low placental weight, and accelerated villous maturation supported the diagnosis of maternal vascular malperfusion.

The chromosomal microarray detected several large regions of homozygosity (3 megabases or larger), encompassing nearly 2% of the genome. Although this result was not diagnostic of a specific genetic condition, it raises the possibility of an autosomal recessive disorder due to the presence of a homozygous mutation in one of these regions.

Discussion:

The 2014 executive summary of a joint workshop including the American Academy of Pediatrics and American College of Obstetricians and Gynecologists defines periviable as 20 0/7 through 25 6/7 weeks of gestation and recommends antenatal corticosteroids, Cesarean delivery for fetal indications, and aggressive newborn resuscitation for an infant at 23 0/7 weeks or more unless considered nonviable based on individual circumstances (1). This infant was considered periviable at the time of delivery and underwent aggressive resuscitation. However, upon further review of the maternal records, the infant had had no spontaneous movements noticeable by the mother or on a biophysical profile for several days prior to the delivery, which arguably, may have been an indication to limit the extent of resuscitative efforts offered. This infant likely had an event that neurologically devastated him prenatally and led to a loss of movement. After delivery, the neurological status remained poor, and chances of recovery were low, which led to transitioning to comfort care in this infant.

The cause of this infant's lack of movements at 24 weeks of gestation is unclear. The presence of the cleft lip and palate and a large region of homozygosity found on the chromosomal microarray, although not fatal on their own, could be indicative of an autosomal recessive disorder due to the presence of a homozygous mutation (2). Additionally, the placental pathology showed a small placenta

for gestational age and decidual arteriopathy consistent with maternal vascular malperfusion. Maternal vascular malperfusion is found in less than 1% of uncomplicated pregnancies but at higher frequencies in patients with preeclampsia, fetal death, small for gestational age neonates, and spontaneous preterm labor. Additionally, maternal vascular malperfusion lesions may be associated with abnormal uterine artery flow and placental infarction, affecting neonatal outcomes (3). Therefore, poor oxygen delivery to the fetal brain due to a compromised placenta may have led to the loss of spontaneous movements in this case.

“More recently, it has been shown that placentas from mothers who tested positive for COVID-19 have an increased prevalence of decidual arteriopathy and other features of maternal vascular malperfusion as compared to historical controls (4).”

More recently, it has been shown that placentas from mothers who tested positive for COVID-19 have an increased prevalence of decidual arteriopathy and other features of maternal vascular malperfusion as compared to historical controls (4). In a review article, 69 of 150 placentas following maternal SARS-CoV-2 infection showed features of maternal vascular malperfusion (5). However, these are preliminary studies, and at this time, the data is insufficient to conclude causality. This remains an area of interest, and further studies are needed to determine whether maternal COVID-19 infection can be implicated as a cause of maternal vascular malperfusion and subsequent poor neonatal outcomes.

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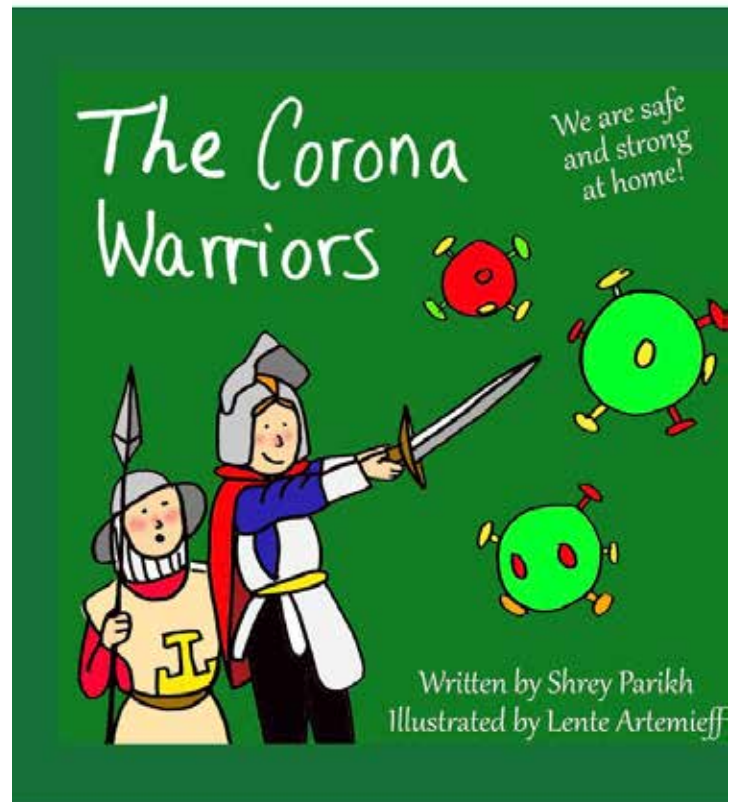
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I am not an addict.

I was exposed to substances in utero. I am not addicted. Addiction is a set of behaviors associated with having a Substance Use Disorder (SUD).



I was exposed to opioids.

While I was in the womb my mother and I shared a blood supply. I was exposed to the medications and substances she used. I may have become physiologically dependent on some of those substances.



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My mother may have a SUD.

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My potential is limitless.

I am so much more than my NAS diagnosis. My drug exposure will not determine my long-term outcomes. But how you treat me will. When you invest in my family's health and wellbeing by supporting Medicaid and Early Childhood Education you can expect that I will do as well as any of my peers!



Learn more about Neonatal Abstinence Syndrome at www.nationalperinatal.org



Commentary: Is it Time To Reexamine our Policies?

T. Allen Merritt, MD, MHA, Mitchell Goldstein, MD

In June 2020, *Neonatology Today* summarized recommendations from the US, Ireland, and the UK regarding the management of mothers with or at a very high risk for COVID-19 infection and care for their infants. During the following past four months, data from COVID-19 “hot spots” in New York has shed new light on the risk of vertical transmission among a cohort of newborns whose mothers had confirmed or suspected SAR-CoV-2 infection as reported by Gyamfi-Bannerman et al. from Columbia University Irving Medical Center in New York City (1). Among 101 newborns, there was no detection of SARS-CoV-2 viral RNA in 95.7% of nasopharyngeal PCR tests for an overall transmission rate of 2%. Of the two infants who did have evidence of vertical transmission, both had indeterminate tests. The authors conclude that they were infected with very low viral copy numbers, and neither newborn has symptoms.

“During the following past four months, data from COVID-19 “hot spots” in New York has shed new light on the risk of vertical transmission among a cohort of newborns whose mothers had confirmed or suspected SAR-CoV-2 infection as reported by Gyamfi-Bannerman et al. from Columbia University Irving Medical Center in New York City (1).”

Notably, about 75% of mothers were roomed-in with their newborns, while six infants were separated from severely ill mothers cared for in the ICU, and 19 infants were admitted to the NICU without contact with their parents. The authors conclude, “This study endorses the benefits of rooming-in, establishing breastfeeding, and delaying pathing on newborn outcomes and suggests that separating mothers positive for SARS-CoV-2 and their newborns and avoiding direct breastfeeding may not be warranted to prevent SARS-CoV-2 transmission.” The American Academy of Pediatrics Perinatal COVID-19 Registry data from more than 3000 deliveries also suggests that about 2% of infants born to women who test positive for SARS-CoV-2 near the time of delivery have tested positive (using PCR testing) within four days of birth. These studies suggest that the vast majority of newborns who are asymptomatic shortly after birth are unlikely to have had a vertical transmission of the virus.

Although the timing of maternal infection in most cases was indeterminate, given this very low risk of postnatal infection, the policy of maternal-newborn separation needs to be reexamined; however, infection control measures still need to be rigorously applied. The Columbia study collected maternal, and infant paired samples admitted from March 13 to April 14 from New York-Presbyterian Morgan Stanley Children’s Hospital and New York-Presbyterian Allen Hospital. All infants included in this study underwent SARS-CoV-2 testing on their first day of life, and several had multiple tests during the nursery stay.

Ninety percent of women who were infected were asymptomatic or had a mild illness. The median maternal age was 28.5 years and over one-third has higher risk, including asthma, diabetes, chronic hypertension, or pregnancy-associated hypertension. Over 50% had BMIs >30. Newborns delivered of mothers with severe or critical COVID-19 infections were significantly more likely to be born 1.4 weeks prior to the expected date of delivery ($P<0.02$), and these infants were at higher risk for hyperbilirubinemia requiring phototherapy ($p<0.04$). One newborn with evidence of vertical transmission was delivered vaginally and underwent testing on day three after birth, while the other was delivered by cesarean section, and the mother was asymptomatic. The authors caution that their findings were from a pandemic epicenter and may not be generalizable to other communities, and most of the women were likely infected in their third trimester.

“The American Academy of Pediatrics Perinatal COVID-19 Registry data from more than 3000 deliveries also suggests that about 2% of infants born to women who test positive for SARS-CoV-2 near the time of delivery have tested positive (using PCR testing) within four days of birth. These studies suggest that the vast majority of newborns who are asymptomatic shortly after birth are unlikely to have had a vertical transmission of the virus.”

Given these limitations, neonatologists and pediatricians may need to balance risks of mother/infant separation, and an accompanying editorial (2) also stresses that careful assessment of mothers and infants needs to continue, but given the low rate of vertical transmission reported, prior recommendations should be carefully considered and modified.

“Given these limitations, neonatologists and pediatricians may need to balance risks of mother/infant separation, and an accompanying editorial (2) also stresses that careful assessment of mothers and infants needs to continue, but given the low rate of vertical transmission reported, prior recommendations should be carefully considered and modified.”

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The author has no conflicts to disclose

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Health Equity Column: Four Featured Trainings

Jenné Johns, MPH, Mitchell Goldstein, MD



Once Upon a Preemie Academy has four featured trainings coming up in the next several weeks. Jenné Johns, MPH has put in an extraordinary effort in coordinating speakers and putting together these trainings. As the nation grapples with disparities on so many different levels, we must confront those issues that affect the care of babies and their parents in the NICU with special attention to issues

of health and racial equity. In this interview, Dr. Goldstein discusses the upcoming four featured trainings with Jenné Johns, MPH.

“As the nation grapples with disparities on so many different levels, we must confront those issues that affect the care of babies and their parents in the NICU with special attention to issues of health and racial equity.”

Mitchell Goldstein: Tell me about this intro that you are going to be doing on what appears to be the fifth of November about health and racial equity in the NICU.

Jenne Johns: So, to kick the academy off, I thought it would be very important to make sure we level set with definitions and standards and expectations for the lens in which information will be presented under this academy. Dr. Joia A. Crear Perry is an internationally renowned birth equity thought leader, passionate advocate, and speaker around all things racial equity for African American moms and babies. She brings an incredible perspective as a physician as an OB-GYN who practiced during Hurricane Katrina Katrina and Rita in New Orleans and helped women to seek care in the middle of A catastrophic event and then, more importantly, meeting to find some creative and innovative solutions. To help to support these moms and babies post-delivery and what I am sure was a very new world in New Orleans at that time. And so she spent a good portion of her career laser-focused on quality improvement initiatives and strategies outside of the box, to eliminate racial and ethnic disparities with preterm birth and then more recently around the infant maternal and child health crisis. She is the founder and the leader behind the birth equity movement that we are now all starting to solution around to help keep black moms and babies healthy and alive pre during and post-delivery. And hopefully, hopefully, helping to spread some nuggets of information that will help reduce the disparities associated with the NICU admissions rates as well. I will be hanging out with her in a moderator capacity. I love listening to and leaning on and learning from her and everything that she does. Now offer some insights, if you will, from a preemie parent perspective or some of the things

we will talk about the role of institutional historical discrimination and racism and how that plays out in the black parents' body and how that is helping to shape the unfortunate experiences that we are having with the infant mortality crisis and the premature crisis.

Mitchell Goldstein: So, these, these that you touched on these desperate circumstances. Hurricanes and so forth. How do you see these affecting issues of disparity? Do you see them, in fact, further worsening these problems?

Jenne Johns: Absolutely. Unfortunately, some of these historical injuries continue to recycle them, so they continue to play out in our day to day current environment. It may look and feel very similar ten years from now when we go and analyze COVID disparities and COVID-related outcome and pairing that off with pregnancy and birth outcomes and NICU admissions rates. We do not know yet. We will see. But it is these kinds of systematic and routine injustices that continue to play out in the health and healthcare environment. That we just need to call a spade a spade and solution around and move us forward as a nation; our babies and our moms deserve equitable treatment and care at the end of the day.

“But it is these kinds of systematic and routine injustices that continue to play out in the health and healthcare environment. That we just need to call a spade a spade and solution around and move us forward as a nation; our babies and our moms deserve equitable treatment and care at the end of the day.”

Mitchell Goldstein: I am going to go through the next one here. So we have talked about Dr. Perry. I know Michael Young, MD going way, way back. She is an absolute dynamo and absolutely advocate for the cause -- fantastic person; tell me your impressions about her because she is going to be talking about solutions for addressing and equities and implicit bias pre during and post NICU.

Jenne Johns: So that I couldn't agree with you more about Dr. Young is absolutely a dynamo she is newer to my radar, and I am sorry that I have not had an opportunity to work with her more closely when I was working in, you know, the insurance space, But she to me brings a unique perspective and that she is a neonatologist working in all black NICU, so she's got the secret sauce and ingredients of what her peers and counterparts may not have the opportunity to leverage or benefit from And some really leaning on her wisdom and her experiences and her thought leadership to help her peers and counterparts. Understand what may potentially be some blind spots that they can learn from her lessons if you will, and apply within their individual make you units paired off with Dr. Young will be Deirdre McDaniel; she was a NICU nurse, she doesn't have that in her bio, but she was once a NICU nurse.

She left the NICU and started to work inside the walls of the health insurance companies to influence perinatal neonatal outcomes. From a payers' lens and she had some really good experiences that she then took in applied with a few industry trade associations working on quality improvement and disparities reductions initiatives. She, too, has seen the NICU and the payer and the trade associations from three different lenses in her career and will offer us very invaluable information that we need to apply to disparities reduction and quality improvement as a marriage. All too often working in the payer space. I did not see a nice blend or a nice merge of what we are doing on the quality improvement side with what my lived experience, in reality, was on the NICU side personally or professionally, and there are some solutions. There are some tangible things. There are some low hanging fruit opportunities. There are some value-based incentive-based opportunities that I just feel are missing because the two worlds have not met in the middle yet so I'm hoping that with this do well. We'll get to some of those solutions.

Mitchell Goldstein: Have you seen the interaction between what you're doing and potentially some of the professional organizations like the NMA and the NBNA. Have you seen them have an interest in getting involved even reached up from at this point in time? I know Dr. Young has been very much involved in NMA politics, and they again seem like a likely supporter in terms of the emphasis of your initiatives.

Jenne Johns: I have not had an opportunity to reach out to NMA yet. They are on our radar; we will be continuing conversations with NBNA. NBNA again is the National Black Nurses Association, and here you have an organization that's full of black nurses. Unfortunately, there isn't a huge preponderance of those black nurses who land in the neonatal space. And so while I can have theoretical conversations within NBNA and we are, and we will continue to have those conversations, we need some of that diversity to transfer over into the neonatal space, and so it will be our continue our conversation can progress.

Mitchell Goldstein: Do you know Millicent Gorham?

Jenne Johns: Yes

Mitchell Goldstein: She is amazing.

Jenne Johns: She is another dynamo. She's another dynamo whom I look forward to engaging with the expansion of the academy in the future. We are starting to put some ideas together now.

Mitchell Goldstein: I think she could be a very, very potent advocate. She has been involved in the National Coalition for health issues, previously when we were engaged with a lot of the battles around RSV, RSV advocacy, breast milk, breast milk advocacy.

Jenne Johns: Right. She is great.

Mitchell Goldstein: Wonderful, wonderful collaborator just fantastic really on point on-spot. She is incredible -- Excellent.

Jenne Johns: Absolutely, thank you for confirming and assuring me that, you know, these two leaders, in particular, are leaders that I don't want to miss the window of opportunity to continue to engage as we expand the again.

Mitchell Goldstein: Let's go to your next PDF, and here you're bringing in Dr. Patterson and Shante Nixon to talk more about

black NICU mother's mental and emotional health pre during and post NICU. Tell me a little bit more about that particular activity.

Jenne Johns: This topic is I think, probably one of the most timely topics that we could talk about right now in our nation's current state. We are faced with two global pandemics and both that are impacting Black NICU families' experiences pre during and post NICU, and so we shouldn't shy away from the emotional and mental needs of this community. All too often, when I meet other African American NICU moms. They, like myself, did not show up with the emotional issues during that NICU stay because we were too busy trying to be strong for our babies. And some of the depression or post-traumatic stress disorder thing did not show up until a year or two years later. It is important for me to introduce this topic so that they can understand how black women may or may not show up needing help during this very traumatic time in their babies lives and to not be offended if the help that's offered isn't accepted or it is not received in the way in which we, you know, clinicians think that it should be. But it is really just time again to roll up our sleeves and be transparent about what the issues are, you know, some of the stigma and some of the shame and some of the fear around just being honest, that there may be a mental and emotional issue that needs to be addressed in the African American community, let alone in the African American NICU parent community, I should say. And so we're really going to lean on some of the lived experiences and observations of Chavis at CHOP, one of the nation's largest Children's Hospital here in my hometown of Philadelphia, to unpack and uncover some of the racial differences he may see you know that he's seeing and observing and experiencing delivering psychosocial services and care to NICU families. And then Shante is going to bring them real-world experience. Unfortunately, she experienced infant loss during the NICU. And she had a bit of a traumatic journey as a black woman who lost her baby, and it was all race-based, and it was all avoidable and preventable. So we just wanted to provide some tools and some skills to help prevent and avoid other clinicians leaving thorns so that we can have more clinicians leaving families with roses because these things carry with us for a lifetime - For a lifetime.

Mitchell Goldstein: Do you have any thoughts about how to have people re-engage staff if they feel that the interventions or, for that matter, the interactions are inappropriate. And again, a lot of people talk the talk but they don't necessarily, walk the walk, and they say that they're sensitive and they say that they have measures in place. But in terms of calling that out in terms of saying, hey, you know, I am not being treated the way I should be. There is something wrong with the way you are interacting with me. How do you do that? How does a family engage that way?

Jenne Johns: Unfortunately, we do not have that making mechanism created yet, which is part of the chasm here, which is part of the challenge. A lot of families may or may not know that the patient satisfaction surveys that they have received during their stay and post-stay home hold value, but to what end I am unclear what happens with the results of those surveys, is it shows a grievance that will file based on discrimination or based on race, within the hospital. I know what happens at the payer level. I am not sure what happened at the hospital level and who's holding the hospital accountable for addressing some of those grievances or some of those issues with the staff; hopefully, with the expansion of the

academy, we can get some quality improvement collaborative going around the country where we look at ways to hold one another accountable for ensuring that the information and the tools and resources that they learn at the academy isn't a checkbox opportunity. This is not what this is really an opportunity to help move us forward with holding ourselves accountable individually and collectively as neonatology, as a neonatal community to deliver better care different here that's more sensitive and more equitable and more targeted based on the needs of the populations we are serving

“But it is these kinds of systematic and routine injustices that continue to play out in the health and healthcare environment. That we just need to call a spade a spade and solution around and move us forward as a nation; our babies and our moms deserve equitable treatment and care at the end of the day.”

Mitchell Goldstein: I agree, moving forward. It is just so important in terms of getting to a better place.

Jenne Johns: And together we spend together, we can do this. I do not think this is as difficult to work as people think it is. I mean, I have lived in this space for about a decade of my career a little longer and have a starting place, and I am hoping that if any professional shows up to train people without knowing where to start. They can at least count this training as their official [training].

Mitchell Goldstein: Let me talk to you about the last PDF in the collection. I think it's the last one, and this is the black preemie parents as partners in preemie care. And this one I think, is most compelling. It really gets down to what is important.

Jenne Johns: Thank you. Thank you. I think this is gonna be a pretty compelling training session as well. I'm excited to have her. Oh, my goodness. Another dynamo is Dr. Terry Major Kincaid. She is a neonatologist and board-certified pediatrician practicing in two NICUs in two states, and she sees a lot. She is experienced a lot, and most importantly, she does the hard work right at the unit and the patient at the unit and practice level to ensure that patients are not isolated. That the parents have been making families and babies are integrated and included in the delivery of the care for the baby. By doing so, she is helping to remove and reduce stigma and fear, and other issues surrounding black families in the NICU. Partnered off with Dr. Major Kincaid is Ashley Randolph of Glo preemies, who is an up and coming, you know, rising leader -- a preemie parent leader in the preemie parents space. She has developed a host of programs and support resources and services to equip and empower parents to be their child's best advocate. And to be a part of planning and decision making tables with new strategies with new programs when new services are being delivered to roll out in the NICU. And so, I am really thankful and appreciative to have both of them because they sit, of course, in two different spaces and then the NICU but to have valid tools and

resources and experiences to leave our population with and all too often, I think for us as professionals. We want to create solutions, right. We want to do what's best for the population that is struggling and the population that is vulnerable whose outcomes are just not moving at all. But we have to ask ourselves as professionals. How often do we simply stop and ask the population that we're attempting to serve what their recommendation or solutions are? And this is what I hope to accomplish with this training session.

Mitchell Goldstein: This sounds amazing. These are all wonderful symposia. I just want to emphasize and underscore the fact that we're really excited about having this collaboration with NT, and I think that it is going to really pay off dividends in terms of getting people to hear your message and to draw people to what you are trying to do because I think it is definitely going in the right direction, and definitely, something that we need so much more of to get to a better place.

Jenne Johns: Thank you. Thank you. This has been on my heart and in my mind for four years now. And although I didn't see it happening virtually, you know, I really saw this being a big major national conference. I'm excited about the opportunity, and I cannot thank you enough, Dr. Goldstein, for taking a chance on me. I'm not a clinician, you know, don't have an MD or in my name, and will never, but I think in acknowledging appreciate you for taking a chance on me

Mitchell Goldstein: What you have is a lot more; it is passion: the passion for doing something. And for making something right and for really showing us, you know what it is that we need to do to get to that better place; It means more than just about any degree. So you should be proud of what you do, never feel that you have to apologize for not having the right initials after your name. It does not matter to me. You are eloquent; you have an extremely devoted cause. And again, anything that I, or we, can do as Neonatology Today, we will always be in your corner.



Jenne Johns: [hears babies, crying in the background at Dr. Goldstein's NICU] Oh, I hear cries in the background, my goodness, I just got a tickle in my belly. We thank you so much, Dr. Goldstein, we have about we have 147 people registered already. I was hoping for 25

Mitchell Goldstein: So let's double that. Let's hope we get to 300.

Jenne Johns: Let's do it.

Mitchell Goldstein: And then we'll do a post symposia afterward, but again, I am really devoted to trying to get this to be a monthly because I want this in front of people all the time. I want to make sure that they see it that they understand it and they know where you're coming from and that they recognize the importance of it.

Jenne Johns: We will have four powerful articles out of the training, definitely.

Jenne Johns: A kind of end of year reflection of it all is what I'm hoping to get for you for the December issue, but thank you again. Dr. Goldstein. I really appreciate your hand in partnership.

Mitchell Goldstein: Pleasure is mine. And we will be in touch, of course.

Jenne Johns: Thank you.

Disclosure: The authors have no disclosures.

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Respiratory Syncytial Virus:

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 National Perinatal Association

*See the NPA's evidence-based guidelines at www.nationalperinatal.org/rsv



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Joia A. Crear Perry, MD, FCOG
President
National Birth Equity Collaborative



Jenné Johns, MPH
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Michal Young, MD, FAAP, FABM
Director NICU and Newborn Services
Howard University Hospital



Deidre McDaniel, MSW, LCSW
Doctoral Fellow Morgan State University
Maternal and Child Health Thought Leader
National Healthy Start Association

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Chavis A. Patterson, PhD
Director of Psychosocial Services,
Children's Hospital of Philadelphia



Shanté Nixon
President and Founder
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Terri Major-Kincade, MD, MPH
Board Certified Pediatrician and Neonatologist



Ashley Randolph
President
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Neonatology Solutions NICU Directory: Updated Content

Scott Snyder, MD



We have continued to refine and update the Neonatology Solutions website content to provide the greatest benefit to our users. Here is an overview of available resources on the site:

NICU Directory:

Neonatology Solutions provides the most comprehensive go-to resource for NICU and Neonatology Practice Content on the web. The NICU Directory (<https://neonatologysolutions.com/explore-nicus-and-programs/>) provides information on all Level 2-4 NICUs, including the size and scope of NICU programs, as well as key contact names, email addresses, and phone numbers to facilitate networking, collaboration, and career planning for fellows

“Within the NICU Directory page, users can select the Neonatology Fellowship Programs tab, which will open a map-based search function as well as all fellowship programs listed by state. Information regarding the number of fellow positions, program directors, division directors, and affiliated NICUs and training sites are all included.”

and neonatologists.

State Summary pages (<https://neonatologysolutions.com/state-summary/>) and AAP District Summary pages (<https://neonatologysolutions.com/aap-district-summary-pages/>) provide information on the number of Level II, III, and IV NICUs, neonatology groups, VON members, current job postings, upcoming conferences, and also links to state-based or district-based resources.

“As always, we appreciate any feedback regarding how to make this site the most valuable free Neonatology resource on the web.”

Also within the NICU Directory page, users can select the Neonatology Fellowship Programs (<https://neonatologysolutions.com/neonatology-fellowship-programs/>) tab that will open a map-based search function as well as all fellowship programs listed by state. Information regarding the number of fellow positions, program directors, division directors, and affiliated NICUs and training sites is included.

Clinical Guidelines:

There are several evidence-based clinical pathways, algorithms, protocols, and guidelines covering nutrition, respiratory support, infectious disease neurodevelopment, and more within the Clinical Guidelines (<https://neonatologysolutions.com/clinical-guidelines/>) resource page.

In addition, there are COVID Resources (<https://neonatologysolutions.com/covid-19-resources/>) to serve as an easily accessible reference point for clinical staff and providers.

Career Planning:

The website offers a 6-step Neonatology Career Planning Guide (<https://neonatologysolutions.com/career-planning/>) for fellows that includes a timeline, tools to help determine your ideal position, explanations of practice types, interview and negotiation tools, salary and compensation data, and onboarding considerations. In addition, a Currently Hiring Page (<https://neonatologysolutions.com/search-open-positions/>) provides details about programs with known open requisitions for Neonatologist positions with several links to community and regional information, cost of living data, and other relevant job search features. Over 140 open requisitions around the country are currently active on the site.

Neonatology Conferences:

While the pandemic has markedly disrupted travel and on-site CME activities, networking and education remain a key focus not only for neonatology fellows but also for practicing Neos. As such, we have added information about virtual conference options in addition to a map-based search feature on our Neonatology Conference page (<https://neonatologysolutions.com/upcoming->



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You can clear a field's selection by going back to "Select One" or by unchecking a radio button. You may also click the reset button, but remember that load times may be longer as it repopulates all NICUs in the U.S

Missing or inaccurate information? [Click here!](#)

[neonatology-conferences/](#)). Education and network opportunities can now be easily located both by the time of year as well as regionally. We've included the latest available information regarding conference changes to assist you with your conference planning, and we have active links directly to the conference registration pages.

As usual, we welcome feedback on how to make this the most helpful free resource on the web for neonatology trainees, Neonatologists, APPs, and NICU staff!

References:

1. <https://neonatologysolutions.com/explore-nicus-and-programs/>

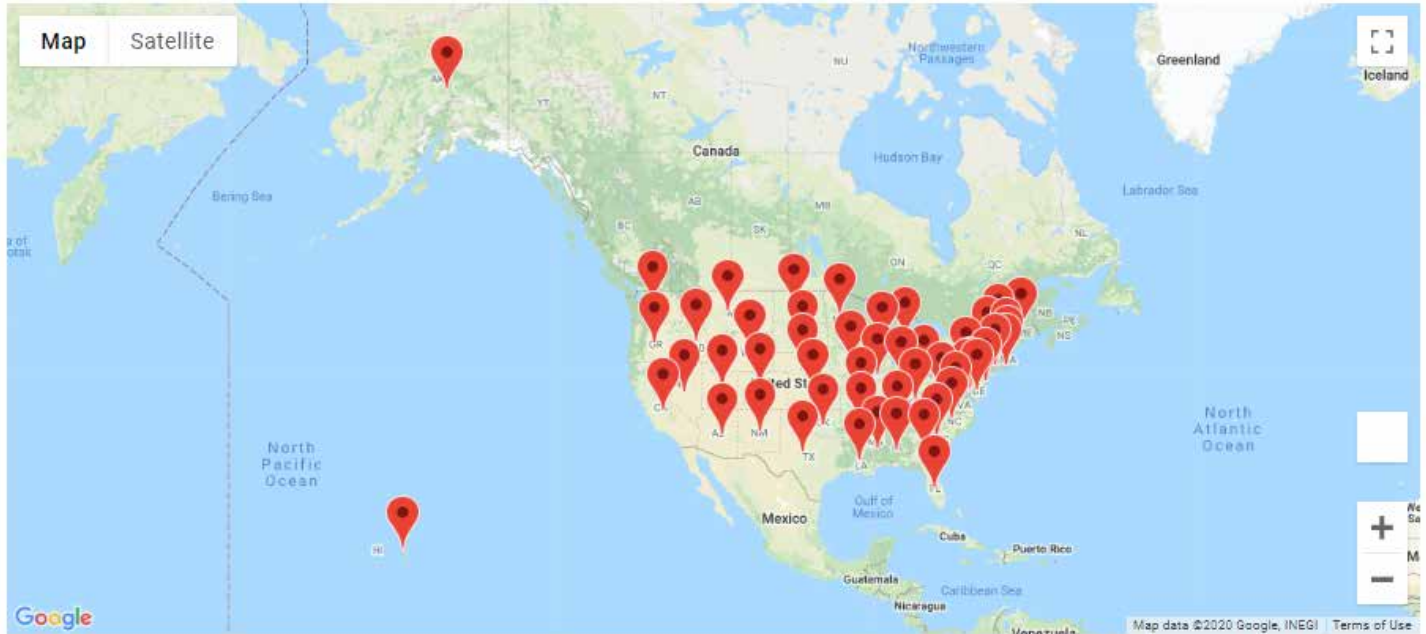
The author is a principal of Neonatology Solutions, LLC.

NT



NICUs by State Summary

Access the NICU State Summary by clicking on the map marker for the state of interest. Please note, not all states have a completed summary, but we are currently working to get them all done.



Neonatology Fellowship Programs

Access the Neonatology Fellowship Program page by clicking on the map marker for the program of interest or by clicking on the program name within the expanded list by State below.



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COVID-19

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COVID-19 Obstetric, Neonatal, and NICU Guidelines



Maternal and Infant Testing/Isolation Following Recovery from COVID-19
v 1.1.20

1. **Decision of initiating isolation precautions**

- For most maternal patients with a history of COVID-19 disease who present to the hospital for delivery greater than 10 days after symptom onset and resolution of fever for at least 24 hours, without the use of fever-reducing medications, and with improvement of other symptoms, isolation precautions are generally not indicated.
- A limited number of patients with acute illness or immunocompromising conditions may produce respiratory-competent virus beyond 10 days that may warrant extending duration of isolation and precautions for up to 20 days after symptom onset, consider consultation with infection control experts if the pregnant patient was hospitalized or had other symptoms of severe illness or compromised immune system (see COVID-19 Infection/Isolation Policy-Obstetrics-Flowchart for Cesarean Delivery and Immunocompromised Criteria).
- For pregnant patients who never showed symptoms, isolation and other precautions are not indicated beyond 10 days after the date of their positive RT-qPCR test for SARS-CoV-2 RNA.

2. **Rate of PCR testing upon presenting to labor or for scheduled delivery**

- For patients asymptomatic, hospitalized, and/or COVID-19 positive patients.



BREAST MILK HANDLING FOR INFANTS OF WOMEN COVID-19+
v 1.1.20

Main Points:

- Women under isolation and/or quarantine may provide expressed breast milk to infants.
- Infants are restricted to proper handwashing, cough/sneezing, and mask, gloves, and gowns during feeding.
- When necessary an individual person to storage and delivery: The identified bottle, stored in a sealed bag and stored in the freezer storage.
- Staff handle milk with the collection system and adhere to infection with gloves or gowns.

Transport of milk to another area for storage or use:

- Infants:
- Person in full PPE (including gloves) should not touch the plastic bag in patient's room. Double gloves are recommended when handling the bag.
- Staff member must wear a clean, dedicated "milk" bag and place the milk in a bag with a clear bag with PPE with surface cleaning gloves, double gloves on the patient's side.

COVID-19 OB Universal Testing Algorithm

updated 8/27/20

Provides a pathway for testing asymptomatic obstetric patients across all inpatient and outpatient settings.

Maternal & Infant Testing/Isolation Post-COVID Recovery

updated 7/21/20

For laboring mothers with a history of COVID-19 from which they have recovered, this provides recommendations regarding testing and isolation of both the laboring mother and her infant, based on the latest CDC guidance.

COVID-19 OB Protocol

updated 9/9/20

Provides guidelines, protocols, and pathways for:

- OB Triage (L&D/Ambulatory) Screening Guideline
- Outpatient/Inpatient Testing Protocols
- Antepartum/Intrapartum/Postpartum Guidelines
- OB Sepsis Protocol
- NICU Resus Team PPE
- Newborn Isolation Guidelines

COVID-19 NICU Resus Team PPE Requirements

updated 8/27/20

Provides a pathway with PPE guidance for NICU resuscitation teams in both vaginal and Cesarean delivery settings.

COVID-19 Newborn Transport from DR to NICU

updated 9/3/20

Provides a pathway with PPE guidance for transporting a newborn from the delivery room to the NICU for COVID PUI infants.

COVID-19 NICU Visitation, Isolation, and DC

updated 8/27/20

Provides guidelines for NICU visitation, isolation, and discharge for an infants born to a mother with confirmed COVID-19 disease or PUI.

COVID-19 Breast Milk Handling

updated 4/24/20

Provides guidelines for breast milk handling for infants born to a mother with confirmed COVID-19 disease or PUI.

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Providing you with resources and tools to ensure your first job is the right choice so you can successfully advance in your career.

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6 Steps to Success



Step 1

Applying the
Right Timeline



Step 2

Defining Your
Ideal Position



Step 3

Finding the Right
Practice



Step 4

Preparing for
Your Interview



Step 5

Reviewing Your
Job Offer



Step 6

Starting with Your
New Practice

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Eunice Kennedy Shriver National Institute
of Child Health and Human Development



Medical News, Products & Information

Compiled and Reviewed by Mitchell Goldstein, MD Editor in Chief

Mouse study suggests parental response to infant distress is innate but adapts to change

NIH-funded study sheds light on how parents may adjust to meet an infant's evolving needs.

Wednesday, October 7, 2020

What

A National Institutes of Health study in mice suggests that parents have an innate capacity to respond to an infant's cries for help and this capacity may serve as a foundation from which a parent learns to adjust to an infant's changing needs. The study was conducted by Robert C. Froemke, Ph.D., of New York University School of Medicine, and colleagues. It appears in *Nature*.

When housed with mice who have given birth, unmated female mice will assist with the care of the newborn pups. The researchers evaluated the ability of such babysitter mice to respond to a variety of recorded newborn distress cries. These included typical distress cries as well as a range of cries that had been digitally altered—sped up or slowed down to include more or fewer syllables than typical distress vocalizations.

Experienced babysitters responded to typical distress cries 80% of the time, compared to the 33% initial response rate of the novice babysitters. Both experienced and novice babysitters at first responded at only low rates to the altered cries, but both learned to recognize these cries with time. Eventually, even the novices responded to some types of altered calls as much as 75% of the time. Similarly, auditory centers in the babysitters' brains activated when the animals heard the calls, at levels corresponding to their initial responses, and increased as they became more responsive to the cries. The researchers also found that administering oxytocin improved the rate at which the mice responded to the cries, while blocking natural oxytocin in the brain reduced their response rate. [Oxytocin](#) has been implicated in maternal bonding and other behaviors.

These results provide evidence that new parents may be hard-wired to respond to certain kinds of cries from their infants, but

also have the capacity to expand their repertoire to include other kinds of vocalizations as well.

The study was funded in part by NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institute of Neurological Disorders and Stroke, and National Institute of Deafness and Other Communication Disorders.

Who

James A. Griffin, Ph.D., chief of the NICHD Child Development and Behavior Branch, is available for comment.

About the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD): NICHD leads research and training to understand human development, improve reproductive health, enhance the lives of children and adolescents, and optimize abilities for all. For more information, visit <https://www.nichd.nih.gov>.

About the National Institutes of Health (NIH): NIH, the nation's medical research agency, includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. NIH is the primary federal agency conducting and supporting basic, clinical, and translational medical research, and is investigating the causes, treatments, and cures for both common and rare diseases. For more information about NIH and its programs, visit www.nih.gov.

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[Eunice Kennedy Shriver National Institute of Child Health and Human Development \(NICHD\)](#)

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Released: Thursday 12/13/2018 12:32 PM, updated Saturday 3/16/2019 08:38, and Sunday 11/17/2019 1020

The American Academy of Pediatrics' Section on Advances in Therapeutics and Technology (SOATT) invites you to join our ranks! SOATT creates a unique community of pediatric professionals who share a passion for optimizing the discovery, development and approval of high quality, evidence-based medical and surgical breakthroughs that will improve the health of children. You will receive many important benefits:

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The Section also accepts affiliate members (those holding masters or doctoral degrees or the equivalent in pharmacy or other health science concentrations that contribute toward the discovery and advancement of pediatrics and who do not otherwise qualify for membership in the AAP). Membership application for affiliates: <http://shop.aap.org/aap-membership/> then click on "Other Allied Health Providers" at the bottom of the page.

Thank you for all that you do on behalf of children. If you have any questions, please feel free to contact:

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The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents and young adults. For more information, visit www.aap.org. Reporters can access the meeting program and other relevant meeting information through the AAP meeting website at <http://www.aapexperience.org/>

NT

About 14% of cerebral palsy cases may be tied to brain wiring genes

NIH-funded study points to genes that control the establishment of neural circuits during early development.

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Monday, September 28, 2020

In an article published in *Nature Genetics*, researchers confirm that about 14% of all cases of cerebral palsy, a disabling brain disorder for which there are no cures, may be linked to a patient's genes and suggest that many of those genes control how brain circuits become wired during early development. This conclusion is based on the largest genetic study of cerebral palsy ever conducted. The results led to recommended changes in the treatment of at least three patients, highlighting the importance of understanding the role genes play in the disorder. The work was largely funded by the National Institute of Neurological Disorders and Stroke (NINDS), part of the National Institutes of Health.

"Our results provide the strongest evidence to date that a significant portion of cerebral palsy cases can be linked to rare genetic mutations, and in doing so identified several key genetic pathways involved," said Michael Kruer, M.D., a neurogeneticist at Phoenix Children's Hospital and the University of Arizona College of Medicine - Phoenix and a senior author of the article. "We hope this will give patients living with cerebral palsy and their loved ones a better understanding of the disorder and doctors a clearer roadmap for diagnosing and treating them."

Cerebral palsy affects [approximately one in 323 children](#) in the United States. Signs of the disorder appear early in childhood resulting in a wide range of permanently disabling problems with movement and posture, including spasticity, muscle weakness, and abnormal gait. Nearly 40% of patients need some assistance with walking. In addition, many patients may also suffer epileptic seizures, blindness, hearing and speech problems, scoliosis, and intellectual disabilities.

Since its first official description in 1862, scientists have hotly debated whether cerebral palsy is caused by problems at

birth. For instance, it is known that babies born prematurely or who experience a lack of blood flow or oxygen during birth have a greater chance of suffering from the disorder. Later though, researchers concluded that [a majority \(85-90%\) of all cases are congenital](#), or born with the disease, and some studies had suggested that cerebral palsy could be inherited. Despite this, the causes of many children's cases had remained elusive.

Then in 2004, scientists discovered the first [genetic mutation known to cause cerebral palsy](#). Since then several more mutations have been identified and depending on how an experiment was performed, scientists have estimated that anywhere from 2 to 30% of all cases may be linked to a misspelling in a patient's DNA. In this study, the researchers provided support for a previous estimate and highlighted which genes may play a critical role in the disorder.

"Cerebral palsy is one of neurology's oldest unresolved mysteries. The results from this study show how advances in genomic research provide scientists with the hard evidence they need to unravel the causes behind this and other debilitating neurological disorders," said Jim Koenig, Ph.D., program director at NINDS.

The study was led by Sheng Chih (Peter) Jin, Ph.D., assistant professor of genetics at Washington University School of Medicine, St. Louis, and Sara A. Lewis, Ph.D., a post-doc in the lab Dr. Kruer leads.

The researchers searched for what are known as "de novo," or spontaneous, mutations in the genes of 250 families from the United States, China, and Australia through a collaboration made possible by the [International Cerebral Palsy Genomics Consortium](#). These rare mutations are thought to happen when cells accidentally make mistakes copying their DNA as they multiply and divide. An advanced technique, called whole exome sequencing, was used to read out and compare the exact codes of each gene inscribed in the

chromosomes of the patients with that of their parents. Any new differences represented de novo mutations that either happened while a parent's sperm or egg cell multiplied or after conception.

Initially the researchers found that the cerebral palsy patients had higher levels of potentially harmful de novo mutations than their parents. Many of these mutations appeared to be concentrated in genes that are highly sensitive to the slightest changes in the DNA letter code. In fact, they estimated that about 11.9% of the cases could be explained by damaging de novo mutations. This was especially true for the idiopathic cases which had no known cause and represented the majority (62.8%) of cases in the study.

Approximately another 2% of the cases appeared to be linked to recessive, or weaker, versions of genes. This raised the estimate of cases that could be linked to genetic problems from 11.9% to 14%, as has been previously reported.

Moreover, the results led to recommendations for more tailored treatments of three patients.

"The hope of human genome research is that it will help doctors find the best, most personalized, matches between treatments and diseases. These results suggest that this may be possible for some patients with cerebral palsy," said Chris Wellington, program director in the Divi-



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sion of Genome Sciences at the NIH's [National Institute of Human Genome Research](#), which also provided support for the study.

When the researchers looked more closely at the results, they found that eight genes had two or more damaging de novo mutations. Four of these genes, labeled RHOB, FBXO31, DHX32, and ALK, were newly implicated in CP while the other four had been identified in previous studies.

The researchers were especially surprised by the RHOB and FBXO31 results. Two cases in the study had the same spontaneous mutation in RHOB. Likewise, two other cases had the same de novo mutation in FBXO31.

"The odds of this randomly happening are incredibly low. This suggests that these genes are highly linked to cerebral palsy," said Dr. Jin.

The researchers also looked at the genes behind other brain development disorders and found that about 28% of the cerebral palsy genes identified in this study have been linked to intellectual disability, 11% to epilepsy and 6.3% to autism spectrum disorders. In contrast, the researchers found no significant overlap between cerebral palsy genes and those involved with the neurodegenerative disorder Alzheimer's disease which attacks the brain later in life.

"Our results support the idea that cerebral palsy is not one narrow disease but a spectrum of overlapping neurodevelopmental problems," said Dr. Lewis.

Further analysis of the results suggested that many of the genes they found in this study, including six of the eight genes that had two or more de novo mutations, control the wiring of neural circuits during early development. Specifically, these genes are known to be involved in either the construction of protein scaffolds that line the perimeters of neural circuits or in the growth and extension of neurons as they wire up.



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Experiments on fruit flies, formally known as *Drosophila melanogaster*, supported this idea. To do this, the researchers mutated fly versions of the wiring genes they identified in the cerebral palsy patients. They found that mutations in 71% of these genes caused flies to have problems with movement, including walking, turning, and balancing. The results suggested that these genes play a critical role in movement. They estimated that there was only a 3% chance these problems would happen if they had blindly mutated any gene in the fly genome.

"Treatments for cerebral palsy patients have not changed for decades," said Dr. Kruer. "In the future, we plan to explore how these results can be used to change that."

