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Screening for Congenital Critical Heart Disease in Neonates Using Pulse Oximetry, Hospital Femap Ciudad Juarez

Hugo Salvador, Staines Orozco, Rafael Mauricio Marrufo, Edgardo Aarón Briceño Hidalgo, and Victoria Isabel Alcantara Moreno

Objective

The objective is to detect cases of newborns at risk of congenital critical heart disease, through neonatal cardiac screening tests using the instrument called "pulse oximeter" manufactured by Masimo SET.

Abstract

Objective. *The objective of this research was to detect cases of newborns at risk of congenital critical heart disease through neonatal cardiac screening tests using the instrument called "pulse oximeter" manufactured by Masimo SET, as part of the collaboration between the Newborn Foundation, the Autonomous University of Ciudad Juarez and the Autonomous University of Queretaro.* ***Method.*** *A total of 547 newborns were screened from December 2019 to March 2021 at Femap Hospital (Ciudad Juarez, Mexico), following the Newborn Foundation algorithm to detect arterial oxygen saturation (SpO2) in the right hand and foot; a saturation lower than 95% would be an indicator of heart disease risk.* **Results.** *Four risky cases of congenital critical heart disease were detected Using the pulse oximeter, referred to as a gold standard test (echocardiography). After the procedure, one case was confirmed positive by the specialist. With the data obtained, correlations and statistical associations were calculated using variables of SpO2 (dependent), height, weight, and age in hours of the newborn (independent). A positive correlation between hand SpO2 and foot SpO2 values was confirmed. Finally, SpO2 prediction graphs were obtained, where it was observed that the age in hours and the weight of the newborn (independent variables) influence the SpO2 variable, showing these maximum and minimum values.*

"A positive correlation between hand SpO2 and foot SpO2 values was confirmed."

Keywords

Congenital critical heart disease, pulse oximetry, cardiology screening, newborn, Ciudad Juárez, SpO2

Introduction

Congenital heart disease

Congenital critical heart disease (CCHD) is a lesion in the neonatal heart that requires early detection, surgical intervention, or cardiac catheterization within the first year of life for survival.(1,2)

Various types of congenital heart disease are classified as critical. Bruno & Havranek(2) named seven types whose attention is of great importance to reduce mortality: hypoplastic left ventricular syndrome, pulmonary atresia, tetralogy of Fallot, total anomalous pulmonary venous return, transposition of the great vessels, tricuspid atresia and patent ductus arteriosus. According to the authors, the incidence of congenital heart disease worldwide is 8 per 1000 live births in the case of CCHD. A study in Mexico,(3) mentioned that between 15,000 to 18,000 newborns with a cardiac malformation are expected annually, this being estimated according to the incidence shown in other countries.

"Authors say that [congenital] heart defects cause between 6% to 10% of pediatric deaths, representing 20% to 40% of deaths from malformations and 30% of prenatal deaths."

Congenital heart disease represents a significant medical and social problem, as mentioned by Ramirez-Escobar et al. (4); authors say that these heart defects cause between 6% to 10% of pediatric deaths, representing 20% to 40% of deaths from malformations and 30% of prenatal deaths. Extrapolating such data to the adult, Vázquez-Antona et al.(3) mentions that, from a population made up of 3483 adults confirmed with congenital heart disease, 25.6% of them were diagnosed in adulthood, indicating that the most important diseases were atrial septal defect, ventricular septal defect, and patent ductus arteriosus. The foregoing denotes a vital problem of the sub-diagnosis of congenital heart disease.

Screening for congenital heart disease

Screening is the procedure to obtain an early diagnosis, which is applied to the entire population. A screening must meet the criteria of Wilson and Junger to be viable as a public health policy, that is, that there is an effective treatment; that there is a high incidence of the pathology; that there is an adequate cost-benefit ratio and that it is cheap, sensitive and specific.(5)

"Between 2004 and 2011, 1732 children under one year died from congenital heart disease, according to data from the Secretariat of Health in Mexico."

The most common malformations are congenital heart disease, with an incidence of 1%, causing a mortality prevalence between 6% to 8% of children under one year of age. Between 2004 and 2011, 1732 children under one year died from congenital heart disease, according to data from the Secretariat of Health in Mexico.(5)

Cardiac screening allows the detection of cardiac malformations without being invasive, giving way to a simple and fast procedure. Del Mar Meseguer & Carvajal Chinchilla6 conducted a prospective study between August 2014 and January 2015 at the Calderon Guardia Hospital in Costa Rica. Researchers performed 899 screenings, resulting in 4 positive cases to which an echocardiogram was performed as a confirmatory test, of which a diagnosis of congenital heart disease was demonstrated in two of the

patients previously indicated as positive. Del Mar and Carvajal concluded that early detection of congenital critical disease is vital to avoid possible sequelae and mortality.

In 2011, Secretary's Advisory Committee on Heritable Disorders in Newborns and Children (SACHDNC) recommended screening for heart disease in all newborns to detect structural abnormalities promptly.(4) Previously, Granelli et al. (7) conducted a study in Switzerland where they studied 39,821 newborns, concluding that pulse oximetry is a technique capable of improving the detection rate of congenital critical heart disease of the ductus arteriosus in 92% of the cases and that this procedure is also profitable in the long run. Riede et al. (8) individually conducted a study in Germany, where 41,455 newborns were evaluated. With the use of pulse oximetry, authors reported a sensitivity of 77% and a specificity of 99% for the detection of CCHD, with a positive predictive value of 25.93% and a negative predictive value of 99.9%.

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A pulse oximeter is an instrument used to perform neonatal cardiac screening. Until 2019, Peña-Juarez et al. (9) reported that only two models were approved by the Food and Drugs Administration (FDA): the Masimo SET oximeter ® and the Covidien Nellcor oximeter ®. According to the author, other models, such as ChoiceMMed ® have reported lower sensitivity values than Masimo SET because of his study conducted at the Hospital General de Occidente in Zapopan, Jalisco, Mexico.

It is also mentioned in a study published in Germany that pulse oximetry as screening offers 77.7% of sensitivity and 99.9% of specificity; also, positive and negative predictive values of 25.93% and 99.9%, respectively.(5)

In a study on the effectiveness of screening for CCHD, a congenital heart disease detection rate of 91% was reported, compared to that of 89% when pulse oximetry was not used, but rather physical examination. A sensitivity of 90.9% and 81.8%, and a specificity of 99.9% and 98.2% of pulse oximetry and physical examination, respectively, were determined.(10)

In the study of Valderrama & Hernández (11) , postnatal echocardiography is described as the gold standard, which shows a sensitivity of 100% and a specificity of 89%. This may vary according to the training of health professionals in this area.

Need for the application of screening in Ciudad Juarez.

According to the data collected by the National Institute of Statistics and Geography (INEGI, for its acronym in Spanish), in 2020, 12,020 births were registered in Ciudad Juárez, Mexico, making a total population of 1,512,450 habitants. However, there is no certified data on congenital heart disease's incidence and prevalence rates locally or nationally.(12)

Between April 1992 and April 1999, Muñoz-Orozco13 obtained and identified, from the records of the Hospital General de Zona No. 6 of the (IMSS) of Ciudad Juarez, 102 cases of patients diagnosed with CCHD from 3 days of life until 51 years old. This would imply an incidence of 14 to 15 new CCHD diagnoses per year in this health unit alone.

In a clinic of congenital cardiopathies for children and adults from the IMSS hospitals system in México City, data was obtained from 3,483 confirmed cases of CCHD between the years 2011 and 2016, where 12.3% were patients under two years of age, 22.05% from 2.1 to 6 years, 21.27% from 6.1 to 10 years, 18.20% from 10.1 to 17 years and 25.64% over 17.1 years old. The late diagnosis of CCHD (from 2.1 years old and above) was 3,036 patients. In addition, the incidence of CCHD would be 696 to 697 new diagnoses per year. (14)

According to the demographic analysis of Márquez-González et al. 14, the prevalence of CCHD varies depending on the health center that treats them, as seen with the data collected in Ciudad Juarez, compared to that collected in Mexico City.

"Malformations of the circulatory system were the second cause of death in Mexico in children under one year old, according to INEGI, and was also one of the top 3 causes of death in the following 15 years of life."

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Year	Newborns	Projected CCHD cases
2021	21,710	From 130 to 174
2020	15,421	From 93 to 123
2019	22,149	From 133 to 177

Table 1: Projection of possible cases of newborns with critical congenital heart disease in Ciudad Juarez by year

Source: own elaboration

According to Torres-Cosme et al. (15), between 1998 and 2013 in Mexico, approximately 41,717,421 births were registered, of which 50,759 (2.48%) died from some CCHD.

If the global incidence of CCHD reported by Quiroz et al. (16), which is 6 to 8 cases per 1000 live births, is taken, the cases of CCHD in Ciudad Juarez would range from 92.52 to 177.19 cases per year.

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Extrapolating the incidence values found in the bibliography, with births per year in Ciudad Juarez, it is possible to estimate general CCHD cases; however, Bouma & Mulder (17) refer that congenital heart diseases are the malformations that are most frequently underdiagnosed.

Materials and Method

Bioethical Committee approval

The protocol and execution of this research were approved by both the Bioethical Committee of the Autonomous University of Ciudad Juarez and the Board of Directors of Hospital Femap.

Research characteristics

This is cross-sectional, analytical, and exploratory research. The main unit of analysis is the newborn in apparent good health. Similarly, information is collected from the mother of the newborn. For the mother, the considered variables are sociodemographic (age and address) and clinical (type of delivery, primiparous pregnancy, weeks of gestation). Regarding newborns, the clinical variables are weight, height, sex, hours of life at the time of screening, and arterial oxygen saturation (SpO2) of the right hand and foot. Statistical analysis was done with a confidence interval of 95%.

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Pulse oximeter description

Two Masimo brand pulse oximeters, Model iSpO2 rx ®, were used as instruments to measure the percentage of SpO2, which received the CE mark and are currently available throughout Europe, Latin America, and most Asian Pacific countries. These instruments are certified to detect oxygenation even in the movement of the newborn and low perfusion.

Equipment setup

Setup was made according to the instructions issued by San Román et al. (18) and recommended by Newborn Foundation as described below:

Step 1. Assemble all the equipment: pulse oximeter and reading device.

Step 2. Connect and check the pulse oximeter cables.

Step 3. Place the YI (probes) sensor on the fixation band. The red mark indicates the light emitter. The light emitter and the detector must be placed in their respective gap in the band.

Step 4. Measurement in lower extremities:

On either baby's foot, position both probes opposite each other on the fleshy outer side of the foot.

Ensure no gaps exist between the probes and the baby's skin.

Step 5. SpO2 reading of the baby's foot is recorded when the quality of the reading is strong and stable.

Step 6. Measurement in upper extremities:

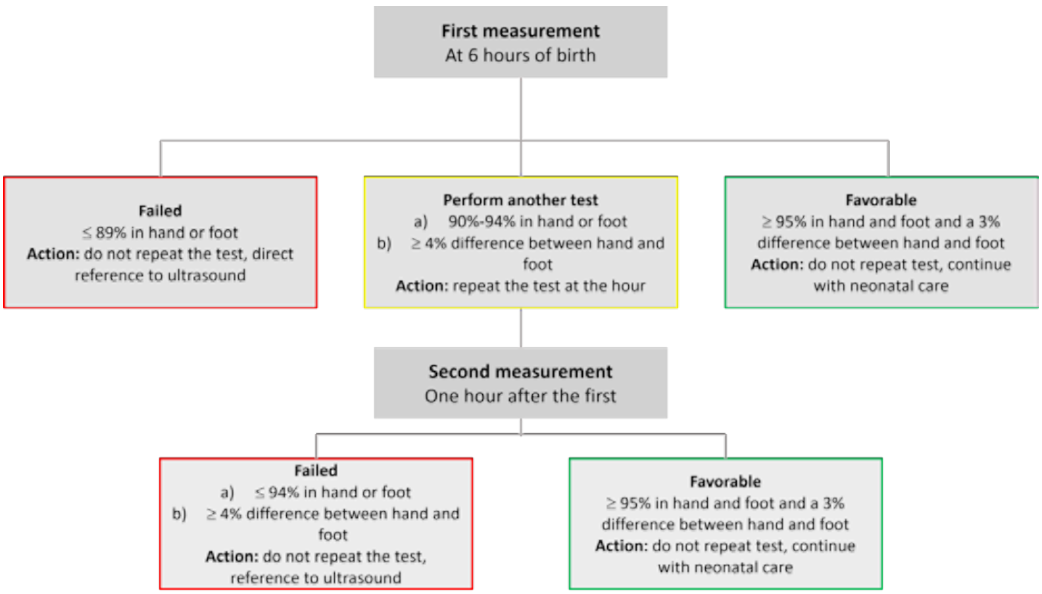


Figure 1: Algorithm description Source: own elaboration based on recommendations of the Newborn Foundation

Place the sensor in the baby's right hand, placing the opposite probes on the outer side of the hand. Make sure there are no gaps between the skin of the baby's hand and the sensors.