These studies were supported by the NIH ([NS106298](#), [NS091299](#), [HG006504](#), [HD050846](#), [HL143036](#)), the Cerebral Palsy Alliance Research Foundation, the Doris Duke Charitable Foundation (CSDA

2014112), the Scott Family Foundation, Cure CP, the National Health and Medical Research Council (Australia; grant 1099163), The Tenix Foundation, the National Natural Science Foundation of China (U1604165), Henan Key Research Program of China (171100310200), VINNOVA (Sweden's Innovation Agency; 2015-04780), the James Hudson Brown-Alexander Brown Coxe Postdoctoral Fellowship at the Yale University School of Medicine, and the American Heart Association (18POST34060008).

<https://www.ninds.nih.gov> is the nation's leading funder of research on the brain and nervous system. The mission of NINDS is to seek fundamental knowledge about the brain and nervous system and to use that knowledge to reduce the burden of neurological disease.

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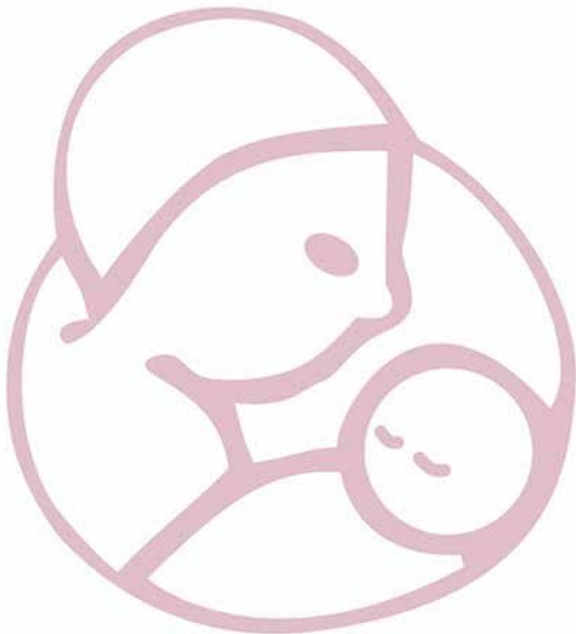
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ters and is a component of the U.S. Department of Health and Human Services. NIH is the primary federal agency conducting and supporting basic, clinical, and translational medical research, and is investigating the causes, treatments, and cures for both common and rare diseases. For more information about NIH and its programs, visit www.nih.gov.

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Article

Jin, S.C., Lewis, S.A.; et al., Mutations disrupting neuritogenesis genes confer risk for cerebral palsy. *Nature Genetics*, September 29, 2020 DOI: 10.1038/s41588-020-0695-1

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NT

NIH expands clinical trials to test convalescent plasma against COVID-19

Rigorous studies to build on earlier efforts to test the experimental treatment

Tuesday, September 22, 2020

ATwo randomized, placebo-controlled clinical trials funded by the National Institutes of Health (NIH) are expanding enrollment to further evaluate convalescent plasma as a treatment for patients hospitalized with COVID-19. Preliminary observational studies indicate that convalescent plasma may improve outcomes among severely ill and

hospitalized patients with COVID-19. Prospective, well-controlled randomized trials are needed to generate sufficient data on whether convalescent plasma is effective and safe for the treatment of COVID-19.

Convalescent plasma is blood plasma taken from people who have recovered from COVID-19. It contains antibodies that can recognize and neutralize SARS-CoV-2, the virus that causes COVID-19, as well as other components that may contribute to an immune response.

“The evidence on convalescent plasma as a treatment for severe cases of COVID-19 is promising but incomplete. We need to carry out rigorous randomized control clinical trials to determine how this therapy can improve outcomes,” said NIH Director Francis S. Collins, M.D., Ph.D. “While the world waits for an effective vaccine, it is vital that we simultaneously expand the options for available treatments for those currently suffering from the worst effects of this disease.”

The trials expect to enroll hospitalized patients across the country at academic and community-based hospitals. Participants will be randomly assigned to receive the treatment or a placebo. Outcomes will be compared with respect to clinical improvement measures and resource needs, such as ventilators. Both trials currently are enrolling participants and anticipate results as early as this fall.

The trials are receiving \$48 million in support through Operation Warp Speed (OWS), a collaborative initiative across federal agencies to advance the development, manufacturing and distribution of COVID-19 vaccines, therapeutics and diagnostics.

The National Center for Advancing Translational Sciences (NCATS), part of NIH, will oversee the grant awards through its Clinical and Translational Science Awards (CTSA) Program research network. The CTSA's Trial Innovation Network (TIN) will play a key role in working to add study sites and enroll patients, including those from communities disproportionately affected by COVID-19.

“The rapid expansion of these vital randomized, controlled convalescent plasma clinical trials demonstrates how nimbly the network of CTSA Program hubs and the TIN can respond to the nation's research needs and shorten the path from discovery to treatment,” said NCATS Director Christopher P. Austin, M.D.

One trial, called Convalescent Plasma to Limit COVID-19 Complications in Hospitalized Patients, was launched in April by NYU Langone Health in New York, with collaboration from the Albert Einstein College of Medicine and Yale University, New Haven, Connecticut, and with funding from NCATS. To increase enrollment in the trial, NYU is partnering with The University of Texas Health Science Center at Houston and the University of Miami in Florida to enroll participants at sites in these states.

With these additional sites, this trial expects to enroll approximately 1,000 hospitalized patients 18 years or older with respiratory symptoms of COVID-19. The trial is primarily assessing clinical improvement at 14 and 28 days and also will be evaluating outcomes based on mortality, intensive care unit admission and patient antibody concentrations. Additional information about this study and participation is available at ClinicalTrials.gov under study identifier [NCT04364737](https://clinicaltrials.gov/ct2/show/study/NCT04364737).

The trial called Passive Immunity Trial of Our Nation for COVID-19 also is expanding to enroll about 1,000 participants. Vanderbilt University Medical Center in Nashville, Tennessee, which launched the trial in April, will have access to about 50 additional clinical trial sites across the CTSA Program. Participants are 18 years or older with acute respiratory infection symptoms and laboratory-confirmed SARS-CoV-2 infection; they may be hospitalized or in an emergency department and likely to be admitted. The trial primarily will assess clinical improvement at 15 days and also will evaluate ventilation use, supplemental oxygen use, acute kidney injury and cardiovascular events. Additional information about this study and participation is available at ClinicalTrials.gov under study



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About the National Center for Advancing Translational Sciences (NCATS): NCATS conducts and supports research on the science and operation of translation — the process by which interventions to improve health are developed and implemented — to allow more treatments to get to more patients more quickly. For more information about how NCATS helps shorten the journey from scientific observation to clinical intervention, visit <https://ncats.nih.gov>.

About the National Institutes of Health (NIH): NIH, the nation's medical research agency, includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. NIH is the primary federal agency conducting and supporting basic, clinical, and translational medical research, and is investigating the causes, treatments, and cures for both common and rare diseases. For more information about NIH and its programs, visit www.nih.gov.

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NT

American Academy of Pediatrics Issues Clinical Report on Care of HIV-exposed Infants

The transmission of HIV from mother to newborn is significantly lower when early interventions are in place

For Release:
10/19/2020

A The American Academy of Pediatrics updates its guidance on evaluating and

managing medical care for infants exposed to the human immunodeficiency virus (HIV) in a newly published clinical report in Pediatrics.

About 8,500 women with HIV infection give birth annually in the United States, according to the clinical report, "[Evaluation and Management of the Infant Exposed to HIV in the United States](#)," published in the November 2020 Pediatrics (published online Oct. 19).

"Whenever possible, we try to identify if a woman has HIV infection before or during pregnancy, because it allows for earlier entry to HIV care for her – and more effective ways to prevent the baby from becoming infected," said Ellen Gould Chadwick, MD, FAAP, a lead author of the report, written by the Committee on Pediatric AIDS. "The rate of transmission to infants remains low, largely because of the treatment initiated when a pregnant mother's HIV status is known."

HIV testing is now part of routine prenatal care in most states. When caring for a newborn, it is important that appropri-

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ate steps are taken for early detection of HIV infection, that appropriate vaccines are administered, and adequate counseling is provided to families living with HIV infection.

The AAP also recommends:

If the mother's HIV status is unknown at the time of labor or birth, the newborn infant's health care provider should perform expedited HIV antibody testing on the mother or the newborn infant or antigen/antibody testing on the mother, with appropriate consent consistent with state and local laws.

The results should be reported to health care providers as soon as possible after birth. This allows for initiation of recommended therapies that include administration of antiretrovirals, which can begin ideally within 6 to 12 hours of life.

The mother should not breastfeed, because antiretrovirals reduce but do not eliminate breastmilk transmission.

Pediatricians should provide counseling to parents and caregivers of HIV-exposed infants about HIV infection, including routine care of the infant, diagnostic tests, and potential drug toxicities.

All HIV-exposed infants should undergo virologic testing at 14 to 21 days of age. If results are negative, these tests should be repeated at 1 to 2 and 4 to 6 months of age to identify or exclude HIV infection as early as possible.

Immunizations and TB screening should be provided for HIV-exposed infants in accordance with published guidelines. HIV testing should be offered and recommended to immediate family members of HIV-exposed infants. The practitioner providing care for an infant with HIV infection should consult with a pediatric HIV specialist.

"We have come a long way in helping mothers manage perinatal HIV exposures

to prevent transmission," Dr. Chadwick said. "We encourage open communication between doctors, patients and their families so that all appropriate therapies can be

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The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents and young adults.

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NT

American Academy of Pediatrics and RQI Partners collaborate to deliver first-ever neonatal resuscitation quality improvement solution

Move positions organizations to improve neonatal resuscitation, education and training in U.S. hospitals

DALLAS, Oct. 6, 2020 – The American Academy of Pediatrics (AAP), a 67,000-member organization dedicated to the optimal health and well-being for all infants, children, adolescents and young adults, and RQI Partners LLC announced today they will collaborate to create new educational programs for neonatal resuscitation in U.S. hospitals.

RQI Partners is a partnership between and

service provider for the American Heart Association and Laerdal Medical. The agreement between RQI Partners and the AAP will further the Academy's decades-long relationship with the Association and Laerdal in creating and promoting lifesaving resources and information, including the Academy's internationally-recognized [Neonatal Resuscitation Program® \(NRP®\)](#), a focal point of this new relationship.

Developed in 1987 by the AAP and the Association, the Neonatal Resuscitation Program teaches an evidence-based approach to newborn resuscitation. Now, the organizations are uniting to create a first-ever NRP program that is rooted in the [Resuscitation Quality Improvement® Program \(RQI®\)](#) and will focus on the skill of positive pressure ventilation. The RQI program was co-developed by the Association, the leading voluntary health organization devoted to a world of longer, healthier lives, and Laerdal, a global trailblazer in providing healthcare and simulation solutions.

"The American Academy of Pediatrics was founded 90 years ago to address the unique needs of children, and ever since then has been committed to achieving optimal physical, mental and social health and well-being for all infants, children, adolescents and young adults," said Janna Patterson, MD, MPH, FAAP, senior vice president, Global Child Health and Life Support at the American Academy of Pediatrics. "Delivering on this promise means aligning with organizations with like-minded missions and employing sound, proven programs that help transform and improve patient care and outcomes. The Resuscitation Quality Improvement Program will allow NRP providers and instructors to improve educational efficiency and give opportunities for low-dose, high-frequency practice, which will help maintain the most important skill of neonatal resuscitation: positive pressure ventilation."

RQI, launched in 2015, is a self-directed, simulation-based performance, mastery learning and quality improvement program for healthcare professionals that offers "low-dose, high-frequency" hands-on learning

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sessions that provide quarterly CPR skills practice. Data is archived in a learning management system, which is used to track and document individual learner performance and competence.

During the five-year agreement period, RQI Partners and the AAP's joint efforts, which are central to improving the efficacy of neonatal resuscitation, education and training, will:

Develop programs, products and services, including comprehensive neonatal resuscitation educational solutions for healthcare professionals.

Reach and engage new audiences and customers by leveraging novel programs and international collaboration.

To achieve these advances, the organizations are leveraging science from the American Academy of Pediatrics and the American Heart Association's leadership in resuscitation education. Laerdal Medical will bring forth its deep expertise in neonatal simulation solutions and RQI Partners will jointly lead program management and design with the AAP.

"We are pleased to collaborate with the American Academy of Pediatrics, combining our respective knowledge, resources and expertise, to position clinical providers to give our most precious patients the best chance of survival," Clive Patrickson, RQI Partners' chief executive officer, said. "Together, we will explore how the boundaries of educational science can extend to neonatal resuscitation education, and subsequently, set a new standard in emergency care."

The first product from the AAP and RQI Partners' strategic alliance — the new RQI for NRP program — will debut in June 2021, following testing at select pilot hospital sites. The program's introduction to healthcare organizations will coincide with publication of the Textbook of Neonatal Resuscitation, 8th edition.

For more information about the RQI program, visit www.rqipartners.com. To learn more about the NRP, visit the AAP website.

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About RQI Partners LLC

RQI Partners LLC is a partnership between the American Heart Association and Laerdal Medical, positioning the organizations to de-

liver innovative solutions that accelerate the impact of their lifesaving mission. The company blends the Association's leadership in science and resuscitation education with Laerdal's expertise in technology and implementation to deliver impactful and innovative resuscitation quality improvement programs. For more information, visit www.rqipartners.com and follow us on [Twitter](https://twitter.com/rqipartners) and [LinkedIn](https://www.linkedin.com/company/rqipartners).

About the American Academy of Pediatrics

The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents and young adults. For more information, visit www.aap.org.

About the American Heart Association

The American Heart Association is a relentless force for a world of longer, healthier lives. We are dedicated to ensuring equitable health in all communities. Through collaboration with numerous organizations, and powered by millions of volunteers, we fund innovative research, advocate for the public's health and share lifesaving resources. The Dallas-based organization has been a leading source of health information for nearly a century. Connect with us on heart.org, [Facebook](https://www.facebook.com/heart.org), [Twitter](https://twitter.com/heartorg) or by calling 1-800-AHA-USA1.

About Laerdal Medical

Laerdal is dedicated to our mission of helping save lives. For more than 60 years, Laerdal has remained a world leader in healthcare education, training and therapy solutions. Laerdal develops products, programs and digital solutions designed to increase survival and improve patient outcomes. By implementing evidence-based solutions within the areas of resuscitation, patient safety and global health, we address the changing needs of healthcare organizations and help build competence of healthcare providers, educators and lay rescuers. Together with our partners, we believe we can help save one million more lives, every year. Laerdal is a global company in 25 countries worldwide with the head office located in Stavanger, Norway. For more information, visit www.laerdal.com.

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NT

Leading Children's Health Groups Urge Lawmakers and Administration to Address Troubling Trends in Children's Uninsurance

News Room / Leading Children's Health Groups Urge Lawmakers and Administration to Address Troubling Trends in Children's Uninsurance

For Release:
10/9/2020

Washington, DC – Leading children's health groups are urging comprehensive and immediate action by Congress and the Administration to protect and improve access to health care coverage for all children. The call to action comes on the heels of recent data from the U.S. Census Bureau showing that 320,000 fewer children had health insurance coverage in 2019 than in 2018, even before the COVID-19 pandemic. Today, a new [report](#) from the Georgetown University Center for Children and Families shows that in 2019, an estimated 4.4 million children did not have health coverage, an increase of 726,000 or nearly 20 percent more children without insurance since 2016, when the nation reached a historic low in children without coverage. The child uninsured rate has grown from 4.7 to 5.7 percent over the same period.

The American Academy of Pediatrics, Children's Defense Fund, Family Voices, First Focus on Children, Georgetown University Center for Children and Families, March of Dimes, and the National Association of Pediatric Nurse Practitioners issue the following statement:

"Our organizations are sounding the alarm over the growing number of children without health insurance. Recent data show the largest increase in the number of uninsured children in more than a decade. A new report today shows that years of progress in covering more children has been eroded, with widespread coverage losses across income, age, and racial and ethnic groups.

"Since 2016, the number of uninsured children has grown each year. Especially concerning is that these 2019 numbers do not reflect the devastating consequences of the COVID-19 pandemic and economic downturn this year, which has caused millions of families to lose jobs and employer-sponsored insurance. These data underscore that the children's health coverage landscape was already headed in a dangerous direction, even before the pandemic hit.

"Without health care coverage, children's health suffers. Often, no coverage means no care, which means fewer preventive screenings to catch conditions before they become severe and costly. It means no access to affordable dental coverage, vaccines, or prenatal services for pregnant mothers. While the latest data show that children across all regions and income levels experienced coverage losses in 2019, the greatest coverage losses were among Hispanic children. The COVID-19 pandemic, which has had a disproportionate impact on communities of color, only exacerbates the impact on children and families who lack access to affordable, comprehensive and high-quality health coverage. We know that children without health coverage could also suffer long-term harm, ending up in poorer health, with less educational attainment and less financial security in adulthood.

"Before the pandemic, the Administration's actions—such as the public charge rule, which has reduced immigrant families' willingness to enroll their children in Medicaid and the Children's Health Insurance Program (CHIP), and other problematic policy changes that impeded access to Medicaid, CHIP and private insurance—are contributors to this erosion of children's coverage. The ongoing global pandemic and subsequent economic recession lead us to believe coverage losses for children will only continue to get worse.

"Children need health care coverage that they can rely on. Congress took the first step to protect children and families by providing greater financial support for Medicaid in the Families First Coronavirus Response Act, along with its continuous coverage protections ensuring that children, pregnant women, and families won't lose Medicaid coverage due to red tape during the pandemic. We call on Congress and the Administration to advance policies that ensure all children and families have health care coverage, not policies that stand in the way of making that possible. Our children's futures depend on our ability to act now."

###

About the American Academy of Pediatrics

The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents and young adults. For more information, visit www.aap.org.

About the Children's Defense Fund

The Children's Defense Fund (CDF) is a 501(c)(3) non-profit child advocacy organization that has worked relentlessly for more than 40

Family Centered Care is trendy, but are providers really meeting parents needs in the NICU?

Consider the following:

Surveys show hospital support groups are being widely underutilized by parents.



And only 10% of NICUs surveyed connect parents with non-hospital support.

Graham's Foundation, the global support organization for parents going through the journey of prematurity, set out to find the missing piece that would ensure all parents have real access to the support they need.

See what they found by emailing info@grahamsfoundation.org to request a free copy of the 2017 whitepaper, "Reaching Premie Parents Today" (*Heather McKinnis, Director, Premie Parent Mentor Program, Graham's Foundation*).

You may be surprised to see what NICUs are doing right and where their efforts are clearly falling short.

Graham's Foundation empowers parents of premature babies through support, advocacy and research to improve outcomes for their preemies and themselves.



Visit www.GrahamsFoundation.org to learn more.

years to ensure a level playing field for all children. The Children's Defense Fund Leave No Child Behind® mission is to ensure every child a Healthy Start, a Head Start, a Fair Start, a Safe Start and a Moral Start in life and successful passage to adulthood with the help of caring families and communities. We champion [policies](#) and [programs](#) that lift children out of poverty; protect them from abuse and

Keeping Your Baby Safe

during the COVID-19 pandemic

How to protect your little one from germs and viruses

Even though there are some things we don't know about COVID-19 yet, there are many more things that we do know. We know that there are proven protective measures that we can take to stay healthy.

Here's what you can do...

Wash Your Hands

- This is the single, most important thing you can do to stop the spread of viruses.
- Use soap.
- Wash for more than 20 seconds.
- Use alcohol-based sanitizers.



Limit Contact with Others

- Stay home when you can.
- Stay 6 feet apart when out.
- Wear a face mask when out.
- Change your clothes when you get home.
- Tell others what you're doing to stay safe.



Provide Protective Immunity

- Hold baby skin-to-skin.
- Give them your breast milk.
- Stay current with your family's immunizations.



Take Care of Yourself

- Stay connected with your family and friends.
- Sleep when you can.
- Drink more water and eat healthy foods.
- Seek mental health support.



Immunizations Vaccinations save lives. Protecting your baby from flu and pertussis lowers their risks for complications from coronavirus.

WARNING

Never Put a Mask on Your Baby

- Because babies have smaller airways, a mask makes it hard for them to breathe.
- Masks pose a risk of strangulation and suffocation.
- A baby can't remove their mask if they're suffocating.



If you are positive for COVID-19

- Wash with soap and water and put on fresh clothes before holding or feeding your baby.
- Wear a mask to help stop the virus from spreading.
- Watch out for symptoms like fever, confusion, or trouble breathing.
- Ask for help caring for your baby and yourself while you recover.



We can help protect each other.

Learn more

www.nationalperinatal.org/COVID-19

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PROTECT YOUR FAMILY FROM RESPIRATORY VIRUSES

flu

coronavirus

pertussis

RSV



WASH YOUR HANDS

often with soap and warm water.

GET VACCINATED

for flu and pertussis. Ask about protective injections for RSV.



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neglect; and ensure their access to health care, quality education and a moral and spiritual foundation. CDF advocates nationwide on behalf of children to ensure children are always a priority.

About Family Voices

Family Voices is a national family-led organization of families and friends of children and youth with special health care needs (CYSHCN) and disabilities. We connect a network of family-led organizations in every state, 5 territories and 3 serving tribal groups that provide support to families of CYSHCN. We promote partnership with families at all levels of health care in order to improve health care services and policies for children.

About First Focus on Children

First Focus on Children is a bipartisan advocacy organization dedicated to making children and families the priority in federal policy and budget decisions.

About the Georgetown University Center for Children and Families

The Georgetown University Center for Children and Families is an independent, nonpartisan policy and research center founded in 2005 with a mission to expand and improve high-quality, affordable coverage for America's children and families. CCF is based at the Georgetown University McCourt School of Public Policy in Washington, D.C.

About March of Dimes

March of Dimes leads the fight for the health of all moms and babies. We support research, lead programs and provide education and advocacy so that every baby can have the best possible start. Building on a successful 80-year legacy of impact and innovation, we empower every mom and every family.

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About the National Association of Pediatric Nurse Practitioners

The National Association of Pediatric Nurse Practitioners (NAPNAP) is the nation's only professional association for pediatric nurse practitioners (PNPs) and their fellow pediatric-focused advanced practice registered nurses (APRNs) who are dedicated to improving the quality of health care for infants, children, adolescents and young adults. Representing more than 9,000 healthcare practitioners with 19 special interest groups and 50 chapters, NAPNAP has been advocating for children's health since 1973 and was the first NP society in the U.S. Our mission is to empower pediatric-focused PNPs and their interprofessional partners to enhance child and family health through leadership, advocacy, professional practice, education and research.

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My Perinatal Network and My NICU Network are products of a collaboration between NPA and NPN

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A collaborative of professional, clinical, community health, and family support organizations improving the lives of premature infants and their families through education and advocacy.



The National Coalition for Infant Health advocates for:

- **Access to an exclusive human milk diet** for premature infants
- **Increased emotional support resources** for parents and caregivers suffering from PTSD/PPD
- **Access to RSV preventive treatment** for all premature infants as indicated on the FDA label
- **Clear, science-based nutrition guidelines** for pregnant and breastfeeding mothers
- **Safe, accurate medical devices** and products designed for the special needs of NICU patients

www.infanthealth.org

Why **PREMATURE INFANTS** *Need Access*
to an **EXCLUSIVE HUMAN MILK DIET**

In the United States, more than **1 IN 10 BABIES ARE BORN PREMATURE**. Very low birthweight babies are born severely premature, weighing less than 1,250 grams.

VERY LOW BIRTHWEIGHT BABIES are at risk for Necrotizing Enterocolitis (NEC), which:

- Damages intestinal tissue
- Causes distended abdomen, infection, low blood pressure and shock
- Threatens infants' lives

NEC occurrence increases when a premature consumes non-human milk products.

When that happens:

5%	17%
1%	12%

of Exclusive Human Milk Diet vs. Non-Human Milk Products

- Very low birthweight babies who get NEC
- Very low birthweight babies requiring surgery to treat NEC

30% of very low birthweight babies requiring surgery will die from NEC

HOW TO HELP PREVENT NEC: EXCLUSIVE HUMAN MILK DIET

What is an Exclusive Human Milk Diet?

- NO cow's milk
- NO sheep's milk
- NO goat's milk
- NO formula

✓ mother's milk
✓ human donor milk
✓ human milk-based fortifier

Why is An Exclusive Human Milk Diet important?

An Exclusive Human Milk Diet gives vulnerable infants the best chance to be healthy and reduces the risk of NEC and other complications.

When a very low birthweight baby can access an EXCLUSIVE HUMAN MILK DIET:

- Mortality is reduced by **36%**
- Feeding intolerance decreases
- Chances of NEC are reduced by **37%**

HUMAN MILK = MEDICINE

NEC is a life-threatening condition that can be deadly. If the digestive tract doesn't heal, it's a sign of human milk. Talk to your baby's doctor to be confident. Talk to your care team about your baby's specific human milk needs and support resources to find your healthy path.

LEARN MORE

NCfIH National Coalition for Infant Health

The Genetics Corner: Hypophosphatasia

Hua Wang, MD, Nivedita Rajakumar, MS, Subhadra Ramanathan, MS, Robin Clark, MD

Prenatal diagnosis of severe perinatal hypophosphatasia allowed early treatment with enzyme replacement therapy on the first day of life

Case History

This infant was born at 39 weeks gestation by scheduled primary Cesarean delivery to a young, healthy primigravida mother. The family history was negative, and the parents were not consanguineous. The pregnancy had been complicated by prenatal diagnosis of a skeletal dysplasia at 23 weeks 2 days gestation. Fetal ultrasound findings from an outside facility showed ventriculomegaly, multiple fractures, and a small chest. Amniocentesis was performed at 24 weeks, and a skeletal dysplasia gene panel was ordered. The results, which were available at 31 weeks gestation, showed two variants in a gene, *ALPL*: one variant was classified as likely pathogenic: c.738G>C (p.Arg246Ser), and the other was classified as a variant of unknown significance: c.119C>T (p.Ala40Val). The mother was transferred to our facility at 35 weeks gestation. At that time, a fetal ultrasound examination showed brachycephaly, short ribs, curled, fairly well ossified, small chest circumference, and underossified vertebrae and long bones (transparent bone) with fractures and bowing. Based on the prenatal ultrasound findings and genetic test results, the diagnosis was made of the severe perinatal form of hypophosphatasia (HPP).

“Prenatal and postnatal genetics consultations were requested. The baby's clinical examination and bone survey confirmed the prenatal diagnosis of the severe perinatal form of hypophosphatasia.”

Genetic Evaluation

Genetics was consulted shortly before delivery and soon after birth. We met the family several times and talked to them by phone. We explained that based on the fetal ultrasound findings and genetic testing results, we believe that each parent carried one of the variants for the autosomal recessive form of severe perinatal hypophosphatasia. Without therapy, this is considered a lethal form of skeletal dysplasia. Targeted parental testing was sent out before the delivery, and results returned one week after the delivery, confirming that the two variants are in trans (Figure 1). The original report was updated, and both variants were classified as likely pathogenic. After birth, on the physical exam, the baby had a small chest, shortened and bowed arms and legs (Figure 2). A bone survey showed diffusely abnormal mineralization of all the bones of the visualized skeleton with multiple bones appearing non-mineralized. In addition, the mineralized bones show abnormal bony architecture with heterogenous and abnormal trabecular patterns and some sclerosis. Multiple long bones show metaphyseal flaring and angulated fracture of the right femoral

diaphysis, as well as a gracile appearance of the ribs. Non-mineralization of posterior elements of the spine, bones of the skull (excluding the skull base), and multiple long bones as well as the phalangeal bones of the upper extremities (Figure 3) were evident. The diagnosis of HPP was further confirmed by the extremely low level of ALP <5. Additional labs showed a low level of PTH.

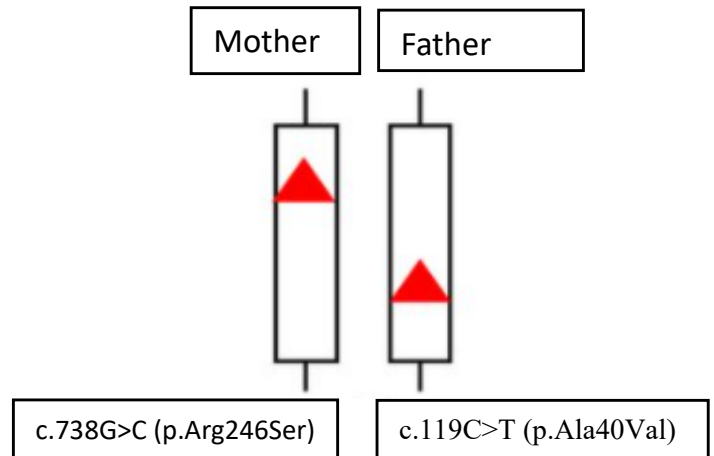


Figure 1. The baby is a compound heterozygote with 2 likely pathogenic variants in *ALPL*; parental testing confirmed that one variant was inherited from each parent.



Figure 2. Shortened and bowed arms and legs.

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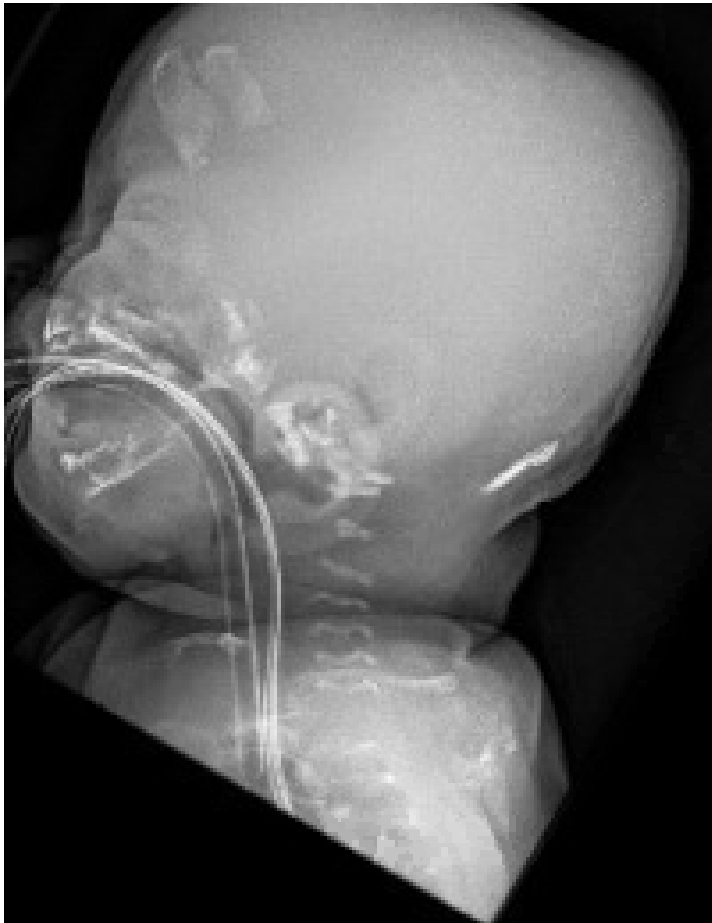


Figure 3. Diffuse undermineralization of all bones.

“Hypophosphatasia (HPP) should not be confused with hypophosphatemia- a different disorder secondary to pulmonary hypoplasia”

During the prenatal genetic consulting visit, the parents agreed to begin enzyme replacement therapy (ERT) with asfotase alfa as soon as possible after delivery. Treatment with asfotase alfa, 2mg/kg, three times per week by subcutaneous injection, was begun on the first day of life. The dose of asfotase alfa was escalated to 3mg/kg on day 18.

“Perinatal hypophosphatasia is the most severe type of HPP. It is complicated by respiratory insufficiency. This patient had additional findings of mild elevated pulmonary pressure and right ventricular hypertrophic cardiomyopathy likely ”

After birth, the infant was orally intubated for hypoxia and respiratory distress. She required SIMV initially but transitioned to NAVA. Chest X-ray (Figure 4, left) at birth showed hypoplastic lungs with coarsened interstitial lung markings. Significant bone dysplasia was evident with absent ossification of vertebral bodies and ribs, bony stippling, and attenuated visualization of osseous structures. Echocardiogram on day one and day five showed mild elevation of pulmonary pressures, severe hypertrophy of the right ventricle, mild dilatation of the right ventricle, and moderate to severe narrowing of the LVOT due to septal wall motion without observed gradient. The mild elevated pulmonary pressure and right ventricular hypertrophic cardiomyopathy were likely secondary to pulmonary hypoplasia. An echocardiogram on day 18 showed normal biventricular systolic function, nonpatent ductus arteriosus, and mild elevation of pulmonary pressures, unchanged compared to prior study.

“Enzyme replacement therapy with asfotase alfa mineralizes the HPP skeleton, including the ribs, and improves respiratory function and survival in life-threatening perinatal and infantile HPP. ”

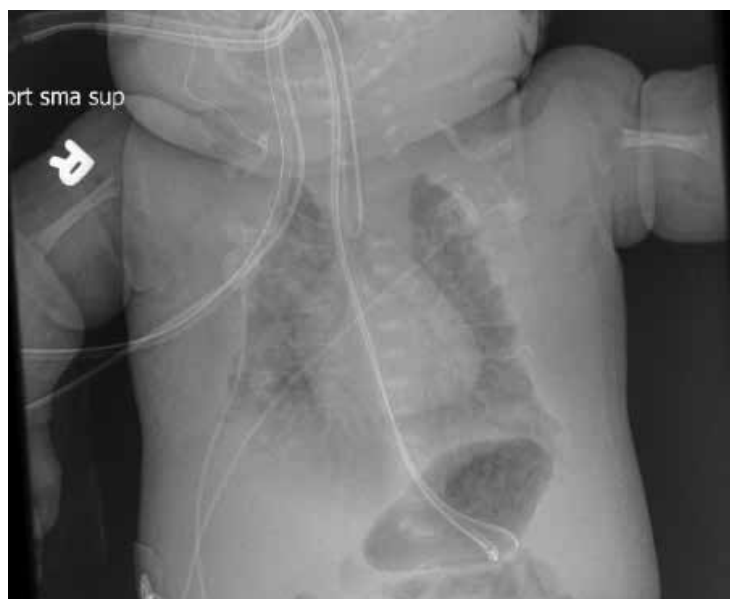
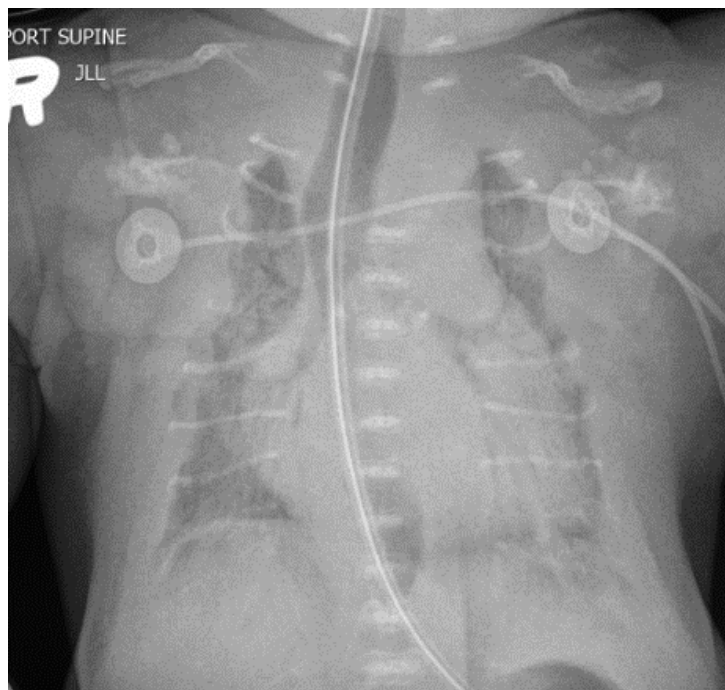


Figure 4. Chest X-rays at birth and at 17 days. Enzyme replacement therapy has not caused an appreciable change in bone mineralization at this point.

Discussion

Before the availability of treatment, the severe perinatal form of HPP often caused death *in utero* or soon after delivery. Affected neonates had rachitic defects in the chest wall, pulmonary hypoplasia, tracheobronchomalacia, causing severe respiratory compromise. Half of the affected infants died shortly after birth. Patients with perinatal or infantile hypophosphatasia were also at



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risk for vitamin B6–dependent seizures,

The availability of enzyme replacement therapy (ERT) is transforming the care and outcome for patients with severe perinatal and infantile-onset HPP. Affected patients treated with asfotase alfa for up to 7-years showed early, sustained improvements in skeletal mineralization, respiratory function, growth, and cognitive and motor function. Asfotase alfa was generally well tolerated. Our patient is one of the few who have been treated at birth. In the report by Okazaki (2016), a patient with severe perinatal hypophosphatasia was successfully treated with ERT from day one of life with evidence of improvement in bone mineralization noted on X-ray after 21 days of therapy. At this writing, our patient is 18 days old. We plan to repeat the bone survey after 21 days of ERT. Figure 4 shows no significant difference in bone mineralization in radiographs taken at birth and 17 days. With asfotase alfa treatment, we anticipate improved bone mineralization after one month of treatment.

Practical Applications

1. Recognize that hypophosphatasia is a rare genetic bone disorder that should not be confused with hypophosphatemia, an electrolyte disorder in which there is a low level of phosphate in the blood.
2. Appreciate the clinical and radiologic features of the perinatal form of HPP, which is an extremely rare, autosomal recessive disorder that causes under mineralization of the skeleton, fractures, and life-threatening respiratory insufficiency due to pulmonary hypoplasia.
3. Appreciate that the pulmonary hypoplasia may cause pulmonary hypertension and further lead to right ventricular hypertrophic cardiomyopathy. Tracheobronchomalacia may cause ventilator dependence.
4. Offer enzyme replacement therapy for severe perinatal and infantile forms of HPP. Although ERT improves bone mineralization and survival in the severe forms of HPP, the treatment effect takes time. Evidence of improved bone mineralization may not be visible radiographically for several weeks or months.

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The authors have no relevant disclosures.

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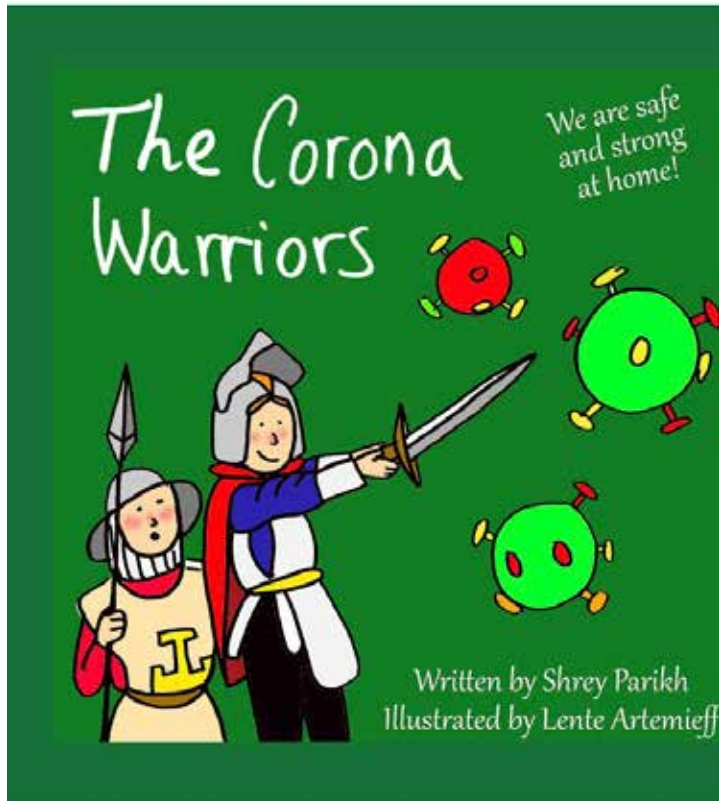
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OPIOIDS and NAS

When reporting on mothers, babies, and substance use

LANGUAGE MATTERS



I am not an addict.

I was exposed to substances in utero. I am not addicted. Addiction is a set of behaviors associated with having a Substance Use Disorder (SUD).



I was exposed to opioids.

While I was in the womb my mother and I shared a blood supply. I was exposed to the medications and substances she used. I may have become physiologically dependent on some of those substances.



NAS is a temporary and treatable condition.

There are evidence-based pharmacological and non-pharmacological treatments for Neonatal Abstinence Syndrome.



My mother may have a SUD.

She might be receiving Medication-Assisted Treatment (MAT). My NAS may be a side effect of her appropriate medical care. It is not evidence of abuse or mistreatment.

My potential is limitless.



I am so much more than my NAS diagnosis. My drug exposure will not determine my long-term outcomes. But how you treat me will. When you invest in my family's health and wellbeing by supporting Medicaid and Early Childhood Education you can expect that I will do as well as any of my peers!

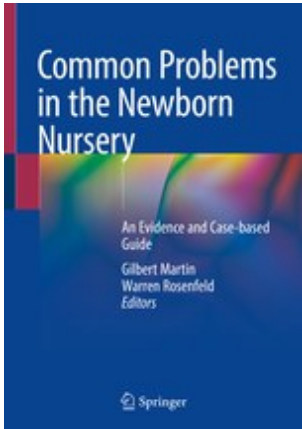
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Editors: **Martin**, Gilbert, **Rosenfeld**, Warren (Eds.)



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While this guide is directed towards health care providers such as pediatricians, primary care physicians, and nurse practitioners who treat newborns, this book will also serve as a useful resource for anyone interested in working with this vulnerable patient population, from nursing and medical students, to nurses and residents in pediatrics or family practice.

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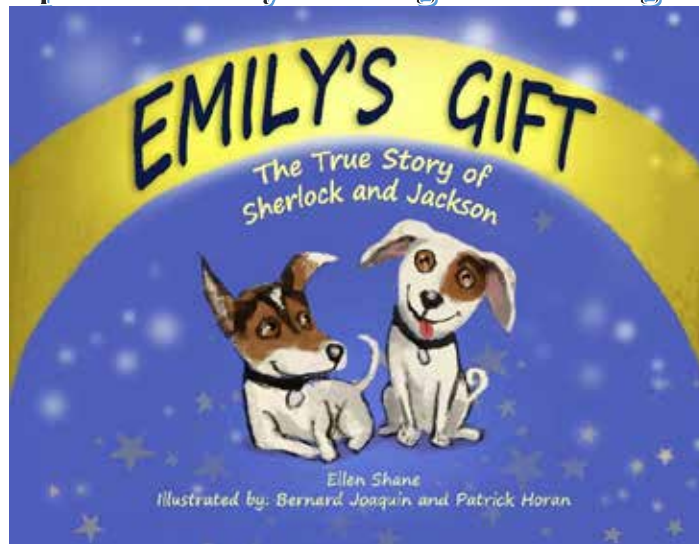
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2020 Virtual Infant Health Policy Summit

Susan Hepworth, Mitchell Goldstein, MD



The National Coalition for Infant Health is a collaborative of more than 180 professional, clinical, community health, and family support organizations focused on improving the lives of premature infants through age two and their families. NCfIH's mission is to promote lifelong clinical, health, education, and supportive services needed by premature infants and their families. NCfIH prioritizes safety of this vulnerable population and access to approved therapies.

On September 10, 2020, the National Coalition for Infant Health held its 2020 Virtual Conference. Although it was originally scheduled to be a in presence summit, difficulties secondary to the COVID-19 pandemic forced the meeting virtual. Highlights from the meeting follow below.

The National Coalition welcomes those interested in our activities as well as organizations interested in protecting access for premature infants through age two to visit our website www.infanthealth.org.

Disclosures: The authors do not have any relevant disclosures.

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National Coalition for Infant Health Values (SANE)

Safety. Premature infants are born vulnerable. Products, treatments and related public policies should prioritize these fragile infants' safety.

Access. Budget-driven health care policies should not preclude premature infants' access to preventative or necessary therapies.

Nutrition. Proper nutrition and full access to health care keep premature infants healthy after discharge from the NICU.

Equality. Prematurity and related vulnerabilities disproportionately impact minority and economically disadvantaged families. Restrictions on care and treatment should not worsen inherent disparities.

VIRTUAL

2020

Infant Health Policy Summit



NCfIH
National Coalition
for Infant Health
Protecting Access for Premature Infants through Age Two

Institute for
Patient Access

Alliance for
Patient Access

2020

Infant Health

Policy Summit

SPEAKERS

REGISTER

Thursday,
September 10

11:30 a.m. to
2:15 p.m. EDT

FEATURED SPEAKER:

Congresswoman
Kim Schrier, MD (WA-08)
Author of the VACCINES Act

TOPICS:

- 📍 The Forgotten Preemies: Late Preterm Infants
- 📍 RSV & COVID-19: Double Trouble
- 📍 COVID-19 Chaos: Isolation, Disruption, Preterm Birth Reduction?
- 📍 High Time: Facing Disparities in Infant Health
- 📍 Congenital Gut Disorders: Research & Reality

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NCfIH National Coalition for Infant Health

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Advocates:

Crystal Baker | Julian Nason | Kaine Tubb

Rebecca L. Cynhar, MPH, PHMP | 2020 PEDIATRIC President

Jenell Johns, MPH | President, Ohio Lactar & Preemie

Martin L. Lee, PhD, CSat, CDev, FIDMS | ProLacta Science™

Eric Sandwith Ross, PhD, CCC-SLP | University of Colorado

Christine Tetter | Hand to Hold

Michael Goldstein, MD, National Coalition for Infant Health

Heidi E. Karger, MD | Emory University/Children's Healthcare of Atlanta

Vivika Prakash-Zawadzka, MD, MS, MBA | President Elect, National Perinatal Association

Susanne Stauber, DNP, APRN, MBA-BC | Emory University School of Nursing

Michael A. Young, MD, FAAP, FASN | Howard University College of Medicine



Overview

The sixth annual Infant Health Policy Summit welcomed health care providers, parents, policymakers, advocates, and other stakeholders to explore how policy solutions can improve the health and lives of infants and their families.

This year's event, held virtually, examined issues such as:

- Late preterm infants
- Respiratory syncytial virus and COVID-19
- Isolation and disruption during COVID-19
- Vaccines
- Disparities in infant health
- Congenital gut disorders
- Human milk.

Julian Nixon, a NICU dad, and director of Diversity & Inclusion Student Services at Clemson University offered welcoming remarks. “We may be scattered across the country, and we may be virtual,” Nixon noted, “but, with this group, we are hardly alone.” Nixon described the event’s attendees as standing “shoulder-to-shoulder on policies that make every family’s journey and every child’s health a priority.”

The summit, which included a series of panel discussions, individual stories, and interviews, was convened by the National Coalition for Infant Health and co-hosted by the Institute for Patient Access and Alliance for Patient Access.



Julian Nixon

“We may be virtual, but we are hardly alone.”

Keynote Address

U.S. Rep. Kim Schrier, MD

Member of Congress



With the sustained risk of COVID-19 combining this fall with other seasonal viruses like the flu, vaccines are as important as ever for infants and their families. U.S. Rep. Kim Schrier, MD, a pediatrician and author of the [VACCINES Act](#) used her keynote address to emphasize the need for childhood immunization.

Rep. Schrier expressed concerns about the growth of anti-vaccination sentiment online, noting that [30%](#) of Americans have said they would not get the COVID-19 vaccine even if it were free of charge. She urged policymakers and advocates to help build trust in science and data.

Rep. Schrier's comments are timely. During the COVID-19 pandemic, many children have missed their well-child exams and gotten off of the standard immunization schedule for infectious diseases like measles, mumps, and polio. Rep. Schrier said schools must insist that children's vaccines are up to date, even if the school is online.

“None of us want to go back to a time with meningitis, pertussis or measles.”

She emphasized the many ways patients can safely receive care during COVID-19. Rep. Schrier reiterated that hospitals are safe and described how some pediatricians have set up tents or offered drive-by vaccination clinics to help keep children and communities healthy. Rep. Schrier noted that telehealth allows patients to see health care providers remotely for patients who might not want to travel.

Rep. Schrier, who takes pride in being the only woman doctor in Congress, reinforced that scientific, evidence-based messaging from medical professionals is crucial for changing the public's perception of vaccinations.

Late Preterm Infants



Susan Hepworth

National Coalition for Infant Health

When people think of preterm infants, they often think of tiny and fragile babies. That is not always the case, explained Susan Hepworth of the National Coalition for Infant Health. Hepworth noted that late preterm infants, those born between 34-36 weeks, might appear to be in good health even if underlying health challenges tell a different story.



Erin Sundseth Ross, PhD

University of Colorado School of Medicine

Erin Sundseth Ross, PhD, explained that preemies have an underdeveloped neurological system, which can affect their muscle tone, sleeping, ability to stay awake, and eating. About 40% of late preterm infants will struggle with feeding problems, as will up to 60% of babies born at 34 weeks.



Viveka Prakash-Zawisza, MD

National Perinatal Association

New mothers can face an enormous amount of stress when their babies won't eat. Viveka Prakash-Zawisza, MD, said that educating families on the risks and complications of having a late preterm baby could help, as could standardizing care for this special group of infants. "Care can vary from hospital to hospital because this population of babies has not been very well understood," said Dr. Prakash-Zawisza.

Feeding disorders have often been overlooked or dismissed, but, starting next year, a standalone diagnosis from the Centers for Disease Control and Prevention will help allow them to be properly diagnosed.

Isolation and Disruptions Due to COVID-19

COVID-19 has made it difficult for infants and their families to receive care.



Mitchell Goldstein, MD

National Coalition for Infant Health

Mitchell Goldstein, MD, said infants' families are constantly in a state of confusion because hospital and NICU rules can change frequently. Dr. Goldstein noted that NICU visitation restrictions can be severe, increasing stress on new parents. Should one parent be COVID-positive, the entire family might be barred from visiting their hospitalized infant altogether.



Rebecca L. Cypher, MSN

Association of Women's Health, Obstetric, and Neonatal Nurses

Rebecca L. Cypher, MSN, echoed concerns about vaccination gaps, especially during the COVID-19 pandemic, noting that the problem is global. She shared that, "The likelihood that a child born today would be fully vaccinated by the age of five is less than 20%."



Christine Tester

Hand to Hold

Christine Tester stressed the importance of infant well-checks to make sure children stay healthy. She also emphasized the need for mother well-checks. Tester said, "New mothers cannot be taking care of a newborn if they are not able to perform the most basic levels of self-care."

Tester concluded by explaining, "If anything good has come out of this, I think it's the fact that the mental health conversation has been brought to the forefront...not just in the NICU setting, but overall."

RSV & COVID-19: Double Trouble

As COVID-19 continues to run its course, a panel explored the overlapping threats of COVID-19 and respiratory syncytial virus or RSV.



Suzanne Staebler, DNP

National Coalition for Infant Health

Like the coronavirus, RSV symptoms start off much like a common cold: runny nose, fever, nasal congestion. Most people can recover in a week or two, but RSV can increase health risks for infants, making it harder for them to breathe. Staebler explained that there is no definite link between COVID-19 and RSV but that the infants at risk for RSV are the same patients at high risk for severe COVID-19.



Crystal Baker

Patient Advocate

Crystal Baker remembers the frightening details of RSV all too well. She shared her son Cameron's story of RSV when flu-like symptoms were compounded with a 60% reduction in Cameron's ability to breathe. He was rushed to the emergency room, but because of COVID-19, Baker was not allowed in the back of the ambulance with her son. The hospital also allowed only one parent to visit at a time, increasing isolation and anxiety for parents.

Scenarios like Cameron's can be avoided by using a preventive treatment called palivizumab, but insurers often deny access to the treatment. Staebler said, "Insurers often think they are saving money... but when you have an infant who is hospitalized, sent to a doctor's office and had a NICU stay, those all increase the risk and cost." Staebler encouraged policymakers to improve access to preventive RSV treatment.



Amanda Conschaffer

Alliance for Patient Access

Panel moderator Amanda Conschaffer outlined [data](#) from the Institute for Patient Access, highlighting how frequently preemies are denied insurance coverage for preventive RSV treatment, despite the virus' threat to infants with fragile immune systems and underdeveloped lungs.

Health Disparities

Another panel discussion explored reducing health disparities for Black infants and their families by embracing patient-centered care.



Michal A. Young, MD

Howard University College of Medicine

Michal A. Young, MD, urged health care providers to “listen to your patients.” Women, in general, are dismissed more frequently by medical professionals, Dr. Young explained. She also noted that hospitals and their NICUs must meet families where they are.

One important step can be staffing the hospital with diverse health care providers. Dr. Young referenced a recent [report](#) that Black babies are three times more likely to die if their health care provider is white. Dr. Young said, “This is an opportunity for the greater community to understand the kinds of...bias that costs us our health and our lives.”



Jenné Johns, MPH

Once Upon a Premie Academy

Jenné Johns, MPH, shared her personal experience with racial bias when she was in the NICU with her son. She said her biggest advice for providers is to participate in racial disparities courses and conversations actively.

Johns encouraged fellow parents, “Talk about what you’re experiencing mentally and emotionally and unpack how those stressors may be impacting you, because at the end of the day, especially as preemie parents, our babies need us.”



Ashley Randolph-Cooley

Alliance for Black NICU Families

Ashley Randolph-Cooley described her new organization’s goal of combatting racial health disparities by listening to the voices of the families who have been the most impacted. The organization’s goal is to support and empower families in the NICU. Members are predominantly Black parents of premature NICU infants who have experienced racial inequity.

Congenital Gut Disorders & Human Milk

Congenital gut disorders are rare birth defects that usually result in intestinal obstruction. That obstruction can cause a multitude of problems, including feeding challenges.



Katie Trudo

NICU Parent

The challenges of congenital gut disorders are familiar to Katie Trudo, a NICU parent who learned at a 20-week ultrasound that her son Camden had a congenital gut disorder. Fortunately, Camden recovered after 16 days in the NICU. Other families who have an infant with a congenital gut disorder can spend an average of four-six weeks in the NICU.



Heidi E. Karpen, MD

Emory University/Children's Healthcare of Atlanta

Panelists explored the benefits of human milk - “medicine, not just nutrition.” Human milk can have particular nutritional value for infants with congenital gut disorders.

As Heidi E. Karpen, MD noted, infants who were fed mostly breastmilk left the hospital 10-20 days sooner than infants who were not. This makes a huge difference for families wanting to take their child home. It can also help to contain medical costs. The infants who consumed breast milk also had a decreased risk of infections.

Gut disorders often require multiple medical procedures, which can be especially challenging for newborns, explained Dr. Karpen.



Martin L. Lee, PhD

Prolacta Bioscience

Martin L. Lee, PhD, emphasized the value of human milk for babies with gut disorders. “Human milk is the best medicine and the best nutrition for babies born premature, and of course, for babies born at term.” Whether through breastfeeding or with the help of donor human milk, Dr. Lee emphasized, “it’s incumbent upon us to make sure that every baby gets fed in the best way possible.”

To learn more about topics discussed at the summit and the National Coalition for Infant Health’s policy priorities and advocacy initiatives, visit www.infanthealth.org

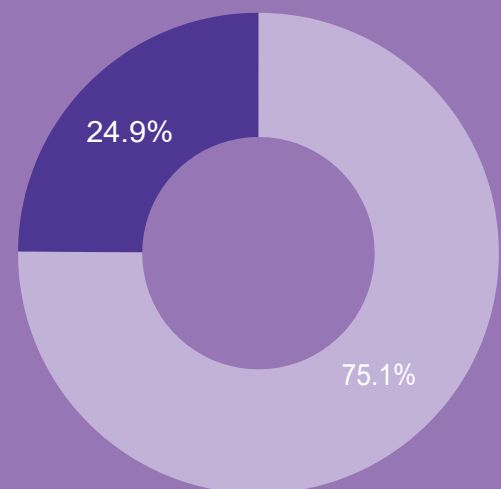
Audience Overview



TOTAL ATTENDEES

416

COUNTRY BREAKDOWN



● Returning Visitors
● New Visitors

NCFIH National Coalition
for Infant Health
Protecting Access for Premature Infants through Age Two

IfPA | Institute for
Patient Access

AfPA | Alliance for
Patient Access



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Keeping Your Baby Safe

How to protect your little one from germs and viruses

The 2020 cold and flu season is going to be especially dangerous for vulnerable infants their families. But there are things you can do to be safer.

- FLU
- COVID-19
- RSV

Here's what you can do...

Wash Your Hands

- This is the single most important thing you can do to stop the spread of viruses.
- Use soap.
- Wash for more than 20 seconds.
- Use alcohol-based sanitizers.

Limit Contact with Others

- Stay home when you can.
- Wear a face mask when out.
- Stay at least 6 feet apart when out.
- Change your clothes when you get home.
- Tell others what you're doing to stay safe.

Provide Protective Immunity

- Hold baby skin-to-skin.
- Clow them your breast milk.
- Stay current with your family's immunizations.

Take Care of Yourself

- Stay connected with your family and friends.
- Sleep when you can.
- Drink more water and eat healthy foods.
- Seek mental health support.

Immunizations

Vaccinations save lives. Protecting your baby from flu and pertussis lowers their risk for complications from RSV and COVID-19.

Never Put a Mask on Your Baby

WARNING

- Because babies have smaller airways, a mask makes it hard for them to breathe.
- Masks pose a risk of strangulation and suffocation.
- A baby can't remove their mask if they're suffocating.

If you are positive for COVID-19

- Wash with soap and water and put on fresh clothes before holding or feeding your baby.
- Wear a mask to help stop respiratory viruses from spreading.
- Watch out for symptoms like fever, confusion, or trouble breathing.
- Ask for help caring for your baby and yourself while you recover.

We can help protect each other.
Learn more www.nationalperinatal.org/COVID-19

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Learn how to support these families.

www.nicuawareness.org
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National Statistics

Respiratory Syncytial Virus



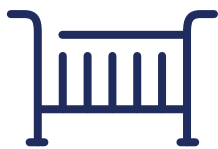
About Respiratory Syncytial Virus

Respiratory syncytial virus, or RSV, is a contagious seasonal respiratory virus that can cause bronchiolitis and pneumonia. It is also the leading cause of hospitalization in babies less than one year old.¹ RSV can be deadly for premature infants and at-risk infants with congenital heart disease or chronic lung disease.

Preventive treatment called palivizumab can protect infants from RSV, but national claims data shows certain babies aren't getting access to this FDA-indicated therapy.

National Health Plan Coverage & Access

A national data supplier provided palivizumab claims for Medicaid and commercial health plans across the nation from January 2019 through December 2019.



"Gap" Babies

Commercial Plans Denied

40%

Medicaid: **25%**

Health plans deny 40% of palivizumab prescriptions for premature infants born between 29 and 36 weeks gestation.



"In-Guidance" Babies

Commercial Plans Denied

25%

Medicaid: **14%**

One in every four prescriptions is denied for infants who should qualify for coverage under standard insurance policies.

This includes severely premature infants born before 29 weeks gestation, babies born before 32 weeks gestation who have chronic lung disease, and babies born with congenital heart disease.



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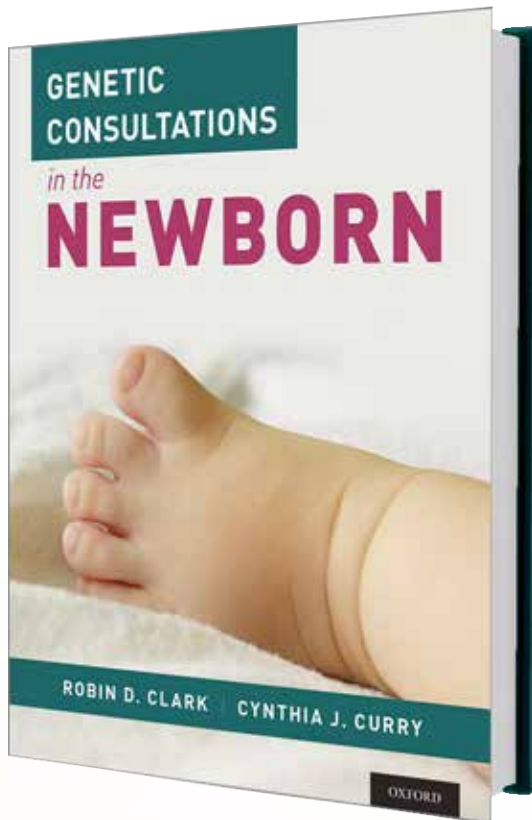
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OXFORD

RSV AWARENESS:

A National Poll of Parents & Health Care Providers

Respiratory syncytial virus, or RSV, is far from the common cold. It can lead to hospitalization, lifelong health complications or even death for infants and young children. **In fact, it is the leading cause of hospitalization in children younger than one.**

Yet a national poll of parents and specialty health care providers reveals a startling divide in attitudes toward the virus. While both groups acknowledge RSV as a significant concern, the two populations vary widely in their reported ability to meet RSV's threat head-on. Health care providers vigilantly

monitor for the virus, which they report seeing regularly in their practices. Parents, however, feel unequipped to protect their young children.

Meanwhile, specialty health care providers overwhelmingly report that health plan rules and insurance denials block vulnerable infants' access to preventive RSV treatment. Such barriers can put unprepared parents at a double disadvantage. The survey does suggest, however, that education can embolden parents to seek more information about RSV and take steps to protect their children.

KEY FINDINGS

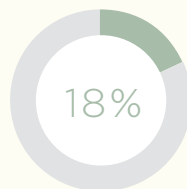
Preparedness

Parents of children age four and under report that understanding of RSV is lacking. That leaves them less than fully prepared to prevent their young children from catching the virus.

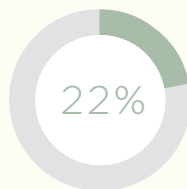
Specialty health care providers reiterated these concerns; 70% agreed that parents of their patients have a low awareness of RSV. Meanwhile, specialty health care providers themselves actively monitor for RSV. They reported that:

PARENTS

Only 18% said parents know “a lot” about RSV, reflecting an awareness level that’s roughly half that of the flu

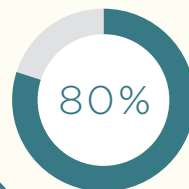


Only 22% of parents consider themselves “very well prepared” to prevent RSV.

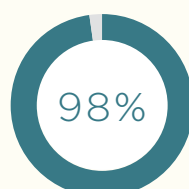


SPECIALTY HEALTH CARE PROVIDERS

They treat RSV as a priority, “often” or “always” evaluating their patients (80% doctors; 78% nurses)



During RSV season, they are especially vigilant about monitoring patients for symptoms or risk factors for RSV (98%).



Clinical Pearl:

The Clinical Utility of the 'World Wide Web' with Historical Perspective from Tim Berners-Lee's Book 'Weaving the Web'

Joseph R. Hageman, MD, Kelty Allen, PhD, Tatiana Anderson, PhD, Mitchell Goldstein, MD.

Introduction

I am amazed every time I take a minute to "Google" a clinical question using the 'World Wide Web'! Since I have had the opportunity to collaborate with Drs. Kelty Allen and Tatiana Anderson at the SIDS Summit (1) and learn from their recent article about research analysis of big data just published in Neonatology Today (2), I felt like I wanted to learn more about who invented the 'world wide web' and how it was developed. So I asked "Siri," and she told me it was Tim Berners-Lee and gave me the link to his book, which is entitled "Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web (3)". I then used "electronic mail" and asked if they would be interested in helping me write an article about the clinical utility of the World Wide Web (WWW) with some historical perspective (3). I also communicated with Dr. Mitchell Goldstein, our Editor-in-Chief and Chair of the Section on Advances in Therapeutics and Technology, American Academy of Pediatrics, to provide his perspective about the clinical utility of the WWW, and he agreed to help.

"In reading this interesting and amazing story, Berners-Lee states, "the vision I have for the Web is about anything being potentially connected with anything" (3-p1). He also notes, "inventing the World Wide Web involved my growing realization that there was a power in arranging ideas in an unconstrained, web-like way. "

In reading this interesting and amazing story, Berners-Lee states, "the vision I have for the Web is about anything being potentially connected with anything" (3-p1). He also notes, "inventing the World Wide Web involved my growing realization that there was a power in arranging ideas in an unconstrained, web-like way. And that awareness came to me through precisely that kind of process" (3-p3). Finally, "I articulated the vision, wrote the first Web programs, and came up with the now pervasive acronyms URL (then UDI), HTTP, HTML, and of course, World Wide Web" (3-p2).

The fact is, as clinicians, we need to have a basic solid understanding of the Web works, what information is available, since nowadays, our patients and their families come to us with all kinds of clinical information and knowledge from a variety of different sources from all over the world and present it to us as clinically reliable, up to date and state of the art since they found it on the internet. It is clear that Tim Berners-Lee, the son of mathematicians, who is currently the director of the World Wide Web Consortium and 3Com Founders Chair at the MIT Laboratory for Com-

puter Science, has accomplished what he started out to do. This resource is an asset that has both made our job easier and harder at the same time.

As I sat in the SIDS Summit with data scientists like Dr. Allen and neuroscientists like Dr. Anderson and listened to how they were able to use all of their resources to do research analysis of large,

"As I sat in the SIDS Summit with data scientists like Dr. Allen and neuroscientists like Dr. Anderson and listened to how they were able to use all of their resources to do research analysis of large, national data sets, and communicate and collaborate with other investigators, using the WWW, I realized how little I really knew and how much I wanted to know about the clinical utility of the World Wide Web. "

national data sets, and communicate and collaborate with other investigators, using the WWW, I realized how little I really knew and how much I wanted to know about the clinical utility of the World Wide Web. I hope you will find this information useful and



helpful as I have.

Now we are in the midst of the COVID-19 pandemic, and data about pregnant mothers and their infants are coming from all over the world almost daily, via the World Wide Web! We have been presenting new COVID-19 related clinical pearls monthly as strategies for universal screening of pregnant women presenting to labor and delivery have been variable and ongoing depending on the hospital system and organization (3-5). Universal screening COVID-19 positive rates for pregnant women varied from 7%-14% depending on where and when mothers were screened during the pandemic (6-8). About three-quarters of the women were clinically asymptomatic (8). Here is one example from the Mass General Questions and Answers regarding the reasoning for universal screening:

Q: I have heard that some hospitals are testing all women for COVID-19 who arrive to the hospital for labor—even women without any symptoms. Will I be tested when I arrive at Mass General?

A: With guidance from infection control specialists and our colleagues in other states, Mass General, along with all our partner hospitals, is testing all women arriving at Labor and Delivery for COVID-19. Some patients who have no symptoms may be identified as COVID positive, and this information will allow us to take the best care of all the mothers and babies on the unit (6).

Clinical manifestations of pregnant and recently pregnant women with suspected or confirmed COVID-19 disease and their infants have been reported from all over the world (7-9). The studies were summarized in a systematic review and meta-analysis in the British Medical Journal by Allotey and colleagues, which included 77 cohort studies from the United States (26), China (24), Italy (7), Spain (6), United Kingdom (3), France (3), and one each from Belgium, Brazil, Denmark, Israel, Japan, Mexico, the Netherlands, and Portugal (8). The pregnant or recently pregnant women most commonly presented with fever (40%) and cough (39%); lymphopenia (35%) and elevated C reactive protein levels (49%) were the most common laboratory findings compared with non-pregnant women with COVID-19 disease (7). A total of 73 women (out of 11,580 women) with confirmed COVID-19 disease died from any cause (7). Thirteen percent of these women were diagnosed with severe COVID-19, 4% were admitted to the intensive care unit, 3% required invasive ventilation, and 0.4% required extracorporeal membrane oxygenation (7). In this review, maternal risk factors associated with severe COVID-19 were increasing age, high body mass index, chronic hypertension, and pre-existing diabetes mellitus (7).

On the newborn infant side, pregnant women with COVID-19 had an increased risk of delivering a preterm infant and having their newborn infant admitted to the neonatal intensive care unit (NICU) (7). There were six neonatal deaths (26 studies with 1728 neonates) and 18 stillbirths (27 studies; 2837 offspring); however, this was considered to be low or “negligible” risk (7).

In another study of pregnant women presenting to labor and delivery in Sweden, RT-PCR testing was done and among the 2682 patients presenting, 156 (5.8%) tested positive for COVID-19 (9). A total of 65% of women were clinically asymptomatic (10). The COVID-19 positive pregnant women were matched with COVID-19 negative pregnant women, and those testing positive were more likely to have preeclampsia, and there was no difference in 5-minute APGAR scores or birthweight for gestational age in their newborn infants (9).

The value of access to data from all over the world via the World Wide Web to clinicians, researchers, and public health professionals is evident from this brief review. Again, as Berners-Lee states, “the vision I have for the Web is about anything being potentially connected with anything” (3-p1). He also notes, “inventing the World Wide Web involved my growing realization that there was a power in arranging ideas in an unconstrained, web-like way (3)”.

Although these web-like manifestations are the substance that makes the World Wide Web so enduring to us, we must remember its potential as “an internet.” The very fact that it provides connection, content, and context is the basis for our ability to amalgamate data from myriad sources to provide the raw material for big data and predictive analytic solutions that would have been improbable just twenty years ago.

“Although these web-like manifestations are the substance that makes the World Wide Web so enduring to us, we must remember its potential as “an internet.” The very fact that it provides connection, content, and context is the basis for our ability to amalgamate data from myriad sources to provide the raw material for big data and predictive analytic solutions that would have been improbable just twenty years ago.”

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The authors have no conflicts to disclose

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May begin with a brief case summary or example.

Summarize the pearl for emphasis.

No more than 7 references.

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NATIONAL PERINATAL ASSOCIATION

**Update: CORONAVIRUS
COVID-19**

According to data
published in The Lancet

**Because of the risk of
developing severe
pneumonia, pregnant
women and newborn
babies should be
considered key
at-risk populations.**



www.nationalperinatal.org

OPIOIDS and NAS

When reporting on mothers, babies, and substance use

LANGUAGE MATTERS



I am not an addict.

I was exposed to substances in utero. I am not addicted. Addiction is a set of behaviors associated with having a Substance Use Disorder (SUD).



I was exposed to opioids.

While I was in the womb my mother and I shared a blood supply. I was exposed to the medications and substances she used. I may have become physiologically dependent on some of those substances.



NAS is a temporary and treatable condition.

There are evidence-based pharmacological and non-pharmacological treatments for Neonatal Abstinence Syndrome.



My mother may have a SUD.

She might be receiving Medication-Assisted Treatment (MAT). My NAS may be a side effect of her appropriate medical care. It is not evidence of abuse or mistreatment.

My potential is limitless.

I am so much more than my NAS diagnosis. My drug exposure will not determine my long-term outcomes. But how you treat me will. When you invest in my family's health and wellbeing by supporting Medicaid and Early Childhood Education you can expect that I will do as well as any of my peers!



Learn more about Neonatal Abstinence Syndrome at www.nationalperinatal.org

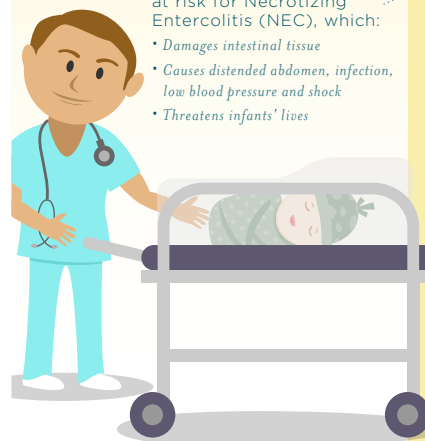


NT

Why PREMATURE INFANTS Need Access to an EXCLUSIVE HUMAN MILK DIET



In the United States, more than **1 IN 10 BABIES ARE BORN PREMATURE**. Micro preemies are born severely premature, weighing less than 1,250 grams.

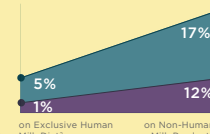


MICRO PREMIES are at risk for Necrotizing Enterocolitis (NEC), which:

- Damages intestinal tissue
- Causes distended abdomen, infection, low blood pressure and shock
- Threatens infants' lives

NEC occurrence increases when a preemie consumes non-human milk products.

When that happens:



30% of micro preemies needing surgery will die from NEC†

HOW TO HELP PREVENT NEC: EXCLUSIVE HUMAN MILK DIET

What is an Exclusive Human Milk Diet?



NO cow's milk



NO sheep's milk



NO goat's milk



NO formula



- ✓ mother's milk
- ✓ human donor milk
- ✓ human milk-based fortifier

Why Is An Exclusive Human Milk Diet Important?

An Exclusive Human Milk Diet gives vulnerable infants the best chance to be healthy and reduces the risk of NEC and other complications.

When a micro preemie can access an EXCLUSIVE HUMAN MILK DIET:

Mortality is reduced by **75%***

Feeding intolerance decreases*†

Chances of NEC are reduced by **77%***



HUMAN MILK = MEDICINE

LEARN MORE ▶



* Hair AB, et al. "Beyond Necrotizing Enterocolitis Prevention: Improving Outcomes with an Exclusive Human Milk-Based Diet." *Breastfeeding Medicine* 2015; 10:106-116. DOI: 10.1089/bfm.2015.0124

† Abrams SA, et al. "Greater Mortality and Morbidity in Extremely Premature Infants Fed a Diet Containing Cow Milk Protein Products." *Breastfeeding Medicine* July/August 2014; 9(6): 281-285

* Hall SA, et al. "Mortality and Management of Surgical Necrotizing Enterocolitis in Very Low Birth Weight neonates: a prospective cohort study." *J Am Coll Surg* 2014; Jun; 218(6): 1148-55.

* Assaad M, Elliott MJ and Abraham JH. "Decreased cost and improved feeding tolerance in VLBW infants fed an exclusive human milk diet." *Journal of Perinatology* advance online publication 12 November 2015; DOI: 10.1098/jp.2015.168

Pragmatic High-Reliability Organizations (HRO) Modulate the Functions of Stress and Fear Behaviors During Pandemic COVID-19: The Stress-Fear-Threat Cascade

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moving within the trajectory of events.

Abstract

Stress and fear have biological functions that, when neuromodulated, make adaptive otherwise maladaptive responses. While the concept of a defensive cascade supports cognitive understanding and hypothesis testing, approaching this domain by function using an ecological approach brings the pragmatic stance with methods for prevention and intervention. Stress, fear, and threat have distinct functions to, respectively, constrain cognition, induce cognitive focus, and reflexively respond when in danger. We differentiate reference frames between a fixed-point reference frame that distinguishes the event (stimulus) from the person (responder and response) and an experiential reference frame within cascading events. Unrecognized, the characteristics and actions of an HRO bring modulation to the defense cascade, check the effects of stress, interrupt cascading fear reactions, and abridge threat reflexes.

“Stress and fear have biological functions. Stress and fear behavioral responses are integrated collectives of motor and emotive behaviors occurring reflexively, modulated, or used intentionally. When modulated, these behaviors initiate engagement and drive enactment.”

Introduction

Stress and fear have biological functions. Stress and fear behavioral responses are integrated collectives of motor and emotive behaviors occurring reflexively, modulated, or used intentionally. When modulated, these behaviors initiate engagement and drive enactment. When entirely reflexive, though, they become destructive to individuals, the system, and the organization. An HRO incorporates stress and fear behaviors into its adaptive response to the unexpected. To better understand how this occurs, we look at stress, fear, and threat from an operational frame of reference supported by science. In this paper, "stress, fear, and threat" refer to stimuli that initiate the defensive cascade, which we differentiate into the functional elements "stress response, fear reactions, and threat reflexes." Further, rather than use a fixed-point reference frame that more easily distinguishes the event (stimulus) from the person (responder and response), the reference frame we use lies within the cascading experiences of the individual

Stress and fear *behaviors* come in suites that contribute to individual temperament and ensembles used when needed. Stress and fear impair information flow, cognition, social interaction and increase staff attrition. These ever-present behavioral suites and ensembles reflect how we will act in a crisis and have unrecognized influences on safety and reliability. Pragmatic HROs have embedded within their characteristics an effective means to diminish these effects. The appearance of maladaptive behavioral suites and ensembles during routine operations are harbingers of failed operations during crises.

“Pragmatic HROs have embedded within their characteristics an effective means to diminish these effects. The appearance of maladaptive behavioral suites and ensembles during routine operations are harbingers of failed operations during crises.”

The NICU exists to extend medical care and supportive human contact into an environment of potential or imminent death and dreams on hold. We expect stress, fear, and a threat to life. Humans evolved to survive such environments. But without neuro-modulation, the debilitating effects from stress, fear, and threat become destructive, impair medical care, and drive good people from the field. Understanding the *functions* of stress, fear, and threats and how they appear in the NICU leads to effective means of preventing or modulating maladaptive responses. Understanding how HROs originated in similar environments can lead to effective use of HRO characteristics. Staff then gain meaning from their efforts to help those who cannot help themselves.

Pandemic COVID-19 disrupted healthcare at multiple levels of organization in healthcare, society, and government. Unrecognized were the protean characteristics of HRO that ensure performance at diverse levels of operations, from NICU professionals coalescing around a mother and infant to systems and organizations unaccustomed to jointly working together. During the 1991 eruption of Mt. Pinatubo, the Philippines, ash from the minor initial eruption blew nearby Clark Air Base, and 13,000 personnel were evacuated to the US Naval Facility at Subic Bay. The second, main eruption occurred as winds from a tropical storm blew heavy, wet ash onto Subic Bay, precluding the air evacuation of personnel. HRO characteristics informed the entire response of the US Navy, US

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Air Force, and US Government aid and support to the Philippine people (van Stralen and Mercer 2015). HRO is a powerful method for performance across and within diverse levels of the organization against abrupt overwhelming demands.

Abrupt threats in environments of sufficient magnitude to cause death may require resetting or changing learned behaviors in the moment, if not start over (Doya 2008). Vertebrates have numerous methods for surviving hostile environments, behavior being the most immediately adaptive (Tinbergen 1963). Behaviors come in suites coordinated for various purposes (Fristrup 2001, 20-21; Sih et al. 2004). These suites of behaviors, combining actions and non-actions, create sustained, coordinated defensive responses for survival. The primary defensive and survival functions are 1) reflexive, subcortical actions, 2) hindering memory systems to limit cognition, and 3) volitional behaviors directed toward self-preservation.

“Inhibiting memory recall in select memory systems, enhancing memory recall for habit and learned behaviors, and selected memory formation supports forming threat reflexes into learned behaviors.”

Reflexive action arises from subcortical structures for immediate response to threats before clearly identifying the threat. These unconscious yet objective *threat reflexes* include the well-known fight, flight, and freeze reflexes (LeDoux 2014; LeDoux and Pine 2016). Inhibiting memory recall in select memory systems, enhancing memory recall for habit and learned behaviors, and selected memory formation supports forming threat reflexes into learned behaviors. Cortisol release during the *stress response*, through the hypothalamic-pituitary-adrenal axis, accomplishes this. Cognitive behaviors directed toward self-protection are organized into offensive and defensive actions. The immediacy and focus of actions and intense feelings identify these conscious yet subjective *fear reactions* (LeDoux 2014; LeDoux and Pine 2016).

Lost in systems and organization thinking is the individual faced with an abrupt threat who experiences natural and expected stress, fear, and threat. In these situations, the individual responds as an *individual* to immediate, local problems relying solely on personal experience. By the time a person asks or calls for assistance or help, actions have already happened. The effects of stress, fear, and threat displace the best plans and systems for support. Individuals at all levels of the organization's hierarchy experience these same effects, which have become incorporated into the culture as expected, if not accepted, behaviors. The ordinary presence of these unrecognized behaviors as stress, fear, and threat behaviors, burdens efforts to achieve safety and reliability (van Stralen, Byrum, and Inozu 2017, 285-7). Unrecognized stress then becomes group stress with loss of individual and organization capability.

The neonatologist can lead staff and the organization through this environment by accepting these behaviors as the expected neurologic response, but one that can be neuromodulated. The physician can recognize these behaviors in patients, staff, colleagues, and senior leaders then support modulating these maladaptive responses for the direct result of increased capability and performance. The use of these characteristics brings adaptability to individual and organization performance *during* unpredictable cir-

cumstances.

In this article, we will describe how pragmatic HRO contains elements to withstand stress, fear, and threat; how we can understand the behavioral responses as conserved defensive and survival behaviors; the adaptive function of stress responses, fear reactions, and threat reflexes; and the specific cases of dissociation, agitation, and posttraumatic stress.

Pragmatic HRO and Stress

HRO emerged from the synthesis of aerial combat decision making, the professionalism of nuclear propulsion crews, and emphasis on aviation operational safety techniques during wartime (van Stralen et al. 2020a). Safety is intrinsic to and inseparable from operations. Safety is not a distinct element, hence the phrase "safety through operations and operations through safety."

The pragmatic stance for HRO is the leadership (van Stralen et al. 2020a and 2020b) necessary to bridge the gap between theory and practice (Zundel and Kokkalis 2010) and discrete concepts and continuous perceptions (Weick 2011), leverages error (van Stralen and Gambino 2020), and informs straightforward decision making for novel medical threats (Eisenberg, Lysouvakon, and Hageman 2020). Perhaps the greatest strength HRO brings to individuals and the organization is the increased capabilities and stress capacity against an abrupt, overwhelming threat. The HRO approach to such incidents also serves for ordinary difficulties, bringing routine situations into the program as impromptu "training" missions. During the Cold War, Soviet threats would approach the USS Carl Vinson. One of the authors (TAM) broke the tension for crew members with the observation, "Remove the 'h' from threat and it becomes a treat;" a "treat" being a real-time training opportunity.

Instrumental for effective implementation and maintenance of high reliability is the leader's actions to modulate stress and fear (van Stralen et al. 2020a) and develop the stress capacity of subordinates (van Stralen et al. 2020b). In these circumstances, maladaptive responses to stress, fear, and threat are deadly and contribute to mission failure.

Authority from a fixed frame of reference outside of the incident follows events as a continuum. Observation at a fixed point detects the emergence of nonlinear patterns and coherent structures not visible locally. Leadership from this fixed point outside of events provides dispassionate direction and support. It might make sense, then, that strong central authority transferred to more experienced leaders would reduce maladaptive responses from stress or fear. This form of directive leadership, however, decreases organizational performance even in routine operations (Pearce and Sims 2002). The environment of a strong central authority can create "mindguards" who protect the leader from disconfirming information (Janis 1989, 279), decreases information flow and cooperation (Westrum 2004), supports simplistic perceptions and decisions by leaders (Tetlock 1979), and can become preoccupied with error and compliance as failure signals (van Stralen and Gambino 2020). Rather than reluctant to simplify, the organization prompts simplification. Subordinates begin to simplify for self-protection.

Stress from decision making under centralized authority, a fixed frame of reference, readily leads to maladaptive decision behaviors. Irving Janis (1989, 78-9) described how simple cognitive or emotive rules develop into four identifiable patterns of decision making. With a low level of emotional demand, the individual will depreciate weak signals and not change course, *unconflicted inertia*, or change course by following simple decision rules, *unconflicted change*. If emotional stress becomes intense, the individual escapes by avoiding or ignoring the problem, *defensive*

avoidance, or impulsively takes *any* option that appears better, *hypervigilance*. While more common to see these patterns of stress and fear in lower echelons, they also occur in "leaders of governments, major business corporations, and other large organizations" (Janis 1989, 3-4). Authority migration and information flow during routine operations in the HRO reduce stress while preparing individuals for consequential decisions, lowering the incidence of these maladaptive decision patterns.

“Stress from decision making under centralized authority, a fixed frame of reference, readily leads to maladaptive decision behaviors. Irving Janis (1989, 78-9) described how simple cognitive or emotive rules develop into four identifiable patterns of decision making.”

Authority from a moving reference frame, on the other hand, follows the trajectory of events as local influences, the flux of circumstances, and emergent properties continuously alter the situation. Local leaders then develop as the situation evolves. These emergent leaders are just as likely to be the person with less experience, though with less training and experience actively working under stress, fear, and threat.

In the NICU, neonatologists engage with a flux of contingencies in an effort to treat infants for their illnesses while simultaneously supporting the continued growth and development of the infant. These efforts sometimes succeed, sometimes fail, and most often, they do both. That mixing, along with abrupt changes by happenstance, can threaten the reliable performance of caregivers and the functioning of the NICU through effects on neurological stress and fear systems. Early researchers of HRO focused on the flight deck and "experiences of *not* failing" ("error-free") and somewhat missed "the experiences of failing" (van Stralen 2020), the leader's role in modulating stress and fear (van Stralen et al. 2020a), and how stress capacity strengthens performance through allostatic change (van Stralen et al. 2020b).

These unrecognized HRO traits, however, create some of the commonly known HRO characteristics. Trust from the reciprocity of mutual influence, an element of pragmatic leadership (van Stralen et al. 2020b) and leadership *in extremis* (Baran and Scott 2010; Campbell, Hannah, and Matthews 2010; Dixon et al. 2017), drives *deference to expertise* and contributes to *resilience* through reward processing in the brain (Charney 2003). Leaders *sensitive to local operations* will engender *resilience* by supporting staff during abrupt, error-prone changes (van Stralen and Gambino 2020) and providing the necessary psychological stability to leverage error for learning and effective error management. Staff, then, become more inclined to engage subtle disruptions and discrepancies, an early form of *preoccupation with failure*. HRO researchers have not recognized the incorporation of stress capacity within the construct of HRO; a characteristic lost in the borrowing of HRO by other organizations.

Conserved Stress and Fear Behaviors

The existential threat a person experiences from the mismatch between aspirations and the environment occurs with every ad-

mission of a newborn infant to the NICU, the mismatch of hopes and dreams against the abrupt reality of a critically ill infant. In addition, the abrupt change brought to a family due to premature birth or an ill neonate now interacts with the larger abrupt public health and societal changes due to COVID-19. This existential mismatch precipitates cascading effects in the neurologic stress, fear, and threat systems for everyone involved.

This is not to decontextualize stress, fear, or threat, nor lose the sense of proportion between the death of one's newborn child and the abrupt responsibility a neonatologist assumes when providing care. When not neuromodulated, stress, fear, and threat systems respond to a wide spectrum of stimuli yet have a narrow suite of behavioral responses. Because of their essential survival function, these emergency behavioral responses remain little changed across mammalian species, though conserved within phylogenetic constraints (Katz 2011).

Behaviors have another reason for being conserved. Even when controlled as behaviors, motor patterns are conserved across species (Wainwright and Friel 2001) through conservation of gene function at various levels, from molecular pathways to structure, behavior, and function (Reaume and Sokolowski 2011). Neuronal pathways within the central nervous system are multifunctional; therefore, pathways for an expendable function also serve other adaptive functions (Kavanau 1990). Therefore, behaviors may be conserved to maintain system coherence, constraining complete loss of behavioral traits (Ghysen 2003; Katz 2009). Of significance, the amygdala, in the highly conserved corticolimbic circuit for stress responsiveness, has conserved a stress-related increase in amygdala-centered structural synchrony paralleled by a decrease in global structural synchrony (Nikolova et al. 2018).

Consequently, survival and defensive behaviors observed in mammals, particularly prey species, can be observed in humans, though in a relaxed form. *Relaxed selection* occurs when an environmental demand or threat is removed, relaxing selection pressure, and altering the original suites of behavior (Lahti et al. 2009). This is similar to animal domestication that introduced domesticated traits unsuitable for survival in the wild condition (Post 1971).

If we understand stress, fear, and threat as suites of behaviors, part of a person's response to the environment, we can understand the logic in their grouping and how they derive from, and form, a person's temperament. Temperament, as the affective, motivational, and attentional core of a person, represents a person's reactivity (excitability, responsivity, and arousability) and self-regulation (Rothbart and Derryberry 1981; Rothbart and Bates 2007). The limbic system, particularly the amygdala and hypothalamus, regulates these perception-based habits and skills (Cloninger 1994), forming a relationship between behavior patterns from temperament with the environment through perceptual influence and adaptiveness to the situation, further defining temperament (Réale et al. 2007). Temperament, as a tendency or disposition, is situational, the behaviors expressed in response to specific eliciting conditions cognition (Rothbart and Bates 2007).

A *suite of behaviors* is not simply a grouping of behaviors that often appear together but part of a collective within the "executive functions" (Sih et al. 2004). The suite is an integrated set of behavior patterns (Schwenk 2001; Réale et al. 2007), functionally coordinated (Fristrup 2001) to engage some phylogenetic problem (Wainwright and Friel 2001) that stabilizes selection pressures on the organism and population (Schwenk 2001). A suite, therefore, can be treated as a single property (Fristrup 2001), an outcome of the temperament traits operationally defined and ecologically valid (Réale et al. 2007), moving with the organism independent of the environment (Schwenk 2001), individually consistent across multiple contexts (Sih et al. 2004).