Step 7. SpO2 reading from the right hand is recorded when the quality of the reading is strong and stable.

Figure 2. Pulse oximeter Masimo model iSpO2 rx ®

Source: Masimo official website (19)

Interpretation of the readings

A satisfactory screening requires readings greater than or equal to 95% from both the hand and foot, with a difference of no more than 3%. These patients can be discharged home.

Readings in hand or foot indistinctly, between 90% and 94%, or with a difference greater than 3% between the two measurements, are considered failed and require a second one-hour screening from the present measurement. If the second screening yields similar results, it is considered a failure, and the responsible physician must be notified to continue with their evaluation as a risky case of CCHD; the newborn must not go home.

"Any confirmed hand or foot reading less than or equal to 89% indicates a failed screening and requires urgent notification to the treating physician as a risky case of CCHD; the newborn must not be discharged home."

Any confirmed hand or foot reading less than or equal to 89% indicates a failed screening and requires urgent notification to the treating physician as a risky case of CCHD; the newborn must not be discharged home. At the end of the measurement, data must be registered in the appropriate format for collection, which will be emptied into a digital database provided by the researchers.

Bioethical Considerations

When approaching the mother, the procedure and the expected benefit of the cardiac screening test were fully explained to her. Their authorization to carry out the procedure was requested, clarifying that it did not imply any risk to the newborn's health, except for any possible reaction to contact with the device's sensors. Through their signature, the mothers accepted that the procedure would be carried out, that they would be informed about its result, and that the data collected would be private and used for scientific research purposes.

Information analysis

From the sheets filled out by hand in the hospital, an emptying was made to a database in Excel format. Then, the database was exported to Stata 14 software to obtain descriptive and inferential statistics. The sociodemographic variables used were the mother's age and neighborhood of residence. Clinical variables for the mother were weeks of gestation, delivery or cesarean section, and primiparous. Regarding the newborn, clinical variables were hours elapsed since birth, weeks of gestation, SpO_2 values in the first measurement in the right hand and foot and, if required, second measurement of SpO_2 in the hand and right foot; weight (kilograms) and height (centimeters) data were also obtained as clinical variables from the newborn.

Descriptive statistics of the mother's sociodemographic data and the newborn's clinical data were obtained. Risky cases were identified according to the algorithm. Univariate logistic regression tests were performed to estimate the odds ratio of the newborn having heart disease (0= negative, 1=positive) according to the clinical variables. Univariate linear regressions were also performed with newborn pulse oximetry variables, taking SpO_2 values of the hand and foot from the second measurement as dependent variables.

Finally, predictions of SpO_2 values were obtained by using weight (kilograms), height (centimeters) and age (hours) of the newborn as independent variables.

"Based on our cases classified as risky through screening using the pulse oximeter and the algorithm recommended by the Newborn Foundation, the identified cases were referred to the Hospital Poliplaza Médica in Ciudad Juarez with a cardiologist for echocardiography to reveal diagnosis as positive or negative to CCHD."

Ultrasound as gold standard

Based on our cases classified as risky through screening using the pulse oximeter and the algorithm recommended by the Newborn Foundation, the identified cases were referred to the Hospital Poliplaza Médica in Ciudad Juarez with a cardiologist for echocardiography to reveal diagnosis as positive or negative to CCHD. To make it easier for the mother to attend, the cost of the procedure was set as free.

Adjustments implemented in our study due to the COVID-19 pandemic

At the beginning of the research project, the approach of the algorithm established the ability to carry out up to 3 repetitions of the screening test in the newborn. As of March 19, 2020, the arrival of the COVID-19 pandemic was decreed in Ciudad Juarez. The

political and health authorities in Mexico decreed social distancing and quarantine policies to reduce the chances of transmission of the SARS-CoV-2 virus. Hospitals around the region also had to follow strict observations to reduce the risk of infections inside for patients and medical, administrative and assistance personnel. As a result of these policies, the length of stay of the mother and the newborn in the hospital was shortened, therefore, our algorithm had to be adapted to a maximum of two repetitions while data collection was done with the corresponding sanitary maneuvers. It was also observed during this period that the rate of births in the hospital decreased.

To adjust for this change, we were summoned by the hospital authorities to an informative workshop on the sanitary measures that would be carried out, such as sanitary control of entry and exit, maximum stay time of the patients and visits. On the other hand, a literature review was made to adapt the algorithm to maximum of two repetitions. (20)

"In addition to the previous adjustments, it was agreed with the hospital to add more analysis variables since at the beginning data on weeks of gestation, primiparous pregnancy, caesarean section or delivery, height and weight of the newborn, as well as neighborhood of residence of the mother. "

In addition to the previous adjustments, it was agreed with the hospital to add more analysis variables since at the beginning data on weeks of gestation, primiparous pregnancy, caesarean section or delivery, height and weight of the newborn, as well as neighborhood of residence of the mother. Thereafter 75% of the data shows these changes. Nevertheless, a third screening was never made on newborns.

Results

General descriptive statistics

The average age of the mothers is 22.95 years, the youngest being 14 years and the oldest 43 years. 43% of the women were primiparous. It was also recognized that 33.13% of births by caesarean section. (Table 2)

There was a higher frequency of male births. On average, the newborns had 38.95 weeks of gestation with a minimum of 26 weeks and a maximum of 43 weeks. The average weight of the newborns was 3.193 kg with a minimum of 2.106 kg and a maximum of 4.7 kg. Regarding the size, an average of 51.709 cm with a minimum of 36 cm and a maximum of 60 cm. The screening was carried out at 19 hours after birth on average. (Table 3)

"There was a higher frequency of male births...Newborns generally have an acceptable level of arterial oxygen saturation, however, there were cases with unacceptable minimum values in the hand (74%, first measurement), foot (78%, first measurement), as well as minimum values not acceptable in second measurement."

Newborns generally have an acceptable level of arterial oxygen saturation, however, there were cases with unacceptable minimum values in the hand (74%, first measurement), foot (78%, first measurement), as well as minimum values not acceptable in second measurement. (Table 4)

Variable		Frecuency	Percentage		
Primiparous	Yes	175	43%		
	No	232	57%		
Total		407	100%		
Emergency cesarean	Yes	107	33.13%		
	No	216	66.87%		
Total		323	100%		
Variable	Mean	Standard deviation	Coefficient of variation	Mínimum	Maximum
Age (years)	22.9561	5.541	0.241	14	43

Table 2: Descriptive statistics from mothers (n=547)

Source: own data

Variable		Mean	Standard deviation	Coefficient of variation	Minimum	Maximum
Hours from birth to screening		19.119	9.545	0.499	3	60
Weight (kg)		3.193	0.495	0.155	2.106	4.7
Gestation weeks		38.959	1.715	0.044	26	43
Gender	Female	45.5	0.502	0.087	NA	NA
	Male	54.5	0.498	0.913	NA	NA
Height (cm)		51.709	3.507	0.067	36	60

Table 3: Descriptive statistics from newborns (n=547)

Source: own data

Variable	Observations (n)	SpO_2 mean (%)	Standard deviation (%)	Minimum (%)	Maximum (%)
First screening on right hand	544	97.075	2.020	74	100
First screening on right foot	543	97.206	2.001	78	100
Second screening on right hand	43	96.255	1.813	91	100
Second screening on right foot	43	96.511	1.894	89	99

Table 4: Percentage of arterial oxygen saturation (SpO2)

Source: own data

Independent variable	B_o coefficient	B_1 Coefficient	CI 95%		Adjusted R^2	p Value	Significative correlation
			Minimum	Maximum			
First screening on foot	43.766	0.548	0.476	0.620	29.33%	0.00	Yes
Second screening on hand	39.845	0.570	0.157	0.983	13.88%	0.008	Yes
Second screening on foot	58.489	0.375	-0.039	0.790	5.28%	0.075	No

Table 5: Linear regressions of the oxygen saturation values

Source: own data

Variable	Coefficient Bo	Coefficient B_1	IC 95% B_1		Adjusted R^2	p value	Significative correlation
			Min	Max			
Age of the mother (years)	97.434	-0.014	-0.051	0.023	0%	0.45	No
Gestation weeks	96.499	0.018	-0.103	0.141	0%	0.76	No
Weight of newborn (kilograms)	97.241	-0.022	-1.004	0.960	0%	0.96	No

Table 6: Linear regressions of the SpO2 value in the first measurement of the hand (dependent variable) and mother and newborn variables (independent variable)

Source: own data

Regression analysis

Table 5 shows the linear regression analysis between SpO2 values of the hand 1st measurement (dependent variable), 1st SpO2 values of foot (independent) and 2nd SpO2 values of hand and foot (independent).

In the previous analysis, the fact that arterial oxygen saturation values of the second measurement in the newborn's foot do not have a significant correlation with the values of the first measurement in the hand is considered a finding since the rest of the SpO2 values have correlation.

"The regression analysis showed that there is no statistically significant correlation between the SpO2 value and the variables of mother's age, weeks of gestation and newborn weight."

The regression analysis showed that there is no statistically significant correlation between the SpO2 value and the variables of mother's age, weeks of gestation and newborn weight.

Subsequently, SpO2 values from the second measurement were analyzed by using logistic regression to determine odds ratio of a positive result after the first measurement, as shown in the following table. (Table 7)

The odds ratio shows that the chances that the newborn will test positive for heart disease in the second measurement of SpO2 in his foot, after having been identified as positive in the first measurement by pulse oximetry are 27.85 greater than in children that were classified as negative in the first measurement (p=0.00).

"According to that, the possibility that the newborn is classified as risk of heart disease in the second measurement of SpO2 of his hand, are 214 times higher when the first measurement was also positive, compared to newborns that were initially classified as non-risky."

Dependent variable	Categories	n	Xi^2	Odds ratio	IC		P value	Sig
					Min	Max		
Positive on 2nd measurement (foot)	Positive	412	0.00	27.85	9.21	84.19	0.00	Yes
	Negative							
Positive on 2nd measurement (hand)	Positive	413	0.00	214.44	52.62	873.76	0.00	Yes
	Negative							

Table 7: Logistic univariate regression (first screening as independent variable)

Source: own data

According to that, the possibility that the newborn is classified as risk of heart disease in the second measurement of SpO2 of his hand, are 214 times higher when the first measurement was also positive, compared to newborns that were initially classified as non-risky (p=0.00).

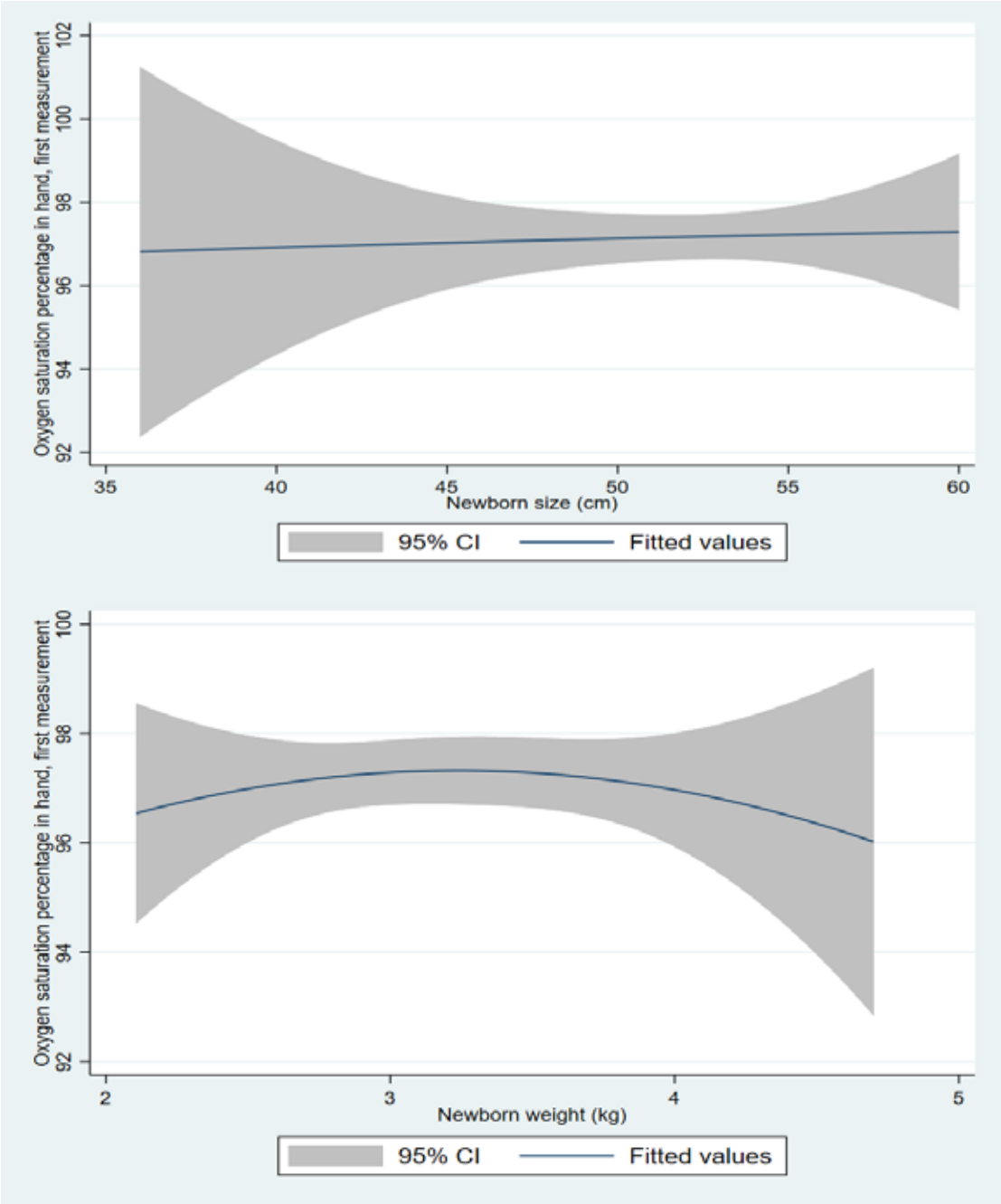
Oxygen arterial saturation predictions at the first measurement in hand

The prediction analysis using graphs was carried out to observe the behavior of the main variable (SpO2) compared to other variables, considering the ranges of acceptability (≥ 95%) and non-acceptability (<95%).

The SpO2 level of the newborn remains almost constant, in the ranges of 96.5% to 97.5% despite the differences in height, where the minimum was 36 cm and the maximum was 60 cm. Therefore, it can be argued through graphic evidence that height does not greatly influence the level of SpO2. (Graph 1)

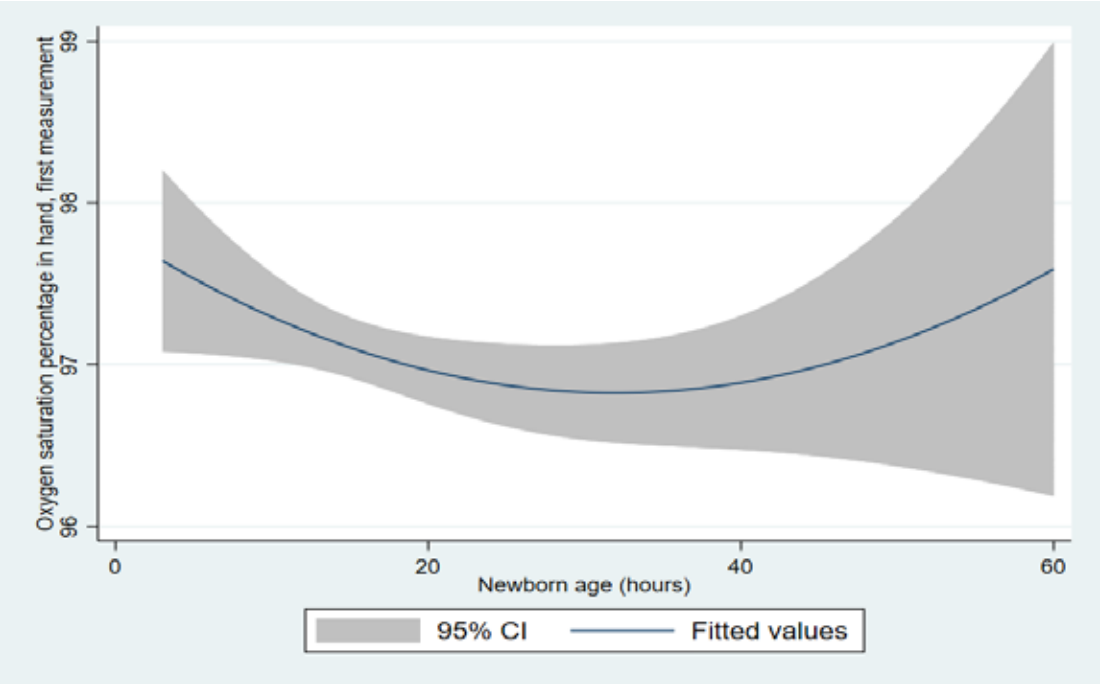
According to the graph, the weight range of newborns if from 2.1 to 4.7 kilograms. Both in the minimum and maximum weight values, the percentage of arterial oxygen saturation trends to decrease, while the maximum values are observed when the weight oscillates between 3 and 3.5 kg. (Graph 2)

The minimum and maximum values in hours of the newborns were 3 and 60 hours. According to the graph, if the screening is done during the first hours, the highest SpO2 values will be obtained; as the hours go by there is the possibility that the saturation percentage decreases, however, after 32 hours it is possible that if the screening is carried out, SpO2 values tend to increase. (Graph 3)



Graph 1 (top): SpO2 percentage according to the height (cm) of the newborn
Graph 2 (bottom): SpO2 percentage according to the weight (kilograms) of the newborn

Sources: own data



Graph 3: SpO2 percentage according to the age in hours of the newborn

Sources: own data

Regressions

Regression graphic shows that while SpO2 values from first screening go up, same happens with SpO2 values during the second screening. (Graph 4)

In this case, while values of SpO2 on first screening in foot have an increment, values of SpO2 on the second screening of hand have a decrement. (Graph 5)

Graphic shows a positive correlation between SpO2 values of hand and foot during their first measurement. It is observed a case of extreme low SpO2 value (74%). (Graph 6)

The first SpO2 measurement in hand has a positive correlation with the values obtained on the second SpO2 measurement in foot. Some values under 95% of saturation are observed, which were remitted to echography. (Graph 7)

Values of SpO2 for first and second measurement have a positive correlation according to fitted line. It is observed one value of SpO2 under 90%, which could be a critical case. (Graph 8)

Discussion

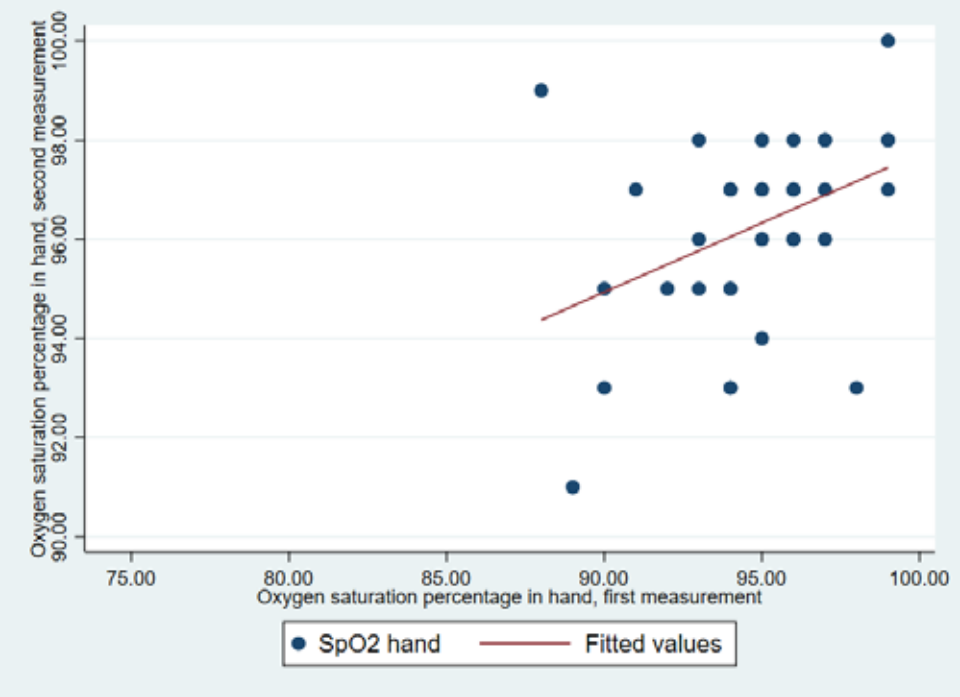
When the Masimo pulse oximeter was used as a cardiac screening instrument, the average time for hand and foot SpO2 measurement was 2.5 minutes. This data complies with one of the indicators of a good screening, that is, speed. The use of the instrument did not represent any economic cost, thus fulfilling another of the requests for screening. (5,21)

Regarding the efficiency of the instrument, it is verified with the gold standard test (echocardiogram). From four cases referred to this test, only two mothers responsibly went to request it; of these two cases, one was positive according to the cardiologist. In this sense, it can be commented that it is favorable for the parents of the newborn that the probability of a positive diagnosis is low, however, in terms of research this indicates that it is necessary to perform more pulse oximetry screening tests and refer suspected and non-suspected cases to echocardiography if sensitivity, specificity, true positive and true negative values are to be estimated, as was done by Thangaratinam et al (22). This task can be completed more quickly as screenings are carried out in hospitals with a higher frequency of births.

Care services provided by the Femap Hospital, although they are private, are inexpensive and are aimed at women who belong to a medium and medium-low socioeconomic level. Their average age was 22.95 years, which is in the age range with the highest frequency of mothers reported by INEGI in 2023 (20 to 24 years; 26.34%) (12). The birth rate in Chihuahua in 2021 was 54.6 per-1,000 women of reproductive age, so the official health services are in constant demand (12). Receiving information about the screening results is beneficial for mothers, and it is also necessary for them to receive guidance to maintain the health of the newborn, or to know procedures for care otherwise (23).

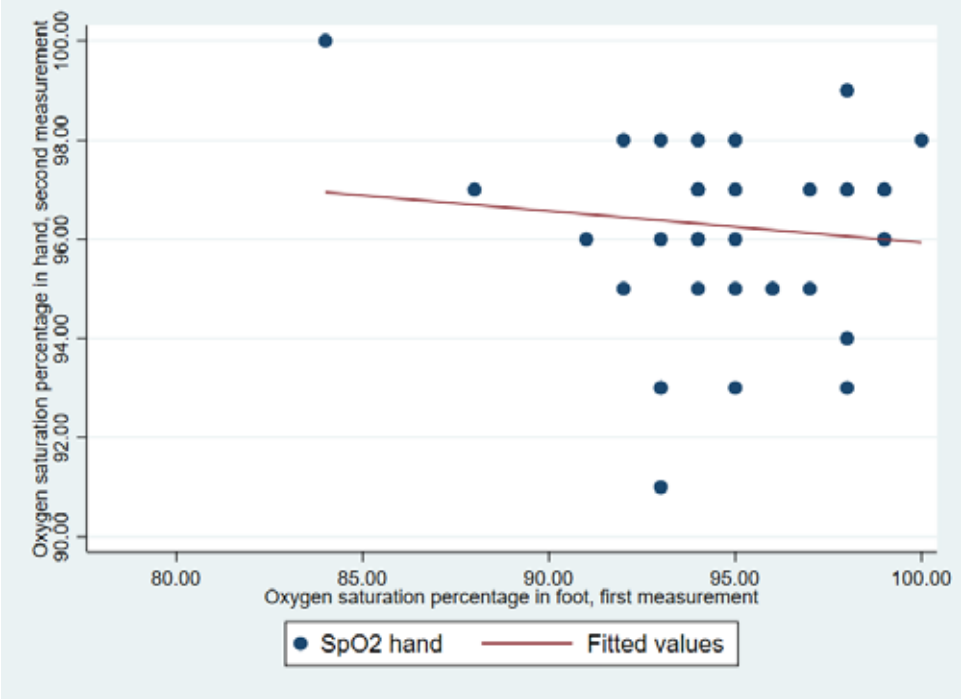
"The results of SpO2 values for foot and hand measurements using the pulse oximeter in the initial screening were satisfactory in the level of oxygenation (SpO2 ≥ 95%) in 504 of the 547 newborns, that is, 92% of the newborns. born was negative for risk of heart disease in the first screening."