Unlike a suite of behaviors, an *ensemble of behaviors* is learned and is selectively activated by specific threat cues. The ensemble functions *for the individual*. The behaviors in an ensemble are considered only in relation to the whole, unlike a suite of behaviors where behaviors are considered as a single property with an ecological function. An ensemble of behaviors serves a social and cultural function (Braica 2014) by maintaining continuity and ongoing social interaction by evoking social support and validating responses from others in ongoing social interaction (Caspi, Bem, and Elder 1989). The social characteristics of an ensemble not only characterize a culture but give some internal coherence to the culture (Braica 2014).

“If we understand stress, fear, and threat as suites of behaviors, part of a person's response to the environment, we can understand the logic in their grouping and how they derive from, and form, a person's temperament. Temperament, as the affective, activational, and attentional core of a person, represents a person's reactivity (excitability, responsivity, and arousability) and self-regulation (Rothbart and Derryberry 1981; Rothbart and Bates 2007).”

Viewing stress, fear, and threat responses as conserved behaviors allow us to discuss maladaptive behaviors as more than random or stereotypical actions or a mark of weakness. We are all susceptible to triggered responses, but we also have the ability to neuromodulate the cascading responses. Suites of behaviors explain the similarity of maladaptive patterns. They can help us differentiate the effects of demands that release cortisol to impede memory recall and working memory, the fear that drives conscious self-protection, and threat reflexes that, though not preventable, need not be sustained.

A person may have learned behavioral ensembles in supportive or malignant social environments. The individual may instrumentally use emotion where emotion is not the end in itself but has some other purpose or end, is a means for solving problems, assists in obtaining an objective, for example, instrumental anger (Pascual-Leone et al. 2013). Other individuals gain a feeling of security through provocative statements or actions. In this way, they gain a sense of control over events by forcing others to respond, thus manipulating the social environment similar to Internet trolls.

Neuromodulatory inputs produce adaptive, flexible patterns of activity (Reaume and Sokolowski 2011). In other words, the protective threat reflexes evolved in mammals to fight to the death in the wild can be modulated by humans in the NICU. It is the degree of modulation that makes the difference between enhancement of actions, maladaptive behaviors, mental illness, or criminal activity. The neonatologist can model and support adaptive responses to stress, fear, and threat.

The function of stress and fear

Scientific and lay literature describe stress, fear, and threat in terms of stimulus, response, and purpose. The defense cascade becomes a sequence of mental, emotional, and behavioral responses triggered by a stressor or threat (Kozłowska et al. 2015) that are maladaptive because of negative consequences.

This runs into the problem Niko Tinbergen (1963) identified with animal behavior, we do not notice the behavior until it happens, and we don't know the mind of the individual. Unknown are the antecedents and cognitive-affective processes. In addition, humans can neuromodulate behaviors, complicating conclusions. We can, however, discuss the *function* of behaviors, described by Niko Tinbergen (1963) as achievements, to better understand the defensive cascade that protects the organism.

Our frame of reference starts with behaviors during the initial alarm, emergent team formation and emergent leadership, following these behaviors as suites and ensembles through the changing trajectory of events. Ours is a functional view of stress, fear, and threat – what do they achieve?

Stress and abrupt threat initiate behavioral and nonbehavioral responses through the three conserved defensive brain systems: The Hypothalamic-Pituitary-Adrenal System (HPA), the Sympathetic Nervous System (SNS), and the Limbic System. Each system, though, is conserved to different degrees with different contributions to behavioral suites and ensembles. For conceptual purposes, researchers and clinicians may assign orders of magnitude to the stimulus and response while assigning a temporal order to responses. We find “in vivo,” little linkage between the magnitude of stimulus and response, and no temporal order or progression in the defense cascade.

The cause-and-effect has a different meaning from an outside point of reference than within the trajectory. From a fixed reference point, an event is an arbitrary point in the flow of events; *the observable is the effect*. You look backward in time, seeking the cause. From within the trajectory, behaviors are a process, and *the observable is the cause*. You trace the ever-changing effects forward in time. The latter approach, described by Tinbergen (1963), helps identify if the observed process promotes better achievement and survival. The difficulty of finding a cause for an observable effect led Tinbergen to think of the function, or achievement, of behavior. That is, observe an effect, then identify the function.

The ultimate *value* of behavior is this adaptive function, while the immediate *cause* of a behavior is how it is constructed from the animal's physiological mechanisms (Tinbergen 1963). Adaptive function defines suites and categories of behaviors, while causation deals with genetics, hormonal, and neurological processes. Though function and causation operate on different levels of analysis, they are not mutually exclusive alternatives for descriptions. This allows reciprocity between ultimate functional causes and mechanistic proximal causes in either domain (MacDougall-Shackleton 2011).

Organizing stress responses and the defensive cascade as functions comes from experiencing and witnessing that moment of existential threat when security is lost (van Stralen et al. 2017). Academicians use cognitive processes, scientific logic, and tightly coupled concepts, coherent and congruent with other concepts (van Stralen 2020). Consequently, concepts cannot overlap, have gaps, but must have congruence with existing concepts and have intellectual coherence. Conceptual clarity then comes at the expense of utility and, ultimately, relevance. While a linear progression of states makes sense, this internal logic falls apart when an individual with a unique biography faces exigencies and happenstance, perceptions change, and local social interactions help, hinder, and harm. The systems of stress, fear, and threat have *functions* to achieve defense and survival. We distinguish the de-

defensive and survival functions as 1) reflexive actions, 2) limited cognition, and 3) self-preservation.

The Mechanisms of Stress, Fear, and Threat

We can connect the three functions to the three accepted processes: subcortical reflexive actions are the threat reflexes, cortisol-limited cognition is the stress response, and cognitive self-preservation is the fear reactions. Reflexive actions, immediate subcortical responses before identifying the threat, include the well-known *threat reflexes* fight, flight, and freeze (LeDoux 2014; LeDoux and Daniel 2016). Limited cognition, from cortisol release during the *stress response*, brings behavioral focus to the threat, supporting protective actions by inhibiting memory recall in select systems and enhancing memory recall for habits and learned behaviors. Self-preservation, cognitive offensive, and defensive actions directed toward self-protection give the immediacy and focus of our *fear reactions* (LeDoux 2014; LeDoux and Daniel 2016).

The three systems of stress, fear, and threat increase survival in different ways:

- *Stress systems*, through cortisol, inhibit memory recall except for procedural, or habit, memory. The organism will quickly use learned behaviors without loss of time thinking and developing plans or actions.
- *Fear systems* on the cortical surface drive defensive or offensive actions, dependent on the distance from the threat.
- *Threat reflexes*, below the level of the cortex, rapidly drive behaviors directed at the immediate threat.

Stress responses (memory), fear reactions (cortical), and threat reflexes (subcortical) are repertoires of behaviors for self-preservation. They innately form suites of behaviors, but as learned responses, they become behavioral ensembles; for example, a person may use distraction when under threat or instrumental anger to exert control. We follow the convention that fear is a subjective, cortical feeling and emotions are the labeling of the state of arousal. We also recognize the uncoupling of the motor and emotive components of the stress, fear, and threat responses. For example, the emotive component of the fight reflex is anger, while the flight reflex has an emotive component, plausible avoidance, and a motor component, moving to safety. The movement toward safety and movement away from threats have different characteristics. As a threat reflex, moving toward safety is rapid and direct, focused away from the threat. People running from an active shooting in that manner may be mistakenly described as running in panic. Running from a threat is more fear-based as the individual will monitor the threat and adjust movement accordingly. The first is a subcortical reflex; the second is cognitive.

The *cortisol stress system* is triggered by *uncontrollable* stress. This is a critical distinction. Research to understand stress requires removing the sense of controllability from the subject. Uncontrollable stress releases cortisol to produce *stress responses*, generally related to failed memory recall. The primary memory systems affected are declarative memory for what is learned, episodic memory of experiences, and working memory for active problem-solving. Procedural memory – habits may be enhanced, allowing the person to continue acting with practiced behaviors. Even minor stress will impair the executive functions (Arnsten 2009).

Stress impairs working memory, and the ability to regulate thought, behavior, emotion, and flexibility of attention:

- Choke (expectations, being observed)
- Impaired memory recall/enhanced procedural memory
- Loss of abstract thought when prefrontal cortex and executive functions are impaired

- Concrete thinking and reasoning due to loss of abstract abilities (amygdala impairs cortex)
- Rules are abstractions, therefore difficult to recall and use
- Failure of cognitive strategies: *Even quite mild acute uncontrollable stress can cause a rapid and dramatic loss of prefrontal cognitive abilities.* Amy F.T. Arnsten (2009).

Fear reactions are conscious sensations experienced when exposed to an imminent threat (Panksepp et al. 2011; Ledoux and Pine 2016). The amygdala sends signals to the unconscious (subcortical) and conscious (prefrontal cortex) regions of the brain, accounting for the uncontrolled fear responses and the feeling of fear. The emotional response of fear, preceded by a threat to self-preservation, is to diminish danger (Oatley & Johnson-Laird 2014). This creates the drive to avoid or escape, generally focusing on self-interest, self-protection, or the protection of others. We can regulate feelings of fear by reappraising the situation or suppressing behaviors (Ochsner and Gross 2008; Heilman et al. 2010; Cutuli 2014; and Gross 2014).

Actions for *offensive protection*, often developed from a developed plan, take the individual into a prompt attack to stop the spread of the problem. The aggressive projection of force secures the initiative but becomes pathological when directed at people. Individuals use surprise, concentrated actions, fast tempo, and audacity. The person will use blame, accusation, and personal attacks.

Actions for *defensive protection* focus on the individual's safety, often with the person moving to a place of psychological or physical safety (Oatley & Johnson-Laird 2014). Any ad hoc emergency plan is singularly focused on personal survival or a sense of safety. The person enters this defensive mode when demands *clearly* exceed capabilities, and risks become too great for the person to feel they can continue or survive. The person will not go near the problem, the source of the threat, which could be the leader, an administrator, or a colleague. Rationalizations and abstractions (for example, clichés and metaphors) support actions since the individual has not approached the situation sufficiently close to identifying correlations or causations. This individual is less useful to protect others because the focus is primarily to reduce risk to themselves. The person will deflect, excuse, justify, or use prophylactic self-blame.

Threat reflexes (subcortical) are commonly referred to as "fear responses," fight, flight, and freeze. We categorize them as "threat reflexes" to differentiate fear from the actual threat and to underscore the uncontrollable appearance of the reflex. The well-known fear responses, fight, flight, and freeze, are more properly neurological threat reflexes mediated through the amygdala. Threat responses are behaviors for survival against adversity or in a hostile environment. Perceptions of threat trigger the reflexes which operate below the level of consciousness (LeDoux 2014).

- A fight engages with the intention of overcoming the threat.
- Flight rapidly increases the distance between the organism and the threat.
- Freeze is attentive or hypervigilant awareness with the cessation of movement. This allows the collection of information necessary for effective action.
- Tonic immobility from the parasympathetic nervous system, the initial response in many prey species, is often accompanied by the evacuation of body contents to mimic carrion. (Immobility does not bring attention to prey, and rotting flesh, containing high levels of pathogens, is not routinely consumed by predators.)

The emotive components are unrecognized manifestations of

System	Dissociation	Tonic Immobility
Response	Cognitive	Behavioral
Defense cascade	Outside	Within
Awareness	Lost	Intense
Emotion	Hypo-aroused	High arousal
Muscle tone	Immobile Flaccidity	Muscle stiffening No flaccidity or collapse
Memory	Fragmented, disorganized, distorted	Intact, even detailed

threat reflexes:

- The fight is anger or frustration.
- The flight is avoidance and distraction.
- Freeze is confusion; mental freeze is the inability to recall knowledge or use working memory.
- Tonic immobility is an upset stomach under pressure that prevents the decisions.

Freeze is hypervigilant attention poised to act. Tonic immobility is the alert aware state during behavioral paralysis.

The startle response, also a reflexive behavior, combines the balance reflex with an acoustic startle to protect the soft abdominal organs. A short yelp may accompany the reflex.

Dissociation, Agitation, and Post-Traumatic Stress

Two psychological states frequently encountered during abrupt challenges are peritraumatic dissociation (dissociation in this paper) and agitation, neither of which fit cleanly into functional or anatomic systems.

Dissociation is a loss of cognition, emotional numbing, and muscle flaccidity occurring when the experience is overwhelming, con-

tains intolerable realities, or causes intense emotions, though it can occur in situations that objectively appear innocuous (Frewen and Lanius 2006; Lanius, Paulsen, and Corrigan 2014). This is also our experience; we have observed momentary inactivity with a vacant expression in public safety officers, physicians, surgeons, residents, nurses, respiratory care, families, etc. Dissociation is a psychological process of fragmented awareness with a spectrum of responses from depersonalization, derealization, and amnesia (Schauer and Elbert 2010; Bovine, Ratchford, and Marx 2014). Emotional numbing or detachment reduced awareness, and distortions of reality, even "out-of-body" experience, may offer protection in situations that they would otherwise be unable to cope.

Tonic immobility develops due to the extreme nature of the threat in close physical proximity, almost direct physical contact. The "prey" appears dead, becoming immobile, and may involuntarily expel body contents (gastric, rectal, or bladder) to mimic rotting carrion. Despite maintaining muscle tone, the person is unable to move (described as "waxy" immobility) or call out, scream, or respond to pain. The person is emotionally aroused and full of fear yet maintains full awareness and consciousness with the ability to recall details of the incident (Abrams et al. 2009; Kozłowska et al. 2015).

For some individuals, it may be the first line of response to trauma because of threat proximity, previous experience, or individual differences (Kozłowska et al. 2015). Within the defense cascade,

System	Agitation	Aggression
Intent	Unintentional	Intentional, self-interest May have criminal intent
Instrumentality	None	Control Manipulation, Instrumental aggression.
Behaviors	Vigorous, irregular	Appears rational yet dismisses contextual information
Direction	No target Undirected <i>Directed</i> behaviors appear aggressive, but actions from psychological pain (PTSD)	Targeted individual or object
Affect	Anxiety	Dire consequences of any action
External stimuli	Hyper-responsive May or may not be aware of surroundings, people, or actions	No effect

the function of tonic immobility is to create intact memories of the event in order to later recognize potential predators. Tonic immobility also has a range of presentations, the more common, mild form, in our experience, appears during the first decision a person makes for others, gastric upset forms, and the individual then avoids the decision or continues onward. Either can become a part of their ensemble of behaviors.

A fundamental difference between *agitation* and *aggression* is intent and direction. Agitation consists of spontaneous, non-instrumental actions that may be triggered by, but are not necessarily directed at, external events. Hence, reducing external stimuli can reduce the degree of agitation. On the other hand, aggression has intent, generally toward self-interest, and is instrumental toward manipulation or control.

Seemingly well-organized people, even leaders, may use instrumental aggression in response to frightening, uncontrollable events. Reducing external stimuli has less effect than engendering a sense of control. Some may respond to the person with faux obedience but more effective is to give the person an easily achieved objective.

There is some consequence for not distinguishing between agitation and aggression. For example, an agitated person runs to *safety* while an aggressive person runs *from a threat*. The agitated individual becomes increasingly disruptive, unpredictably causing damage while exhausting important resources but not completely disrupting active, improvised plans. The aggressive person engages the threat or cogently escapes and evades. The aggressive individual has intent and focus, harming targeted individuals, and disrupting plans. Intentional aggression may appear reasonable, rational, and logical, making it insidious and more difficult to identify.

Emotional memory and Post-Traumatic Stress

We learn to identify life-threat from a single experience because the amygdala links memory to emotions causing reflexive emotional, visceral, and behavioral responses to threat. Ecologists have also identified the effects of traumatic stress in wild animals as similar to posttraumatic stress in humans (Boonstra 2013). Because the neural circuitry to identify subtle danger is adaptive, it is conserved in animals through predator-prey interactions.

Everyone has memories of some emotionally charged experience, which is a product of life in general, but those who consistently work in a high-risk environment may develop sensitivity to the environment for these cues. A benign but similar cue may elicit a response to a past danger. That is, *the trigger is from the past, but the response is in the present*.

Conclusion: Regulated threat reflexes

The common occurrence of maladaptive responses to stress, fear, and threat, have a greater influence on safety and reliability than the more commonly appreciated problems we encounter in healthcare. In the intensive care environment, we must appreciate and accept the prevalence of stress, fear, and a threat to human executive functions and cognitive processes. In effect, we may best achieve safety through individual capability and stress capacity.

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SKIN-TO-SKIN CARE DURING COVID-19



GET INFORMED ABOUT THE RISKS + BENEFITS

work with your medical team to create a plan

GET CLEAN WASH YOUR HANDS, ARMS, and CHEST

with soap and water for 20+ seconds. Dry well.



PUT ON FRESH CLOTHES

change into a clean gown or shirt.



IF COVID-19 + WEAR A MASK

and ask others to hold your baby when you can't be there



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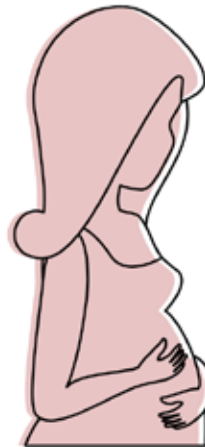
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NATIONAL PERINATAL ASSOCIATION

Update: CORONAVIRUS COVID-19



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LOW



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2 to 3 servings per week of properly cooked fish can provide health benefits for pregnant women and babies alike:



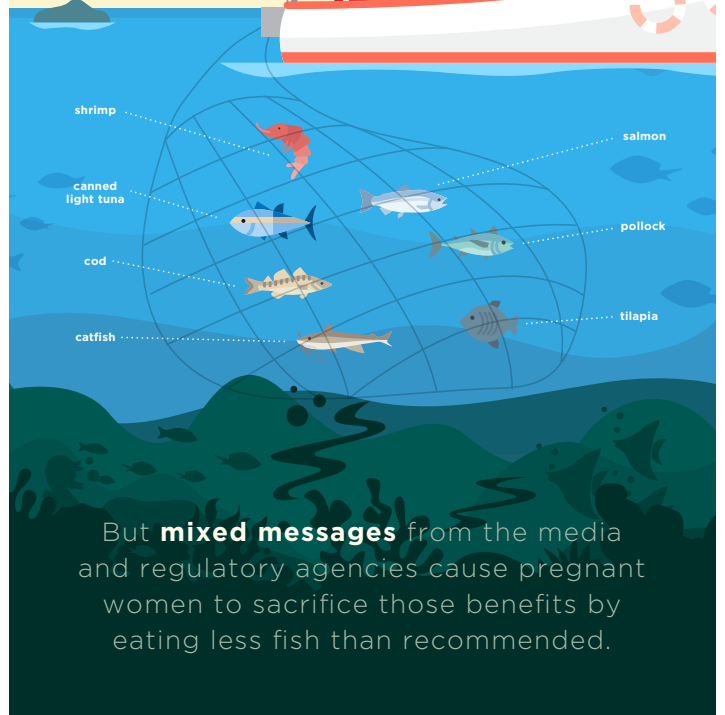
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Omega 3 fatty acids



Earlier Milestones for Babies



But **mixed messages** from the media and regulatory agencies cause pregnant women to sacrifice those benefits by eating less fish than recommended.



Did you know that
PMAD
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account for

20%

of Postpartum
Maternal Deaths?

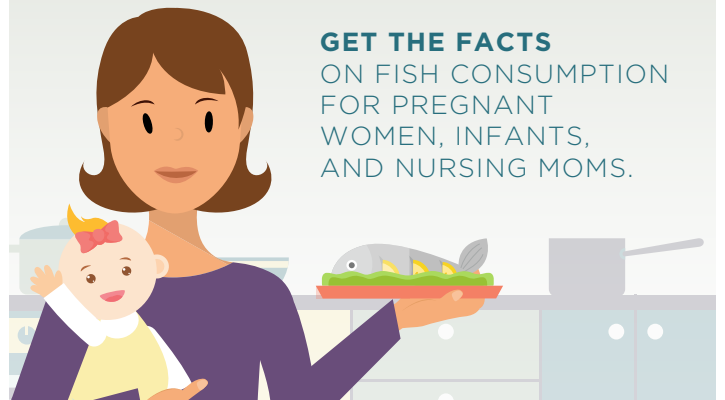
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Abstracts from the 33rd Annual Gravens Conference on the Biophysiology of Human Interaction, in collaboration with the March of Dimes

Robert White, MD



The abstracts from the the 33rd Annual Gravens Conference are presented below:

Poster Abstracts Table of Contents:

Gravens2020-1	Relationship of NICU Stress and Cortisol Variability with Very Low Birth Weight Infant Behavioral Outcomes at 2 and 4 Years
Gravens2020-2	A comparative study of mothers of infants hospitalized in an open ward NICU and a combined pod and single-family room design
Gravens2020-3	A Grounded Theory of Primary Nursing Relationships in the Neonatal Intensive Care Unit.
Gravens2020-4	Music Therapy and the Use of Recorded Maternal Singing and Heartbeat to Promote Analgesia for Preterm

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Infants Undergoing a Retinopathy of Prematurity Screening

How the Single-Family Room Design Model is Impacting Family Engagement in the NICU

Use of the Optimal State Scoring Tool as a way to engage in transdisciplinary care and help guide medical team decisions for medically complex infants in the NICU.

Parental Understanding of Neonatal Intensive Care (NICU) Neurodevelopmental Follow-up Program: Quality Improvement Crafting a comprehensive program to address parental and infant psychological health in the NICU. Review of evidence, program evaluation, and tools for improvement and advocacy.

Implementation of a Formal Parent Buddy Program in Community Level 3 NICU Using the "MyChart Bedside" App to Enhance Early Consistent NICU Discharge Preparedness

Multidisciplinary Team Approach to Improve Early Hand Expression (EHE) of Colostrum in a Community Level 3 NICU Transitioning from NICU to Home: The Next Step

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Integrated Fetal Care: An Innovative Approach to Prenatal Counselling Narrative Training and Consultation in Neonatal Intensive Care: Building Tools for Self-Reflective Learning

A Suggested Framework to support Maternal/Newborn health and biophysical stability: Embrace Refugee Birth Support Program

Reduction of Noxious Stimulation (Cuff Blood Pressures) in the Small Baby Population

Nurse Driven Assessment of Maternal-Infant Attachment in the Neonatal Intensive Care Unit.

Early contingent language learning in NICU infants: brain-based evidence Maternal experiences participating in a pilot study of individualized human milk fortification in the NICU: a qualitative study

Factors which may contribute to the success or failure of use of human milk in a Level IV Neonatal Intensive Care Unit

USE OF THICKENED LIQUIDS IN



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- Gravens2020-24 UTILIZING AN INFANT FEEDING SCALE TO IMPROVE ACCURACY OF REPORTING IN THE NICU
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- Gravens2020-30 Monitoring antibiotic use rate changes in neonatal ICUs of a large healthcare delivery network
- Gravens2020-31 Motivational Interviewing Intervention to Increase Maternal Visitation Rates on a Level IV Neonatal Intensive Care Unit: Challenges in Implementation and Preliminary Findings in the Pilot Phase
- Gravens2020-32 Increasing Caregiver Involvement in the Neonatal Intensive Care Unit Through Swaddle Bathing: A Quality Improvement Project
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- Gravens2020-36 Using Acceptance Commitment Therapy to Improve the Discharge Experience for NICU Families: Lessons learned from the CCENT study
- Gravens2020-37 Engaging Parents to Help Manage Painful and Stressful Procedures in the NICU
- Gravens2020-38 Fostering A Maternal-Infant Relationship Across Distance and Trauma: Building a relationship between mother and infant after long-distance surrogacy resulting in extreme prematurity.
- Gravens2020-39 Fostering A Maternal-Infant Relationship Across Distance and Trauma: Building a relationship between mother and infant after long-distance surrogacy resulting in extreme prematurity.
- Gravens2020-40 Sweetening Up the NICU Environment at Penn State Hershey Children's Hospital

Survey Says: RSV

RESPIRATORY SYNCYTIAL VIRUS, or RSV, is a dangerous virus that can lead to:

- Hospitalization
- Lifelong health complications
- Death for infants and young children

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- 88% They treat RSV as a priority, "often" or "always" evaluating their patients
- 77% RSV is the "most serious and dangerous" illness for children under four
- 77% Barriers to access and denials from insurance companies limit patients' ability to get preventive RSV treatment

But Parents are Unprepared.

- 18% Only 18% know "a lot" about RSV
- 22% Only 22% consider themselves "very well" prepared to prevent RSV

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After parents learned more about RSV, they were:

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Gravens2020-1

Relationship of NICU Stress and Cortisol Variability with Very Low Birth Weight Infant Behavioral Outcomes at 2 and 4 Years

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Background and Purpose: Preterm infants requiring life-saving medical care after birth often face increased risks to long-term developmental outcomes. Risks result from the developing infant's acute sensitivity to internal and external stimuli. Life-saving care inherently exposes infants to cumulative stressful and painful events that activate the hypothalamic-pituitary-adrenal axis and cortisol response. Cortisol can promote both adaptation and damage to early life brain development. The study purpose was to explore the relationship between repeated measurements of stress and skin cortisol samples during the first 6 weeks of life in the neonatal intensive care unit (NICU) with behavioral measures at ages 2 and 4 years.

Methodology: From a larger primary study, participants include those infants followed from birth in the NICU until 4 years of age. The 21 former very low birth weight infants were born weighing less than 1500g, admitted to a level III NICU and with a mean gestational age of 27.9 weeks. Measured over the first 6 weeks of life were daily NICU stress scores using the Neonatal Infant Stressor Scale and cortisol from skin tape sampling every 2 weeks. Stress scores and cortisol were both categorized as high and low variability. Behavior was measured at 2 and 4 years using the Battelle Developmental Inventory-II (BDI) and the Child Behavior Checklist (CBCL).

Impact or Results: Analyses indicate interactions between high and low stress scores and cortisol on both Total BDI ($p=0.018$) and Total CBCL ($p=0.034$). Further analyses show these interactions exist in the Cognitive ($p=0.009$), Communication ($p<0.001$) and Motor ($p=0.003$) BDI subscales and in the Internalizing Scale ($p=0.001$) of the CBCL. No significant difference in birth gestational was found in infant groups of high and low stress and cortisol ($p=0.729$). These exploratory results suggest some infants who are physiologically unable to mount a cortisol response may be most at-risk for later life problems. More research is needed to investigate these relationships.

Gravens2020-2

A comparative study of mothers of infants hospitalized in an open ward NICU and a combined pod and single-family room design

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Background and purpose:

The architectural design of a Neonatal Intensive Care Unit (NICU) may affect the physical and psychological well-being of mothers. The current trend in neonatology has been to replace open-ward (OW) units with single family rooms (SFRs). OWs or bays contain several incubators in one space, whereas SFRs are designed for one infant. Another existing design involves pods, where 4 to 6 incubators are located in one space.

Recent evidence suggests that SFR NICUs have several advantages over OWs, including reduced incidence of infant sepsis, higher rates of exclusive breastfeeding at discharge, more parental presence and greater participation in infant care and skin-to-skin contact [1]. Other studies report negative outcomes related to SFRs including poorer infant language development and greater maternal stress [2, 3]. However, relatively little is known about how design affects parental well-being. Some researchers now suggest another design option - a combination of pods and SFRs, but more evidence is needed to guide decision-making for those planning to renovate or build NICUs.

In January 2016, the NICU of a Canadian hospital moved to a newly constructed unit with a combination of pods and SFRs. The goal of this study was to examine NICU design and the well-being of mothers. We hypothesized that mothers would report lower NICU stress, depressive symptomatology and sleep disturbances, as well as greater perceptions of support, family-centered care (FCC), readiness for discharge and breastfeeding self-efficacy in the pod/SFR unit compared to the previous OW unit.

Methodology:

A pre-post quasi-experimental study was conducted in a level 3 unit before and after transitioning from an OW unit to a new unit of 6-bed pods and SFRs. Pre-occupancy data were collected in 2014. Post-occupancy data collection started one year after the transition to allow for adjustment of the unit to the new design, in 2017-2018.

Mothers were included if: their infant was hospitalized in the NICU for at least 2 weeks, their infant's condition was stable, they were able to read English or French, and they were staying within one hour from the hospital. Mothers were excluded if: they would not be caring for the child after discharge, their infant had a major congenital anomaly or they had given birth to multiples.

After providing informed consent, mothers responded to reliable and valid questionnaires assessing their well-being as well as a socio-demographic questionnaire and described their presence in the NICU. One week before discharge, they responded to measures of readiness for discharge and breastfeeding self-efficacy and described their presence in the NICU once again.

Results:

A total of 70 mothers from the OW and 80 mothers from the pod/SFR unit participated. The two groups were comparable with respect to demographic characteristics except more mothers reported university education in the pod/SFR group compared to the OW. Analyses were performed with and without education as a control variable – few differences were found.

As hypothesized, mothers in the pod/SFR unit reported lower NICU stress compared to mothers in the OW, particularly on two of three subscales: “sights and sounds” ($p = .05$) and “parental role restriction” ($p < .01$). Mothers in the pod/SFR unit reported less stress from NICU sight and sounds and felt less restricted in their role as a parent. These subscales are more likely to be affected by NICU design compared to “appearance and behavior of the infant”.

The groups differed on one aspect of family-centered care; mothers in the pod/SFR unit perceived more respect from staff than mothers in the OW. When controlling for mothers' education, SFR/pod mothers rated their infant's readiness for discharge as greater than OW mothers.

Contrary to our hypotheses, no significant difference was found regarding depressive symptoms, nurse-parent support, sleep disturbances and breastfeeding self-efficacy. Approximately half of mothers in both groups experienced depressive symptoms in the clinical range (50.0% versus 45.0% in the OW and SFR/pod units respectively, $\chi^2 = 0.51$, $p = .48$), and a majority of mothers had sleep disturbances in the clinical range as well (74.3% versus 65.0 % in the OW and pod/SFR units respectively, $\chi^2 = 2.13$; $p = .15$).

Lastly, pod/SFR mothers were present in the NICU significantly more than OW mothers -double the time (84 hours per week in the pod/SFR unit compared to 44 hours in the OW).

Conclusions:

In the current study, mothers in the pod/SFR unit experienced two types of design: their infants were admitted to a pod and then moved to a SFR close to discharge. Findings indicate that at the time they were in 6-bed critical care pods, mothers reported lower stress compared to mothers in the former OW, suggesting that pod designs may be less stressful than OWs. In pods, mothers may be less exposed to stressful sights and sounds given the presence of fewer infants and staff in a smaller shared space. Parental role restriction may be lower in pods than in OWs as parents have more space at bedside and greater privacy. Design was also shown to influence mothers' presence in the NICU perhaps for these reasons as well.

This study was the first to our knowledge to explore the association between design and readiness for discharge. Pod/SFR mothers considered their infant's readiness for discharge to be greater

than in the OW. Greater presence and more privacy may have helped them get to know their infant and recognize that he/she was ready to go home.

Strengths of the current study include the use of valid and reliable measures and the 1-year delay before collecting post-occupancy data to allow for an adaptation period following transition. The results illustrate the potential of combined pod/SFR units for mothers' well-being which is why future research on the effect of combined pod/SFR design is indicated.

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Learner objectives:

- Understand the impact of NICU design on mothers' well-being and presence in the NICU.
- Learn about the benefits and limitations of combined pods/SFRs unit designs relative to commonly used open ward designs

Gravens2020-3

A GROUNDED THEORY OF PRIMARY NURSING RELATIONSHIPS IN THE NEONATAL INTENSIVE CARE UNIT.

Author: Stephanie Bailey, PhD, RNC-NIC

University of Texas Medical Branch at Galveston

Background & Purpose:

Primary care nursing is a common nursing care delivery system within the Neonatal Intensive Care Unit. Some study of the effects of this form of care delivery have demonstrated positive effects for patients, families, nurses, and healthcare facilities, but other studies have reported concerning negative effects for nurses. There has been little study of the underlying relationships that develop between the primary nurse and the family which can be complex because of involvement of the parents in the NICU environment. The few extant studies of primary care nursing (PCN) relationships in the NICU are either dated or conducted in regions outside the United States. The purpose of this study was to explore the relationships between primary NICU nurses with their primary infants and those infants' families.

Budget & Resources:

Study costs were minimal and self-funded; they included transcription and printing services.

Methodology:

Classical Grounded Theory seeks to elucidate theories that un-

derlie sociological processes while staying firmly grounded in the data. Eleven participants were recruited purposively and through snowball sampling methods from geographic areas spanning the US South, Southwest, and West. The researcher collected data using recorded semi-structured interviews. Transcripts were analyzed using constant comparative method, substantive and selective coding, memoing, and sorting. Since this was a qualitative study using CGT, there were no strict outcome measures other than to seek abstract concepts and underlying theory that would help explain relationship formation between primary nurses and NICU families.

Results:

The participants' main concern was revealed to be *Maximizing Impact* and they resolved their concern through relationships they built with NICU families through a four-phase process named: *Safeguarding this Family*.

Implications & Conclusions:

At present, primary nursing relies on motivated individual nurses and most NICU infants are not matched with a primary nurse. The substantive theory *Maximizing Impact* offers insight about how relationships are initiated, developed, and transformed over time through the four-phase process *Safeguarding this Family* and clarifies the importance of the long-term transformed relationship in motivating primary NICU nurses to engage in primary care nursing in the future. Understanding *Maximizing Impact* has implications for those interested or engaged in patient or family-centered care delivery such as primary care nursing including bedside nurses, nursing educators, healthcare organizations, and their leadership.

Learner Objectives:

1. Understand the significance of PCN in supporting developmental family-centered care.
2. Understand the motivations of primary nurses to engage in PCN.
3. Understand the importance and impact of the close relationships that form between primary nurses and NICU families and their effect on nurses' participation in PCN.

Gravens2020-4

Music Therapy and the Use of Recorded Maternal Singing and Heartbeat to Promote Analgesia for Preterm Infants Undergoing a Retinopathy of Prematurity Screening

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Background and Purpose: Retinopathy of prematurity (ROP) is the leading cause of childhood blindness. ROP eye exams are routine for premature infants but constitute significant pain during and after the procedure. This study examined the effects of recorded maternal singing and heartbeat to help reduce pain for premature infants after their ROP exam. Maternal singing and heartbeat combine auditory familiarity with pacifying qualities of music to promote comfort for preterm infants. Repeated painful experiences for preterm infants negatively impact their neurodevelopment and future pain reactivity. This music therapy intervention was a cost-effective non-pharmacological option for targeting pain during an ROP screening.

Budget and Resources: This study was supported by a \$500 grant from the University of Central Florida, Theta Epsilon Chapter of Sigma Theta Tau International Honor Society.

Methodology: We utilized a non-crossover design to randomize preterm infants into two groups: (1) music therapy intervention of recorded maternal singing and heartbeat, (2) standard comfort care alone. 100 preterm infants were recruited between the ages of 33 weeks and 36 weeks and 6 days corrected gestation. Infants were included in the study if they were outside an enclosed incubator, were not receiving any anxiolytic or analgesic medication (besides topical anesthetic for the eye exam) and did not have a medical diagnosis that significantly impacted hearing (e.g., severe intraventricular hemorrhage). Pain was measured via the Premature Infant Pain Profile (PIPP) at four repeated measures: before the eye exam, during the eye exam, and 1 and 5 minutes after the eye exam. Subjects and their vital monitors were video recorded at each repeated measure. Experienced neonatal nurses watched these videos muted (to mask them to study group) and documented PIPP scores. Additional demographic data and information related to the ROP exam (comfort support from parents and length of eye exam) were recorded. Equipment for this study included bookshelf speakers, condenser microphones, a laptop computer, and digital stethoscope. A music therapist met with mothers of subjects to begin informed consent, then worked with each mother to record her singing in lullaby-style and record her heartbeat. These sessions included discussion about pacifying music qualities, anxieties surrounding singing and interaction with preterm infants, cultural implications, and song preferences of the family. Singing and heartbeat recordings were edited into a 5 minute piece and played for infants in the music therapy group directly after their eye exam.

Results: Infants in the study represented a relatively homogeneous sample of 49 males and 51 females with a mean gestational age of 35 weeks. 31% of these infants were white/Caucasian, 28% African American, 26% Hispanic, and 15% other identified ethnic group. Eye exams were conducted by four different ophthalmologists on an even rotating schedule. Parents and developmental specialists trained in comfort support were present for 50% of infants. Between the music therapy and standard care group, PIPP scores were virtually identical at baseline (4 vs 3.98) and during the eye exam (10.44 vs 10.71). PIPP scores were lower 1 minute and 5 minutes post eye exam in the music therapy group compared to standard care. PIPP scores were significantly different at 5 minutes post eye exam (3.81 vs. 4.76; $P=0.02$). Although the PIPP scores were not significantly different 1 minute post exam, the standard care group approached moderate pain at this timepoint (6.4), while the PIPP scores in the music therapy group represented mild pain (5.8). In addition, the music therapy group returned to their baseline PIPP score 5 minutes post-exam (4.0[baseline] vs. 3.81[post-exam]), but the standard care group did not return to baseline by 5 minutes post-exam (3.98[baseline] vs. 4.76[post-exam]; $P=0.03$). Average length of the eye exams was 84 seconds. Infants that received an eye exam ≤ 84 seconds had significantly less pain 5 minutes post-exam compared to infants that experienced an eye exam >84 seconds (3.92 vs. 4.86; $P=0.03$). However, for the infants in the music therapy group, there was no difference in PIPP scores 5 minutes post-exam regardless of the eye exam length. Music therapy may be a protective factor against pain related to longer eye exams. The physical presence of parents did not impact pain scores, though specific techniques or comfort measures were not documented. Parents may require more direction in order to make a significant impact on infant pain reactivity. This music therapy intervention can reduce pain for late preterm infants after their ROP exams. Longer eye exams indicate greater pain after eye exams, but music therapy helped diminish this effect. Future research may focus on specific parental support, ophthalmoscopy technique, ROP severity, and infant

responses within the context of ROP screenings and pain. This music therapy intervention has foundations in family-centered care through active engagement of mothers. Nurses and music therapists could collaborate to provide this intervention for infants receiving an ROP exam, other procedures, or standard developmental care.

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Learner Objectives:

1. Audience will identify the protocol for this music therapy intervention.
2. Audience will learn the practical use of this music therapy intervention within a collaborative model.
3. Audience will identify 3 takeaways for future research concepts related to this study.

Gravens2020-5

How the Single-Family Room Design Model is Impacting Family Engagement in the NICU

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ABSTRACT:

Background and Purpose

Parents are integral users of neonatal intensive care units (NICUs) due to their critical contributions to infant development. While at the NICU, parents are encouraged to participate in a process called family engagement, where they are expected to move from passive to active caregivers, in preparation for their role after dis-

charge. Family engagement serves to activate parents' emotional, cognitive, and behavioral capabilities to engage in infant care, thereby reducing chances of infants' early hospital readmissions. While the engagement process in the NICU is potentially affected by the built environment, no studies have investigated this relationship in any depth. NICU design has developed to encourage parental involvement by incorporating single-family rooms (SFR), improving infant outcomes and parental privacy in comparison to previous design models. The SFR design model, however, has never been investigated as to how its characteristics are supporting or hindering family engagement components such as family presence, family care, family information exchanges, and family caregiving in the NICU. Further, there is no empirical evidence clearly showing how parents and staff are effectively utilizing or perceiving the SFR NICU design as a resource to their actions and interactions during family engagement.

This study was aimed at understanding how built environment characteristics of NICUs representative of the SFR design model are impacting family presence, family care, family information exchanges, and family caregiving, which are recognized as integral concepts within family engagement at the NICU.

Methodology

Interviews with 20 families and 30 staff members as well as 214 hours of in-depth observations of family engagement actions and interactions were conducted in 2 NICUs representing the SFR design model. In each NICU, family engagement actions and interactions related to family presence, care, information exchanges, and caregiving were observed and described in terms of the type, location, number of people involved, and design elements involved. Interview questions elicited family and staff perceptions about built environment characteristics supporting or hindering these actions/interactions. Additionally, built environment characteristics were collected through photographs and a physical assessment checklist. Data analysis was guided by a grounded theory approach, looking for environment-behavior patterns emerging from the data.

Results and Implications

The SFR was observed and described as the mostly used space for all actions and interactions related to family engagement. Features of the interior design of the SFR such as the family zone, family zone partitions, and the information board emerged as impacting factors to family privacy and family-staff communication. Characteristics of other family support spaces, in turn, emerged as impacting family care and information exchanges between family and staff, while also supporting family respite, social support, and education. Findings ultimately contribute to evidence-based design by providing a new platform to understand, evaluate and apply design features that address family engagement in the context of NICU environments.

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Learner Objectives:

1. Understand how NICU environments embodying the SFR model are impacting staff and family behaviors during family engagement actions and interactions.
2. Understand concept within the family engagement process as measures of family experience.
3. Identify design strategies typically incorporated into the single-family room (SFR) NICU design model that are supporting or hindering family engagement in these settings.

Key words:

NICU Design, Family engagement, Built environment, Single-Family Room.

Gravens2020-6

Use of the Optimal State Scoring Tool as a way to engage in transdisciplinary care and help guide medical team decisions for medically complex infants in the NICU.

Authors: Leah Lumbaca MPT, CNT; Molly Cantwell OTD, OTR/L; Kelly Susey, PT, MPT; Melissa Hanin, MOTR; Susan Lynch, MD; Margaret Mehling, PhD; Jennifer Curtiss MS, RD, LD, CLC

Background and Purpose: As the medical complexity and developmental needs of the patient with severe BPD continues to evolve, so has the approach to caring for them. The Comprehensive Center for Bronchopulmonary Dysplasia (CCBPD) at Nationwide Children’s has embedded a Transdisciplinary Model of care to meet the medical, developmental, and psychosocial needs of families and their babies (Shepherd, et al. 2011). Members of the transdisciplinary team, including physicians, dietitians, nurse practitioners, bedside nurses, respiratory therapists, pharmacists, and neonatal therapists, have created a tool aimed at guiding medical decision making to achieve an optimal state for human interaction and developmental growth for this unique population. Many factors contribute to achievement of optimal capacity for a baby that is medically compromised. Specifically for babies with severe BPD, optimal state can be defined as respiratory stability, positive neuroregulation and developmental growth, pharmacological stability, and appropriate nutrition and linear growth. Optimal state can only be achieved when all systems are functioning at maximum capacity relative to the severity of the disease (Logan, Burdo-Hartman & Lynch 2017) . NICU OT, PT, and SLP play an integral role in providing information regarding a baby’s neuroregulation and developmental capacity throughout their NICU journey (Sweeney, et al. 2009). This tool identified 6 categories which equate to optimal neuroregulation and development reflecting principles embedded in the Synactive Theory of Development (Als 1982). These include use sedative/neuroregulatory medications, ability to engage with the environment, sleep/wake cycles, postural tolerance, head control, and ability to co-regulate/self-regulate. The goal of this presentation is to further define the categories and our role in contributing and collaborating with members of the transdisciplinary team to promote optimal state.

Budget and Resources: Administration and physician leadership across multiple disciplines in the NICU to support education and

time necessary for culture change. Epic/IT support for the creation of necessary documentation.

Program and Materials: Educational time and instruction regarding specific components of the scoring tool and bedside practice and integration.

Impact: CCBPD at Nationwide Children's includes a NICU that consists of infants with established BPD at 36 weeks and beyond. The medical complexity of these infants has fostered collaboration across multiple disciplines with the goal of providing comprehensive medical and neurodevelopmental care to promote each individual patient's optimal capacity. The optimal state scoring tool's primary intention is to guide medical management of babies with severe BPD at NCH and has the potential to impact BPD management in other institutions across the world.

The neonatal therapist has a unique perspective regarding a baby's functional developmental capacity in the setting of severe BPD. With the use of this tool, neonatal therapists can provide quantifiable information regarding a baby's ability to develop in a highly complex and fluctuating medical environment.

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Learner Objectives:

1. Medical professionals will be able to define the six subcategories of Neuroregulation and Development used in the Optimal State Scoring Tool.
2. Attendees will be able to integrate the principles of Neuroregulation and Development using the six subcategories into clinical practice.