The results of SpO2 values for foot and hand measurements using the pulse oximeter in the initial screening showed satisfactory oxygenation (SpO2 ≥ 95%) in 504 of the 547 newborns. That is, 92% of the newborns were negative for risk of heart disease at the first screening.



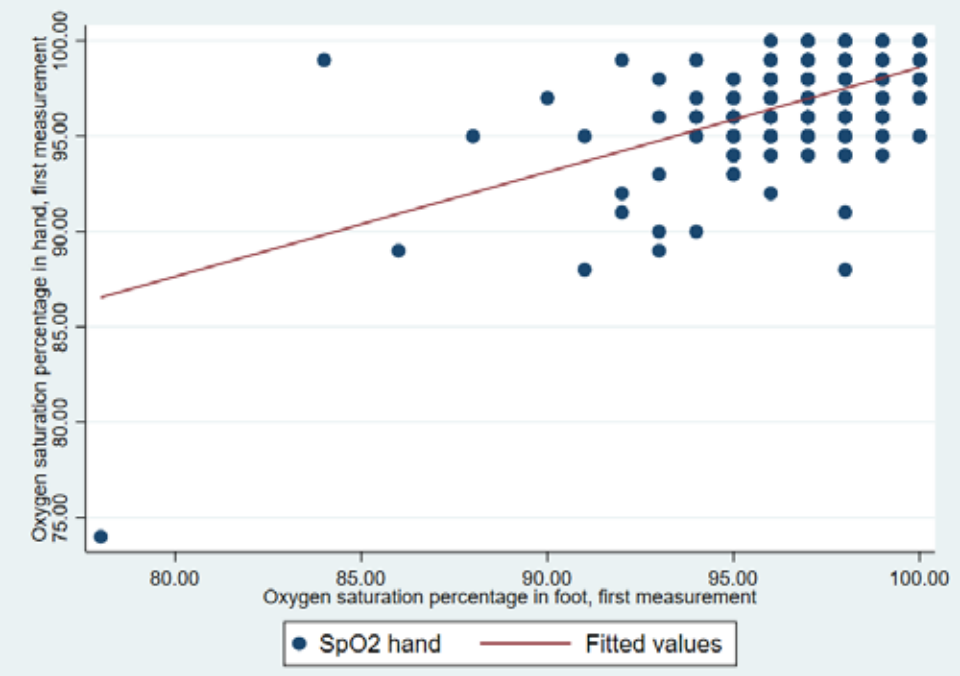
Graph 4: Linear regression of SpO2 hand second measurement (dependent) and SpO2 hand first measurement

Source: own data



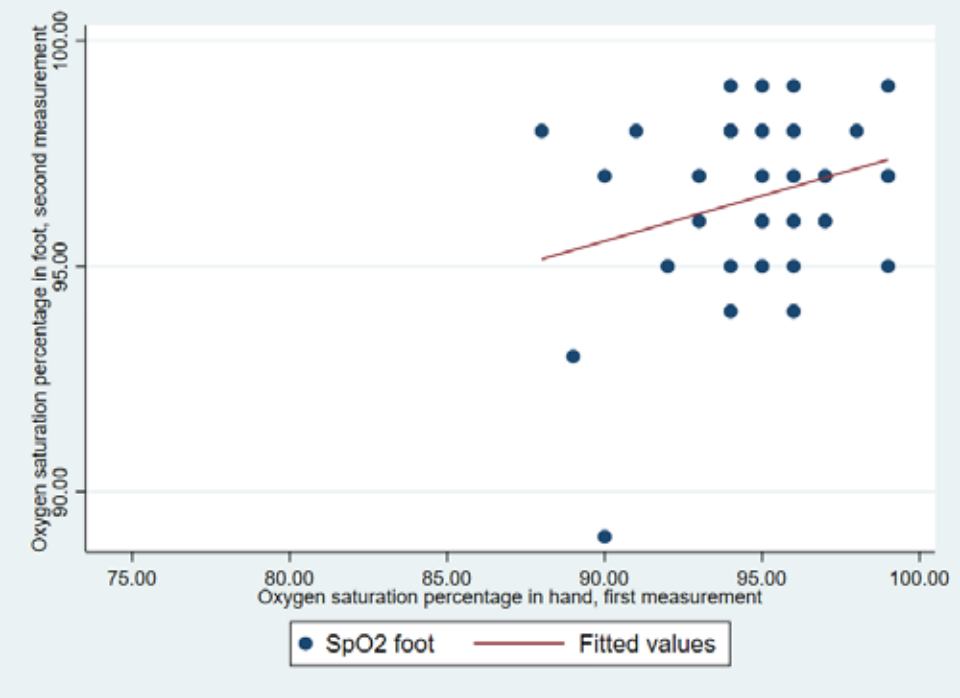
Graph 5: Linear regression of SpO2 hand second measurement (dependent) and SpO2 foot first measurement

Source: own data



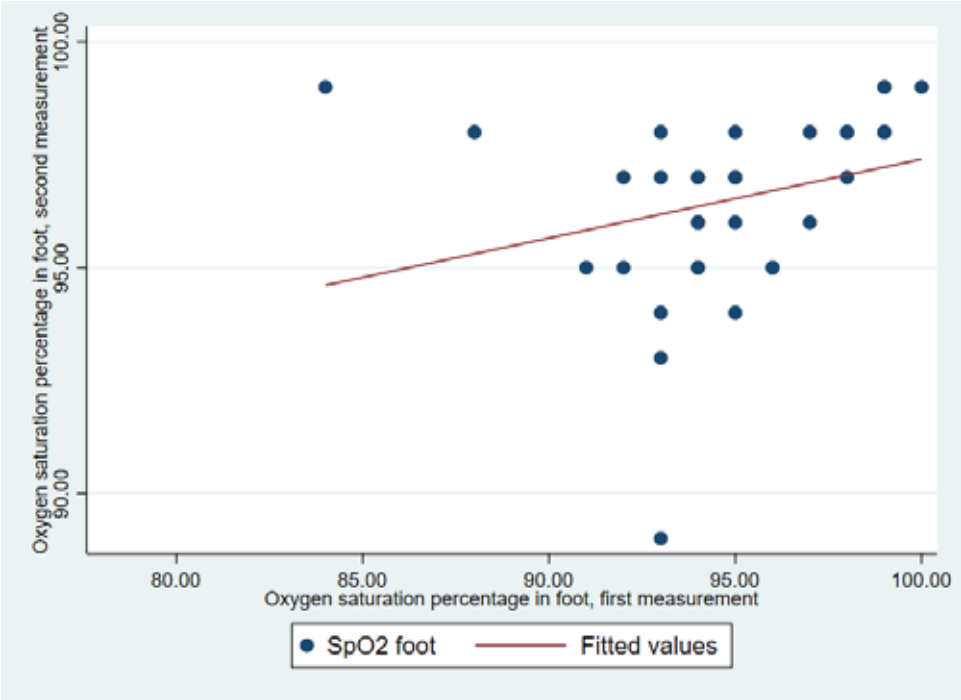
Graph 6: Linear regression of SpO2 hand first measurement (dependent) and SpO2 foot first measurement

Source: own data



Graph 7: Linear regression of SpO2 foot second measurement (dependent) and SpO2 hand first measurement

Source: own data



Graph 8: Linear regression of SpO2 foot second measurement (dependent) and SpO2 foot first measurement

Source: own data

In total, 43 newborns were referred for a second screening, and 4 of them were re-diagnosed as cases of risk for congenital critical heart disease. In this way, 91% of the newborns were discarded after the second screening thanks to the interpretation of data obtained with the pulse oximeter; For their part, San Román et al (18) discarded only 82% of newborns subjected to repeat screening (29/160). Finally, the calculated incidence of risky cases by pulse oximetry was 0.7%, which is close to that estimated by Bruno & Havranek (2), with an incidence of 0.8%, while that estimated by San Román et al (18), without reaching the echocardiography test, was 29/3007, that is, 0.9%. For their part, Del Mar and Carvajal (6) obtained 4 cases from 899 screenings (0.4%).

The results on the correlation between the oxygen saturation variables of hand and foot, confirm the findings of San Román (18), thus, the values detected by the pulse oximeter are consistent. In the case of this research in Femap, it was decided to expand the number of variables including weeks of gestation, weight and height of the newborn. Although the sample is relatively large, there were no approximations to a statistically significant correlation of these variables with those of arterial oxygen saturation. In this regard, Rosvik et al (24) reported a negative correlation also using a pulse oximeter, but with newborns weighing more than 2500 grams. When carrying out this procedure with our data, a negative B coefficient was also found for weight (-0.715), with a p value of 0.09, so the result is reliable at a 90% level, indicating that the lower the weight, the higher SpO2 percentage. In contrast, Laptook et al (25), were interested in SpO2 values in low-birth-weight newborns, recommending that further evaluations be made on saturation limit values, which, from this perspective, implies the need for further studies on the effects of SpO2 values somewhat less than 95%.

Although cardiac screening by pulse oximetry has proven to be effective, fast, and low-cost, it is necessary to multiply the number of hospitals in Mexico where it is routinely practiced, hence the need for hospitals to adhere to the Official Mexican Standard for this proof. If this is achieved, it would be necessary to supply hospitals with equipment and offer thorough training to clinical staff, but also the possibility of access to echocardiography tests would have to be expanded.

"Although cardiac screening by pulse oximetry has proven to be effective, fast, and low-cost, it is necessary to multiply the number of hospitals in Mexico where it is routinely practiced, hence the need for hospitals to adhere to the Official Mexican Standard for this proof."

For the measurement of SpO2 with the pulse oximeter, a condition of rest and tranquility of the newborn is required. It was observed that when the newborn was not calm, the SpO2 values were not quickly displayed on the digital readout, so the mother's collaboration is considered essential.

Finally, for the Health System in Mexico, the task remains of ensuring that hospitals responsibly assume the task of performing cardiac screening, for which they must have the necessary instruments, train the staff and know how to channel risk cases.

Conclusions

Newborn screening tests are a timely way to detect potential health risks. In the case of cardiac screening. An Official Mexican Standard was published for its rutinary implementation, so that health personnel and researchers have worked in a coordinated manner to achieve this in Mexico.

Using the results obtained locally at the Femap hospital in Ciudad Juarez, it can be stated that the pulse oximetry cardiac screening test meets the criteria of efficacy, speed, and low cost, as well as ease of obtaining data to identify risky cases (26). In this sense, the need arises to have more accessibility to gold standard tests when newborns with possible heart disease are detected.

"Using the results obtained locally at the Femap hospital in Ciudad Juarez, it can be stated that the pulse oximetry cardiac screening test meets the criteria of efficacy, speed, and low cost, as well as ease of obtaining data to identify risky cases."

Statistical analyes of data obtained with the pulse oximeter demonstrate the correlation between the main variables of arterial oxygen saturation in the foot and hand. It is possible to add more variables, both clinical and social, to know more about their association and correlation with SpO2 values. In the other hand, hospital authorities acquire the obligation of training their staff and accomplish the task of informing parents, ensuring that importance of screening is understood.

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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%

AFRICAN AMERICAN BABIES bear the brunt of RSV. Yet the American Academy of Pediatrics' restrictive new guidlines limit their access to RSV preventative treatment, increasing these babies' risk.

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Next Level FCC: How FICare Can Benefit US NICUs

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Arrhythmia of Algorithm: NICU and Artificial Intelligence

Shabih Manzar, MD, MPH

Abstract:

An algorithm is helpful in clinical medicine but may create havoc if overutilized. A scenario of a daily round in a NICU is presented to make us think about the overuse of artificial intelligence and machine learning in medical practice.