Gravens2020-7

Parental Understanding of Neonatal Intensive Care (NICU) Neurodevelopmental Follow-up Program: Quality Improvement

Authors: Alicia Quim, BA^{1,2}, Silvia Castaneda, MSN, RN¹, Alice Gong, MD²

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Background and Purpose: Neurodevelopmental follow up of preterm infants has been proven to change and improve trajectory of developmental outcomes. However, many barriers impede clinic follow-up compliance after NICU discharge. Parental understanding of the need for neurodevelopmental follow-up is one of

them. Our clinic's practice was to provide scheduled appointment at the time of discharge. In review of practices to improve compliance, we designed a parental meeting with nurse case manager while the infant is in the NICU after 32 weeks' corrected gestational age (CGA). The purpose was to provide parental education about benefits of neurodevelopmental follow-up and how this differs from services provided in primary care clinic and early childhood intervention agencies. Benefits include close surveillance of overall development, parent education to enhance growth and progress, multidisciplinary coordination of care and support in getting access to early childhood intervention and other services as needed.

Methodology:

This quality improvement project undertaken to improve neurodevelopmental clinic compliance due to anticipation of increase in census. Retrospective review from archived clinic records of NICU survivor preterm infants' compliance for one appointment kept during the first 6 months CGA was completed. NICU term infants and outside referrals were excluded. Baseline attendance rate (2013-2014) was compared to after intervention 2015-2018 to determine effect of intervention.

Results:

Compliance rate before implementation was 86/91 (95%) and 84/87 (97%) for 2013 and 2014 respectively. Intervention was started in 2015. Compliance rates increased and then decreased: 93/93 (100%), 95/103 (92%), 79/104 (76%), and 98/112 (88%) for years 2015, 2016, 2017, and 2018. In 2017, we expanded our outreach to include infants born at ≤ 32 completed weeks' gestation; a decrease in compliance was seen. This may be attributed to the inability to meet with parent prior to NICU discharge because of their shorter length of stay or to parents not understanding the need. After analysis of root causes contributing, another method to contact family was instituted early this year. The team now engages the NICU unit clerk with a list of patients and is instructed to call the office when a parent visits to arrange or conduct the meeting.

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Learner Objectives:

1. Identify new methods to increase compliance
2. Understand importance of parental understanding regarding neurodevelopmental follow-up

Gravens2020-8

Crafting a comprehensive program to address parental and infant psychological health in the NICU. Review of evidence, program evaluation, and tools for improvement and advocacy.

Authors: Melissa Scala MD¹, Soudabeh Givrad MD¹, Stanford University¹

Background and Purpose:

NICU infants and their families face significant challenges to their mental health. For infants, a combination of prematurity, prolonged NICU stays, medical illnesses, intrusive interventions, and separation from primary caregivers cause or create barriers to mitigating trauma and distress. The infants face increased risk of poor neurodevelopmental outcomes and future emotional and mental health disorders. NICU parents, in turn, are at increased risk for emotional distress and have higher rates of depression, anxiety, and PTSD. Moreover, NICU parents and infants might struggle to establish optimal bonds and relationships in part related to many of the factors mentioned above. Evidence for the benefit of various developmental care practices and mental health interventions has grown over the last 30 years. However, it has often been a struggle to address the psychological and developmental needs of NICU infants and parents and few programs contain all components of care which have been proven effective.

In this workshop we aim to review current existing evidence for best practices in supporting family and infant psychological health, provide ways of assessing individual programs, and provide an opportunity for guidance/discussion for program expansion or improvement through practical steps and advocacy for resources.

Budget and resources:

Our hospital supports a multidisciplinary developmental care team consisting of a nurse, infant developmental specialist, music therapist and physical and occupational therapists. We also have an assigned NICU psychologist in addition to social workers who perform initial mental health screening for parents. Our institution also has a perinatal psychiatry and an outpatient parent-infant dyadic psychotherapy clinic.

Program:

Our program to support infant and family psychological health utilizes our multidisciplinary team in a coordinated fashion to provide the following services: family centered developmental care for NICU infants and their families, mental health screening for NICU parents, group therapies for mothers and fathers, individual counseling for parents in the NICU, prenatal psychiatric care for mothers during high risk pregnancies, and parent-infant psychotherapy clinic for those NICU parents and infants who suffer from relational difficulties upon discharge from the NICU. We are working to bring dyadic/family psychotherapy into the NICU and to create a continuum of care based on an integrated biopsychosocial model.

In our work, we bring together principles of developmental care, perinatal, and infant mental health. We have reviewed various

existing models of care, programs within the developmental care paradigm, and those programs addressing parental and infant distress and psychological health.

In this workshop we will discuss the various programmatic elements which have proven effective in supporting infant's and/or family's psychological health and how they have been combined in more comprehensive programs. Evidence supports the use of the following components: family mental health screening, parental mental health treatments, infant pain and stress mitigation, infant sensory exposures, parent-infant therapy addressing relational difficulties between parents and infants, and NICU staff support. The impacts of each of these components will be reviewed. For most institutions, programs to address psychological health in the NICU do not employ all available components.

We will provide a tool for individual program assessment in small group discussion at the beginning of the session. We will then provide a comprehensive review of the current evidence regarding components of psychological health support and lead small group interactive sessions aimed at individual program reassessment and brainstorming avenues for improvement. We will share resources that may be used in advocacy as well as low budget ways to implement changes for unused components. A shared resource model will be used so participants may choose to share with the larger group impactful interventions in use at their institutions.

Impact:

Research has shown the deleterious effects of distress, trauma, and psychopathology during the perinatal period for both short term and long term outcomes for infants and their caregivers. Prematurity, medical illnesses, intrusive interventions, and NICU stay heighten the vulnerability for both infants and parents. But most NICUs around the country still struggle to implement a program that can address NICU infants' and parents' psychological and developmental needs. There has not been a consensus on what a comprehensive program looks like and NICUs face many practical issues in implementing various elements of care. In this workshop we aim at addressing both of these issues.

Learner objectives:

- To learn current best evidence for family centered developmental care interventions
- To learn how to screen for and address psychological distress in NICU parents and infants
- To assess local program strengths and opportunities for improvement
- To receive resources and ideas from other participants on ways to improve family centered developmental care programming

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Gravens2020-9

Implementation of a Formal Parent Buddy Program in Community Level 3 NICU

Authors: Malathi Balasundaram, MD^{1,2}, Stephanie Miller, MD^{1,2}, Melinda Porter, MS, RN, CNS, NNP-BC², Naina Sodhi, LMFT SEP^{2,3} and Dharshi Sivakumar, MD^{1,2} ¹Pediatrics, Neonatology, Stanford University School of Medicine, Stanford, CA, ²El Camino Health NICU, Mountain View, CA, ³ El Camino Health Maternal Outreach Mood Service Program .

Background: Premature birth and the Neonatal Intensive Care Unit (NICU) experience is highly stressful for parents. It is well documented that parents of preterm infants have higher rates of depression, post-traumatic stress disorder, and anxiety¹ which may impact infant bonding, reduce the duration of breast feeding, and contribute to long term neurodevelopmental impairment. The evidence shows NICU parents who receive peer support have increased confidence and wellbeing, problem solving capacity, self-esteem, and acceptance of their situation¹. These positive changes lead to improved neurodevelopmental outcomes for NICU infants. In 2012, the American Academy of Pediatrics² recommended that health care professionals should facilitate and encourage peer support. Peer support and role modeling help parents throughout their infant's hospitalizations, giving them hope, helping them begin to develop parental identity, and providing anticipatory guidance about taking their infant home.

Baseline Status: In our NICU, parental psychosocial support was provided by a social worker, bedside nurses, and neonatologists. A parent support hour was held monthly to provide an opportunity for parents to connect with team members and other parents. In addition, individual staff had sporadically connected current parents with former NICU parents with the goal of providing peer support. No formal processes or training was in place. We implemented Family Centered Care (FCC) in our NICU in 2016. As part of FCC, a Family Advisory Board (FAB) with former NICU parents was formed. With the support and advice of some of the FAB parents, a parent buddy program was launched in 2019. This project was strongly supported by the multi-disciplinary members of the NICU staff, the hospital administration, and physicians.

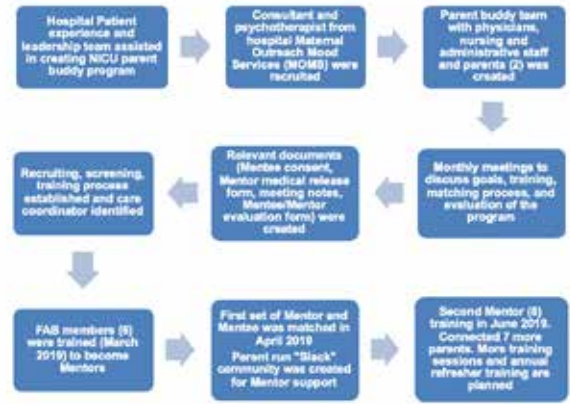
Goal: Establish a formal parent buddy program with the goal of

connecting at least one current NICU parent to a mentor by June 2019.

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

Methods:

Figure 1



The Figure 1 diagram explains our implementation process: Once the decision was finalized to create a NICU parent buddy program, we reached out to hospital leadership who financially supported the process with a consultant trained in assisting and launching such programs. The parent buddy team was formed by recruiting physicians, nursing staff and two parents from the FAB. We reached out to our Maternal Outreach Mood Services (MOMS) and recruited a psychotherapist (NS) to assist in program design and mentor training. Using a template provided by our consultant as well as feedback from FAB, we developed our "Mentor Training Program" to accommodate the busy lives of our former parents such that they could receive training. Mentors completed part of the program online at home before a shortened in-person two hour training with the team. The in-person training highlighted roleplaying and handling difficult situations at mentoring sessions. The Parent Buddy team developed videos, consent forms, questionnaires, and feedback forms in order to match mentor-mentee pairs and to evaluate the program.

A care coordinator who is responsible for assessing the needs of the program, matching families, and following up feedback (Figure 2) was selected. Referral to the program can be made by the social worker, nursing staff, or physicians. Representatives from the Parent Buddy team assisted with training and learning objectives. Six FAB members interested in becoming mentors (buddies) attended the initial training session in March 2019, and our first formal mentor-mentee pair was matched in April 2019. To facilitate support to the mentors, a parent run "Slack" community (on line platform) was created. A second training session was held in June 2019 and 8 more mentors were trained. All of our current mentors are parents of former preemies. A total of 8 mentor-mentee pairs had been connected as of September 2019. Upon matching a pair, the first meeting is face-to-face. Subsequent ongoing support is by any chosen method of communication works best for the pair (in person, email, or phone). Currently the parent buddy program is offered to parents of infants born < 33 weeks gestation. Future directions include the plan to expand the support to all NICU parents.

Budget: The Patient Experience Department of the hospital supported the development of the program and provided the financial

support for the consultant.

Impact: We have held two parent mentor training sessions thus far (March and June 2019) and trained 14 former NICU parents. We have connected mentors with 8 current NICU parents. Evaluations from both training sessions were positive and revealed a desire to have ongoing refresher training sessions with more emphasis on roleplaying.

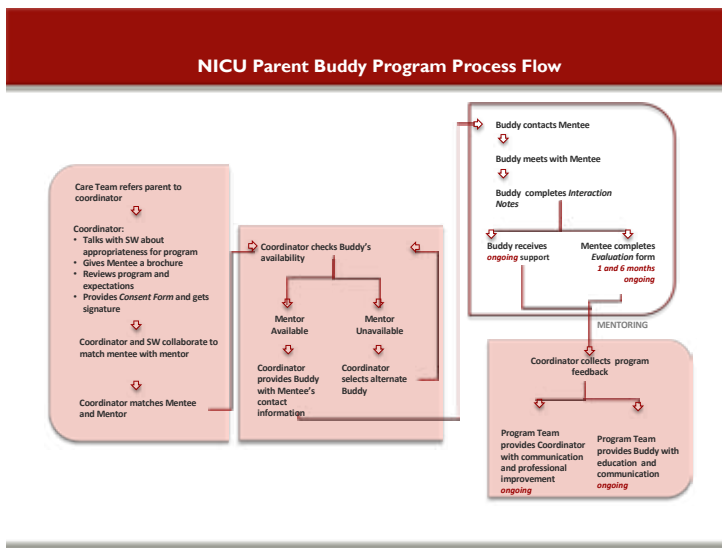
Next Steps: We plan to have a refresher training course and support for mentors every year. We hope to recruit FAB members who are parents of former term infants and expand the parent buddy support to current NICU parents of term infants, ideally matched by similar clinical diagnosis. Lastly we will improve staff knowledge about NICU parent psychosocial support through educational programs.

Acknowledgement: Jody Charles, NICU Manager; Ashlee Fontenot, Manager Patient Experience; Meaghan Andrews, NICU Parent; George Rabanal, NICU Parent; Joan Forte, Consultant; Parent Buddy Team Nurses (Kelly Younger, Tammy Lee, Sierra Sam, and Kim Strom); Family Advisory Board Members; El Camino Health NICU Staff and Stanford Neonatologists

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Figure 2



Gravens2020-10

Using the “MyChart Bedside” App to Enhance Early Consistent NICU Discharge Preparedness

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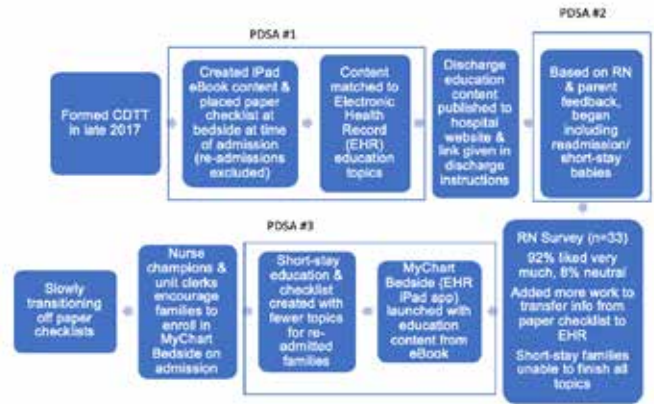
Background and Purpose: Neonatal Intensive Care Unit (NICU)

families often feel inadequately prepared for discharge with their high-risk infant. This feeling contributes to poor infant outcomes, heightened family anxiety, and increased healthcare utilization after discharge.^{1,2} The American Academy of Pediatrics (AAP) provides guidelines³ for NICU discharge programs. The quality of discharge teaching has proved to be the strongest predictor of discharge readiness, and therefore it is important to develop a comprehensive discharge preparation program.¹ We created a comprehensive discharge teaching task force (CDTT) as a part of our Family Centered Care (FCC) program and included technology to improve our families’ discharge experience and preparedness.

Setting:

We are a 20-bed Community Level 3 NICU with approximately 4200 deliveries and 450 NICU admissions per year.

Figure 1



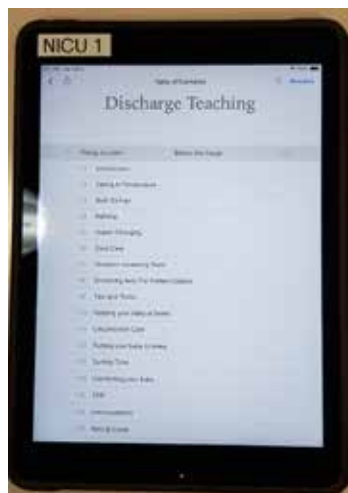
Mechanism: Our FCC formed a CDTT in late 2017 and created a unit specific discharge teaching eBook (Figure 2a) which was uploaded onto iPads for parental review. Discharge teaching was started at the time of NICU admission when a paper discharge checklist (Figure 2b) was placed at every infant's bedside. At their own pace, parents were able to review discharge content on the eBook. Parents would then initial completion of each topic on the checklist. The discharge content within the eBook has an easily navigated table of contents (TOC). We intentionally matched the discharge education TOC with the nurse’s EHR teaching documentation for easy workflow.

Initially, 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. However, based on parent and nursing feedback during the process, we did ultimately include re-admission and short-stay babies in our discharge teaching project in PDSA cycle # 2. Nurses were surveyed (n=33) as a part of the quality improvement project: 92% liked the discharge teaching tool because it supplemented and eased the teaching process on the day of discharge, while some expressed concern that it added more work to transfer information from the paper checklist into the EHR and that short-stay families were unable to finish all of the education topics.

Following the survey, we initiated PDSA cycle # 3 with our hospital's pilot of MyChart Bedside (Epic Systems Corporation) in our NICU. MyChart Bedside is an application that allows patients to view their EHR online during an inpatient hospitalization. It was designed to improve inpatient education and engagement, and to strengthen patients' relationship with their care team. We added the discharge education eBook into the MyChart Bedside education section so that parents could access the learning material on their devices at any time. Once material was reviewed, parents could sign off electronically and this information would then flow directly into the EHR (Figures 2c-2d). If parents needed more information about a topic, they could mark "I have questions," which the bedside RNs would then be able to view in the EHR and discuss further with families. We also created a specific short-stay education checklist with fewer topics assigned for readmitted families. Nurse champions & unit clerks encouraged families to set up MyChart Bedside shortly after admission. We are now slowly transitioning off the paper checklist.

Figure 2

a. eBook Table of Contents

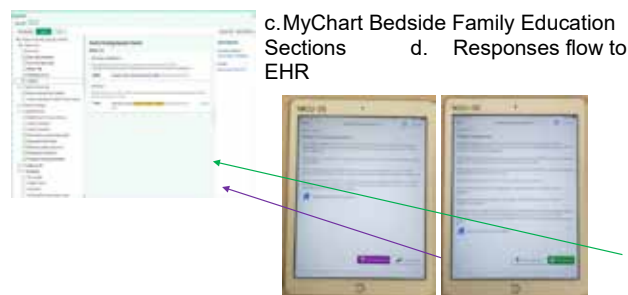


b. Paper Checklist



c. MyChart Bedside Family Education Sections

d. Responses flow to EHR



Impact: We improved our parent satisfaction survey "prepared for discharge" top box responses from 62% to 72% (Figure 3). Nurses appreciated the elimination of the extra work of transferring information from paper documents into the EHR. Nurses are working on incorporating activation of MyChart Bedside into their workflow. Workflow on the day of discharge was improved because parents had previously seen the discharge education content electronically and were able to ask better, more informed questions. This process did not replace direct bedside RN teaching of parents but was a welcomed supplement.

Figure 3

Limitations: Barriers to implementation included disseminating information about new changes to staff, delay in uploading the eBook content into the iPads due to hospital IT security concerns, resistance to including the paper 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.

Budget and Resources: Original iPads donated by Family Advisory Board member onto which discharge eBook content was uploaded. Once the hospital adopted MyChart Bedside, multiple iPads were provided by the IT department. The EHR had to be configured so that the appropriate education was automatically assigned in MyChart Bedside based on the type of encounter (birth versus readmission).

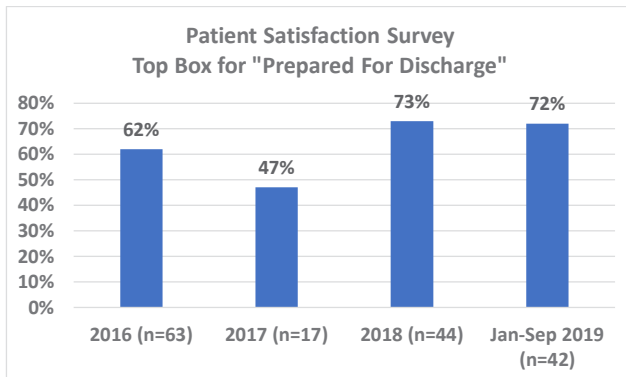
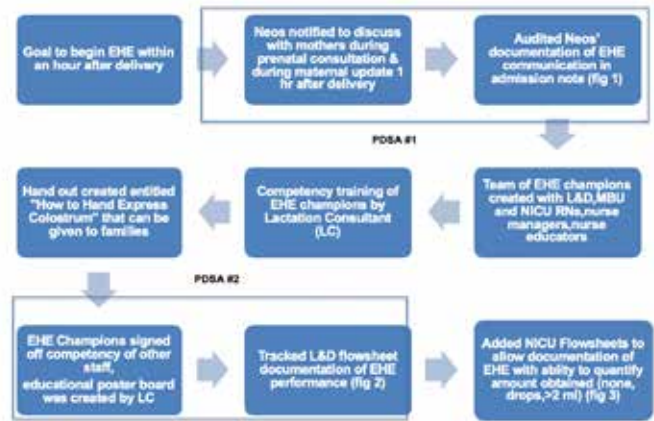
Implications for family support: Our goal is for families to feel well-supported during their NICU journey and to help better prepare them for discharge by delivering clear, concise, and consistent information.

Learner Objectives:

1. To recognize the importance of discharge readiness and guide families through the discharge teaching process starting at the time of NICU admission.
2. To learn 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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Journal of Perinatology, 33, pp 415-421.

Gravens2020-11

Multidisciplinary Team Approach to Improve Early Hand Expression (EHE) of Colostrum in a Community Level 3 NICU

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El Camino Hospital NICU, Mountain View, CA².

Background and Purpose: The benefits of human milk feedings have been well established, particularly in preterm infants.^{1,2,3} However, establishing optimal milk supply for mothers of infants admitted to the NICU comes with unique challenges. Infants are often unable to breastfeed in the immediate postpartum period, a critical time for establishment of lactation. Alternative methods may be required to assist in lactogenesis. Hand expression (HE) of colostrum shortly after delivery has been shown to increase breast milk production.^{4,5,6} Our Family Centered Care Program (FCCP) initiated a quality improvement project involving discussion, encouragement and hands-on teaching of mothers to self-perform early hand expression (EHE).

Settings: We are a 20-bed Community Level 3 NICU with approximately 4200 deliveries and 450 NICU admissions per year. We targeted EHE of colostrum for the mothers of all NICU admissions.

Methods:

During prenatal consultation the neonatologists emphasized the importance of establishing maternal milk supply and provided the parents with a video⁷ on how to perform HE. The mothers viewed the video at their own pace. In Sep 2017, we initiated two main quality improvement projects post-delivery: improving maternal communication within 1 hour of delivery and encouragement of EHE. There is evidence to support an increase in milk production with EHE, ideally within the first hour of delivery⁵. After delivery, a physician, bedside nurse, or nurse manager returned to L&D to update the mother within an hour. We focused on improving maternal milk supply with the goal that mothers would express colostrum shortly after delivery. The neonatologists documented their communication about HE in their admission note.

Once communication regarding HE improved, we began to track the actual performance of HE through nursing flow sheets in the Electronic Health Record (EHR). We formed a team of HE champions in L&D on each nursing 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 underwent training, and competency completion was signed off by the champions. The training included real time assistance with actual hand expression. NICU and Mother Baby Unit nurses were also recruited and trained in the same manner to disseminate a consistent message and continuous reinforcement of hand expression during postpartum period. L&D nurses documented hand expression of colostrum within an hour after delivery for all NICU admissions. Documentation included a quantification of milk obtained (none, drops, > 2ml). Figure 2 shows the L&D documentation of EHE from Nov 2018 - Sep 2019. Figure 3 shows timing of first colostrum received in the NICU. Our next step is to improve the time colostrum is collected and given to the infant, as well as maternal milk volume during the course of the infant's NICU stay.

Barriers to Implementation: Most barriers to implementation

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stemmed from time involved in training and signing off competencies, disseminating information about the new process, time lag of creating EHR flowsheets, and designing data reports.

Impact: We were able to show improved documentation by neonatologists regarding communication with the mothers about HE from 25% to 97% (Figure 1), improved L&D documentation of first hand expression from 25% to 41% (Figure 2), and improved first colostrum received in the NICU from 26% to 88% (Figure 3).

Budget and resources: iPads donated by our Family Advisory Board (FAB) were used to educate parents about HE. Additional funding for lactation support was provided by hospital administration. HE videos used with permission by Jane Morton, MD.

Implications for family support: By initiating EHE, we hope to improve breast milk supply and the rates of breast milk feeding at the time of discharge from the NICU while providing support to parents during their NICU journey.

Acknowledgements: NICU Manager - Jody Charles, MSN, NE-BC; Lactation consultant - Suzanne DeSandre, IBCLC ; EHR report developer III - Gopal Vedartham; El Camino Health staff and Stanford neonatologists; HE Nurse Champions: L&D - Amber Nicholls, Theresa Esters, Odiri Maku, Naomi Harel, Sabrina Davis; MBU - Jamie Huang, Marissa Lontoc, Amie Pecho, Eva Ifeishat, Valerie Yermanov, Lanh Dang, Janey Wan, Abigail Galang, Estephani Castro-Torres; NICU - Laura Haselden, Cristina Canete, Melissa Suarez.

Learner objectives:

1. Understand the importance of early hand expression of colostrum in improving breast milk supply and feeding
2. Recognize the importance of communicating with the mother after delivery for every NICU admission.
3. Learn new ways to support families during their NICU journey, with hope of taking ideas back to their own unit for implementation.

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Figure 1

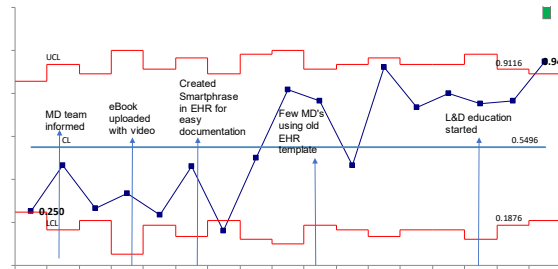


Figure 2

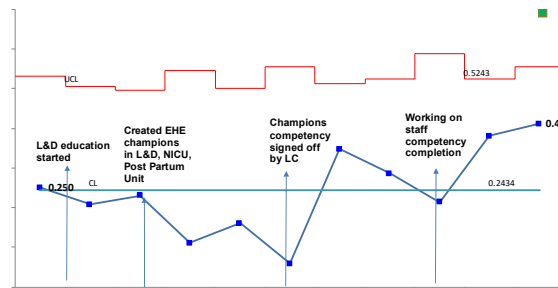
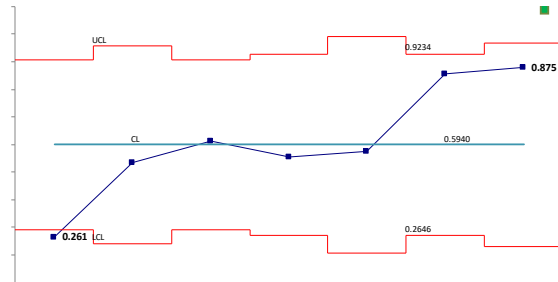


Figure 3



Gravens2020-12

Transitioning from NICU to Home: The Next Step

Heidi B. Gates RN and Vincent C. Smith MD MPH

Background:

As technology has increased, the field of neonatology has expanded and smaller, sicker babies are routinely cared for and saved. As care providers in the NICU, once these infants are medically stable, our focus shifts to getting the babies and their families ready to go home. At Beth Israel Deaconess Medical Center (BIDMC), a large teaching medical center, we embarked on a mission to develop a strong, comprehensive discharge program that would provide every family the skills necessary to take their baby home safely. Over time, our program has developed to include a robust parent education protocol which emphasizes bedside, hands on teaching, parent classes and appropriate referrals to community care providers and support programs. While most NICUs consider discharge planning to be important, many are having a difficult time implementing a standardized approach to NICU discharge preparation and transition planning.

Objectives:

The main purpose of this workshop is to support the development of strategies to improve the discharge preparation of NICU families and to help NICU families have a successful transition to home. At the end of the workshop participants will be able to:

- Discuss some discharge planning interventions that have been successful
- Describe the role of a NICU Nurse Discharge Coordinator and how that role may help to provide a better care for NICU families
- Provide some practical guidance on implementing or advancing discharge preparation and transition planning in the NICU

Workshop description:

- Formal presentation of background information that:
 - Describes the discharge planning programs that has been successful at BIDMC
 - Demonstrates the effectiveness of the program based on standard QI methodology
- Open discussion about the process of the development of the discharge planning program
 - Including barriers to implementation and some less than successful interventions
- Provide a description of the NICU Nurse Discharge Coordinator and its impact on the discharge planning process for the family and the staff
- Help attendees with a hands-on approach to discharge planning that could be applied to their home NICU
- Audience participation for Q&A

Gravens2020-13

Systems-Based Practice: Engaging institutions, staff and families to support optimal and equitable outcomes

for all

Authors' names, degree(s), and institution

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Workshop Proposal [preferred]

Background and Purpose:

Parents of young children with developmental challenges embark on a lifelong process of advocating for environments that meet their child's needs. Research demonstrates that the participation of children with developmental delays and disabilities is limited by environmental barriers such as negative attitudes, lack of resources, inflexible policies, and physically and cognitively inaccessible spaces and activities (Forsyth, Colver, Alvanides, Woolley, & Lowe, 2007; Law, Petrenchik, King, & Hurley, 2007; Mihaylov, Jarvis, Colver, & Beresford, 2004). Using a socio-ecological perspective we see these various barriers stem from multiple levels: from the immediate familial environment, to the local community and neighborhood, to regionally-delivered services, to state and national policies that impact access to and availability of such services. Barriers at each of these levels can negatively impact the development and participation of young children with developmental delays.

Emerging research reveals that through experience, parents learn to anticipate and respond to such environmental barriers in order to maximize their child's participation (Bedell, Cohn, & Dumas, 2004; Khetani, Cohn, Orsmond, Law, & Coster, 2013). However, this learning process is often one of trial and error

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honed over many years. Early childhood is an ideal period to equip parents by creating environments that collaboratively embrace families with young children. Multi-level support is essential to guide the beginning of a lifelong journey addressing barriers across multiple environmental levels to maximize their child's development and participation.

Children born preterm are at heightened risk for developmental challenges and chronic health problems (McCormick, Litt, Smith, & Zupancic, 2011). Most parents of preterm infants who spend time in the NICU (Neonatal Intensive Care Unit) are embarking on a lifelong process of advocating for environments that best meet their children's needs. Yet, most service systems, including NICUs, are loaded with barriers for families and professionals: unclear processes and responsibilities, high literacy demands, and siloed practices (Institute of Medicine, 2013; Rosenfeld, Kramer, Levin, Barrett, & Acevedo-García, 2018). As such, these systems typically fall short of fully supporting families on their journey (Smith, Hwang, Dukhovny, Young, & Pursley, 2013). Barriers at any level can negatively impact the lifelong development and participation of these young children. For example, family and community-level barriers may prevent or delay appropriate therapies and socio-emotional opportunities, both during and beyond the NICU stay. A lack of appropriate therapies may, in turn, result in missed opportunities for educational and community participation (e.g. early play or support groups, early intervention, early care and preschool, neighborhood or religious events). Such therapies and opportunities are known to increase child and family participation, fostering better physical, developmental, and mental health outcomes.

Evidence continues to build for the efficacy of environment-focused interventions concerning parents of children with developmental delays. (Ahl, Johansson, Granat, & Carlberg, 2005; Darrah et al., 2011; Dunn, Cox, Foster, Mische-Lawson, & Tanquary, 2012). However, these interventions use an intensive 1:1 therapy model in which a rehabilitation or other early childhood professional helps parents address their child's specific needs in the immediate context. The interventions do not provide program and system structures that explicitly address barriers at multiple environmental levels to address the needs of families and their young children. Certainly, these interventions may not be equally effective for all parents; 70-100% of research participants in the studies cited above had at least some post-secondary education. Parents with lower levels of education and/or who speak English as a second language may be less likely to benefit from these interventions.

Therefore, individual parent education and support will not alone alleviate the problem. Indeed, such initiatives are often a consequence of complex systems issues. Institutional change is needed so all families and communities (e.g. a population) can be positively impacted (Nelson & Brooks, 2016; Bodenhausen & Birge, 2017; American Academy of Family Physicians, 2019; Reid, Nariño, Magge, & Sassi, 2019). Existing integrated care models do not explicitly employ a lens where assessment and change processes are driven by integrating frameworks essential for optimizing outcomes for all families: disability, racial and health equity, literacy environment, life course, and family engagement (Beck, Edwards, Horbar, Howell, McCormick, & Pursley, 2019). Such integration is essential to appropriately address the unique institutional issues related to families of preterm infants, because without it, our work lacks the critical perspective to create positive change for all. We have developed an easy-to-use and systematic environment-focused process that considers the experience of diverse parents encountering barriers at multiple systems and environmental levels. The assessment tools are evidence-based and rooted in social science theory. Used

iteratively with families and program staff, our approach aims to appropriately address the unique institutional needs of preterm infants and their families.

Workshop Plan:

We will present an innovative process from Boston Children's Hospital's NICU GraDS (Growth and Developmental Support) program. Workshop participants will engage in hands-on activities to explore how using this process can positively impact systems-based practices to improve child and family outcomes. The process focuses on environment-focused strategies that maximize children's development and participation across the life course. It addresses program and system structures and is used iteratively with staff and participants. Families and staff play a direct role in deciding what to address and how to implement tests of change.

In this workshop, we will describe and engage participants in using:

Resources & Tools

to produce optimal and equitable access to positive outcomes for all families

Guidelines: Racial Equity and Family Engagement

Frameworks for Action: Life course and Social Determinants of Health

Systems Assessment: Health Literacy Environment

to engage families and staff in a process that explores family, staff, and key informant perspectives concerning program facilitators and barriers related to satisfying family needs or expectations

Interviews

Problem-solving Focus Groups

Systems-focused change strategies

to explore and implement better experiences and processes for families and staff

Plan: Establish a process to continually assess program/institution work with families and their pre-term infants.

Do: Roll out and test the process and its components.

Study: Assess the process

Act: Make needed changes.

Repeat: **Plan. Do. Study. Act.** cycle

Create an iterative implementation and use plan to establish a routine process.

Participants will be introduced to these concepts and practice using them. They will also leave with resources and strategies to discuss with colleagues and an outlined process for testing and adapting resources, tools, and strategies.

Budget and Resources:

In-kind contributions include leadership buy-in and staff and participant time, while monetary contributions may include con-

sultant or training costs, if there is no expertise in-house.

Impact:

The biophysiology of human interaction is rooted in systems. Using systems-focused strategies that consider disability, racial and health equity, literacy environment, and family engagement perspectives across levels and across the life course can change the way that participants and staff consider and target an organization's goals, strategies, and outcomes. Such a focus on program and systems structures is essential to address the needs of families with pre-term infants, not only in the NICU but in their lives beyond it, to maximize optimal and equitable physical, developmental, and mental health outcomes.

Conversations and practice opportunities among inter-disciplinary practitioners and families are indispensable to improve systems of care for equitable and optimal outcomes for all.

Learner Objectives:

Participants will be able to define developmental disability, racial and health equity, literacy environment and family engagement.

Participants will be able to apply racial and health equity, literacy environment and family engagement in assessing NICU follow-up programs.

Participants will be able to identify systems-change strategies that can be tested out in the programs and institutions they work in.

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Gravens2020-14

Integrated Fetal Care: An Innovative Approach to Prenatal Counselling

Authors:

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Background & Purpose:

One in three babies will be born with a birth difference in the US every year (National Center on Birth Defects and Developmental Disabilities [NCBDDD], 2016). Approximately 120,000 infants are affected annually in the US and account for 20% of infant mortality (Centers for Disease Control and Prevention [CDC], 2008; Mathews, MacDorman, & Thoma, 2013; NCBDDD, 2016). With the rise in prenatal testing and fetal care, pregnant mothers and their families are now cared for in fetal care centers often part of pediatric hospitals where their child will receive care after birth.

Current practice at most fetal care centers across the US includes families having individual consultations with a variety of specialty services at different times, with the goal of learning about their child's diagnosis and how each specialist plans to approach care. Families appreciate learning about their child's condition and planning for their care (Berman, Costanzo, Smola, Taggi-Pinto & Luks, 2017). However, families have expressed a desire for a cohesive plan of care, continuity among providers, and increased support

when they are given education about their child's condition and a plan of care (October, Watson, & Hinds, 2013).

Integrated Consultations (IC) as modeled by the Elizabeth J. Ferrell Fetal Health Center (FHC) at Children's Mercy Hospital (CMH) in Kansas City, Missouri use an interdisciplinary care model where families meet with multiple specialists at the same time, with the goal of discussing correctable or palliative treatment options, potential complications, future medical needs, and quality of life for the baby. Integrated consultations involving the care team and family encourage holistic, comprehensive, family-centered care that is unique to the FHC. This approach gives providers an opportunity to be updated with the most current information about the patient and family, encouraging effective communication (Fox, Brittan, & Stille, 2014). IC's offer a broad array of expertise and provide comprehensive and individualized care that minimizes uncertainty and helps parents feel empowered and supported (Kratovil & Julion, 2017).

Budget & Resources:

Integrated consultations are billed to the patient as a flat monetary amount versus being billed by each individual provider who attends the consultation. During the IC each family is provided with a FHC notebook comprised of information detailing care and providers in the FHC, fetal diagnosis, and hospital and community resources as well. The value to patients and families far outweighs the potential lost revenue of billing each sub-specialist separately.

Program, Materials, or methodology:

The use of the Neuman's Systems Model provided a framework for team members within the FHC to embrace the family as individualized, whole people who are comprised of physiologic, psychological, sociologic, developmental, and spiritual components (Kozier et al., 2000). The nurse coordinator in the FHC prepares families at their first visit for what to expect during the IC and provides continuity during all prenatal care. To provide family centered care and communication, the IC is attended by a pediatric specialty physician, neonatologist, social worker, palliative care provider as applicable, radiology, neonatal coordinator, and a genetic counselor. For complex patients diagnosed with multiple anomalies, providers from additional specialty services are also present.

Barriers to performing an IC for all patients include provider and patient availability for scheduling. Many patients seen in the FHC are from all over the region as well as local. This can lead to increased social stressors for the patient including transportation, price of fuel, and additional time off work. Some of these stressors can be mitigated by the unit social worker. In addition, the neonatal coordinator facilitates the consultation by preparing the care team with patient information regarding diagnoses and fetal testing and psychosocial factors, and functions as a parental advocate. The IC session can occur at a variety of different time points but most typically occurs four weeks after the initial FHC prenatal visit to allow for the collection of additional testing and results including: detailed ultrasound, echocardiogram, MRI, and genetic testing, depending on the individual diagnosis of each fetus. This also allows the family time to process and prepare questions for providers. The family is encouraged to write all questions down, or call the neonatal coordinator with questions prior to their IC. The work done by the nursing, and social work team with preparation and coordination of this pre-visit planning is vital for the throughout of the patient during the hour-long IC visits.



Impact/Results:

Interdisciplinary integrated consultations (IC) can be used to prepare families for delivery and care of their fetus diagnosed with complex medical diagnoses. Since 2011, our institution has performed 2,588 ICs across all specialties and an average of 400 consults per year for the last two years. When mothers were given a questionnaire following their IC experience and asked to which degree they felt “worried” (numerical value of 1) versus “relieved” (numerical value of 7), participants provided a mean response of 5.6 ($n=19$, $SD=1.3$) (Liddle, Koehn, Dowling, 2017). Patients reported that the IC team “understood what was on [their] mind”, reporting a mean of 4.5 on a 5.0 scale ($n=19$, $SD=0.5$). Participants also reported they “felt reassured”, reporting a median of 4.4 ($n=19$, $SD=0.6$), and “felt taken care of”, reporting a mean of 4.7 ($n=19$, $SD=0.5$). It can be determined that participation in an IC prior to the birth of the critically ill neonate is a well-received, patient- and family-centered intervention. Such consultation lessens stress for those pregnant women and their families, validating current processes of this center and should be implemented in all fetal centers.

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Learner Objectives:

- 1) Demonstrate the value of the integrated consultation to improve quality of care, subsequently contributing to enhanced outcomes and satisfaction.
- 2) Identify barriers to implementing integrated consultations when performing prenatal care for critically ill fetuses.

Gravens2020-15

Narrative Training and Consultation in Neonatal Intensive Care: Building Tools for Self-Reflective Learning

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Background and Purpose:

The intensity of the interactions in Neonatal Intensive Care take an emotional toll on the staff and stress scales of NICU staff rank consistently high in the profession (Braithwaite, 2008). Due to the nature of highly specialized form of nursing, NICU nurses experience high levels of psychological and physical stress (Braithwaite, 2008). Compassion fatigue, the precursor to burnout, is defined as emotional distress leading to apathy brought on by the trauma of constant care for others and will be experienced by almost all healthcare workers at some point in their profession (Mathieu, 2014) Current literature in a meta-narrative review of 90 studies in nursing and other healthcare professionals, calls for a new discourse that looks at the distinguishing characteristics, motivators and outcome responses of occupational stress and burnout of healthcare providers. Recommendations included encouraging new models that honor the healthcare providers lived clinical experiences. (Sinclair, Raffin-Bouchal, Venturato, et al., 2017). Narrative Consultation is a construct designed to meet this need and to be utilized with front line clinicians. Narrative consultation is a process that can be used to support employees and educate in a co-constructed exchange of information that gives voice to as well as honors the lived experiences of those on the frontlines.

Program, Materials, or Methodology:

Narrative consultation engages perspective through reflection in order to build a phenomenological picture of experiences in the unit. The consultation sessions utilize medical humanities, holistic nursing theory, and reflective practice, which all centralize the theme of narrative practice and the patient and clinician's stories in intersection. In an era in which the electronic medical record has reduced our stories to a narrative of checked boxes, it is imperative to return our frontline staff to the practice of examining patients' stories and embracing our role as a pivotal part of their narrative. In addition, this practice of giving voice to our frontline staff and hearing the challenges and triumphs of clinical practice has been utilized to aid in safety and quality improvement in our hospital units. Safety stories have been discussed in frameworks such as the high reliability organization (HRO) (Hayes & Maslen, 2014).

Narrative Consultation gives participants a platform to be heard and examine their own belief systems in order to develop trusting relationships and improve care. It can also give nurses the tools to deal with the ethical dilemmas that occur within the unit. Goals of the sessions revolve around what health and healthcare may mean to the individuals and families that clinicians are trying to serve. In order to provide holistic care, they must be attentive to the patient's story as well as their own narratives within their story. The ability to be in contact with this understanding of perspec-

tive can be accomplished within the field of Narrative Medicine and is gaining strong evidence to its use within the medical fields (Charon, 2006; 2016).

Data Collection and Analysis

Sample obtained from the Neonatal Intensive Care Staff in a Level III Community NICU at The Valley Hospital in Ridgewood, NJ.

N= 76 Phase One

N=55 Phase Two

Outcome: Staff lived experience of the workplace (Neonatal Intensive Care) will be assessed qualitatively through semi-structured interviews and observation, and quantitatively by means of questionnaires.

Semi-structured Interviews: Two interviews will be conducted with each participant, one each prior to (baseline), and one after (after 6 sessions over a three month period). Interviews focused on the participant's lived experience of NICU will be conducted in a private setting within the hospital, recorded and transcribed prior to analysis.

Observation: Activity in the NICU will be documented with ethnographic field notes, photography, audio recording and on film. Ethnography is experientially driven as the writers immerse themselves in the culture they are studying and draw conclusions directly from their fieldwork. Drawing conclusions is an interpretive act that occurs within the writing of notes and text (van Maanen, 1990; 2011). We also may find augmentation to the institutional quality markers (patient and staff satisfaction, safety markers, uptake of change, retention and absenteeism) through phenomenology. Lastly, we will be looking for additional emerging themes related to the hypothesis that Narrative Consultation may address occupational stressors and improve work environment as well as serve as an educational tool and supplementation to didactic education.

Impact or Results:

Major accomplishments of the sessions included participation by

over 50% of staff members including administrative personnel, physicians and frontline staff. Team values including quality caregiving, cohesive teamwork, effective communication and the importance of the identification of self as a NICU professional were found throughout phase one interview and observation. These values were examined throughout the narrative sessions and the needs and potential solutions to addressing gaps in these, as well as other care areas, were co-constructed within the groups.

Learner Objectives:

1. Learner will understand the history and benefits of narrative practice within the healthcare environment.
2. Learner will understand the sensitizing framework and underpinnings of Narrative Consultation including how the practice is designed to address occupational stressors in Neonatal Intensive Care.
3. Learner will identify ways that narrative consultation may be applied including facilitation of institutional quality improvement and the uptake of operational and systems change through meeting the educational and supportive needs of the frontline staff.

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Gravens2020-16

A Suggested Framework to support Maternal/Newborn health and biophysical stability: Embrace Refugee Birth Support Program

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Friends of Refugees: Embrace Birth Family Mentor

Background/Purpose

Approximately 95,000 people are living in refugee camps on the border of Thailand and Burma (Myanmar.)^{1,2} Ethnic minorities (Chin, Karen and others) who have fled conflict for over 30 years have registered with the United Nations to be resettled in a third country. Many escaped as children and grew up with limited education, healthcare, and job opportunities. A large group has resettled in Georgia finding employment in chicken processing facilities an hour north of the city. Fathers leave their families 12 hours per day. Pregnant women in this community are at risk for poor prenatal care due to lack of transport, caring for other children, and lapses in Medicaid coverage.^{4,5} New arrivals struggle to learn English and to adapt to American customs. The strengths of the community are apparent in their humble nature, diet of proteins, homegrown vegetables and rice, value of the nuclear family, and nurturing of their children in close contact. This population is vulnerable when encountering the healthcare system due to language, cultural differences and lack of understanding of American healthcare practices.^{4,5}

The Embrace Refugee Birth Support program is a community effort which identifies pregnant women and pairs them with caring mentors. It is funded through philanthropy and mentors are trained volunteers. The mentor accompanies the woman through childbirth and all prenatal, postpartum, and early pediatric appointments. The aim of this narrative is to describe how a provider trained in family centered developmental care (FCDC) can provide a culturally sensitive framework for individualized assessment and support while mentoring a Karen mother. The goal was to minimize the effects of stress of birth and hospital encounters, and improve maternal/infant birth experiences by employing principles of (FCDC), observation, and reflection.⁶ The Newborn Individualized Developmental Care and Assessment Program/Family Infant Neurodevelopmental Education (NIDCAP/FINE) principles of family centered support, individualized care, observation and reflection were incorporated.^{6,8}

Methods

A 28 year-old G5P4 Burmese mother had two normal deliveries in a refugee camp prior to arrival in the US in 2013. Her third pregnancy ended in fetal demise. During her 5th pregnancy she missed prenatal appointments and was labeled as high risk. English was limited and she had an extremely humble nature in the face of challenges. The Embrace mentor, a NIDCAP trained provider, established trust and friendship by accompanying her to birth classes (instructed by another Karen immigrant) where she was educated on delivery, hospital policies, infant care, and family planning. She developed a pictorial narrative of her birth plan. The mentor transported her to prenatal appointments where there was the opportunity to observe and interpret her responses to medical information, seeing the ultrasound of her baby, and painful procedures.

Findings

Labor occurred spontaneously at 39 weeks. Careful observation revealed that contractions were coming 10 minutes apart. She was transported to triage and assessed as 4 cm dilated. The mentor remained at the mother's side and counted contractions. Labor progressed rapidly with low intensity responses from the mother. The baby was moderately distressed at birth requiring suction and stimulation. The NIDCAP trained mentor supported the infant on the warming table and in transition to the mother's chest. The infant improved his status and was monitored with pulse oximetry. He made a rapid crawl for her right breast and suckled for at least 20 minutes. I pointed out his intentional behavior for the one nurse

left in the room. We marveled as this baby smelled his hand, pushed with his feet, rooted and lifted his head to find his mother's breast. The FCDC approach bolstered confidence in the medical team to allow the baby and mother to engage in their strengths in spite of his apparent initial distress.

The mentor offered to observe the infant carefully so that mother and baby could have protected skin to skin time. He no longer had the noisy breathing or diffuse color changes observed on the warming table. He was pink, strong and active. I protected the next hour of bonding, engagement, and rest. Mother did not acknowledge me again until she moved out of a state of calm drowsiness.

In the 48 hours after the birth, NIDCAP principles of modifying the environment, observation, positioning, supporting with painful procedures and maximizing skin to skin were instituted.^{6,7}

Conclusions

Family integrated, relationship based, culturally sensitive, and responsive maternal-infant interactions were the NIDCAP principles implemented improving the experience for this mother and infant. As stated in the NIDCAP vision statement, care was individualized, enhancing strengths and minimized the stress of hospitalization of a newborn and his family. An evidence-based approach of observation, evaluation, modification and reflection was employed.^{6,7} It is the hope of this author that NIDCAP/FINE training could be used in diverse settings and with people in need of sensitive caregiving.

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8. Inga Warren July 2015 Family and Infant Neurodevelopmental Education

Gravens2020-17

Reduction of Noxious Stimulation (Cuff Blood Pressures) in the Small Baby Population

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Problem Statement:

Many hemodynamically stable small babies (< 27 weeks gestational age at birth) are having cuff blood pressures taken too frequently. Cuff blood pressure measurements in the otherwise stable small baby are notoriously inaccurate and often do not reflect any true hemodynamic disturbances in this population; however they do create a noxious stimulation to the baby which may contribute to decreased neurodevelopmental outcomes.

Background:

The evidence is clear that more painful stimuli in this patient population can lead to worse neurodevelopmental outcomes. Cuff blood pressures are often difficult to obtain and represent a noxious, painful stimulation in an otherwise hemodynamically stable premature infant. Measurements like urine output and capillary refill are more applicable when monitoring hemodynamics. During our baseline data, home going hemodynamically stable babies were receiving an average of 32 blood pressures during their last 7 days of hospitalization. Our current floor routine in our Level IV NICU is to obtain a blood pressure measurement every 6 hours.

Resources:

Our Small Baby Program includes designated providers, guidelines, a Small Baby Coordinator and weekly Small Baby Rounds. During these rounds, blood pressure audits and education could be discussed with the bedside caregivers. Small Baby Rounds are multidisciplinary including a neonatologist, nurse practitioner, nurse educator, bedside nurse, respiratory therapist, OT/PT, social worker, lactation specialist, family liaison specialist and a quality improvement specialist. Therefore, all disciplines are able to provide input.

Methodology:

A key driver diagram was derived by our team supporting our AIM to reduce cuff blood pressures on hemodynamically stable patients. The outcome measure of our quality improvement project is to increase the percentage of patients receiving ≤ 14 cuff blood pressures in the last week of their hospitalization, who are discharged home. Ideally, a hemodynamically stable infant should receive blood pressure measurements every twelve hours. To acquire baseline and subsequent patient data, an EPIC report request was submitted to our Neonatology Data Team. As a process measure, audits were performed of the number of cuff blood pressures taken on all small babies. To engage bedside staff, the audit results were shared during Small Baby Rounds and at unit meetings. Families were educated by our family liaison so that they understood the transition of care to being more stable. Balancing measures, such as Code Blues, use of vasopressors, and use of anti-hypertensive medications were also tracked in the patient cohort.

Results:

Our baseline data demonstrates home-going hemodynamically stable babies were receiving an average of 32 cuff blood pressures in the last seven days prior discharge. Post intervention home-going hemodynamically stable babies are now receiving an average of 16 cuff blood pressures in the last seven days prior to discharge. Pertaining to our outcome measure, our baseline for taking ≤ 14 cuff blood pressures in the last week of hospitalization was 5%. Post intervention, hemodynamically stable babies receive ≤ 14 cuff blood pressures nearly 60% of the time.

Discussion:

Neonatology literature is full of articles about decreasing stress and noxious stimulation to the baby in order to improve neurodevelopmental outcomes; however there are minimal articles that

reference how an accurately obtained normal blood pressure measurement is reflective of a hemodynamically stable patient. Hypotension is a late sign of shock, therefore, a blood pressure measurement alone is not a reliable measure to assess the adequacy of cardiovascular status overall. The caregiver should also be taking into account the patient's overall status, clinical assessment, and past medical history. It has also been observed in our data that the number of documented blood pressure measurements in the electronic medical record differ from the number retained within the monitoring instrument on several patients. This may also reveal another variation in practice and the true number of noxious stimuli the baby is receiving from cuff blood pressure monitoring.

Future studies may include evaluating additional noxious stimuli that may be contributing to detrimental neurodevelopmental outcomes, along with assessing unintended, adverse effects practice changes. This may include increased utilization or creating an index for patient friendly care.

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Learner Objectives:

1. Learner will recognize that the blood pressure is not the most critical factor in making medical decisions in the hemodynamically stable infant, and therefore should be

decreased in frequency as medical stability improves.

2. Learner will acknowledge the noxious impact that a cuff blood pressure presents to the baby.
3. Learner will acknowledge the correct timing and technique to achieve an accurate blood pressure.

Gravens2020-18

Nurse Driven Assessment of Maternal-Infant Attachment in the Neonatal Intensive Care Unit.

Authors: Dolores Greenwood, DNP, RNC-NIC, Margaret Brady, PhD, RN, CPNP-PC, Penny Weismuller, Dr.PH, RN, California State University- Doctor of Nursing Practice

Background and Purpose: The purpose of this project is to develop and implement an assessment tool for nurses to use to assess mother-infant attachment in the Neonatal Intensive Care Unit (NICU). In this setting, the infant's medical needs often interfere with bonding behaviors. There was concern that nurses did not recognize attachment and bonding behaviors so that parents and infants exhibiting poor attachment could be referred to the psychologists of the Infant Mental Health Program in order to improve maternal-infant attachment and provide intervention to avert possible problems in development.

Budget and Resources: There was no budget required for the project and resources were available at the institution. The resources required were the assistance of the Nurse Researcher and the Statistician who are both employees of the institution.

Program and Methodology: The Plan Do Study Act (PDSA) framework was utilized to guide this project. The assessment tool was piloted in Zone One of the NICU and interrater reliability was established. Training was provided to help nurses increase awareness of the characteristics associated with positive and negative behaviors of attachment. This training allowed the bedside nurses to notify the social workers and psychologists if any negative behaviors were noted.

A 30-day pilot was conducted to evaluate the use of the tool. Once the 30-day pilot was completed, a survey was sent to the 150 nurses who were identified as working in Zone One during the pilot to determine nurses' opinion about the usefulness of the training on the attachment assessment tool. The goal of this project is to increase the number of referrals to the psychology team.

Results: A survey was completed by approximately 23% of the nurses who were sent the survey via email. There were 21 (91.3%) nurses who felt reported the education and training were adequate. There were 23 (100%) nurses who noted that the tool was easy to use and that the information was applicable to their job. There were six (27%) nurses who knew about the psychologists, with seven (31.8%) somewhat familiar with their presence. There were nine (40.9%) nurses who were unaware of the psychologists being used in the NICU. Most of the nurses surveyed stated that the information gathered from the tool and from the education would assist them in initiating a referral to the psychology team (73.9%). Only two nurses stated that they would not be so apt to make a referral based on the information provided. The completion rate was low; however, this may have been the result of the survey being sent out by the nurse scientist. This was done

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OPIOIDS and NAS

When reporting on mothers, babies,
and substance use

LANGUAGE MATTERS



I am not an addict.

I was exposed to substances in utero. I am not addicted. Addiction is a set of behaviors associated with having a Substance Use Disorder (SUD).



I was exposed to opioids.

While I was in the womb my mother and I shared a blood supply. I was exposed to the medications and substances she used. I may have become physiologically dependent on some of those substances.



NAS is a temporary and treatable condition.

There are evidence-based pharmacological and non-pharmacological treatments for Neonatal Abstinence Syndrome.



My mother may have a SUD.

She might be receiving Medication-Assisted Treatment (MAT). My NAS may be a side effect of her appropriate medical care. It is not evidence of abuse or mistreatment.

My potential is limitless.

I am so much more than my NAS diagnosis. My drug exposure will not determine my long-term outcomes. But how you treat me will. When you invest in my family's health and wellbeing by supporting Medicaid and Early Childhood Education you can expect that I will do as well as any of my peers!



Learn more about
Neonatal Abstinence Syndrome
at www.nationalperinatal.org



in order to avoid any possible issues with coercion, since the proj-

ect author was a nurse manager on the unit.

Impact: There were no referrals to the psychology team in Zone One prior to the pilot implementation. In contrast, there was an increase in the total NICU referral rate during the month following the project pilot. This may have been due to the increased familiarity with the protocol and increased confidence in making referrals.

Projected component of the project will include a review and revision of the education plan. An additional PDSA cycle will be initiated in an attempt to gain a better understanding of the maternal-infant attachment and the characteristics that can be associated with poor attachment. The psychologists are on board with assisting in educating the staff nurses and are hopeful that referrals will increase as nurses become more aware of attachment behaviors.

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Learner Objectives:

1. Identify positive and negative characteristics of maternal-infant attachment
2. Identify challenges with promoting maternal-infant attachment in a Level IV Neonatal Intensive Care Unit.
3. Recognize the possible issues that can result from lack of intervention.

Gravens2020-19

Early contingent language learning in NICU infants: brain-based evidence

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NICU infants are often deprived of infant-directed speech and have few opportunities for reciprocal speech sound exchanges. However, our previous work showed that this active, contingent learning is not only possible in very young infants, but it is critical to the development of speech sound differentiation (a strong predictor of language abilities at 2 years). The human brain loses the ability to differentiate speech sounds from a potential of more

than 50 to less than 50 by 8 months of age. We hypothesized that contingent exposure to an infant-directed foreign language in the NICU could increase speech sound differentiation for that language specifically, as opposed to another, and that this would not decrease differentiation in response to English.

30 stable patients, aged 36-75 weeks' postmenstrual age (mean=44 weeks, SD=9.92; 14 males), were recruited from the Neonatal Intensive Care Unit and Clinic using IRB-approved protocols and randomized to receive twenty 15-minute sessions over a 2-3 week period consisting of either passive listening to an English recording as a controlled native exposure, or active, suck-contingent listening to a recording in French. The English exposure-only group allowed us to control for potential negative effects of an early active exposition to foreign language in an environment where native language is infrequent. All recordings were of infant-directed female voice singing lullabies or reading to the child in their native languages. Thresholds for delivering the recording through the suck-listening device were set at levels appropriate for postmenstrual age, so that minimal effort was required to trigger the device; however, the settings also ensured that regular attempts were needed to continue to receive the recording. Pre and post-training infants' event-related potential responses (ERP) or time-locked EEG, were obtained using a 128-channel EEG system. Measures of infant cortical processing were collected in response to speech stimuli in response to early standardized English, French and Chinese phonemes.

Analyses of ERP were based on a previously published methodology. Briefly, response amplitudes were averaged within the 150-700ms post stimulus onset interval and mean amplitudes were measured at each electrode location (F3: frontal left, F4: frontal right, T5: temporal left, T6: temporal right). Responses to vowels and consonants contrasts were analyzed through different time-windows: 150-250, 250-400, 400-700ms.

Differences in amplitude between pairs of stimuli across 3 languages were as follows:

There were no decreases in English speech-sound processing ability after exposure to French language as compared to the controlled English exposure group (Linear regression controlling for group, $p > 0.106$). Both groups showed improvement in English speech sound differentiation after exposure (one way Anova, English exposed group $p = 0.0005$ for F4 and $p = 0.0003$ for T6; French exposed group $p = 0.005$ for F4 and $p = 0.003$ for T6).

In the group actively learning French, paired T-test for each sound pair demonstrated a significant increase in differentiation of sounds in T6, with the mean difference of amplitudes increasing from 4.04 microvolts (SD=0.88; pre-exposure) to 4.99 (SD=1.04; post-exposure), $p = 0.039$. However, no similar effect was observed for Chinese sound pairs, demonstrating a French-specific process.

Across all infants, there was a significant loss of differentiation of sounds if they were non-exposed to a specific foreign language during the 2-3 weeks of the intervention. The loss was most prominent for those exposed only to English language who lost Chinese contrasts (predominant effect in T6 with a mean difference of amplitude of -0.95 between pre- post exposure; $p < 0.05$) and those learning French who selectively lost differentiation of Chinese contrasts (predominant effect in T6 with a mean difference of amplitude of -0.21 between pre and post exposure; $p = 0.04$).

This study shows for the first time that it is possible through active listening to infant-directed foreign language to increase language-specific speech sound differentiation in hospitalized infants. Fur-

thermore, early learning of a foreign language, even in NICU infants, does not impede native language processing. Effects of active exposure on speech processing were predominantly observed in the right cortical hemisphere, strengthening previous studies showing cortical lateralization within the first months of life. Together, these findings suggest that use of contingent learning in the NICU can enhance and preserve infants brain plasticity for differentiating multiple languages.

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Learner Objectives:

- Neural signature of foreign language sounds perception can be recorded in a child friendly manner.
- Suck-contingent exposure shapes the infant speech discrimination at the cortical level.

Gravens2020-20

Maternal experiences participating in a pilot study of individualized human milk fortification in the NICU: a qualitative study

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Background: Many parents feel that involvement in neonatal research leads to better care and/or other benefits for their baby (McCarthy et al. 2018, Harvey et al. 2017). Newly available technology for point-of-care human milk analysis allows individual infant-level targeting of human milk fortification in the NICU. We conducted Pre-Nourish as a single-arm study to establish the feasibility of individually targeting human milk fortification, with a future goal of investigating the effectiveness of this approach. Maternal perceptions of this kind of human milk research are unknown.

Aim: The aim of this qualitative study was to characterize maternal perceptions and experiences of their preterm infant's participation in Pre-Nourish, a pilot study of individually targeted human milk fortification during the NICU hospitalization.

Methods:

The setting was a single tertiary care academic hospital. Infants in Pre-Nourish were singletons born between 24 and 30 completed weeks' gestation whose parents had provided written informed consent for them to participate. All participating infants received a human milk-only enteral diet (maternal and/or donor milk, no for-

mula). Fortification was individually targeted based on macronutrient analysis with a mid-infrared spectroscopy-based point-of-care human milk analyzer (Miris AB, Uppsala, Sweden). Primary infant outcome measures were anthropometry, body composition by air displacement plethysmography (PEA POD, Cosmed, USA), and brain magnetic resonance imaging.

For the present study, mothers of all infants who completed Pre-Nourish were eligible. One author (K.D.) conducted and audio-recorded semi-structured interviews in English with mothers once their infants had completed all study procedures, near the time of NICU discharge. Interview questions were developed by the study team to probe maternal perceptions and experiences of topics such as the decision to enroll, study procedures, and interactions with study staff. Mothers were also asked open-ended questions to help understand their perceptions and experiences during the study. For mothers unable to complete the interview in-person, we offered phone interviews. Audio recordings were transcribed verbatim with interruptions, noises, unintelligible audio, and other relevant circumstances noted in brackets. Data from transcripts were analyzed using the constant comparative method (Corbin & Strauss, 2015). Two authors (K.D., E.D.) independently read each transcript from start to finish, then coded the transcript with codes they had generated from the content. For each transcript, they compared codes and quotes to those of previous transcripts, thereby reinforcing and refining themes as each new transcript was coded. Together, both authors discussed codes and quotes from each transcript and grouped them into mutually agreed-upon themes.

Results: Of 9 eligible mothers, 8 (89%) completed semi-structured interviews (6 in person, 2 by phone). Mean maternal age was 32.7 years. 38% of mothers reported their race as Caucasian, 25% reported African American, 12% reported Asian, and 25% reported Other. 63% of mothers were primiparous. The mean gestational age of infants was 29 weeks' and the mean birth weight was 1148 grams. Infants completed all outcome measures, with the exception of one infant whose parents declined the brain MRI at term equivalent age.

We identified four main themes that captured maternal perceptions and experiences of their preterm infants participating in Pre-Nourish. These themes with example quotations and representative codes are shown in Table 1.

Table 1. Main themes around maternal perceptions and experiences of their infant's participation in the Pre-Nourish Study of individually targeted human milk fortification

Theme	Example Quotations	Representative Codes
Risks, benefits, and opinions factored into the decision to participate in the study.	- A "no-lose situation" - "Not wanting to expose them to anything that's experimental"	- Low-risk, benefit, invasive, interest, better nutrition, oversight, joint decision
Participating in the study was easy, interesting and positive.	- "I didn't have to do anything but make milk" - A "good experience"	- Easy, interesting, good idea, follow up, patient, friendly, welcoming
Babies grew while moms gained motivation and insights.	- "He's growing so fast on whatever they're doing!" - "I'm motivated... to keep pumping because I know he's getting good stuff"	- Weight gain, growth, benefits, nutrition, motivated, reminder, emotional benefit, pumping
Stress and concern were part of the NICU experience and the study.	- "Having a preterm baby, there's a lot of guilt." - "Very difficult and stressful time" - "For the MRI for us it was, I was a little worried because she was moving, and she had to extend the timing"	- Overwhelmed, vulnerable, stress, difficulty, MRI, PEA POD, worried

Impact: The results provide insight into maternal perceptions and experiences of having an infant participate in a NICU research study of individualized human milk fortification. These results support the feasibility of this research and will inform our approach to family engagement during an upcoming NIH-funded randomized, controlled trial investigating the effectiveness of individually targeted as compared to standard human milk fortification. These results also contribute to the relatively sparse knowledge about parent perceptions regarding low-risk research in the NICU (Freibott et al. 2016).

Learner objectives:

- Understand maternal experiences while participating in a low risk study for very preterm infants
- Understand factors that influence parental decision-making in low risk research in the NICU
- Understand maternal perceptions and experiences in a study that focuses on pumping, breast milk composition, and breast milk fortification in the NICU

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Gravens2020-21

Factors which may contribute to the success or failure of use of human milk in a Level IV Neonatal Intensive Care Unit

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Background: NICU mothers must rely on expressing their breast milk to promote and ensure an optimal supply of human milk for their infant. Many mothers provide for their infant's feedings during their entire hospitalization while other mothers have a less than optimal breast milk production necessitating the need for donor human milk or formula supplementation. Maternal health factors which negatively impact breast milk production include but are not limited to pregnancy induced hypertension, obesity, infection, and intrapartum hemorrhage. Maternal demographic factors such as age, race, and ethnicity effect the duration of breast feeding. Factors such as gestational age, birth weight, and length of stay are among a number of infant factors which effect the duration of breast milk feeds. There is limited knowledge about which infant and maternal factors may contribute more to the cessation of breast milk feeds than other factors.

Purpose: The aim is to develop a Lactating Risk scoring tool which identifies maternal and infant factors or combinations of factors which are associated with the cessation of providing human milk during hospitalization.

Budget and Resources: The data used for this project is derived

from an existing database. No other resources or funds are required.

Methodology: Maternal and infant factors and combinations of factors placing NICU mothers at risk of reaching and maintaining an optimal breast milk supply throughout the infant's hospitalization were identified. A neonatal database was created of infants <7 days of age admitted into a level IV NICU, who initiated breast milk feedings and continued at discharge as compared to those patients that discontinued use of breast milk at discharge. The database consists of 788 mother-infant dyads. Twenty maternal factors and twenty-eight fetal factors were assessed for a significant relationship with stopping the use of breastmilk/breastfeeding during hospitalization. Univariate logistic selection was used to select variables significant at $p = 0.05$ to include in stepwise selection process. Final logistic regression models from stepwise selection were developed separately for maternal and fetal factors, as well as for a model including all factors. These models were assessed for discriminating ability using a C-statistic.

A Leave-one-out method was used for validation for the final models. Hosmer and Lemeshow Goodness-of-Fit Test was used to assess calibration. Additionally, all maternal and fetal variables were assessed for relative importance to determine the contribution of individual variables in total explanatory value by averaging over many possible ordering of variables in a model.

Results: As the numbers of maternal risk factors increases, so does the mother's risk of weaning. The median for those who continued on mom's own milk (MOM) is 1 whereas those who discontinued MOM had a median of 3 and they were significantly different at $p < 0.001$. The same trend can be seen for fetal factors as the median number for those on MOM was 2 compared to 5 for those who discontinued MOM ($p < 0.001$).

Insufficient breast tissue, low volume of maternal milk and infrequent visits were the maternal variables that were most predictive for mothers stopping milk expression. Additionally, mothers with a cesarean delivery had a 2.59 times greater chance of weaning compared to vaginal or spontaneous delivery. A longer length of stay, Lower Gestational age and a diagnosis of an abdominal wall defect were the most predictive fetal factors for cessation of use of breastmilk/breast feeding prior to discharge.

Impact: In Level IV NICUs with diverse patient populations, lactating mothers often struggle to maintain their milk supply. Most maternal risk factors impacting lactation outcomes are not preventable, however early identification of those factors which can be mitigated may prevent early lactation cessation.

The lactation risk scoring tool will assist the health care team to identify a mother-infant dyad at risk of cessation of mother's own milk during the infant's hospitalization. Early Identification will enable the team to develop a plan of care for mothers of infants in a neonatal care unit to provide optimal lactation management and outcomes.

Gravens2020-22

USE OF THICKENED LIQUIDS IN THE NICU

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BACKGROUND:

The use of thickened liquids is routinely recommended by health professionals for two main pediatric populations: children with suck-swallow-breath incoordination (oro-pharyngeal dysphagia) and children who display gastro-esophageal reflux. For young infants, liquid feeds provide them with both nutrition and hydration. Hence, it is essential that they can consume their liquids efficiently and safely. This talk will review thickening options and safety considerations in the NICU population.

AIMS:

We aimed to describe the proportion of NICU infants who required thickened liquids, the reasons why they required thickened liquids, the demographics of this population, and the methods used for thickening liquids.

METHODS:

This was a retrospective review of 3 years' worth of medical records from a large Level III NICU.

RESULTS / CLINICAL IMPLICATIONS:

Approximately 5-8% of our NICU population in any year required thickened liquids during their inpatient stay. Of these, greater than 80% had concerns for both gastro-esophageal reflux and suck-swallow-breath incoordination. The strongest predictors of need for thickened liquids were degree of chronic lung disease and overall morbidity index. Of note, approximately 75% of those who went home on gavage feeds required thickened feeds due to demonstrated aspiration risk and/or gastro-esophageal reflux management. Methods for thickening and safety factors to be considered will be reviewed.

CONCLUSION:

A small, but significant, proportion of the total NICU population require thickened feeds. These infants often have complex medical histories and a long length of stay. Thickening liquids can potentially help facilitate safe discharge home in these cases.



However, a number of safety factors need to be considered prior to implementation.

3 LEARNING OBJECTIVES:

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

- List 3 potential indications for the use of thickened liquids in infants
- List 3 safety considerations when using thickened liquids in infants
- List 3 potential methods to test the efficacy of thickened liquids in infant feeding management

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Gravens2020-23

IMPLEMENTING AN INFANT FEEDING ALGORITHM TO IMPROVE FEEDING PRACTICES IN THE NICU

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BACKGROUND:

Variable feeding management practices in the Newborn Intensive Care Unit (NICU) can affect patient safety, contribute to delays in achieving early feeding milestones, prolong length of stay, and potentially contribute to long-term feeding difficulties.

Evidence-based clinical practice guidelines were developed for oral (*per os*, PO) feeding management in the NICU to facilitate more consistent feeding practices. Their creation was guided by the principles of individualized (cue-based) developmental care, multi-disciplinary collaboration, and family-centered practice. As part of these guidelines, an infant feeding management algorithm has been developed and implemented.

AIMS:

We aimed to describe the rationale for the high-risk and low-risk arms of the Boston Infant Feeding Algorithm, implementation of the feeding algorithm, and the proportion and demographics of infants who received feeding compensations, per the feeding algorithm.

METHODS:

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

RESULTS / CLINICAL IMPLICATIONS:

Approximately 1/3 of our NICU population received therapeutic feeding compensations. Of these, approximately 30% were commenced on the high-risk arm of the feeding algorithm, and the remaining 70% commenced on the low-risk arm of the feeding algorithm, but transitioned to the high-risk arm, based on demonstrated behaviors. By the time of discharge, approximately 85% of those who were commenced on feeding compensations continued to require some degree of compensations (e.g. special bottle nipple, positioning, and/or therapeutic strategies, such as external pacing).

Evidence-based, multi-disciplinary clinical practice guidelines result in improvements in staff consistency, quality of patient care, and improved patient and family experience.

3 LEARNING OBJECTIVES:

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

- List 3 potential benefits of having evidence-based clinical practice guidelines
- List 4 key steps in developing clinical practice guidelines
- List 3 ways to measure the success of feeding practices

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Gravens2020-24

UTILIZING AN INFANT FEEDING SCALE TO IMPROVE ACCURACY OF REPORTING IN THE NICU

Pamela Dodrill, PhD, CCC-SLP; Katherine Gibson, MS, CCC-SLP; Debra Marks, NP; Carmina Erdei, MD;

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BACKGROUND:

Preterm infants often display difficulty establishing oral (per os, PO) feeding in the weeks following birth. Frequent, careful assessments of infant feeding are required to guide management decisions to ensure that infants make the transition to safe, successful PO feeding as soon as they are physiologically and developmentally ready. Various terms are used by clinicians to describe observed infant feeding behaviors, which can lead to discrepancies in reporting and confusion for parents. An evidence-based feeding scale was developed to facilitate more consistent reporting of PO feeding skills and development in the NICU population.

AIMS:

We aimed to describe the development and establishment of the Boston Infant Feeding Scale, as well as the validity and reliability of the feeding scale.

METHODS:

Construct validity was established by comparing score of the

scale with other relevant measures from patient medical records. A chart review was conducted for infants admitted to a large Level III NICU in 2016-2018. Within- and between- rater reliability were established with multi-disciplinary panel.

RESULTS / CLINICAL IMPLICATIONS:

The feeding scale was determined to be highly reliable (inter- and intra- rater reliability $r > 0.8$) and valid (feeding score had high correlation with %PO, number of adverse events during PO feeds, and length of stay, $p > 0.8$). Approximately 25% of our NICU population continued to be scored as displaying immature feeding skills at the time of discharge (approx. 2% scored as dysfunctional; the remainder scored as functional, but not fully competent). The majority of these infants were able to feed safely PO with therapeutic compensations in place.

Evidence-based, multi-disciplinary reporting tools result in improvements in staff consistency, quality of patient care, and improved patient and family experience. Since implementation of the feeding scale, we have observed an improvement in both staff-staff communication and staff-parent communication, as well as in consistency of staff feeding management practices.

3 LEARNING OBJECTIVES

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

- List 3 potential benefits of utilizing a formal infant feeding scale in the NICU
- List 3 main stages of feeding development in preterm infants
- List 3 ways to measure the success of INFANT feeding practices

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Gravens2020-25

Clinician perception and addition of mindfulness to NICU developmental interventions

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NICU developmental therapists directly impact an infant's sensory environment with each of their interactions. While tactile, auditory and positioning stimuli are apparent during therapy sessions, a less obvious sensory environment is created by the autonomic state of the practitioner. This is especially critical during times when infants experience direct contact with the therapists, as breathing movements and heart rate are transmitted to the patient, creating a distinct auditory and vestibular environment. While mindful practice has been demonstrated to regulate such physiological signals and improve various outcomes in patients, no current research addresses its use to improve the sensory environment created by practitioners in the NICU.

Our aim was to determine the feasibility of incorporating mindfulness practice during NICU developmental interventions, with the goal of improving the sensory environment of infants through increased therapist physiological stability. We first surveyed a large group of NICU developmental therapists to determine knowledge of mindfulness and its implementation during clinical practice. Questions were multiple choice and open ended with a preset list of correct answers, and de-identified individual responses were collected and stored in a secure REDCap database. Secondly, we conducted a prospective longitudinal study of subjects before, during, and after a day-long standardized Mindfulness Based Stress Reduction workshop, in simulated stressful situations and in a real-life NICU setting one month later. We measured respiration (RR) and heart rate (HR) variability at 4 points during a standardized timed scenario.

Fifteen occupational, physical, speech and music therapists responded to the survey. Most therapists (11/15) knew about the concepts of "being present in the moment" and "being aware" but only 2/15 knew the concept of "non-judgement." At least 1 mindfulness exercise (most often focused awareness) was used by 13/15 during their NICU practice. Barriers to practicing consistent mindfulness in the NICU included lack of time, education, work demands, and understanding of relevance to the therapy session. Most therapists surveyed (86%) reported that use of mindfulness during sessions would likely enhance their treatment effectiveness.

The 8 subjects who attended the workshop were comprised of 4 music therapists and 4 medical professionals. Music therapists had 2 or more years of clinical experience and a bachelor or master's degree, and medical professionals were comprised of 2 research associates, a project manager, and a neonatologist. Subjects were able to significantly reduce the variability of their HR and RR during the standardized scenario between baseline and after the workshop. Average RR and HR were 14.7 breaths per minute and 64.2 beats per minute (bpm) before training during the standardized scenario. After 1 month, in the NICU, they were 11.6 and 59.9 for the same scenario. Standard deviation of RR across subjects decreased from an average baseline of 3 respirations per minute during a session to 1 or less by the sustain phase in the NICU for slope across points ($p < 0.05$). Standard deviation of HR across subjects decreased from an average of 4.7 bpm during a session to 1.9 bpm across subjects ($p < 0.05$). Results maintained when tested one month later both in the simulated and NICU environment. They were then able to incorporate mindfulness during clinical practice, especially when direct holding was involved. By proving structured knowledge and continuous monitoring and support, it is possible for therapists to improve the stability of the direct environment they provide infants during developmental sessions. Future studies will evaluate the correlations of practitioner mindfulness on infant physiological stability.

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Learner Objectives:

1. Participants will be able to define mindfulness
2. Participants will identify various mindfulness techniques and how to apply them to clinical practice while caring for NICU patients
3. Participants will understand the challenges of implementing mindfulness techniques in the NICU and identify ways to overcome those challenges

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Presentation Preference: no preference

Gravens2020-26

Skin Failure in the NICU: an unrecognized problem

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Background:

The skin is the largest organ of the body. The skin declines as an organ; most notably when a state of multi-system organ failure exists. This resultant skin deterioration may be identified as "skin failure". Skin failure may be described as an event in which the skin and underlying tissue die due to hypoperfusion secondary to severe dysfunction or failure of other organ systems. Skin failure has not been recognized in the NICU and is usually reported as a pressure injury. As tinier babies are being saved, recognition of skin failure in NICU patient must be acknowledged and reported.

Purpose:

The aim of this project is to present our findings. We believe it is important for those caring for the babies in the NICU, especially the ELBW, to review the pressure related wounds in their NICUs, to see if those wounds meet criteria for skin failure and to encourage research into the phenomena.

Methodology:

Skin care rounds occur daily in this 58 bed level 3/Level 4 NICU by the organization's Wound Care Ostomy Nurses (WOCN). The WOCN was consulted by the bedside nurse and neonatologist caring for the baby because they identified the baby as having a "device related pressure injury". The WOCN consulted the unit's Clinical Nurse Specialist (CNS) and together they reviewed the wound. It was apparent that what was being called a pressure injury was atypical in its development and presenting signs and symptoms to what is usually seen in the NICU.

A review of the literature was undertaken and skin failure has been noted in the adult literature for the last 2 decades. Although there is a dearth of literature in pediatrics and especially in neonatology, it was clear that this infant met the criteria for skin failure.

Risk factors for Skin Failure include the following: SIRS (Systemic Inflammatory Response Syndrome), Multiple Organ System Failure, Severe anemia, severe edema/anasarca, severe hypoalbuminemia, respiratory failure/life support measures, severe nutritional depletion/weight loss, pharmacologic (steroids, vaso-pressors, immunosuppressants), hypoperfusion/hypoxia, pre-existing skin damage and the dying process.

Implications and Conclusions:

Skin failure continues to be labeled as a pressure injury even when all the risk factors exist for skin failure. The occurrence of skin failure as a distinct entity from pressure injuries has been documented and published in adults and needs to be acknowledged as occurring in children and neonates. Skin failure, although not commonly seen in the neonatal setting, can occur in the NICU patient, especially in the ELBW.

The fact that this problem continues to be labeled as a pressure injury even when all the risk factors exist for skin failure in the neonate needs to be investigated and acknowledged.

We encourage all NICUs to monitor for occurrences of this condition, report findings and contribute to needed research.

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Objectives:

1. Describe Skin Failure.
2. Identify at least four signs that are present with skin failure.
3. Recognize the difference between skin failure and pressure injury.

Gravens2020-27

Welch Emotional Connection Screen Training Workshop

Amie Hane, Ph.D., Department of Psychology, Williams College; Martha G. Welch, Department of Pediatrics, Columbia Irving University Medical Center

The Welch Emotional Connection Screen is a practicable tool that assesses parent-child relationship health for children ages 0-5. This workshop will introduce you to the WECS and provide direct instruction on use of the measure.

For this workshop, we will need a conference room that is equipped with an audio-visual set-up that is conducive to showing video clips used for behavioral coding on the WECS.

Abstract

In this workshop, attendees will be introduced to the Welch Emotional Connection Screen (WECS), a behavioral observational screening tool that assesses emotional connection¹ between parent and infant/child. Emotional connection, as assessed by the WECS, offers a valid²⁻⁴ and efficient observational tool that is associated with healthy physiological and behavioral response to stress in infants² and is predictive of future behavior problems in toddlerhood³. The WECS was designed for research and as a clinical method for assessing relationship health for parent-facing professionals. The WECS can be rated live, in the moment of observation, or based on video-recorded interaction. WECS ratings are based on a brief (approx. 3 min) observation of parent-infant/child in a face-to-face interaction, devoid of toys. This observation has been completed in the NICU, physician offices, home visiting programs, and research laboratories. In this workshop Dr.'s Welch and Hane will provide an overview of the WECS instrument. Attendees will then be guided through a series of pre-recorded observations and will be taught how to rate emotional connection via the WECS. Workshop attendees will learn the importance of assessing relationship health and gain an introductory-level knowledge of the Welch Emotional Connection Screen.

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Gravens2020-28

Mother's voice intervention results in sustained attention for infants with neural insults at high-risk for neurodevelopmental delays

Authors' names, degree(s), and institution

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Background and Purpose:

Neurologic insults in infancy often have significant long-term effects on children's developmental outcomes, including sustained attention. This population of infants is often excluded from interventions while in the NICU, with intervention typically beginning post-discharge, even though these infants could potentially benefit the most. Utilizing the principle of positive reinforcement, it was hypothesized that infants who listen to recorded mother's voice contingent on non-nutritive suck would demonstrate increased attention to the auditory stimulus compared to those who received it passively, regardless of the severity of the infant's brain injury.

Budget and Resources:

This study receives funding from the Research Foundation of the Cerebral Palsy Alliance.

Program, Materials, or Methodology:

This study was a randomized controlled trial of 68 infants enrolled between 33.1 and 42.4 weeks postmenstrual age (PMA) with diagnoses of Grade III/IV IVH, hydrocephalus, PVL, neonatal encephalopathy or thrombosis/infarct, or an abnormal General Movements Assessment (GMA) reading by certified study staff. Infants were randomized to either control or intervention groups in order to study the effect of suck-contingent mother's voice on attention as compared to passive listening. Both groups received recorded mother's voice singing native-language lullabies for 2 daily sessions of 15 minutes each for a total of 20 sessions across 14-21 days. In the event that mother's voice was unattainable for any reason, a standard therapist recording was utilized. The intervention was delivered using a Pacifier-Activated Music (PAM) player that measures timing and strength of the infant's sucks via a sensor that is inserted into a pacifier; if the infant achieved the predetermined suck pressure and count, mother's voice recording would play for 10 seconds and then stop, requiring the infant to again meet the predetermined suck strength and count settings to reactivate the music. The study therapist modulated the settings of the PAM in response to the infant's performance based on an IRB-approved protocol. The control group sessions consisted of passive listening to mother's voice recording played non-contingently for 20 sessions and 15-minute pre- and post-intervention PAM assessments with no voice reinforcement. Attention to the auditory stimulus was measured by looking at pause time between suck bursts at the 0-, 5-, 10-, and 15-minute time points, with shorter pause times indicating increased attention to the auditory stimulus.

Impact or Results:

Data were analyzed using an ANOVA between categories and simple linear regression looking at the average pause time at the final session using the initial session as the predictor and controlling for group. Overall, there were no true demographic differences between groups with the exception of severity of brain injury (intervention group 64% severe neurologic injury versus control group 51% severe neurologic injury). The intervention group ($n=33$) consisted of 45% male subjects and control group ($n=35$) consisted of 51% male subjects. A chi-square test of independence was performed to examine the relationship between gender and group and was not significant ($p=0.622$). Infants in the intervention group had a significantly shorter average pause time during the final session (6.7 seconds) than the control group (7.2 seconds) when controlling for baseline ($p=0.038$, $R=0.425$). We also examined the effect of brain insults to determine whether those with severe neurologic insult had decreased attention at baseline utilizing both ANOVA between categories and a linear regression controlling for baseline attention. There were no significant differences between categories of neurological severity ($p=0.266$, $R=0.380$). Comparing the use of a standard therapist recording versus mother's voice recording across infants in both groups at baseline demonstrated that infants with mother's voice appeared to sustain attention longer than those with a standard therapist recording: at 15 minutes into the assessment, the mother's voice group demonstrated shorter pauses than those with the standard recording ($p=0.049$).

This study demonstrates significant correlations between active listening and increased attention of infants, regardless of severity of neurologic insult. Future studies can leverage this capacity to develop new treatments for these infants while still in the NICU.

Learner Objectives: 2-3

1. Learners will understand the correlation between an active listening intervention and increased attention.
2. Learners will describe the impact of mother's voice on sustained attention prior to additional intervention.

Gravens2020-29

Live Music Therapy as Procedural Support for Hospitalized Infants: A Randomized Controlled Trial

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Background and Purpose:

Infants hospitalized in the Neonatal Intensive Care Unit (NICU) experience frequent stressful and painful bedside procedures as a part of their routine medical care, but often receive inadequate support to mitigate distress during the perioperative period. Research has shown that frequent activation of the stress response causes adverse neurodevelopmental outcomes (Duerden et al, 2018; Brummelte et al, 2012).

NICU music therapy protocols are evidence-based interventions that promote the neurodevelopment of premature infants (Standley, 2012; Emery et al, 2019). Anderson and Patel suggested that music intervention facilitated by trained music therapists could be

a non-invasive approach to moderate the stress response in neonates in the NICU due to its potential to abate the stress response, provide a means of positive social contact during acutely stressful experiences, and enrich the neonate's environment (2018). Although there is evidence to support music therapy intervention as procedural support for adult and pediatric patients, few studies have differentiated the neonatal population from the general pediatric population.

Budget and Resources:

Costs associated with this study were paid through department funds; the primary associated costs consisted of purchasing SalivaBio Infant's Swab from Salimetrics and subsequent saliva sample processing.

Program, Materials, or Methodology:

Using an interventional randomized controlled trial design, infants 34 to 56 weeks postmenstrual age in a Level IV NICU scheduled to receive skin breaks (heel stick, venipuncture, injections) or ultrasounds as part of their medical care were randomized to either facilitated tucking as standard care or facilitated tucking with live music therapy treatment groups. We hypothesized that infants who received live music therapy (infant-directed singing) in conjunction with facilitated tucking would demonstrate less activation of the stress response compared to infants who received only facilitated tucking during bedside procedures, as evidenced by lesser Neonatal Facial Coding System (NFCS) overall scores and salivary cortisol concentration post procedure. Cortisol levels were quantified from saliva collected pre- and post-procedure as a measure of stress. Infants' faces were video recorded throughout the procedure without audio. Videos were scored at predetermined time points by reviewers blinded to intervention using the NFCS as a measure of stress; physiologic data (heart rate and oxygen saturation) corresponding to those timepoints were also analyzed.

The study was powered by projecting that music therapy could decrease the NFCS score from 7 (very stressful procedure) to 4 (mild to moderately stressful procedure). In current literature, NFCS scores have a standard deviation of 4 for stressful procedures. Therefore, assuming two-side equality, a sample size of 16 infants per group is predicted to be sufficient to confirm the difference between group means with a power of 80%. Twenty-four infants were engaged in study sessions during 38 total procedures with 19 procedures per treatment group and 58% of enrolled infants participating in both treatment groups.

Impact or Results:

Infants who received music therapy with facilitated tucking treatment while undergoing bedside ultrasound had significantly lower NFCS scores (expressed as mean \pm standard deviation at intervention end: 1.95 \pm 1.85 intervention, 2.68 \pm 2.17 control) compared to infants receiving facilitated tucking alone ($p=0.003$). Cortisol levels trended lower in the group receiving the music therapy plus facilitated tucking, approaching significance ($p=0.1$). Live, infant-directed singing with facilitated tucking is an effective intervention to reduce infant stress during minimally invasive bedside procedures when provided by a Board Certified Music Therapist. Additional research is recommended to further explore the effects of live music therapy for acutely painful bedside procedures, such as heel sticks.