"Artificial intelligence (AI) and machine learning are changing medical practice. Physicians are using electronic medical records with frequent clinical decision-support prompts. A plethora of clinical guidelines and algorithms have emerged to streamline the management and decrease practice variability."

Artificial intelligence (AI) and machine learning are changing medical practice. Physicians are using electronic medical records with frequent clinical decision-support prompts. A plethora of clinical guidelines and algorithms have emerged to streamline the management and decrease practice variability. The use of AI is impacting medical practice. Here, we present an example of futuristic daily NICU rounds with trainees using AI.

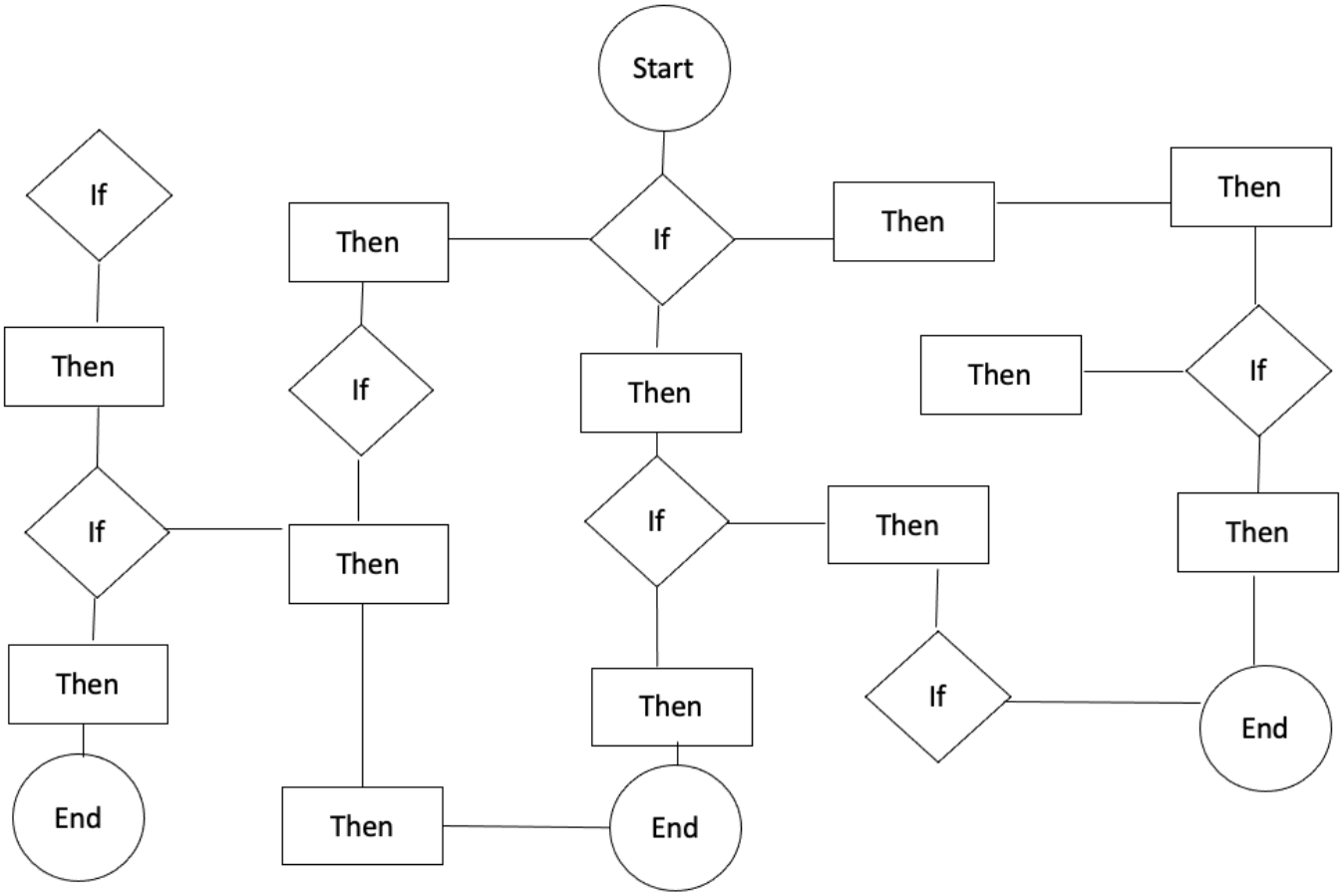
"A plethora of clinical guidelines and algorithms have emerged to streamline the management and decrease practice variability. The use of AI is impacting medical practice. "

The team is rounding in NICU, and a preterm infant reportedly has low blood pressure (39/21 mm Hg).

The attending asks the intern, "What should we do now?"

The intern browses through the portable computer (computer on wheels -COW) and says, "If the diastolic is low, we should consider dobutamine, and if systolic is low, then we should consider dopamine, and if both are low, we should consider epinephrine or norepinephrine. It also depends if we need alpha 1 agonist or beta 2 antagonist."

The consultant requests to see the algorithm, and the intern shows him the picture on the COW's monitor (Figure)



After back-and-forth questioning and answering, they agreed to use vasopressin, which does not act through these alpha or beta receptors. The intern tries to order the medication through the computer. The clinical decision support (CDS) advise box appears, saying, please check if the patient has good urine output. The intern marks that box as "yes." Then the CDS prompt box says, does the patient have the syndrome of inappropriate ADH? The intern checks "no." The CDS box says the dose should be low as the patient is a premature infant. The intern adjusts the dose. The CDS box says this dose is high for this patient, with a creatinine level of 0.9 mg/dL and urea nitrogen of 32 mg/dL. The intern, in frustration, called the pharmacist and requested that she place the order for him. The pharmacist says, “It will be a verbal order, and we have already exceeded the quota for meaningful use of computer order entry, so he must enter it. He returns to the chart and realizes that the admitting staff had wrongly entered the neonate’s weight. He corrects the weight and then finalizes the order. The pharmacy dispenses the medication, and just before the drug is given, the nurse tells the intern that the BP cuff used for blood pressure in this premature infant is wrong. Using the age-appropriate cuff, the infant has normal blood pressure (48/32 mmHg).

All is good what ends good, but a good clinical history, a complete physical examination, the use of the right skills and equipment in assessment, and correct documentation could have avoided this arrhythmia of the algorithm.

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Peer Reviewed

Ethics and Wellness Column: Why Neonatologists Need to Have Leadership Roles in Hospital Utilization Review Committees

Lily Martorell-Bendezu, MD, Mitchell Goldstein, MD, MBA, CML, Elba Fayard, MD, T. Allen Merritt, MD, MHA

Abstract:

We highlight the compelling reasons for Neonatologists' active participation and integration into the Utilization Review process. By meticulously analyzing the intricacies of Utilization Review Committees' decision-making, as stipulated in federal regulations, we underscore the pivotal role played by medical necessity evaluations and the assessment of extended stays. A particular focal point revolves around the guidelines for length of stay and underlying causes of variation from national benchmarks. Many insurers reference entities like MCG and InterQual, which serve as benchmarks for some third-party payers'. We have meticulously examined the nuanced landscape wherein certain private organizations have capitalized on the commercialization of lengths of stay based on specific diagnoses and provide "case management," consequently exerting substantial influence on payers regarding the readiness for patient discharge and attempt to limit payment based on their guidelines that may not be evidence-based. A striking comparison emerges between the avenues available to Neonatologists for disputing lengths of stay and other denials, as afforded by the Code of Federal Regulations (CFR), and the more abrupt denial of care often observed when insurers make decisions regarding discharge dates or decisions regarding ongoing care.

"We underscore the committee's multifaceted roles, functions in the intricate healthcare ecosystem, and susceptibility to potential errors, thus urging the Neonatologists to take an assertive stance in shaping this vital aspect of medical practice."

Introduction

While comprehensive datasets from organizations like Vermont Oxford Network (VON) and California Perinatal Quality Care Collaborative (CPQCC) provide valuable insights regarding the appropriateness of NICU hospital stay, we critically assess how limitations in accounting for combined diagnoses, the intricate interplay of family-related factors, the local availability of home health resources, outpatient therapies and distances to sub-specialists for follow-up care required by infants may lead to deviations from average length of stays. This paves the way for a compelling conclusion, wherein the authors advocate for proactive engagement of Neonatologists within the framework of Utilization Review (UR) committees, particularly those mandated by the Centers for Medicare and Medicaid Services (CMS). We underscore the committee's multifaceted roles, functions in the intricate healthcare ecosystem, and susceptibility to potential errors, thus urging the Neonatologists to take an assertive stance in shaping this vital aspect of medical practice.

Infants admitted to the Neonatal Intensive Care Units (NICU) have some of the longest hospital stays of all hospitalized patients, and among infants born at 24-25 weeks gestation, hospital stays can equal or exceed 15-16 weeks at enormous expense. Parents of many of these infants have comprehensive insurance coverage that pays in part for their hospital care, and many infants covered by Medicaid are covered by the State Children's Health Insurance Program, assuming that the State has expanded their Medicaid coverage. Insurers frequently question the "medical necessity" of these protracted hospital stays and have contracted with commercial groups that monitor an infant's progress in the NICU. They perform "case management" on behalf of insurers and advertise that their case management saves thousands of dollars. However, when coverage is denied during the stay, how do Neonatologists, NICU leadership, and Hospital fiscal officers respond to these denials for payments after specific dates? **What is the recourse to appeal such denials for payments, and who performs them on behalf of the treating Neonatologist and the institution of care? What is the Utilization Review Committee's responsibility? Who forms part of this committee, and how can they advocate for patients, physicians, and parents who are often sent a bill for hundreds of thousands of dollars for incurred costs after the insurer stops coverage? Do third-party case managers, often without licensure in the State where the infant is being cared for, influence care decisions that belong to the bedside Neonatologist?**

"Parents of many of these infants have comprehensive insurance coverage that pays in part for their hospital care, and many infants covered by Medicaid are covered by the State Children's Health Insurance Program, assuming that the State has expanded their Medicaid coverage. "

Understanding the Code of Federal Regulations regarding Utilization Review

The overall regulatory mandate governing the Utilization Review Committee in the hospital setting and the role of case managers, among others, who are striving to provide medically necessary care and prepare for discharge at the earliest possible time when medical stability has occurred is governed by the Code of Federal Regulations Title 42, Chapter IV, Subchapter G, Part 482 Subpart C, subsection 482.30. (https://www.ecfr.Gov/current/title-42-IV/subchapter-G/part-482/subpart-C/section-482.30) (CFR). Hospital case management is related to compliance with the Centers for Medicare and Medicaid Services, Conditions of Participation, and regulatory mandates that can affect patient care and financial well-being. Hospital case manager leaders must stay current with these governmental requirements for hospitals and all levels of care and keep case managers informed, proficient, and fluent when coordinating the care of patients and assisting in discharge planning. The COVID-19 pandemic led to a dramatic change in the healthcare landscape. As a result, the hospital case management leader must proactively address evolving therapies, medication,

and durable medical equipment shortages, a multigenerational workforce, lack of title protection, and issues of appropriate and timely placement and follow-up care for the infant with parents who are often overwhelmed when facing complicated discharges.

"As a result, the hospital case management leader must proactively address evolving therapies, medication, and durable medical equipment shortages, a multigenerational workforce, lack of title protection, and issues of appropriate and timely placement and follow-up care for the infant with parents who are often overwhelmed when facing complicated discharges."

42 CFR Utilization Review (UR) guidelines mandate hospitals to have in effect a utilization review (UR) plan that reviews services furnished by the institution and by members of the medical staff to patients entitled to benefits under Medicare and Medicaid programs. The Centers for Medicare and Medicaid Services has determined that the UR procedures established by the State under XIX of the Act are superior to the procedures required by this section and have required hospitals in a State to meet the UR plans under subsections 456.50 through 456.245. The composition of the UR committee must include two or more practitioners who must carry out the UR function, and at least two members of the UR committee must be doctors of medicine or osteopathy. The others may be any of the types of practitioners specified in subsection 482. c(1). The UR committee must be one of the following: a staff committee of the institution; a group outside the institution, established by the local medical society and some or all the hospitals in the locality; or established in a manner approved by the Centers for Medicare and Medicaid. The UR committee may not be conducted by someone with a direct financial interest (for example, an ownership interest) in that hospital or who was professionally involved in the care of the patient whose case is being reviewed. Precisely, what is determined to be a direct financial interest in a hospital is not defined, as many physicians sit on executive committees within hospitals that make financial decisions that benefit their institution.