Infants undergoing bedside ultrasounds often receive sedation medications (oral sucrose or chloral hydrate) for reduction of distress and to eliminate movement. Infants in this study did not require any sedation medications as assessed in real-time by nursing, as the interventions provided assisted the infant in

maintaining a well-regulated, unmoving state throughout the procedure, eliminating the need for sedation. Staff successfully completed 100% of study procedures without sedation; therefore, this protocol could inform other NICUs to reduce use of unnecessary sedation for non-invasive procedures while ensuring neurodevelopmentally appropriate support. Reducing the need for sedation medications is not only best for infant neurodevelopment but is also cost-effective (Walworth, 2005). Providing music therapy as procedural support during non-invasive procedures could have significant implications for cost savings in a large facility due to decreased need for medications, in addition to providing interventions that support best patient outcomes.

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Learner Objectives:

1. Participants will examine the outcomes of two developmentally supportive interventions during bedside procedures for hospitalized infants.
2. Participants will identify an evidence-based intervention that decreases infant stress during bedside ultrasounds in the NICU.

Gravens2020-30

Monitoring antibiotic use rate changes in neonatal ICUs of a large healthcare delivery network

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Background:

Antibiotic Stewardship Programs (ASP) are hospital-based programs dedicated to improving antibiotic use by optimizing the treatment of infections and reducing adverse events associated with antibiotic use (Ting et al., 2019). While the implementation of

ASP is a commonality in many hospitals, adherence to them in the neonatal period has significant variability in the antibiotic use rate (AUR) (Ho et al.,2018). Antibiotic use rate is defined as the number of patient days that neonates were exposed to antibiotics (1 or more) per 100 patient days. Analysis of what factors most contribute to improving prescribing practices in the NICU is not readily available (Ho et al.,2018). Furthermore, while many hospitals have detailed protocols for adults, similar protocols for NICUs are not commonly implemented (Schulman et al.,2015). Our study aimed to explore AUR changes in the NICUs of an integrated delivery network (IDN) in order to expound the primary factors driving change in antibiotic prescription practices in the NICU.

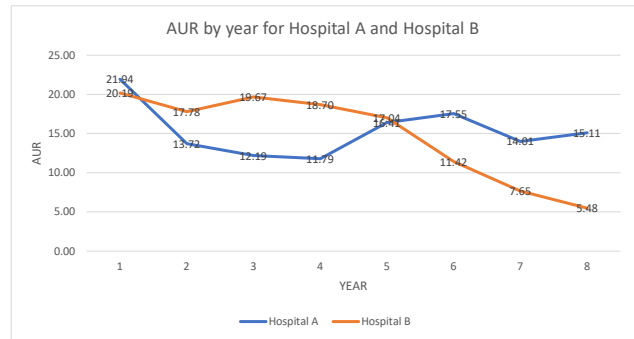
Methods: We conducted a retrospective analysis of deidentified data from seven NICUs in a hospital IDN collected across eight years consisting of 15434 admissions. Of the seven, we analyzed data from two of the hospitals (Hospital A - 2090 admissions and Hospital B – 1416 admissions) in the IDN, in detail, to identify potential factors that were driving the differences in AUR. The AUR for hospital A and hospital B showed the maximum divergence in the last four years. We conducted a difference of variance F-test to quantify the difference in AUR variance of the two hospitals during this time period. We also evaluated differences between the two hospitals in number of admissions over the years, patient mix (number of admissions divided by gestational age at birth), and average antibiotic course duration per hospital per year.

Results: We found that the IDN showed a significant reduction in AUR over the 8 years studied. However, when evaluating the performance of individual hospitals in the IDN, we observed that despite similar hospital protocols, there existed a significant variability in individual hospital change in AUR over the 8 years. Furthermore, evaluating 2 specific hospitals (Hospital A and B), we observed that while the two hospitals started at the same AUR at the beginning of the study, the performance over the years diverged significantly after year 4 [Figure 1]. Hospital B went on to show the maximum reduction in AUR particularly in the last 4 years of the study while hospital A had the same overall AUR (difference of variance $p = 0.0407$, Table 1). Detailed analysis regarding whether a change in the patient mix by gestational age for both hospitals A and B were responsible for this difference in AUR trends showed no difference between the two hospitals. Evaluating differences in the antibiotic course duration between the two hospitals showed that for the neonates born at gestational age of more than 34 weeks, the trends in course duration replicate the overall AUR change for the two hospitals [Figure 2]. However, when we looked at neonates born at gestational age less than 34 weeks, we did not find significant differences between the two hospitals.

Conclusion: Our analysis showed the course duration of antibiotics prescribed to neonates older than 34 weeks gestational age at birth was driving the overall AUR in all of the NICUs in the IDN through higher rates of admissions in this specific population. From conducting interviews with neonatologists practicing at this particular IDN, we may infer that the reduction in course duration was practice driven (i.e., driven by prescriber preference or practice group initiatives). We also found that hospital A enrolled in a statewide perinatal quality collaborative in year 7 and in year 5 hospital B provided NICU-specific guidelines to address antibiotic stewardship. Interviews also revealed that the management of infants of gestational age > 34 weeks evolved over this time period (eight years) driven by antibiotic stewardship efforts promoting the use of the multivariate risk assessment tool to decrease the number of infants exposed unnecessarily to antibiotics. The local roll-out of these antibiotic stewardship initiatives coincided with years when antibiotic use rate saw a reduction for both hospitals. Other factors such as patient acuity can possibly explain remaining variance in observed data but require further evaluation to confirm.

We show that review of antibiotic prescription practices over time and across different hospitals can support the investigation of factors driving the differences and identify reasons for successful reduction in AUR.

Figure 1: Year on year change in AUR for hospital A and hospital



B.

Figure 2: Year on year change in antibiotic course duration for hospital A and hospital B.

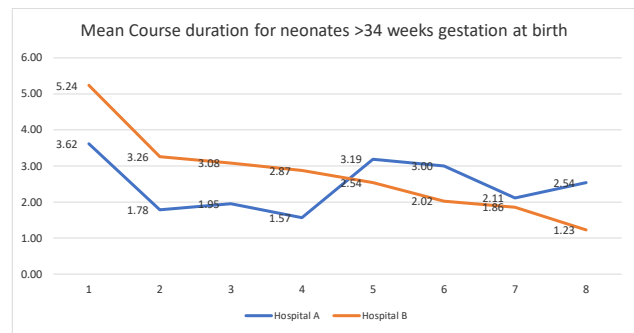


Table 1: F-test Two-sample for variances in AUR for the last 4 years.

	Hospital A	Hospital B
Mean	15.7696442	10.396137
Variance	2.36026848	25.6124716
df	3	3
F	0.09215309	
P(F<=f) one-tail	0.04053944	

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Learner Objectives:

- Recognize that antibiotic stewardship and antibiotic usage rates in the NICU's may vary between hospitals in an IDN.
- Discuss prescriber preference as a primary factor differentiating antibiotic use rate in NICU's from 7 different hospitals in the IDN with the same antibiotic stewardship protocols.
- Identify potential factors that contribute to successful NICU-specific management of antibiotic overuse.

Gravens2020-31

Motivational Interviewing Intervention to Increase Maternal Visitation Rates on a Level IV Neonatal Intensive Care Unit: Challenges in Implementation and Preliminary Findings in the Pilot Phase

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Background and Purpose:

Higher caregiver visitation practices have been linked to improved infant self-regulation patterns, shorter hospitalization and better neurobehavioral outcomes in infants. The purpose of this pilot was to obtain feasibility data and consider the challenges to conducting a brief randomized clinical trial using a motivational interviewing intervention to increase maternal visitation rates in a level-IV NICU. We believe that several of the challenges we are presenting are specific to psychosocial interventions in the NICU setting, and our experience may benefit others planning similar studies.

Budget and Resources:

The study was supported by a small grant that primarily covered costs of a research assistant (20 hours/week), MI consultation from a trained expert who provided training and reviewed fidelity of audio records of interventions, translation and language validation, supplies (iPads for administration of assessment forms and audio recorder), and an incentive of \$10 per session for study participation.

Methodology:

The intervention consisted of a validated MI interventional tool administered to participants during each visit, up to 6 visits. Participants were administered the Parental Satisfaction and Motivation to Visit questionnaire during each visit.

All patients admitted to the level IV-NICU were screened for inclu-



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sion criteria: 1) infant in the legal custody of biological mother, 2) infant in the care of the biological mother, 3) the mother speak English or Spanish, 4) no maternal cognitive impairment, and 5) the infant was expected to stay in the NICU for at least 72 hours.

Twenty-five biological mothers met criteria (Age $M(SD) = 31.12$ (6.16); 72% Caucasian). Fifteen participants reported being born in the US. Baseline demographic information was collected. During the baseline and final visits, participants were administered a packet of questionnaires assessing parental stress, depression, bonding, and motivation to visit. Maternal visitation data were collected from visitation data in the patient's EPIC flowsheets documented by bedside nurses and check-in processes for visitors when parents entered the hospital. Additionally, NICVIEW camera data were collected, detailing the number of logins to the camera during the infants stay in the NICU.

Feasibility:

A total of 32 mothers were approached in a NICU where an average of 669 babies are admitted annually. Of those approached, 6 declined (3 due to lack of interest, 1 indicated limited availability, 1 was discharged early, and 1 additional failed further screening). Therefore, 26 participants were recruited for the study and randomized into the two arms of the study. One of those randomized to the control group did not complete measures. This left 14 participants in the intervention group and 11 in the control group, or 78% of those approached. The average number of sessions for these participants was $M(SD) = 3.96$ (2.37) or 80% of planned sessions.

Challenges and Lessons Learned:

Eligibility Criteria

- Participants were initially required to be enrolled within the first 3 days of admission to the NICU. Mothers were not always at bedside during daytime hours for numerous reasons, including maternal post-partum hospitalization.

Enrollment Criteria

- We initially specified that babies whose length of stay was expected to be less than 72 hours would be excluded. Since prediction at enrollment is often inaccurate, we reevaluated this criterion. Further, we started the pilot by approaching every 5th participant in the NICU to control the flow into our study in this busy NICU setting. We found that this rate was too slow to allow for adequate enrollment, and changes were made to approach every eligible patient. This strategy in turn needed modification, and it became a challenge to create a formula that did not overwhelm the researchers or delay the process of recruiting participants to the study.

Randomization

- We initially planned to utilize cluster randomization, separating the two arms of the study into different physical spaces that were segregated in our NICU. This plan was modified before being implemented

as infants were moved around the NICU based on changing medical needs and staffing patterns.

Completion of Assessments

- Mothers' availability at bedside to complete assessments was a challenge. Even when mothers visited, their time in the hospital was frequently taken up by interactions with medical staff or visitors.

Lack of Consistency among Outcome Measurement Strategies

Much of the data reported on visitation utilizes days visited. We hoped to catch greater variability by breaking down the visit into smaller units such as hours. The challenge of obtaining accurate records was significant, particularly since different sources of data (EPIC logs, check-in processes for visitors when parents entered the hospital, and NICView cameras) frequently were contradictory.

Ethical Concerns

- Perhaps the most difficult balance was respecting the parents' vulnerability during the significant stress of a medically unstable infant, while seeking to enroll a representative group of mothers so that the study might be generalizable.
- There was difficulty in balancing the two roles of clinician and researcher that were served by the PI. Additional difficulty presented with balancing routine psychological services and research participation, while ensuring that families felt comfortable refusing either.

Impact/Results:

This initial evaluation of feasibility prepares us to launch our clinical trial and will provide some insight to help inform on the challenges of conducting a brief randomized clinical trial in a busy clinical setting. Discussion of these specific challenges will inform new directions and solutions to be developed.

Gravens2020-32

Increasing Caregiver Involvement in the Neonatal Intensive Care Unit Through Swaddle Bathing: A Quality Improvement Project

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BACKGROUND & PURPOSE: Research has shown statistically significant findings for an increase in heart rate, cardiac oxygen needs, and motor stress cues with sponge bathing practices¹. Stressors in the Neonatal Intensive Care Unit (NICU) negatively impact sleep, hearing and vision development, and growth, which impacts the infant's long term outcomes^{2,3}. The swaddle bathing technique shows improved state regulation, reduced motor stress cues, and maintenance of body temperature^{3,4}.

Additionally, caregiver-infant bonding, caregiver confidence,

caregiver stress, and infant-caregiver interaction is improved^{3,4}. Parents who are not provided with support or opportunities to parent their infant in the NICU often misunderstand their infant's behaviors^{5,6}. In the NICU at St. Luke's Baptist Hospital, traditional sponge bathing has historically been standard practice; however, it has been noted that infants were often demonstrating stress cues during bathing and their state of arousal after a bath was often not appropriate for oral feeding. In addition, baths were typically occurring with limited family involvement in the bathing process.

AIM: To replace nursing bathing practices from traditional sponge bathing to swaddle bathing in 100% of cases that bathing is appropriate and ensure proper swaddle bathing practices by both staff & caregivers while improving and promoting more caregiver involvement with infant.

BUDGET & RESOURCES: TurtleTub™ (\$390 for a case of 10) and plastic bathtub liners (\$295 for a case of 100) were purchased when this project was implemented. In addition, there was a small cost to conduct the "Swaddle-thon" (for snacks and decorations), but these costs were negligible. Finally, the fleece blankets that are used for swaddle bathing are donated to the unit by a volunteer organization and the thermometers used for measuring axillary temperatures are available as part of standard of care in the unit.

PROGRAM, MATERIALS, METHODOLOGY: In an effort to reduce stressors associated with bathing and promote caregiver-infant bonding in the NICU, a multidisciplinary team consisting of healthcare providers, support staff, and parents is working to replace bathing practices from traditional sponge bathing to swaddle bathing. Supplies were prepared for all neonates to have access to swaddle bathing. Infants were swaddled in fleece blankets and bathed in a TurtleTub™. Axillary temperatures were measured with a Welch Allyn – SureTemp® Plus thermometer before and after each swaddle bath as part of standard of care in the unit. Water temperature was measured by temperature gauges located inside each tub and ranged between 100 and 103 degrees Fahrenheit.

An unexpected result of the implementation of swaddle bathing in our unit was greater variability in temperatures with swaddle bathing versus traditional bathing. Key factors that contributed include caregiver involvement in the swaddle bath as well as receiving education during the bathing process; therefore, increasing the length of the bath and decreasing temperatures.

The project also revealed that baths primarily occurred during night shift in our unit. Prior to this project we were missing opportunities to provide family centered care. We increased family involvement by encouraging caregivers to be directly involved in bathing their infants and scheduling bath time with the family.

Baseline data collection: January 2018 – February 2018

- Concept of swaddle bathing was introduced to staff & baseline bathing data was collected

PDSA Cycle 1 ("Staff and Caregiver Education"): February 2018 – January 2019

- Purchased Turtle Tub and created portable bathing stations with swaddle supplies and

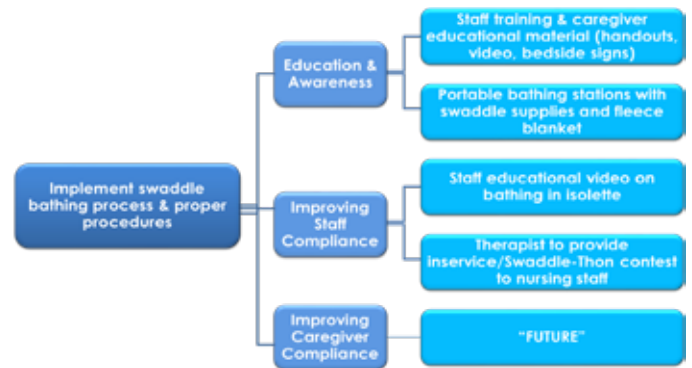
fleece blankets

- Therapist trained "Nursing Super Users" on swaddle bathing
- Therapist and Nursing Super Users trained all nursing staff
- Created Swaddle Bathing caregiver handout
- Created Swaddle Bathing educational video for caregivers and staff
- Created bedside signs to coordinate bathing schedule between caregivers and staff
- Created staff educational handout "Hot Topic"

PDSA Cycle 2 ("Improving Staff Compliance"): February 2019 – current

- Therapist to provide inservice to nursing staff
- Through feedback from nursing staff, the team identified a need for further education on swaddle bathing in an isolette; therefore, a staff educational video for bathing in isolette was created
- Swaddle-thon contest for nursing staff

PDSA Cycle 3 ("Improving Caregiver Compliance"): Future



RESULTS: Median change in body temperature at baseline was -0.65° F. After PDSA Cycle 1, median change in temperature was -0.55°F (15% increase from baseline).

After PDSA Cycle 2, median change was -0.30°F (54% increase from baseline) (Figure 1). The median change in body temperature decreased after PDSA Cycle 1 with further decrease after PDSA Cycle 2. There was a shift in temperature change during PDSA Cycle 1 which suggests the intervention helped decrease the temperature change.

During PDSA Cycle 2, the temperature change was significantly greater when caregivers bathed the infants compared to when the infants were bathed by staff (caregiver median: -0.55°, staff median: -0.16°)(Figure 1). The intervention that showed the greatest decrease in temperature change was the "Swaddle-thon" event in which we aimed to improve compliance and efficiency by encouraging staff with a contest and incentives. The comfort level of the twenty nurses in the unit also increased after the "Swaddle-thon"

contest (Figure 2). Future PDSA Cycle 3 will focus on caregiver education and involvement during bathing.

IMPACT: The project unified our unit and showed strengths in our teamwork by using a multidisciplinary approach to implement the practice of swaddle bathing. The “Swaddle-thon” unified disciplines (nursing staff, therapy staff, etc) and facilitated dialogue between all staff members. In addition, the project facilitated family involvement in the unit. Swaddle bathing provided caregivers an opportunity to bathe their infant, independently “schedule” bathing time, and take ownership of this aspect of their infant’s care.

Figure 1. Change in body temperature

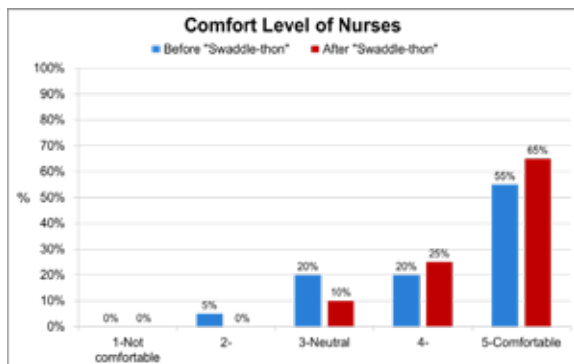
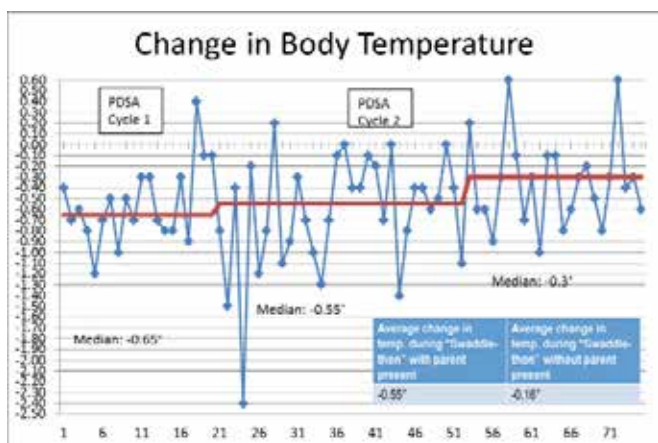


Figure 2. Comfort level of nurses with swaddle baths. Survey recorded before and after “Swaddle-thon” with a 5 point scale.



LEARNER OBJECTIVES:

- Identify benefits of swaddle bathing vs. traditional sponge bathing.
- Identify ways to involve caregivers in the bathing process.

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Gravens2020-33

Improving Human Interaction: High Touch, High Impact: The development of a Massage Program in the Neonatal Intensive Care Unit.

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Background and Purpose: Touch is defined as contact between two objects and can be active or passive. Active touch in the Neonatal Intensive Care Unit (NICU) is purposeful and is used to provide care or a therapeutic intervention such as massage. Massage is defined as methodological stimulation with the purpose of improving sleep, decreasing pain, improving growth or improving gastrointestinal function. Research has demonstrated



that premature and term infants who receive massage in the NICU demonstrate better long and short term developmental outcomes. Massage improves circulation, improves digestion, reduces stress hormones, improves elimination and improves sleep-wake cycles. Infant massage has also shown to assist with improving attachment and strengthening the bond between parents and their baby. Although caregivers understand the benefits of massage, there continues to be ambiguity surrounding the implementation of these practices and knowing how and when to massage a neonate is an important skill to learn. The purpose of this evidenced based practice project was to improve the neurodevelopmental care of the patients in the NICU with the use of Infant massage. The project included the development of practice guidelines, the development of a multimedia education program and the development of a plan to demonstrate clinical competency with massage. Finally, this project looked at the impact of massage on one particular population subset, the NAS patient, to demonstrate the clinical impact that massage can have.

Program, materials, or methodology: Understanding the benefits and importance of neonatal massage, a group of caregivers collaborated to develop a neonatal massage program for a multihospital system that includes both level 3 and 4 NICUs. The program focused on developing the NICU nurse's knowledge and comfort with massage. NICU nurses have comprehensive knowledge of the medical situations and unique developmental conditions that characterize the NICU population. We recognize the importance of nurses learning about infant massage. We also recognize that incorporating a multi-media approach will enhance the nurses' learning experience. Clinical nurse specialists (CNS) have an important role in developing innovative teaching approaches. An interdisciplinary team including the CNS, nurses, nurse educator, occupational and physical therapists had a shared goal to develop a massage instructional video with the support of our patients and families. This video was an important supplement and part of a blended learning approach for infant massage training. In addition, a hands-on-learning instructional demonstration to each nurse by a certified or trained massage therapist was performed. The nurse returned the demonstration and a skills checklist was completed. An infant massage nursing protocol was created for nursing. Continued clinical competency for infant massage for the staff working in the NICU will provide infants and their parents the best possible outcomes. Following education and implementation of the program the team evaluated the impact that massage has on neonates who were being treated for Neonatal Abstinence Syndrome (NAS). To evaluate the impact the team used the pre and post intervention Finnegan score. The Finnegan scoring system is a tool commonly used at the bedside to evaluate the severity of NAS and can be helpful for initiating, monitoring, and terminating treatment in neonates.

Budget and Resources: Costs for this project was minimal and included, but were not limited to, salaries for indirect time, allowing caregivers to work on project, and the development of the teaching video, which was done by the in-house media team.

Impact or results: After months of work and planning the program implementation date was August 20, 2019. Therefore the patient outcome data will be limited to five patients. Although limited patient outcome data is available, there is a wealth of information that will be shared regarding the planning and development of a neonatal massage program. Therefore the primary outcome that will be shared are the many lessons learned along the journey from planning to teaching to implementation. This information can assist another units who are interested in developing a massage program. Although more data is needed, thus far all five patient treated with neonatal massage demonstrated a decreased Finnegan score when given 5-10 minutes of massage following an elevated pre-intervention score. Future goals include evaluating

the impact on patient experience, evaluating the impact on additional NAS patients and also evaluating the impact on neonatal growth and length of stay.

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Learner objectives:

- Caregivers will gain knowledge of the benefits of a NICU massage program.
- Caregivers will gain information on how to successfully design and implement a NICU massage program
- Caregivers will identify challenges/barriers to the development and implementation of a Neonatal Massage Program
- Caregivers will gain knowledge of the benefits using a multi-media approach to education especially when teaching a new skill.

Gravens2020-34

Neonatal Abstinence Syndrome: Effectiveness of Discharge Education for Caregivers - A Quality Improvement Project

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BACKGROUND & PURPOSE: Neonatal Abstinence Syndrome (NAS) is a prevalent issue in the Neonatal Intensive Care Units (NICU) serviced by Pediatrix in San Antonio, Texas. According to Patrick, et al, within the last 2 decades, the incidence of NAS in the United States has more than tripled. By 2014, an infant was born with NAS every 15 minutes nationwide, resulting in more than \$500 million in hospital costs (Crook, et al.). Infants who are admitted and treated for NAS are at risk for adverse outcomes after discharge that may include emergency room visits, re-admission to the hospital, and/or adverse developmental outcomes (Crook, et al). Infants affected by NAS are followed at San Antonio Pediatric Developmental Services after discharge; however, even though follow up with the developmental clinic is part of their routine outpatient care, infants are often lost to follow up and are not receiving neurodevelopmental services for a variety of reasons (Roth). Although instructions on how to care for infants with NAS are provided during the NICU stay and at discharge, oftentimes caregivers report not receiving or understanding education regarding the importance of long term developmental surveillance. To add to the problem, length of stay has decreased

due to the standardizing of NAS care, allowing less time for caregiver education to occur (Thompson & McClaskey). In a survey of caregivers, 71% expressed having received information/education to care for their infant, but only 37.5% felt confident with said knowledge. Based on these results, it became apparent that in order for caregivers to feel confident in caring for their infant affected by NAS, the education provided during the NICU stay needed improvement.

AIM: To increase and improve Neonatal Abstinence Syndrome education given to caregivers of infants affected by NAS within a 1 year period of time so that 90% of caregivers feel confident to care for the affected infant.

BUDGET & RESOURCES: Aside from the cost of printing educational brochures, no budget or funding was allocated for this project.

PROGRAM, MATERIALS, METHODOLOGY:

- Baseline data collection: June 2018 – August 2018

A questionnaire was administered to caregivers of infants affected by NAS to evaluate caregiver preparedness prior to leaving the hospital. Preparedness to leave the NICU was measured through three categories: confidence of NAS knowledge, confidence in knowing when to call a healthcare provider, and confidence in medication administration (if applicable).

- PDSA Cycle 1 “Caregiver Education”: April 2019 – Ongoing

An educational brochure outlining signs and symptoms of NAS, comforting techniques, follow up information, safe sleep recommendations, & criteria for when caregivers should seek medical attention was created and given to caregivers prior to discharge.

- PDSA Cycle 2 “Foster Family Education”: April 2019 – Ongoing

After determining that most infants affected by NAS are discharged with foster care agencies or to Child Protective Services (CPS), education was provided to staff of local foster agencies & potential foster parents in the form of in person lecture with PowerPoint presentation.

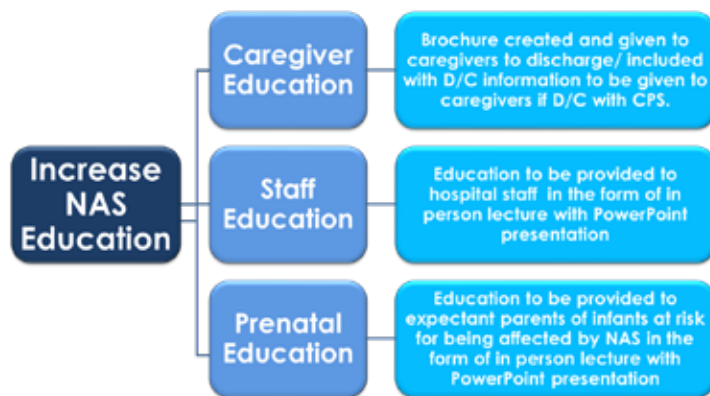
- PDSA Cycle 3 “Staff Education”: June 2019 – Ongoing

In order to have a more effective education experience for caregivers, staff must also be prepared to answer questions caregivers may have. Staff preparedness to educate on the topic of NAS was measured and education was provided to hospital staff in the form of in person lecture with PowerPoint presentation.

- PDSA Cycle 4 “Prenatal Education”: Future

It has been observed that infants discharged to mothers on methadone treatment who do not require CPS clearance oftentimes do not attend their scheduled follow up appointments. Therefore, education is to be provided to expectant parents of infants at risk for being affected by NAS in the form of in person

lecture with PowerPoint presentation.



RESULTS: The number of caregivers that received education on NAS increased from 71% to 88%. All other caregiver education measurements had less than a 5% change. The type of caregivers surveyed were 58% foster, 30% biological, 3% adoptive, and 10% guardian (either family member or CPS disposition).

Nurse confidence of scoring NAS increased from 80% to 100%. Nurse confidence with long term effects of NAS and benefits of long term developmental surveillance increased from 53% to 64%. The other topics of nurse confidence had less than a 5% change.

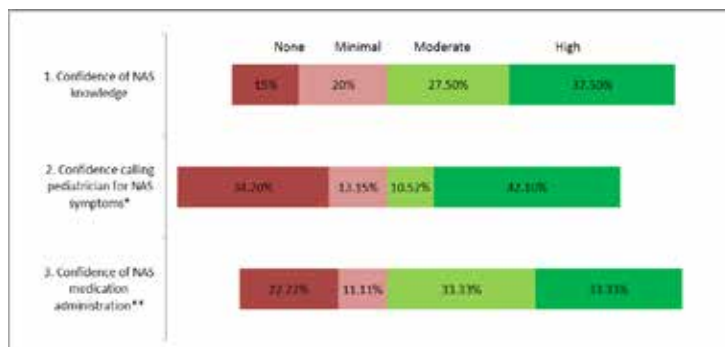


Figure 1. Baseline caregiver education on NAS

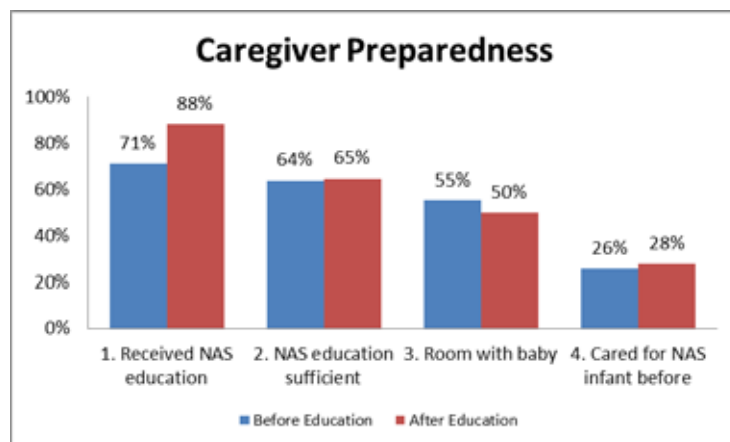


Figure 2. Caregiver Preparedness to take care of NAS babies

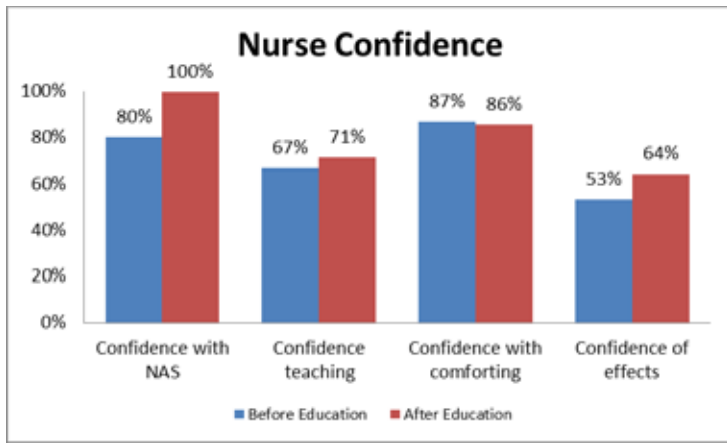


Figure 3. Nurse Confidence

IMPACT: This project has helped create an environment where caregivers realize they are a critical part of the infant's recovery as they provide non-pharmacological therapy through comforting measures. Empowering and encouraging caregivers to be more involved in the care of their infants provides them with additional opportunities for further education and promotes their confidence in caring for these infants after discharge.

Education of staff and volunteers has resulted in a non-judgmental, trauma-informed approach to families struggling with Substance Use Disorder. In addition, volunteer & "cuddler" programs in our local NICUs have expanded. It has also been observed that outpatient developmental follow up rates have improved since caregivers now seem to understand that this population is at risk for developmental delays & therefore they see the value in developmental surveillance.

DISCUSSION: We aim to better understand the dynamic between foster parents and CPS to assist in the dissemination of NAS knowledge. Educating staff helped them become more confident with NAS and NAS long term procedures. Although we educated staff on the specifics of NAS, we hope to educate them on communication and teaching methods they can apply with caregivers. We hope to avoid the mistrust between caregivers and staff in the future as communication and knowledge from both caregivers and nurses increases.

LEARNER OBJECTIVES:

1. Identify benefits of Neonatal Abstinence Education for caregivers and NICU staff.
2. Identify ways to increase caregiver involvement with non-pharmacological support for infants affected by NAS.
3. Identify ways to increase follow up rates after NICU discharge.

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Gravens2020-35

Theoretical modeling of music interventions targeting relevant needs of NICU hospitalized infants.

Deanna Hanson-Abromeit, PhD, MT-BC, University of Kansas
Amy Smith, PhD, MT-BC, Sam Houston University

Kara Caine, MME, MT-BC, University of Kansas

Background and Purpose:

Music is a commonly used sensory modality with infants and parents in the NICU with little understanding of how and why it contributes to therapeutic change.

However, clear conceptualization of the identified need, paired with a theoretical framework to support proposed mechanisms of music to target change can enhance the effectiveness of music interventions. The purpose of this presentation is to illustrate the theoretical modeling of three clinically responsive music interventions targeting Neonatal Abstinence Syndrome, language development of very preterm infants and father's engagement in infant bonding experiences.

Budget and resources: n/a

Program, materials or methodology:

Each framework will illustrate the causal relationships between variables of the problem and determinants of music characteristics as mechanisms of change for improved neurodevelopment and social, emotional experiences. In addition, presenters will outline the next phase of study for these music interventions.

Vocal Improvisation to Reduce NAS Symptoms

Neonatal Abstinence Syndrome (NAS) results from maternal use of opioids during pregnancy causing withdrawal symptoms in the neonate such as extreme irritability, excessive crying and irregular sleep patterns. Decreased use of opioids, such as morphine, to minimize negative withdrawal symptoms is the primary intervention, but non-pharmacological interventions are desired. NAS infant stress responses initiate sympathetic nervous system and HPA activation, inhibiting infant coping, caregiver attachment, and contributing to later behavioral disorders. Naturally occurring receptors of the human endogenous opioid system adjust between the brain's pain and reward communication and have a role in social bonding behaviors. Addictive substances stimulate dopamine activity through the opioid receptors. Afferent sensory information, like music, alter induced reward systems by triggering dopamine circuits of the endogenous opioid system, particularly music that is structurally inconsistent. However, such sensory experiences must be potent enough to counteract NAS symptoms and be appropriate to the neonate's capacity to perceive and integrate the sensory information. Therefore, a music intervention that uses vocal improvisational singing with an unpredictable changing melodic structure and rhythmic variations, non-changing timbre (consistent female voice) and low dynamics, while synchronizing to shifts in infant behavioral state is hypothesized to initiate dopa-

mine, decrease HPA activation and trigger the parasympathetic nervous system, thus reducing NAS symptoms. This theoretical framework will inform intervention mapping through three clinical case studies to be implemented late 2019/early 2020.

Singing for Early Auditory Development in Very Preterm Infants

Long term language delays are a developmental concern associated with very preterm (VP) birth and are likely due to the relationship between auditory perception and language acquisition. Language delays can result in social and cognitive delays during childhood and throughout the lifetime. Early life in the extrauterine environment of the neonatal intensive care unit (NICU) exposes under-developed auditory systems of VP infants to stimulation vastly different from the intrauterine environment. Premature birth causes infants to lose access to the filtered sounds of human voice and language, identified as essential for normal auditory development. Additionally, the NICU environment can include loud background noise, high frequency electronic sounds, or long periods of sound isolation which further reduce access to human voice and language.

Therefore, auditory development for VP infants may be altered as a result of this stark change in auditory stimulation. Exposure to human voice sounds and language during the third trimester creates the ability to perceive human voice over other environmental sounds, an essential skill for language development.

No known interventions to address experience dependent acoustic exposure currently exist for premature infants. Highly rhythmic and melodic sounds of filtered speech transmitted into the womb share overlapping qualities with simple sung melody lines. Thus, simple melodic compositions designed to specifically mimic filtered (i.e. intrauterine) language characteristics may provide increased exposure to important auditory experiences missed due to preterm birth.

Intrauterine characteristics of pitch, rhythm and prosody can be used as active ingredients in a music intervention to target the early auditory development of VP infants in the NICU prior to their readiness for full spectrum speech sounds.

Increasing exposure to human voice and language for VP infants through singing may improve auditory perceptual skills and thus improve long-term language outcomes. Prior to developing an intervention with this vulnerable population, a feasibility study will be implemented (Summer 2020) to determine the demand, acceptability, and practicality of a music intervention based on this theoretical framework.

Father's Singing for Bonding in the NICU

Admittance to the NICU is traumatic for parents. In this environment, parents may have barriers to bonding with their infant, making it more difficult to form a secure infant-caregiver attachment. The quality of attachment between an infant-caregiver can be predictive of future psychopathology or can act as a protective factor. Research is emerging regarding a father's distinct role and experience of becoming a parent in the NICU, yet literature is limited regarding the use of singing to support father-infant bonding and attachment. This theory-based causal model synthesizes evidence to describe the unique experience of fathers with a premature infant in the NICU and delineates relationships between variables that influence father-infant bonding. Additional qualitative evidence of fathers' experiences singing to infants, gathered through interviews, has implications for clinical music therapy practice and intervention development. Fathers experiences singing to infants was positive overall. Singing helped fathers feel calmer and more

present. Fathers described singing as a way to be together with their infant: a tool they could use to interact and connect.

These results indicate that singing has therapeutic potential for fathers of infants in the NICU.

Impact or Results:

Music is a complex stimulus and must be carefully constructed for optimal and safe outcomes. A strong theoretical basis for music interventions promotes higher integrity and effectiveness. This presentation represents three unique theoretical frameworks to operationalize targeted needs of infants and families in the NICU and specify how music elements function as active ingredients in a music intervention to promote optimal neuro, social and emotional development of at-risk infants.

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Learner objectives: 2-3

Participants will increase their understanding of targeted music interventions that contribute to at-risk hospitalized infants' neuroprotection and emotional and mental health.

Participants will gain knowledge in how to apply music interventions more strategically within clinical practice.

Gravens2020-36

Using Acceptance Commitment Therapy to Improve the Discharge Experience for NICU Families: Lessons learned from

the CCENT study

Dr. Julia Orkin, MD, Hospital for Sick Children
Arpita Parmar, Research Coordinator, Hospital for Sick Children
Kayla Esser, Study Coordinator, Hospital for Sick Children
Kate Robson, ACT Coach and Parent Representative, Sunnybrook HSC

The first phase of the Coached, Coordinated, Enhanced Neonatal Transition Study focused on feasibility. We sought to discover if it is possible to deliver a program focused on improving the discharge experience for families by a) identifying a point person to be the main contact for a family during the discharge process and for one year post-discharge, and b) using Acceptance Commitment Therapy as a coaching and mindfulness framework to address the stress families experience when they have an infant in the NICU.

During the first phase of the program participants in intervention and control arms were enrolled at two hospitals. In our workshop, we will present and discuss the facilitators and barriers to participation we encountered, and share how our Family Advisory Committee helped us design educational materials to support families through the discharge process. Our aim is to open up a transparent discussion about issues we faced with recruitment and cross-centre collaboration, and enable collaborative learning about what researchers can do to address equity and access issues when designing studies. We will also do a live participatory Acceptance Commitment Therapy presentation to show workshop participants what the intervention looked like for families and give them a chance to experience it for themselves.

At present the study is well into the second phase with 95 of 220 participants recruited; for this workshop our intent is to focus on the earlier feasibility discussion as well as an exploration of the ACT intervention.

More about CCENT: <https://www.child-bright.ca/ccent>

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Learner objectives

1. Attendees will see and experience how Acceptance Commitment Therapy can provide an educational and support framework for NICU families as they prepare for discharge and adjust to home.
2. Attendees will explore the many factors that can facilitate or inhibit diverse participation in studies, and discuss strategies for encouraging diverse family participation both as study partners and as study participants.

Gravens2020-37

Engaging Parents to Help Manage Painful and Stressful Procedures in the NICU

Joanna Celenza, MA, MBA, Children's Hospital at Dartmouth-Hitchcock, Marybeth Fry, M.Ed, Akron Children's Hospital

Teesha Miller, Ed.D (candidate), MBA, MHA, Youth Ambassadors

Amy Nyberg, BA, Helen DeVos Children's Hospital

Background and Purpose:

Parents want to be involved in the care of their baby while in the NICU. Their participation in care can extend to assistance in the management of their baby's pain and stress through non-pharmacological and pharmacological means. Encouraging clinician's reconsideration of and parental advocacy around neuroprotective pain management of 'routine' clinical procedures.

Budget and Resources:

Cost to produce materials to educate staff and families was minimal as both handouts were created in-house and printed in-house.

Program, Materials, or Methodology:

Engaging parents to help manage painful and stressful procedures in the NICU leverages the Neonatal Integrative Developmental Care Model. The Neonatal Integrative Developmental Care Model utilizes seven core activities for neuroprotective family-centered developmental care of premature infants. The model engages families in participatory clinical practices while present in



neonatal intensive care units (NICUs) to create a healing environment for infants and families (Altimier & Phillips, 2016).

The seven neuroprotective core measures are:

- 1) supporting a healing environment
- 2) partnering with families
- 3) positioning & handling
- 4) safeguarding sleep
- 5) minimizing stress and pain
- 6) protecting skin
- 7) optimizing nutrition

An awareness campaign for both staff and families at the Intensive Care Nursery at the Children's Hospital at Dartmouth-Hitchcock was developed. Pain can be a difficult thing to discuss, yet it's vitally important for families to be full members of the care team and knowledge about how pain is managed as well as how families can help with pain is in alignment with this role as full team members.

Educational pieces for staff and families were developed to provide the foundation for ongoing conversations with families. We shared information about (often routine) painful and stressful procedures.

Data collected was via a bulletin board where staff members or parents could add a butterfly with details of how they helped babies through painful or stressful procedures.

Impact or Results:

Families were educated and empowered to calm and comfort their babies through painful and stressful procedures. Knowing they could comfort and soothe their babies allowed their confidence to grow as parents and their stress to reduce from within their NICU experience.

The often traumatic NICU patient experience exposes vulnerable families and critically ill newborns to numerous sources of stress: noxious environmental stimuli, painful procedures and frequently prolonged separation from their mothers. According to well documented research, Coughlin (2017) reminds us that early life adversity alters an infant's developmental trajectory through epigenetic, neuroendocrine and psychosocial mechanisms. As a result, consistently and reliably providing supportive, trauma-informed, neuroprotective clinical is an effective evidence-based framework that can transform culture and the provision of care as well as improve short and long-term outcomes.

Bibliography: for oral presentations, at least 3 related references that support the program

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Learner Objectives:

1. The learner will discover ways to engage parents in helping to manage pain and stress of their NICU babies
2. The learner will discover ways to educate staff on engaging parents in the management of pain and stress of their NICU babies.

Presentation preference: no preference

Gravens2020-38

Fostering A Maternal-Infant Relationship Across Distance and Trauma: Building a relationship between mother and infant after long-distance surrogacy resulting in extreme prematurity.

Authors: Umber Darilek, RN BSN PhD student, UT Health, San Antonio and Alice Gong, MD, Professor of Pediatrics, UT Health, San Antonio

Background and Purpose:

Laws surrounding gestational surrogacy can sometimes force parents to choose gestational carriers who live outside of their home state. Certain states do not allow paid surrogacy and others do not allow biological parents any parental rights until they have adopted their biological children from the surrogate. Texas is a state which allows for paid surrogacy and for a judge to affirm parentage to the biological parents during the pregnancy, so that the biological parents can appear on the birth certificate instead of the gestational carrier. During the randomized control trial of the Family Nurture Intervention (FNI), a family with a unique history was enrolled in the intervention arm of the study. The FNI aims to foster a mutual emotional connection between mothers and premature infants during the NICU stay through simple guided nurturing behaviors between the mother and infant. During the RCT, a family was enrolled and randomized to the intervention group. They were unique in that they lived out of state and their micro-preemie twins were born to a gestational surrogate. The infants stayed in the NICU in Texas for five months, and the parents were unable to relocate to be with them through the NICU stay. The FNI Nurture Specialists (NS) performed the maternal tasks of the FNI as surrogates with the mother and father present and talking to the babies via internet video conferencing and facilitated the intervention in person with the mother when she was present. This case study describes the challenges, success and failures of attempting to foster an emotional connection across distance, when the biological connection of pregnancy and the trauma of premature birth and other home stressors are also present. As the availability of telemedicine and increasing use of gestational surrogates continues to grow, case studies such as this could help understand how to best utilize resources and equip NICUs to deal with complex emotional issues which prepare families for a safe, emotionally connected, transition to home.