"Precisely, what is determined to be a direct financial interest in a hospital is not defined, as many physicians sit on executive committees within hospitals that make financial decisions that benefit their institution."

The UR committee must provide for review for Medicare and Medicaid patients concerning the medical necessity of (i) admissions to the institution, (ii) the duration of stays, and (iii) professional services furnished, including drugs and biologicals. Admission reviews may be performed before, at, or after hospital admission. In some circumstances, reviews may be conducted on a sample basis. Hospitals that are paid for inpatient hospital services under the prospective payment system must conduct as follows: (i) for duration of stays, these hospitals need review only cases that they reasonably assume to be outlier cases based on extended length of stay and (ii) for professional services, these hospitals need review only cases that they reasonably assume to be outlier cases based on extraordinarily high costs, as described in the CFR chapter. Certainly, many extremely low birth weight infants meet these categories, as well as term infants requiring ECMO or prolonged ventilatory support, infants requiring one or multiple surgeries (especially cardiovascular surgery), and infants with genetic conditions requiring an extended work-up and initiation of treatment.

"Before deciding that an admission or continued stay is not medically necessary, the UR committee must consult with the practitioner or practitioners responsible for the patient's care and allow the practitioner or practitioners to present their views."

The determination that an admission or continued stay is not medically necessary may be made by (i) one member of the UR committee if the practitioner or practitioners responsible for the care of the patient concur with determination or fail to present their views when afforded the opportunity, and (ii) must be made by a least two members of the UR committee in all other cases. Before deciding that an admission or continued stay is not medically necessary, the UR committee must consult with the practitioner or practitioners responsible for the patient's care and allow the practitioner or practitioners to present their views. Suppose the UR committee decides that Admission to or continuing stay in the hospital is not medically necessary. In that case, written notification must be given to the hospital, the patient (or parents), and the practitioner or practitioners responsible for the patient's care no later than two days after the determination.

In hospitals paid under the prospective payment system, the UR committee must review all cases reasonably assumed by the hospital to be outlier cases because the extended length of stay exceeds the threshold criteria for the diagnosis, as described in subsection 412.80(a)1(1)(i). The hospital is not required to review an extended stay that does not exceed the outlier threshold for the diagnosis. The UR committee must make the periodic review no later than seven days after the day required by the UR plan. The UR committee is responsible for reviewing professional services, determining medical necessity, and promoting the most efficient use of available health facilities and services.

Funding from Medicare and Medicaid Services, especially within States with expanded Medicaid services, provides significant revenue for NICUs and their ancillary services, imaging, laboratory, and administrative functions after an infant is admitted. Professional services in Neonatology are paid by using specific codes with modifiers whose criteria for use have been determined by

Neonatologists, among others, to bill for both medical care and specific procedures using a formula that includes not only the complexity of medical decisions and procedural skills but also includes regional adjustments or modifiers. While UR committees do not influence professional reimbursements directly, they determine medical necessity that distinguishes between inpatient, observation, or outpatient appropriate levels of care and, thus, professional reimbursement levels.

"While UR committees do not influence professional reimbursements directly, they determine medical necessity that distinguishes between inpatient, observation, or outpatient appropriate levels of care and, thus, professional reimbursement levels."

Length of Stay

The length of care that is appropriate for specific diagnoses, gestational age at birth, and birth weight by consortia of NICUs, NICU networks such as VON, national databases, but also by MCG Health (https://www.mc.com/) and their companion Indicia provides evidence-based clinical decision support for mitigating commercial payer and CMS denial for payments, as does another database called InterQual (https://www.cargehealthcare.com/clinical-decision-support/interqual/level-of-care-critria). Insurers use these data as "norms" for care. However, these estimates of "norms" for the duration of care needed by an individual infant's diagnoses fail to consider predicted complications associated with an infant born extremely premature or a complicated cardiovascular condition that requires unique surgical approaches. These "norms" fail to include unique family situations, especially families living in rural areas, accessibility to recommended therapists, availability of necessary sub-specialists (pediatric ophthalmologists, pulmonary, and developmental specialists), and parents with their health limitations.

Several insurers, such as Humana, have a Case Management division that audits NICU care and length of stay. American Health Holdings advertise "Neonatal and Pediatric Case Management" that "maximizes cost savings for high-risk neonatal and pediatric cases" (https://www.americanhealthholding.com/OurProducts/NeonatalAndPediatricCaseManagement), and Progeny Health indicates that they return 2:1 or better return on investment by insurers delivering 12-16% savings, a 10-15% reduction in Length of Stay, and up to a 50% reduction in readmission and emergency room visits.. They claim to have managed "60,000+ NICU cases" in over 1400 facilities with cost savings for health plans. (https://progenyhealth.com) They report that the average length of stay is a stepping stone to savings for all payment methodologies, and they work to lower the average level of stay in NICUs using their case management strategies. Dr. Ellen Stang founded this case management company with Dr. Linda Genen, a pediatrician, as their Chief Medical Officer with a Medical Advisory Committee comprised of Neonatologists. (https://info.progencyhealth.com/nicu-economics-soilved.).

Recommended Length of Stay (LOS) for Extremely Low Birthweight Infants

Many independent insurers utilize guidelines from MCG Health Informed Care Strategies. For "Prematurity, Extreme (Less than 1000 Grams or Less than 28 weeks' gestation ORG: P-P359) updated 6/28/23 their guidelines explicitly state that "the assignment of a goal length of stay for a neonate requiring higher-level care is not possible to determine with precision." They discuss the "stages of recovery" that allows clinicians and case managers to anticipate known predictable milestones in the recovery of the neonate, and note that the infant's progression through the identified Recovery Milestones may not be smooth or strictly linear. However, they stress that the "overarching purpose" of their Recovery Milestones is to assist in identifying and tracking clinical progress toward discharge readiness. Attainment of all relevant recovery milestones indicates that an infant may be discharge-ready. However, they explicitly state, "Not all clinical and social (e.g., home or caregiver situation) factors can be included in a table. Thus, deciding when a neonate is ready for discharge must be individualized." They quote data from a national all-payer hospital discharge database of 7467 neonates that they analyzed to determine hospital length of stay (birth to discharge), by gestation at birth, for premature infants (born less than 37 weeks gestation age), discharged alive.

"'Not all clinical and social (e.g., home or caregiver situation) factors can be included in a table. Thus, deciding when a neonate is ready for discharge must be individualized.'"

Gestational Age at Birth (weeks)	% of cohort	Average Length of Stay (days)
28 0/7 to 28 6/7	27.1%	64.2
27 0/7 to 27 6/7	19.8%	74.9
26 0/7 to 26 6/7	16.5%	84.0
25 0/7 to 25 6/7	11.0%	91.5
24 0/7 to 24 6/7	8.6%	94.9

(referenced to Premier PINC AI (trademark) Healthcare Database (PHD) -12/31/2021. Premier, Inc.)

They cite the American Hospital Association categories of care provided to neonates by delineating four codes corresponding to varying degrees of intensity of clinical care provided to neonates. These four codes are widely accepted as billing designations and focus on the quantity and intensity of nursing, medical care, and services the newborn needs on a given day. The billing level of care is determined retrospectively and should reflect the resources and intensity needed (over 24 hours, midnight to midnight). The appropriate billing code fluctuates (up or down) during the neonate's stay. Billing codes are independent of the care location and do not directly correspond to the facility level. (Revenue code table 017x Nursery In: UB-84 Official Data Specifications Manual 2023 Ver 17:00 July 2022 ed. American Hospital Association. 2022: 128-129.

"Edwards and coworkers reported in 2021 that between 2005 and 2018, postmenstrual age discharge increased an estimated 8 to 9 days for all infants among 314,811 infants from 814 US Vermont-Oxford Network member hospitals born at 24-29 weeks gestational age without major congenital abnormalities who survived to discharge from the hospital."

Their report lacks the variation in LOS among various NICUs, usually expressed as a Z score. Edwards and coworkers reported in 2021 that **between 2005 and 2018, postmenstrual age discharge increased an estimated 8 to 9 days for all infants among 314,811 infants from 814 US Vermont-Oxford Network member hospitals born at 24-29 weeks** gestational age without major congenital abnormalities who survived to discharge from the hospital. They used quantile regression, adjusting for infant characteristics and complexity for the hospital course, and estimated differences in median age weight and discharge z-score at discharge stratified by gestational age at birth and NICU type. An increase in postmenstrual age at discharge increased in all gestation age categories, with the greatest increases among infants born at 24 weeks (discharge at 42 weeks), at 25 weeks (discharge at 40.7 weeks), and at 26 weeks (discharge at 39.8 weeks) from 2005 to 2018. During this interval, the number of infants discharged from the hospital on any human milk, which included exclusive human milk and human milk plus fortifier, increased from 2005 to 2018. Previously, they had described that infants discharged on human milk alone or in combination with formula showed improvements in weight z-score charge and weight velocity from 2012 to 2016, similar to formula-fed infants. They noted that non-Hispanic Black and Native American infants less likely than non-Hispanic white infants to be discharged on any human milk (2) Further, variation in the diagnosis of apnea of prematurity and its treatment in moderately premature infants 33-34 weeks' gestation at birth was noted by Eichenwald and coworkers (3) found that the mean postmenstrual age at discharge was higher infant diagnosed with apnea compared with those without apnea (36.4 +/- 1.3 vs 35.7 +/- 0.0, P<0.001, analysis of variance). They also report among 10 NICUs in California and Massachusetts comprising the study population that there was significant inter-NICU variation in the proportion of infants diagnosed with apnea (range 24-76%), p<0.001) and an increase in the age at discharge among infants with a diagnosis that included apnea of 1.2 weeks, p<0.001. They suggest that as much as 28% of the variability in postmenstrual age at discharge between NICUs could be explained by the variability in the proportion of infants diagnosed with apnea.

Thus, any determination of the "appropriate" length of stay must take into consideration the choice of nutrition for very low birth weight infants and the occurrence of apnea, and no single predicted "normal length of stay" can be predicted by MCG Health Informed Care Strategies or another firm without consideration of these factors among many.

"Thus, any determination of the "appropriate" length of stay must take into consideration the choice of nutrition for very low birth weight infants and the occurrence of apnea, and no single predicted "normal length of stay" can be predicted by MCG Health Informed Care Strategies or another firm without consideration of these factors among many."

Recommended LOS for Hypoxic-Ischemic Encephalopathy

MCG Informed Care Strategies also states the goal of the length of stay for an infant with hypoxic-ischemic encephalopathy is three days, but that extended stays beyond this goal can be of moderate (four to seven days) or prolonged (seven or more days) when there is insufficient feeding, developmental or neurologic abnormalities (e.g., Seizures, lethargy, abnormal imaging finding or EEG), respiratory insufficiency and the need for ventilatory assistance or infection (e.g., sepsis, pneumonia) diagnosed or suspected (e.g., fever, hypotension). (MCG Health Informed Care Strategies. Update 6/28/2023). Nothing is stated regarding neonatal cooling and rewarming intervals, time until imaging, and requirement for subspecialty services, physical and/or occupational therapy assessments, or home readiness.

Recommended LOS for Sepsis

Their 27th edition guideline for confirmed neonatal sepsis (ORG: P-425) lists an anticipated stay of 10 days, with an extended stay for delayed diagnosis, gram-negative bacteremia, Herpes simplex, and a positive cerebrospinal fluid culture. Fungal infections are expected to have a moderate stay extension.

Recommended LOS for Neonatal Hyperbilirubinemia

Neonatal hyperbilirubinemia has a goal of two days hospitalization according to MCG Informed Care Strategies, and Admission indicated by one or more of the following indications: Total serum bilirubin (TSB) exceeding risk threshold for phototherapy in an infant without neurotoxicity risk factors (other than gestational age) as indicted by: TSB meets or exceed phototherapy threshold, the rapid rise of TSB within the first 24 hours after birth at a rate of 0.30 mg/dl per hour or more, and rapid rise of TSB at 24 hours after birth or later at a rate of 0.20 mg/dL per hour or more Risk factors include serum albumin < 3.0 g/dL, iso-immune hemolytic disease with a positive direct antiglobulin test, glucose-6-phosphae dehydrogenase deficiency, and other hemolytic conditions such

as sepsis, significant clinical instability in the previous 24 hours, such as asphyxia, significant lethargy temperature instability, or acidosis that could extend the hospital stay. Need for exchange transfusion or intravenous immune globulin are designated as reasons for an extended stay. They cite American Academy of Pediatrics guidelines for indications for phototherapy with the caveat that "clinicians and families may choose to employ phototherapy at lower levels of TSB based on individual circumstances and preferences such beginning phototherapy at a subthreshold level during a birth hospitalization to reduce the risk of readmission if the absolute level or rate of rise of the TSB suggests a high likelihood of exceeding the treatment threshold after discharge citing the American Academy of Pediatrics Clinical Practice Guideline revision by Kemper, AR, et al. (4). Alternatives to hospital admission are listed to include home phototherapy and frequent feeding with lactation consultant if needed. However, no consideration is made for parents living far from hospital laboratories for sequential bilirubin measurements or the safety of home phototherapy in many households.

"However, no consideration is made for parents living far from hospital laboratories for sequential bilirubin measurements or the safety of home phototherapy in many households."

Recommended LOS for Neonatal Opioid Withdrawal

A commercial group encourages the use of non-evidence-based guidelines. For example, Amerigroup Guideline CG-MED-26 (https://medpol.providers.amerigroup.com/dam/medpolicies/amerigroup/activie/guidelines/gl_\pw_a053765.html.) cite int their 4/12/2023 Utilization Management Guidelines for Neonatal levels of care. They list conditions and services for many neonatal levels of care (levels 1-4 NICU care) with specific diagnoses. They particularly focus on neonatal opioid withdrawal syndrome and mention the modified Neonatal Abstinence Scoring System but also endorse an alternate tool called Eat, Sleep, Console (ESC) suggested by Grishman and coworkers (5) to guide treatment by the infant's clinical signs of withdrawal though their ability to eat, sleep undisturbed, and be consoled. They acknowledge that this approach has only been studied through quality improvement programs, and it is unclear if improvements result from this approach itself or better adherence to nonpharmacologic management, resulting in cost savings by earlier discharge. However, they state, "Admission to and continued stay in appropriate neonatal levels of care are considered NOT MEDICALLY NECESSARY when their criteria are not met. Often, funding is halted using guidelines that have not been rigorously tested in contrast to other scoring systems for neonatal opioid withdrawal.

It is disappointing that most NICU case management groups fail to cite the 2023 Standards for Levels of Neonatal Care: II, III, and IV published in Pediatrics, which provides the most current description of care practices by the American Academy of Pediatrics NICU Verification Program (6). Furthermore, the multiple variables associated with an infant's diagnosis and multidisciplinary approaches for discharge readiness using a parental and nurse survey for all families prior to discharge from a large NICU as discussed by Gupta and coworkers (7), demonstrated substantial variability but improved readiness when caregiver-parent dyads dedicate resources to improve parental readiness for taking their infant is not mentioned or used by commercial case management firms. Parental psychosocial support using individualized, flexible, but realistic pre-and post-discharge plans with parents requires insurance funding in the transition from hospital to home and community (8).

"It is disappointing that most NICU case management groups fail to cite the 2023 Standards for Levels of Neonatal Care: II, III, and IV published in Pediatrics, which provides the most current description of care practices by the American Academy of Pediatrics NICU Verification Program."

In conclusion, we have meticulously examined the nuanced landscape wherein certain private organizations have capitalized on the commercialization of lengths of stay or very low birth weight infants based on gestational age at birth, disregarding associated diagnoses and consequently attempting to exert a substantial influence on when payers perceive that an infant has readiness for NICU discharge. These are based on stay averages and do not generally account for unique aspects of required care for many neonates and their families and their readiness to get their infants home.

A striking comparison emerges between the avenues available to primary physicians for disputing lengths of stay, as afforded by the CFR, and the more abrupt denial of care often observed when insurers make decisions regarding discharge dates and those advising them through contractual arrangements focused on reducing the cost of care as they promise in their promotional materials.

"Neonatologists are advised to be informed and willingly collaborate with their institutional Utilization Review committee to represent infants and families under their care better and advocate for more patient and family-centered decisions regarding length of stay, utilization of resources, and quality of care in the NICU. "

Neonatologists are advised to be informed and willingly collaborate with their institutional Utilization Review committee to represent infants and families under their care better and advocate for more patient and family-centered decisions regarding length of stay, utilization of resources, and quality of care in the NICU. Knowledge of their right to appeal decisions through their Utilization Review committee and arbitrary decisions by insurers is essential. Neonatologists should exercise their rights to dispute denials for funding of care granted through the cited CFR regarding Utilization Review and peer-to-peer discussions to refute arbitrary

decisions made by insurers. UR committees afford opportunities to defend care practices and needed lengths of stays for individual patients and not be tied to a formula proposed by case management firms. Neonatologists should embrace this opportunity for the well-being of their patients, families, and professionals dedicated to caring for critically ill newborns.

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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

National Perinatal Association

Letters to the Editor

Letter to Editor: "Human Milk Supports Health and Growth for Babies"

Dear Editor,

With great excitement, we read "Human Milk Supports Health and Growth for Babies" by Josie Cooper.

"In this article, Ms. Cooper advocates for human milk, whether from the mother or donor, as the best source of nutrition for supporting neonatal health. Ms. Cooper underscores the importance of human breast milk as a source of nutrition and medical therapy. From being used as a topical treatment to treating diaper rash to decreasing the risk of complications after surgery, human milk benefits are thoroughly supported."

In this article, Ms. Cooper advocates for human milk, whether from the mother or donor, as the best source of nutrition for supporting neonatal health. Ms. Cooper underscores the importance of human breast milk as a source of nutrition and medical therapy. From being used as a topical treatment to treating diaper rash to decreasing the risk of complications after surgery, human milk benefits are thoroughly supported. What we found particularly persuasive for its use in the infant population was its range of applicability, wide availability, and inexpensiveness in patient care. Considering the great benefit that human milk advocacy could have on our most vulnerable infant population, we thought it was important to expand on this topic further.

"Beyond these short-term benefits we see in babies, human milk can lead to lifelong improvements in health. It protects against diabetes, obesity, asthma, cardiovascular diseases, and autoimmune disorders. Despite being one of the most medically advanced nations worldwide, many Americans suffer from preventable diseases."

Beyond these short-term benefits we see in babies, human milk can lead to lifelong improvements in health. It protects against diabetes, obesity, asthma, cardiovascular diseases, and autoimmune disorders. Despite being one of the most medically advanced nations worldwide, many Americans suffer from preventable diseases. Although some of this is attributable to genetics, poor dietary habits and sedentary lifestyle choices plague our nation, with nearly two in five American adults suffering from obesity. This also extends into our pediatric population, with one in six children ages 2-19 being overweight and one in five having obesity. Obesity increases the risk for several chronic medical conditions like type 2 diabetes, hypertension, heart disease, stroke, joint problems, liver disease, gallstones, some types of cancer, and sleep and breathing problems (1). Diabetes affects nearly 37.3 million Americans nationwide, affecting an individual's quality of life and physical, mental, and emotional well-being. Diabetes and diabetes-related health complications are far-reaching, ranking as the eighth leading cause of death in the US. These issues are also costly, equating to nearly $327 billion in medical costs and lost work and wages (2). Despite these astounding impacts, there is still no cure for diabetes, and treatment is solely based on lifestyle changes and symptomatic management.

"Diabetes and diabetes-related health complications are far-reaching, ranking as the eighth leading cause of death in the US. These issues are also costly, equating to nearly $327 billion in medical costs and lost work and wages (2). Despite these astounding impacts, there is still no cure for diabetes, and treatment is solely based on lifestyle changes and symptomatic management."

Obesity and diabetes are often comorbid with cardiovascular disease. According to the CDC, nearly one person dies every 33 seconds in the US from cardiovascular disease. Heart disease is the leading cause of death for men, women, and people of most racial and ethnic groups in the US (3).

Lastly, Ms. Cooper also discusses the benefits of human milk on asthma. Although seemingly benign, asthma is a major problem that interferes with daily activities. Uncontrolled asthma can result in frequent severe exacerbations or death, adverse medication reactions, and chronic morbidities such as impaired lung function or reduced lung growth. Impaired lung function in a child can lead to delays in growth and puberty (4). These impairments will also reduce exercise tolerance, leading to a sedentary lifestyle that may result in obesity, diabetes, or heart disease, further perpetuating a vicious cycle of poor health.

Using breast milk to reduce the chronic diseases outlined above can profoundly impact a patient's quality and length of life, reducing morbidity and mortality. These effects extend downstream into

our healthcare system, reducing healthcare spending and lessening the burden on healthcare providers. Early on in life, breast milk is an upstream, preventive health measure, and practitioners nationwide should continue to encourage its use.

Ms. Cooper also states that human milk is widely available and inexpensive, making it accessible to those who wish. We want to explore this point further as barriers to healthcare have been well-established, and breast milk is not a resource immune to such disparities in access. It has been found that socioeconomic factors, including public insurance and lack of transportation, cause decreased breast milk use in NICU infants. Family factors, such as lack of transportation, can also limit a family's ability to care for their babies in the NICU and decrease breast milk availability (5).

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In the case that babies were then given donor breast milk, it was also found that the use of donor milk causes a decrease in breast milk use prior to discharge with the supposition that the use of donor milk may result in a delay in establishing an optimal breast milk supply from mothers (5). Mothers may not be able to transition well to providing breast milk, affecting children's source of breast milk after they are taken home. Additionally, donor human milk (DHM) availability is a healthcare disparity. DHM is expensive, with an average price of $3-5 per ounce, which makes it costly for hospitals to maintain milk banks or continuous access to milk (6). Although those living in California with Medicaid can be reimbursed, not all insurance do so, causing significant costs to families who cannot afford it (7).

"Outside of familial factors, even within NICUs, there are differences in resources; lactation support is one example. The importance of lactation support staff in the NICU has been well-established, but access varies between institutions (5)."

Outside of familial factors, even within NICUs, there are differences in resources; lactation support is one example. The importance of lactation support staff in the NICU has been well-established, but access varies between institutions (5). Higher-level NICUs may have regular lactation support, while lower-level NICUs may not be as well-staffed, and this would negatively affect the availability and use of breast milk for infants.

Ultimately, the extensive benefits of breast milk are not in question, as Ms. Cooper outlined many of the wonderful qualities of using it in the NICU. However, while donor or mother's breast milk might be available during stays in the NICU, there are disparities in access. Furthermore, these disparities extend to infants' times after discharge, as education in the hospital dramatically influences how babies are fed after they are taken home. A focus should be placed on making plans for families to continue using human breast milk for their children, which would benefit babies towards the end of their stays in the hospital and at home.

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Sincerely,

Suha Godil, OSM III, Tushara Govind, OSM III, and Amal Shafi, OSM III

Dear Doctors to be Godil, Govind, and Shafi:

We sincerely appreciate your eloquent and insightful letter to the Editor, responding to Josie Cooper's article on the pivotal role of human milk in neonatal health. Your comprehensive analysis and thoughtful commentary bring essential nuances to the conversation, and we welcome the opportunity to delve deeper into the issues you discussed. (1)

Firstly, your genuine enthusiasm for this topic shines through your words. You highlight the extensive benefits of human milk, whether sourced from mothers or donors, in nurturing the health and development of infants. Cooper's article serves as a compelling testament to the manifold advantages of breastfeeding.

Your emphasis on the lifelong health benefits of breastfeeding resonates deeply. It is undeniable that breastfeeding has the potential to reduce the risk of chronic diseases, ultimately enhancing both the quality and length of individuals' lives. Furthermore, your mention of the economic ramifications of these preventable conditions on our healthcare system underscores the urgency of promoting breastfeeding as a preventative measure. (2, 3)

As you discussed, the disparities in access to human milk are crucial to this discourse. Socioeconomic factors and other barriers can create unequal access to human milk, especially in the sensitive NICU environment. Identifying and addressing these disparities is paramount to ensure that all infants, regardless of their background, can equally benefit from human milk. Your insights into the influence of donor milk on maternal milk supply underscore the necessity for comprehensive support and education for mothers to make informed choices. (4)

"As you discussed, the disparities in access to human milk are crucial to this discourse. Socioeconomic factors and other barriers can create unequal access to human milk, especially in the sensitive NICU environment. Identifying and addressing these disparities is paramount to ensure that all infants, regardless of their background, can equally benefit from human milk. "

Your concerns regarding the affordability and accessibility of donor human milk are well-founded. The cost factor associated with donor human milk can be prohibitive for many families, making policy initiatives like Medicaid coverage essential for ensuring accessibility. Ensuring that donor milk is affordable and readily available is critical for its widespread use as a valuable resource for neonatal care.