Budget and Resources:

The FNI is a low-cost intervention. This case used iPad tablets and video conferencing software, scent cloths which were mailed or transported from the parents to the NICU and audio recorders which were provided by the parents and contained their voices reading books and singing to the infants.

Methodology:

Ethical approval was provided by the UT Health San Antonio IRB and University Health System IRB. The family was enrolled in the RCT, having made an IRB approved exception in the inclusion criteria, as the infants were born days before the 26 week minimum gestational age. The activities of the FNI are NS guided 1. Emotional speech 2. Scent cloth exchange 3. Eye contact 4. Calming touch and 5. Calming holding. The NS attempted to facilitate the activities of the FNI when parents were physically present and when they were not, via video chat and surrogate physical activities by the NS. The parents were able to visit three times during their NICU tenure. Scent cloths were exchanged when the parents provided them. For five months, the NS video conferenced the parents in the evening at the time they requested, at least 4 times per week. During the video conferences, the parents were encouraged to speak emotionally and sing to their children. The NSs held the babies for one hour per day minimum and practiced calming touch and eye contact with the babies. During parent visits, they were encouraged to hold, touch, practice eye contact, feed, change diapers, and assume other aspects of infant care. The parents were very reluctant to visit and to participate in care. They displayed trauma and avoidance behaviors. Many discussions were had with the parents about the needs of the children and they were encouraged to grow in their participation.

Results:

The infants displayed good social behaviors by discharge. The parents were reluctant to participate in infant care even during visits and displayed behaviors consistent with trauma and avoidance, but did participate in nightly video conferences and their communication and attention to babies' cues improved over time. The parents stated they would visit more often than they did and seemed detached from the reality of the existence of these babies and their immediate needs. NS had many conversations about the importance of physical presence in the lives of their preemies and acknowledged that emotions can be mixed and this can be a confusing time. The NS noticed that while the infants did not display any social cues toward the figures on the tablet screen, they did experience the voices of their parents during times when they were being cuddled, maintained eye-contact and received comforting touch. They did display good social cues toward the NS. The infants' vital signs stabilized during holding time. The parents had a touch stone with the NSs and were grateful for the help. At the same time, the relationship between the NS and the parents suffered from poor boundaries with phone calls at all hours after discharge and the parents asked one NS to return to their home state as a nanny for the babies. After discharge, the parents wanted to frequently video conference with the babies (now in the care of the parents) and the NS at night. Over time, the NS had to wean parents from frequent contact.

Learner Objectives:

1. To articulate one possible technique for using technology to facilitate parent/ infant communication during separation in the NICU experience.
2. To enumerate some of the strengths and pitfalls of facilitating the FNI across distance and trauma.

3. To list some of the possible places where policies can exist to protect families and staff from inappropriate dependencies post-discharge.
- 4.

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Gravens2020-39

Fostering A Maternal-Infant Relationship Across Distance and Trauma: Building a relationship between mother and infant after long-distance surrogacy resulting in extreme prematurity.

Authors: UMBER DARILEK, RN BSN PhD student, UT Health, San Antonio and ALICE GONG, MD, Professor of Pediatrics, UT Health, San Antonio

Background and Purpose:

Laws surrounding gestational surrogacy can sometimes force parents to choose gestational carriers who live outside of their home state. Certain states do not allow paid surrogacy and others do not allow biological parents any parental rights until they have adopted their biological children from the surrogate. Texas is a state which allows for paid surrogacy and for a judge to affirm parentage to the biological parents during the pregnancy, so that the biological parents can appear on the birth certificate instead of the gestational carrier. During the randomized control trial of the Family Nurture Intervention (FNI), a family with a unique history was enrolled in the intervention arm of the study. The FNI aims to foster a mutual emotional connection between mothers and premature infants during the NICU stay through simple guided nurturing behaviors between the mother and infant. During the RCT, a family was enrolled and randomized to the intervention group. They were unique in that they lived out of state and their micro-preemie twins were born to a gestational surrogate. The infants stayed in the NICU in Texas for five months, and the parents were unable to relocate to be with them through the NICU stay. The FNI Nurture Specialists (NS) performed the maternal tasks of the FNI as surrogates with the mother and father present and talking to the babies via internet video conferencing and facilitated the intervention in person with the mother when she was present. This case study describes the challenges, success and failures of attempting to foster an emotional connection across distance, when the biological connection of pregnancy and the trauma of premature birth and other home stressors are also present. As the availability of telemedicine and increasing use of gestational surrogates continues to grow, case studies such as this could help understand how to best utilize resources and equip NICUs to deal with complex emotional issues which prepare families for a safe, emotionally connected, transition to home.

Budget and Resources:

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Methodology:

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its, they were encouraged to hold, touch, practice eye contact, feed, change diapers, and assume other aspects of infant care. The parents were very reluctant to visit and to participate in care. They displayed trauma and avoidance behaviors. Many discussions were had with the parents about the needs of the children and they were encouraged to grow in their participation.

Results:

The infants displayed good social behaviors by discharge. The parents were reluctant to participate in infant care even during visits and displayed behaviors consistent with trauma and avoidance, but did participate in nightly video conferences and their communication and attention to babies' cues improved over time. The parents stated they would visit more often than they did and seemed detached from the reality of the existence of these babies and their immediate needs. NS had many conversations about the importance of physical presence in the lives of their preemies and acknowledged that emotions can be mixed and this can be a confusing time. The NS noticed that while the infants did not display any social cues toward the figures on the tablet screen, they did experience the voices of their parents during times when they were being cuddled, maintained eye-contact and received comforting touch. They did display good social cues toward the NS. The infants' vital signs stabilized during holding time. The parents had a touch stone with the NSs and were grateful for the help. At the same time, the relationship between the NS and the parents suffered from poor boundaries with phone calls at all hours after discharge and the parents asked one NS to return to their home state as a nanny for the babies. After discharge, the parents wanted to frequently video conference with the babies (now in the care of the parents) and the NS at night. Over time, the NS had to wean parents from frequent contact.

Learner Objectives:

1. To articulate one possible technique for using technology to facilitate parent/ infant communication during separation in the NICU experience.
2. To enumerate some of the strengths and pitfalls of facilitating the FNI across distance and trauma.
3. To list some of the possible places where policies can exist to protect families and staff from inappropriate dependencies post-discharge.

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Gravens2020-40

Sweetening Up the NICU Environment at Penn State Hershey Children's Hospital

Introduction: The neonatal intensive care unit (NICU) is a fast paced critical care environment where nurses are required to make high-level critical decisions regarding patient care as well as dealing with the burden of providing assurances to families dealing with the unexpected emotional trauma of a hospitalized critically-ill newborn. Such an environment impacts the emotional toll that caring for critical neonate can take on a nurse (Adams, Hollingsworth & Osman, 2019). Reduced job satisfaction and

burnout are common secondary effects among neonatal nurses. This leads to a downhill economic effect resulting in increased costs for organizations secondary to turnover and orientation for new staff (Jones & Gates, 2007). The American Nurses Association has recently launched a new Healthy Nurse, Healthy Nation campaign to increase the health and wellbeing of nurses across the country (ANA, 2016). Retention of experienced critical care nurses that can lead, mentor and teach novice nurses is imperative for sustainment of the workforce (Mason et al., 2014). This philosophy is embraced at Penn State Health, where the hospital has received and maintained Magnet designation for the third time demonstrating nursing leadership's commitment to positive nursing engagement and a healthy work environment.

Problem: Our NICU is a 42-bed Level IV open bay layout and four private rooms. This type of environment is loud and overstimulating for the NICU team as well as the patients and families. In addition, the critical nature of the providing intensive care to newborns results in further emotional burden. Even though the open bay layout permits nursing interactions, the 2016 RN satisfaction survey revealed poor scores related to nurses being unsatisfied in their working environment and reporting a decrease in support provided by their peers. Through discussions with nursing staff, the NICU developmental care committee (DCC) recognized that many staff members had high distress levels, discussing the necessity of embracing self-care and resiliency in the workplace. Nursing leadership also recognized the distress level in the unit amongst the team and supported discussions on improvement.

Methods: In February 2017, the team began discussions around creating a nurturing environment with decreasing stimulation through implementation of designated quiet hours in the afternoons and creation of a quiet space for the NICU team off the unit to promote healing and quiet time during breaks. Due to Department of Health restrictions, the designated quiet room was not permitted, but was integrated in the new NICU design expected to open October 2020. The DCC also championed strategies to reduce overall environmental noise impacts by the decrease in volume level for equipment and instituting quiet hours. In addition, DCC offered the concept of "Healing Week." The Healing Week was a week with scheduled activities such as pet therapy, NICU night out to a spa, distribution of healthy recipes and stress reduction activities to promote healing and self-care. From this, the team reached out to nursing leadership for approval for the Healing Week. Once approved, this was presented to the unit leadership council for further buy in and suggestions. DCC members also sought out NICU staff members who were known experts for certain calming activities, such as yoga and reiki, and invited them to participate in the week. Fliers were created and distributed throughout the unit as well as to leaders of the multi-disciplinary teams. The week prior, announcement in the unit newsletter and huddle reports were done as well as giving reminders during the week to announce the schedule of various activities.

Outcomes: There have been 4 Healing Weeks since 2017. An electronic survey was created to solicit feedback after the second Healing Week to evaluate effectiveness and also generate ideas for future activities. Overall, the majority of responses indicated staff perceived they experienced decreased stress levels. Staff comments included "need to find a way to get more people to the stations." and "really enjoyed the staff nurse coming in to do a

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quick roaming relaxation/yoga” and “I loved Reiki!” Suggestions for improvement included adding chair massages and altering times to better suit night shift worker attendance.

In my work as a clinical head nurse during the time of these interventions, I perceive that there has been an overall better engagement and sense of trust among the entire NICU team since the implementation of Healing Week. Further, the DCC has been provided direct acknowledgement and appreciation from management and staff for providing an entire week dedicated to focused activities on their health and well-being.

Areas of future work include focusing in and providing staff not only the activities but the tools to promote self-care and resiliency outside the workplace, such as the utilization of stress/coping resources, i.e., gratitude journaling. This program implemented by our NICU DCC has assisted in providing a more collaborative environment that provides teamwork, caring, and support for each other. Our future expectation is that these continued strategies will lead to higher staff satisfaction and retention and a decrease in nurse turnover.

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Why PREMATURE INFANTS Need Access to an EXCLUSIVE HUMAN MILK DIET

In the United States, more than **1 IN 10 BABIES ARE BORN PREMATURE**. Very low birthweight babies are born severely premature, weighing less than 1,250 grams.

VERY LOW BIRTHWEIGHT BABIES are at risk for Necrotizing Enterocolitis (NEC), which:

- Damages intestinal tissue
- Causes distended abdomen, infection, low blood pressure and shock
- Threatens infants' lives

NEC occurrence increases when a preemie consumes non-human milk products.

When that happens:

Very low birthweight babies who get NEC	17%
Very low birthweight babies requiring surgery to treat NEC	12%
Very low birthweight babies who die	5%
Very low birthweight babies who die	1%

30% of very low birthweight babies requiring surgery will die from NEC.

HOW TO HELP PREVENT NEC: EXCLUSIVE HUMAN MILK DIET

What is an Exclusive Human Milk Diet?

NO Cow's milk

NO Sheep's milk

NO Goat's milk

NO Formula

✓ Mother's milk
 ✓ Human donor milk
 ✓ Human milk-based fortifier

Why is An Exclusive Human Milk Diet Important?

An Exclusive Human Milk Diet gives vulnerable infants the best chance to be healthy and reduces the risk of NEC and other complications.

When a very low birthweight baby can access an EXCLUSIVE HUMAN MILK DIET:

- Mortality is reduced by **75%**
- Feeding intolerance decreased
- Chances of NEC are reduced by **77%**

HUMAN MILK = MEDICINE

NEC is more often fatal, resulting in the nutrition that babies need. Only breast milk, with your baby's mother's milk, is best. Talk to your care team about your baby's specific nutrition needs and request support to help you achieve your goals.

LEARN MORE

National Coalition for Infant Health

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Letters to the Editor

Letter to The Editor

Ventilator-Associated Event in A Neonate: Flaw in The Definition

The definition of pediatric ventilator-associated pneumonia (PedVAE) (1) is based on an increase in daily minimum FiO_2 of ≥ 0.25 (25 points) over the daily minimum FiO_2 of the first day in the baseline period and an increase in daily minimum mean airway pressure (MAP) values of $\geq 4 \text{ cmH}_2\text{O}$. However, this definition has a potential flaw: increase oxygen requirement and the need for increased airway pressures may not necessarily indicate VAE. It is a too generalized definition for a heterogeneous group of infants. (2) We will present a brief case to make our point.

The infant was delivered vaginally. Delivery was complicated by vacuum assistance and shoulder dystocia. The infant had mild respiratory distress and was given continuous positive airway pressure in the delivery room. He was then admitted to the NICU for transitional care. The cord blood gases: $7.27/31 \text{ CO}_2/33\text{O}_2/15 \text{ HCO}_3^-$ -12.5 base deficit (venous) and $7.14/51/15/24/-11$ (arterial). On the physical exam in the NICU, the infant was noted to be pale, lethargic, with continuous grunting and nasal flaring. A decision was made to intubate and place on a ventilator. Chest x-rays before and after intubation are displayed in Figure 1 A and B.

On the follow-up point of care blood gas result, the hemoglobin was noted to be low, further confirmed by the laboratory analysis. Figure 2 depicts the serial values of hemoglobin and hematocrit over time. The infant was transfused with packed red cells. The cause for blood loss was identified as subcapsular liver bleed (Figure 3 A). The infant continued to require increase oxygen to keep oxygen saturation above 95%. An echocardiogram was obtained that was compatible with high right ventricular pressure (Figure 3 B). Inhaled nitric oxide was started.

As the infant's FiO_2 and MAP requirement went up from the baseline, the infant was labeled as PedVAE per definition (1). Our counter-argument is with the evidence of other causes for hypoxemia in this infant (anemia, pulmonary hypertension), how confident are we in labeling this as a ventilator-associated event? Oxygen content and delivery are dependent upon hemoglobin level and cardiac output; therefore, these factors should be considered.

Due to the subjectivity in the definition, the pneumonia component has been taken away from the definition of ventilator-associated pneumonia (VAP). On the same token, we suggest looking into the definition of PedAEV in an infant with other causes of hypoxemia. Currently, in the definition of PedVAE, infants on ECMO are excluded. Based on the case presented, we suggest that infants with severe anemia and poor heart function should be eliminated from the surveillance definition of PedVAE.

Reference:

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Figure legends:

Figure 1:

- A: Chest X-ray before intubation
- B: Chest X-ray after intubation

Figure 2: Serial hemoglobin and hematocrit levels displayed over time

Figure 3:

- A) MRI abdomen showing hepatic subcapsular hematoma
- B) Echocardiogram (subcostal view, 4-chamber view) showing septal flattening

Sincerely,

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NATIONAL PERINATAL ASSOCIATION

Update: **CORONAVIRUS**
COVID-19

According to data published in The Lancet

Because of the risk of developing severe pneumonia, pregnant women and newborn babies should be considered key at-risk populations.

www.nationalperinatal.org

National Perinatal Association



Sign up for free membership at 99nicu, the Internet community for professionals in neonatal medicine. Discussion Forums, Image Library, Virtual NICU, and more..."

www.99nicu.org

Figure 1

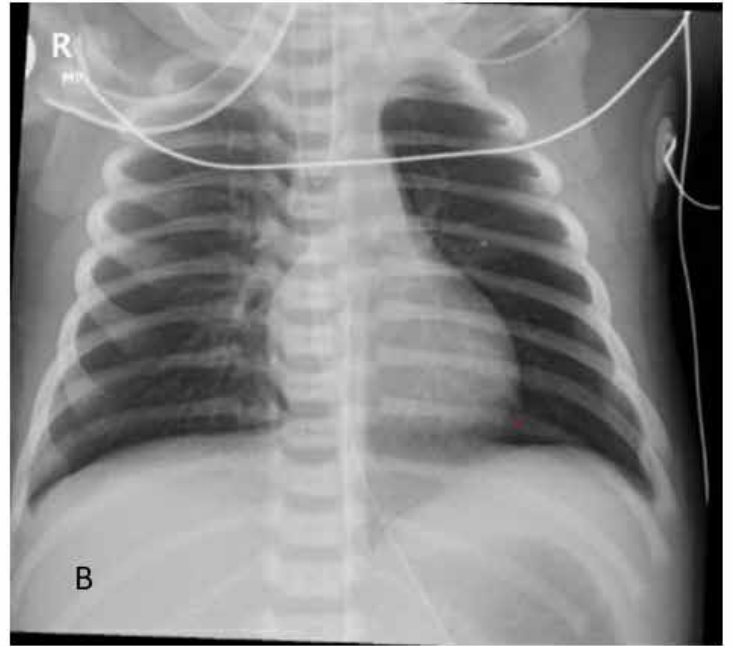
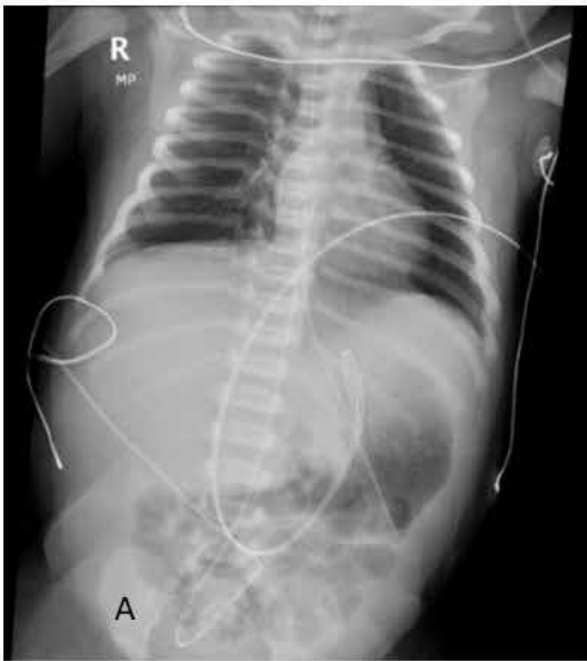


Figure 2

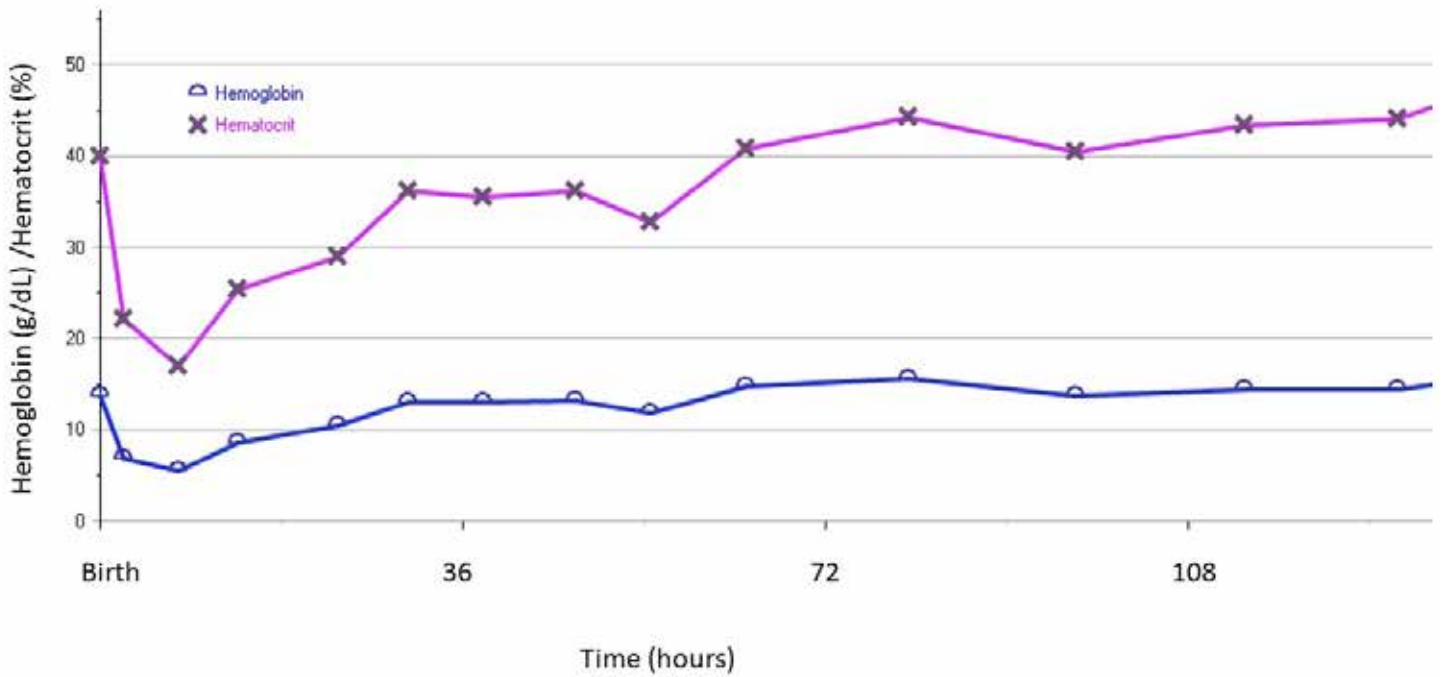
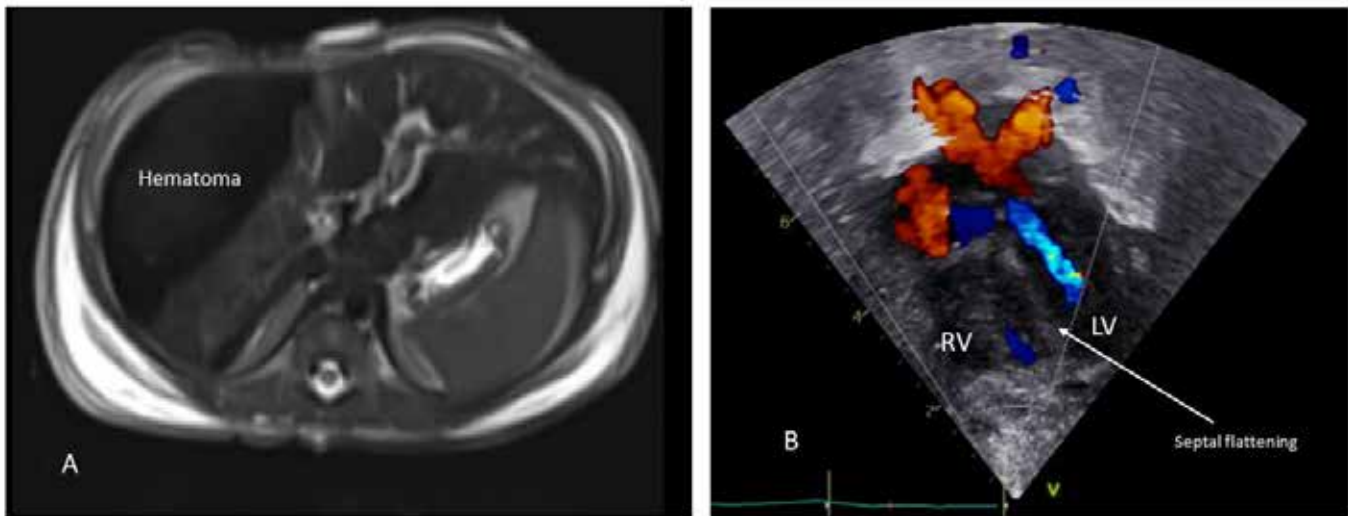


Figure 3



Dear Dr. Manzar:

This issue is very compelling but very common in medicine. It is all too often that a measure or a category is created to define a certain entity that is clinically manifest. While the initial nomenclature may seem to work well for all circumstances, as you have correctly pointed out, there are often a certain subset of clinical entities that are not adequately addressed by the definitions that have been "standardized" by various medical organizations and insurers.

To the extent that they interfere with patient care or misidentify causality, these terms should be avoided. However, often it is medical billing or other compliance related departments within the hospital that compel charting according to a diagnosis that may be inaccurate but in compliance with the required metric.

For this situation, an elevation to a higher level is required. Although coding experts can help, ultimately it will take a more significant effort to mitigate the effects of this situation or it will continue to occur.

Sincerely,

Mitchell Goldstein, MD
Editor in Chief

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Peer Reviewed Research, News, and Commentary on Neonatology and Perinatal Medicine

MONDAY, OCTOBER 19, 2020

Volume 45 | Issue 4

The screenshot displays the Neonatology Today website interface. At the top, it shows the journal title and a date of Monday, October 19, 2020. Below this, there are several main sections: 'CURRENT ISSUE' featuring articles like 'Human and Donor Milk Use Post-ICU Discharge' and 'An Unbalanced Translocation Involving Partial Duplication of Chromosome 8 and Partial Deletion of Chromosome 12 in a Premature Infant with Tetralogy of Fallot'; 'RECENT ARTICLES' with a search bar; 'ABOUT US' providing information about the journal's history and mission; 'ADVERTISING' with a banner for 'Are you bubbling?'; 'NEWS & VIEWS' with a section on 'Compartment Syndrome'; 'EDITORS' listing Michael S. Kramer, MD, FAAP; and 'AUTHORS' with a photo of a child.

Neonatology Today's Digital Presence

Neonatology Today's now has a digital presence. Although officially still in beta, the site is operational now and defines the future look of our digital web presence. By clicking on this <https://www.neonatologytoday.org/web/>, researchers can download individual manuscripts both in digital format and as part of the original PDF (print journal). While the PDF version of Neonatology Today will continue in its present form, we envision that the entire website will be migrated to this format in the next several months. We encourage you to take a look, "kick the wheels," and let us know where we still need to improve. We are working towards making the website more functional for subscribers, reviewers, authors and anyone else. Although we have not yet applied for inclusion in the National Library of Medicine Database (Pub-Med), this new format meets several of the important metrics for this ultimate goal.

As we indicated last month, we look forward to a number of new features as well.

1. An online submission portal: Submitting a manuscript online will be easier than before. Rather than submitting by email, we will have a devoted online submission portal that will have the ability to handle any size manuscript and any number of graphics and other support files. We will have an online tracking system that will make it easier to track manuscripts in terms of where they are in the review process.
2. Reviewers will be able to review the manuscript online. This portal will shorten the time from receipt of review to getting feedback to the submitting authors.
3. An archive search will be available for journals older than 2012.
4. A new section called news and views will enable the submission of commentary on publications from other journals or news sources. We anticipate that this will be available as soon as the site completes the beta phase.
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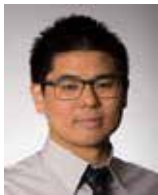
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fu-sheng.chou@neonatologytoday.net

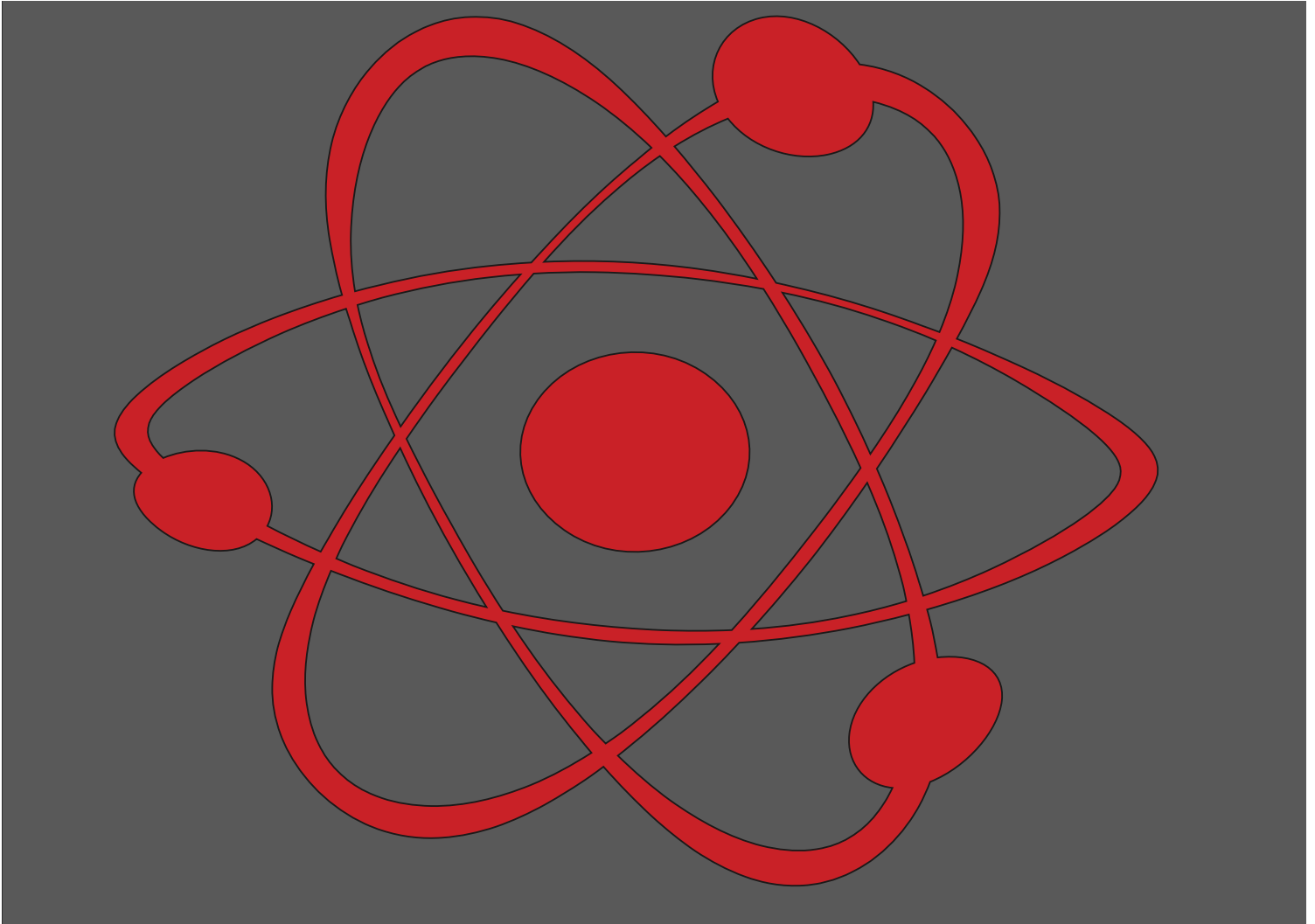


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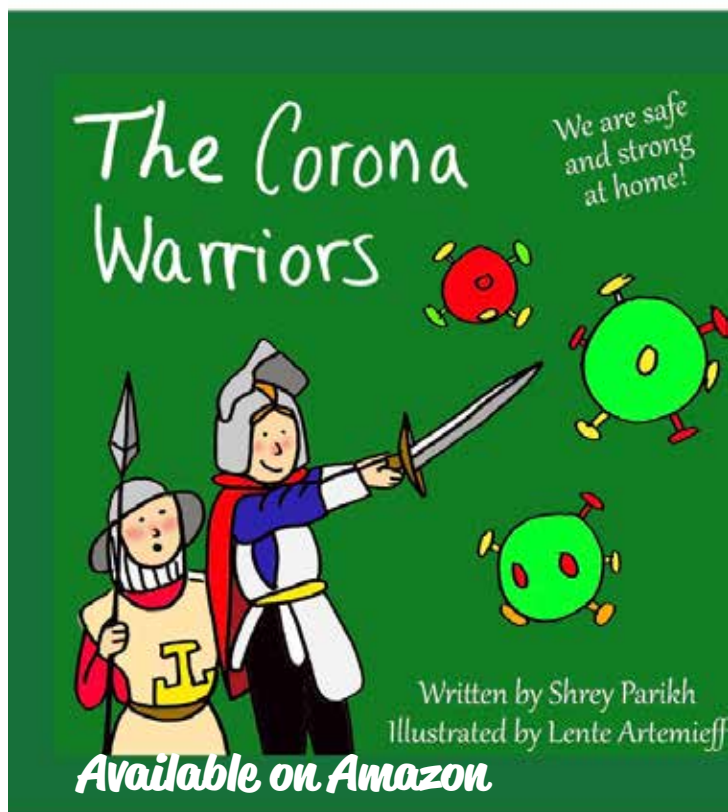
Which Infants are More Vulnerable to Respiratory Syncytial Virus?

RSV is a respiratory virus with cold-like symptoms that causes 90,000 hospitalizations and 4,500 deaths per year in children 5 and younger. It's 10 times more deadly than the flu. For premature babies with fragile immune systems and underdeveloped lungs, RSV proves especially dangerous.

But risk factors associated with RSV don't touch all infants equally.*

*Source: Respirator Syncytial Virus and African Americans

Caucasian Babies	Risk Factor	African American Babies
11.6%	 Prematurity	18.3%
58.1%	 Breastfeeding	50.2%
7.3%	 Low Birth Weight	11.8%
60.1%	 Siblings	71.6%
1%	 Crowded Living Conditions	3%




Erratum (Neonatology Today September, 2020)

Neonatology Today has identified that early downloads of the September, 2020 edition had a "footer" which incorrectly identified the journal as the August, 2020 edition. This has now been corrected.

Corrections can be sent directly to LomaLindaPublishingCompany@gmail.com. The most recent edition of Neonatology Today including any previously identified erratum may be downloaded from www.neonatologytoday.net.

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 AFRICAN AMERICAN BABIES bear the brunt of RSV. Yet the American Academy of Pediatrics' restrictive new guidelines limit their access to RSV preventative treatment, increasing these babies' risk.

AfPA
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Will your **PRETERM INFANT** need **EARLY INTERVENTION** services?

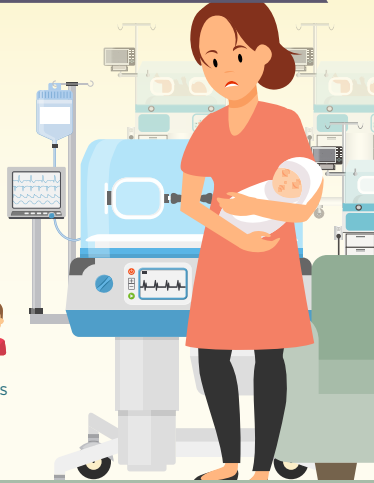
Preterm infants are:

2x more likely to have developmental delays

5x more likely to have learning challenges



1 in 3 preterm infants will require support services at school



Early intervention can help preterm infants:



Enhance language and communication skills



Build more effective learning techniques



Process social and emotional situations



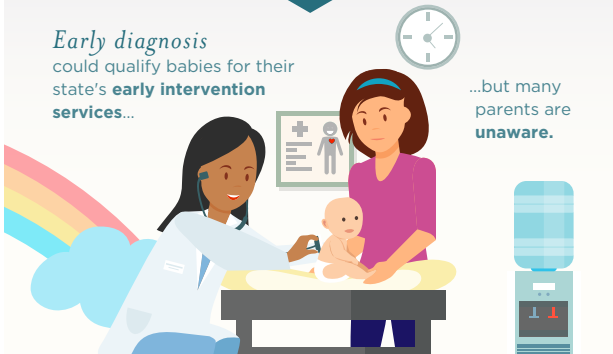
Address physical challenges



Prevent mild difficulties from developing into major problems

Early diagnosis could qualify babies for their state's **early intervention services**...

...but many parents are **unaware**.



NICU staff, nurses, pediatricians and social workers should talk with NICU families about the challenges their baby may face.

Awareness, referral & timely enrollment in early intervention programs can help **infants thrive** and grow.



NCFIH National Coalition for Infant Health
Protecting Access for Premature Infants through Age Two
www.infanthealth.org

Visit CDC.gov to find contact information for your state's early intervention program.

Las nuevas mamás necesitan acceso a la detección y tratamiento para **LA DEPRESIÓN POSTPARTO**



1 DE CADA 7 MADRES AFRONTA LA DEPRESIÓN POSTPARTO, experimentando



Sin embargo, sólo el **15%** recibe tratamiento!

LA DEPRESIÓN POSTPARTO **NO TRATADA PUEDE AFECTAR:**

El sueño, la alimentación y el comportamiento del bebé a medida que crece?



La salud de la madre
La capacidad para cuidar de un bebé y sus hermanos

PARA AYUDAR A LAS MADRES A ENFRENTAR LA DEPRESIÓN POSTPARTO



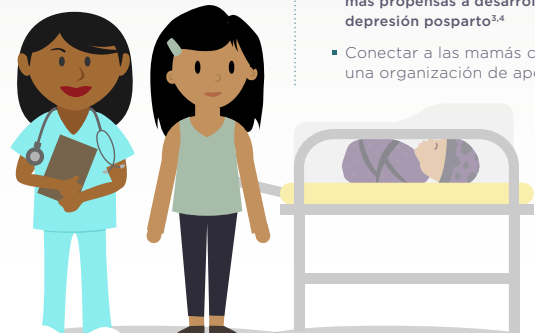
LOS ENCARGADOS DE FORMULAR POLÍTICAS PUEDEN:

- Financiar los esfuerzos de despistaje y diagnóstico
- Proteger el acceso al tratamiento



LOS HOSPITALES PUEDEN:

- Capacitar a los profesionales de la salud para proporcionar apoyo psicosocial a las familias... **Especialmente aquellas con bebés prematuros, que son 40% más propensas a desarrollar depresión postparto**^{3,4}
- Conectar a las mamás con una organización de apoyo



NCFIH National Coalition for Infant Health
Protecting Access for Premature Infants through Age Two
www.infanthealth.org

¹ American Psychological Association. Accessed on: <http://www.apa.org/women/resources/reports/postpartum-depression.aspx>

² National Institute of Mental Health. Accessed on: <http://www.nimh.nih.gov/health/publications/postpartum-depression-facts/index.shtml>

³ Journal of Perinatology (2015) 35, 529–536. doi:10.1097/JP.0000000000000147

⁴ Prevalence and risk factors for postpartum depression among women with problem and low-birth-weight infants: a systematic review. Vigod SN, Villages L, Dennis CL, Ross LE BJOG. 2010 Apr; 117(5):540-50.

Upcoming Medical Meetings

4th Annual NeoHeart
October 28 - 30, 2020
New York, New York
<https://neoheartsociety.org/conference2020/>

International Conference on
Neonatology and Perinatology
November 5 - 6, 2020
Cape Town, South Africa
<https://waset.org/neonatology-and-perinatology-conference-in-november-2020-in-cape-town>

Miami Neonatology 2020: 44th
International Conference
live interactive online conference
November 16-20, 2020
University of Miami Miller School of
Medicine
Miami Beach, Florida
<http://pediatrics.med.miami.edu/neonatology/international-neonatal-conference/>

Perinatal Care and the 4th Trimester:
Redefining Care
National Perinatal Association
Aurora, Colorado
<http://www.nationalperinatal.org/2020conference>

Hot Topics in Neonatology
December 6 - 9, 2020
Organization: Nemours
National Harbor, Maryland
<http://www.hottopicinneonatology.org/>

38th Annual Advances in Therapeutics
and Technology Conference
March 23 -27, 2021
Snowbird, Utah
<https://paclac.org/advances-in-care-conference/>

Annual Neonatal and Pediatric
Airborne Transport Conference
May 5 - 7, 2021
International Biomedical
Austin, Texas
<https://www.int-bio.com/events-news/airborne-conference/>

Pediatric Academic Society Virtual Meeting

Phase 1: April 30 - May 4, 2021
Phase 2: May 10 - June 4, 2021
<https://www.pas-meeting.org/pas2021-virtual/>

22nd Annual International Perinatal
Bereavement Conference (IPBC)
May 12 - 15, 2021
Pregnancy Death and Infant Loss
Alliance (PLIDA)
Chicago, Illinois
<https://www.plida.org/ipbc-2021>

44th Annual Conference on Neonatal
Perinatal Medicine
June 17 - 21, 2021
AAP District VIII Section on
Neonatal-Perinatal Medicine
<https://nm2020.district8sonpm.org/>

Location: Santa Fe, New Mexico
Innovations in Neonatal Care
August 9 - 11, 2021
Mednax
<http://www.innovationsconference.com/>

Location: Austin, Texas
*For up to date Meeting
Information, visit
[NeonatologyToday.net](http://www.NeonatologyToday.net) and click
on the events tab.*

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The Neonatal Intensive Care Unit (NICU) at Loma Linda University Children's Hospital is committed to providing high-quality, family-centered care with our highly skilled, multi-disciplinary neonatal team. Our unit has 84 licensed beds for the most critically ill infants and a new Tiny Baby Program focusing on improving survival and outcomes of extremely low birth weight infants (<1000g at birth). As one of the only level 3 tertiary centers in Southern California, we are equipped to provide the highest level of care for the most complex disorders. We have subspecialists in all medical and surgical areas that are available at all times and are supported by hospital staff with technical, laboratory, and service expertise.

At Loma Linda University Health, we combine the healing power of faith with the practices of modern medicine. We consist of a University, a Medical Center with four hospitals, and a Physicians Group. These resources have helped us become one of the best health systems in the nation.

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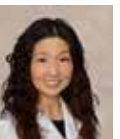
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coronavirus

pertussis

RSV



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warm water.



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for flu and pertussis.
Ask about protective
injections for RSV.



**COVER COUGHS
AND SNEEZES.**
Sneeze and cough
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ALCOHOL-BASED
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Neonatology and the Arts

This section focuses on artistic work which is by those with an interest in Neonatology and Perinatology. The topics may be varied, but preference will be given to those works that focus on topics that are related to the fields of Neonatology, Pediatrics, and Perinatology. Contributions may include drawings, paintings, sketches, and other digital renderings. Photographs and video shorts may also be submitted. In order for the work to be considered, you must have the consent of any person whose photograph appears in the submission.

Works that have been published in another format are eligible for consideration as long as the contributor either owns the copyright or has secured copyright release prior to submission.

Logos and trademarks will usually not qualify for publication.

This month we continue to feature artistic works created by our readers on one page as well as photographs of birds on another. This month's original artwork is again from Paula Whiteman, MD who provides us with a Rooster in stunning glory. Our bird of the month is provided by Dr. Mita Shah. These parakeets were captured in all of their glory in front of our NICU in West Covina, CA.



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Manuscript Submission: Instructions to Authors

1. Manuscripts are solicited by members of the Editorial Board or may be submitted by readers or other interested parties. Neonatology Today welcomes the submission of all academic manuscripts including randomized control trials, case reports, guidelines, best practice analysis, QI/QA, conference abstracts, and other important works. All content is subject to peer review.

2. All material should be emailed to:

LomaLindaPublishingCompany@gmail.com in a Microsoft Word, Open Office, or XML format for the textual material and separate files (tif, eps, jpg, gif, ai, psd, or pdf) for each figure. Preferred formats are ai, psd, or pdf. tif and jpg images should have sufficient resolution so as not to have visible pixilation for the intended dimension. In general, if acceptable for publication, submissions will be published within 3 months.

3. There is no charge for submission, publication (regardless of number of graphics and charts), use of color, or length. Published content will be freely available after publication. There is no charge for your manuscript to be published. NT does maintain a copyright of your published manuscript.

4. The title page should contain a brief title and full names of all authors, their professional degrees, their institutional affiliations, and any conflict of interest relevant to the manuscript. The principal author should be identified as the first author. Contact information for the principal author including phone number, fax number, e-mail address, and mailing address should be included.

5. A brief biographical sketch (very short paragraph) of the principal author including current position and academic titles as well as fellowship status in professional societies should be included. A picture of the principal (corresponding) author and supporting authors should be submitted if available.

6. An abstract may be submitted.

7. The main text of the article should be written in formal style using correct English. The length may be up to 10,000 words. Abbreviations which are commonplace in neonatology or in the lay literature may be used.

8. References should be included in standard "NLM" format (APA 7th may also be used). Bibliography Software should be used to facilitate formatting and to ensure that the correct formatting and abbreviations are used for references.

9. Figures should be submitted separately as individual separate electronic files. Numbered figure captions should be included in the main file after the references. Captions should be brief.

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