"In conclusion, your letter is invaluable to the ongoing discussion surrounding the significance of breastfeeding and equitable access to human milk. It highlights the need for a holistic approach that not only extols the benefits of breastfeeding but also identifies and resolves the barriers and disparities that impede its implementation."

Lastly, your observation of the disparities in lactation support within NICUs is a poignant revelation. It emphasizes the importance of providing consistent and equitable access to lactation support services across healthcare institutions. Addressing these disparities should be a paramount concern for healthcare providers and policymakers.

In conclusion, your letter is invaluable to the ongoing discussion surrounding the significance of breastfeeding and equitable access to human milk. It highlights the need for a holistic approach that not only extols the benefits of breastfeeding but also identifies and resolves the barriers and disparities that impede its implementation. Your steadfast advocacy for equal access to this essential resource for all infants especially premature infants is commendable and serves as a call for action. (5, 6)

I look forward to continued dialogue on this pressing issue and the steps we can collectively take to ensure every infant has the opportunity to thrive through the nurturing power of human milk.

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Sincerely,

Mitchell Goldstein, MD, MBA, CML

Editor in Chief

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Erratum (Neonatology Today August, 2023

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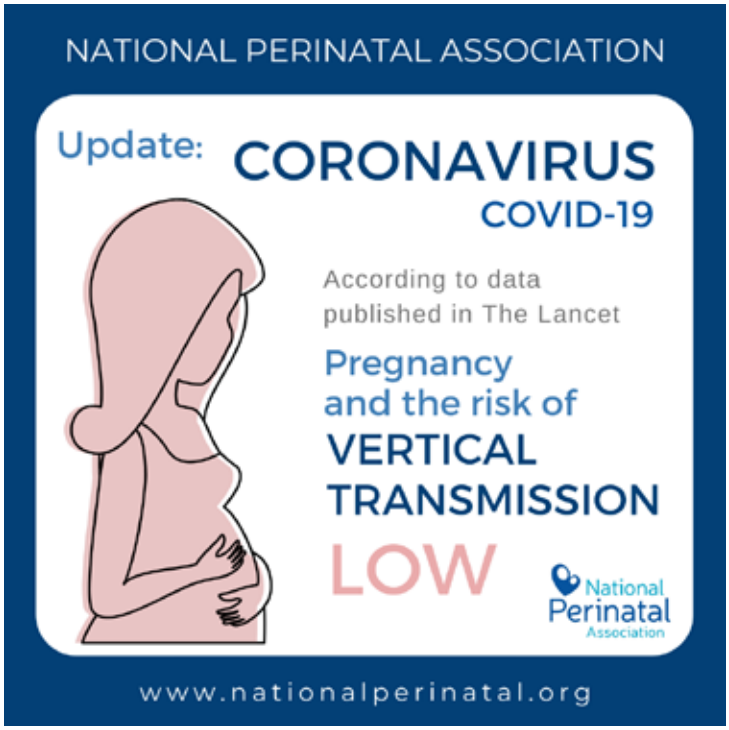
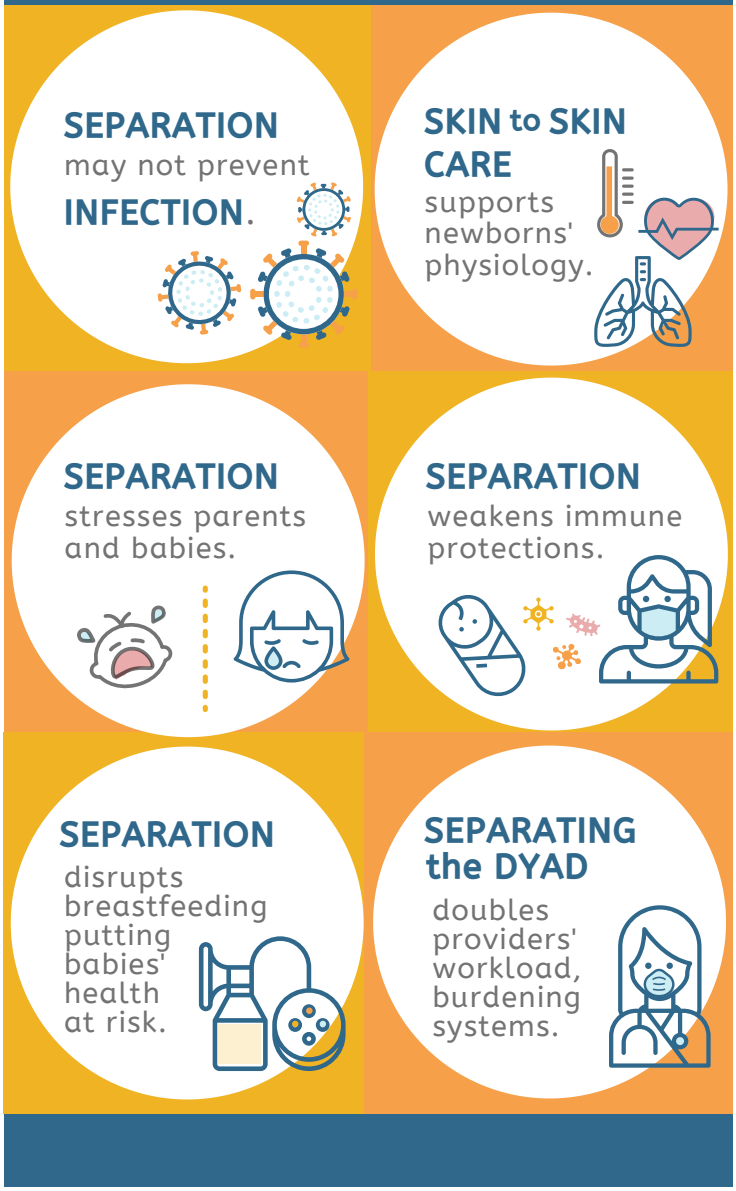


Should Infants Be Separated from Mothers with COVID-19?

FIRST DO NO HARM



BASED ON THE ARTICLE:

Should Infants Be Separated from Mothers with COVID-19? First, Do No Harm

Peer Reviewed

Fellows Column: Drug Shortages in the USA is a Persistent Problem

Akshaya Ramakrishnan, Varsha Ramachandran

Introduction:

Drug shortages in the health industry has been a persistent problem for more than a decade in the United States. Drug shortages pose a risk to patients and burden healthcare providers. Since the pandemic hit, drug shortage has followed an increasing trend, and no solution has been found.

The two-year-long COVID pandemic has worsened this shortage of much-needed drugs. Recent news has reported a shortage of Vincristine, a vital drug to treat leukemia, a shortage of Adderall, a commonly-prescribed drug to treat ADHD, and anti-inflammatory tocilizumab used for chemotherapy as well to treat COVID patients. (2) The FDA currently lists 109 drugs in short supply nationally. The American Medical Association calls the shortage an "urgent public health crisis" that "threatens patient care and safety." According to the American Society of Health-System Pharmacists, three of the top five shortages are drugs used for chemotherapy, heart conditions, and antibiotics.

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The effects of the problem, apart from the apparent implication on the patient on such critical diseases like leukemia, ADHD, and COVID, have lots of other side effects such as higher hospital expenses, increasing quality control risks in patient care, and straining the supplies of drugs even more.

Lifesaving drugs:

Some of the lifesaving drugs that are in shortage are the following,

- **Norepinephrine:** used to treat septic shock
- **Bleomycin:** palliative care
- **Lidocaine:** anesthesia
- **Adderall:** Used to treat ADHD

https://www.fda.gov/media/132058/download

Norepinephrine, used to treat septic shock, has had a past shortage. In 2011, the absence of the drug forced physicians to use alternative drugs on patients suffering from septic shock. As a result, the probability of dying from complications was much higher in hospitals that incorporated alternatives than in hospitals using norepinephrine.

Bleomycin is used to treat many forms of cancer, including but not limited to Hodgkin and non-Hodgkin lymphoma. During its shortage in 2016, alternatives to the drug were introduced. Though they were effective, bleomycin alternatives required in-patient care, exposing the patient to pathogens in the facility, increasing stress for loved ones and costs.

Lidocaine, used to reduce burning sensations, is usually associated with propofol, a common anesthetic. When treated with propofol without lidocaine, patients have reported burning sensations, increasing stress, and agitation during a procedure.

Adderall is a drug used to manage attention deficit hyperactive disorder. Patients who do not get this medication can become more disruptive since their symptoms are poorly controlled with other less potent drugs. Adderall is sometimes prescribed as a last resort when the alternatives do not work. (4)

"Physicians are forced to use an alternative drug that may be either less potent or produce more side effects. Treatment duration can be prolonged, resulting in increased costs and health complications."

Impact on public health and economy:

Physicians are forced to decide who receives the needed medication and who does not. There will be delays in getting critical medication or treatment. There is a higher chance of medication errors and accidents when pharmacists have to prepare desired concentrations independently, e.g., preparing pediatric dosing using adult formulations. Physicians are forced to use an alternative drug that may be either less potent or produce more side effects. Treatment duration can be prolonged, resulting in increased costs and health complications.

Possible causes:

There are multiple causes for the problem, some of them long-standing: A NIH commissioned study did a survey and found out that the main reasons were manufacturing problems (23%), supply and demand issues (13%), discontinued drugs (6%) and raw material shortages (3%). However, the same study classified a large percentage (55%) as unknown. A survey by Kesselheim et

al. further illustrated the severity of the drug shortage and concluded that rationing and hoarding were prevalent in large hospitals, further compromising health care. An FDA study concluded that the drug shortage crisis does not follow a typical market response. In a typical market, a shortage results in a price increase addressed by increased supply by existing and new manufacturers to meet the demand. However, the market for prescription drugs, especially generic ones, differs from other markets. The study found three major causes for the shortage: (5)

- Manufacturing drugs with little benefit economics-wise: Due to restricting market circumstances, firms lack the incentive to participate in the market for older prescription drugs. Firms are more interested in profiting from newer drugs, whereas firms that produce older generic drugs are put in a difficult position. (5)
- The economy and drug market give no reward to manufacturers for well-thought-out management systems: The Current Good Manufacturing Practices (CGMPs) regulate the requirements for the production of drugs. The CGMPs, however, only give a bare minimum expectation and not a high standard for mature management systems that guarantee a reliable and high-quality supply of drugs. In order to lower the costs of manufacturing, firms must minimize investment in manufacturing quality, which, in turn, reduces the quality of the product.
- The market cannot come back from regulatory and logistical setbacks: Many companies have their production or contract companies overseas. Due to the complexity involved in the supply chain, response to a drug shortage is not immediate, or it sometimes does not happen due to regulatory challenges. If a new company wants to enter the US drug market and is willing to produce the drug in shortage, the manufacturer has to develop a file and wait for FDA approval, which is a long process. (6)

"An FDA study concluded that the drug shortage crisis does not follow a typical market response. In a typical market, a shortage results in a price increase addressed by increased supply by existing and new manufacturers to meet the demand. However, the market for prescription drugs, especially generic ones, differs from other markets. "

Possible Solutions:

Utilizing a long-term solution that ensures a stable, reliable, and sufficient supply of essential medications is essential. Though this problem is significant, the FDA poses three recommendations to combat it.

The first recommendation is to have a system that provides transparency to the solution and brings more awareness of the problem. Research should be conducted to narrow down, isolate, and solve the problem.

The second recommendation is to implement a rating system to incentivize the manufacturers, and the last recommendation is to consider new contracting approaches to ensure a reliable supply of essential drugs. (8) Hospitals must consider including a directory of pharmacies at the hospital in order to have a well-thought-out plan to manage shortages, implement structured communications between distributors to recognize shortages in a timely manner, ask the right questions to find the root cause of the shortage, purchase only from official channels, and have the right amount of inventory. For example, periodic risk assessments should often be conducted to identify manufacturing supply vulnerabilities.

The third solution is to lengthen the expiration date, which can be achieved by increasing the quality of storage and transport. According to the US Food and Drug Administration, expiry dates can be lengthened through manufacturers or the Shelf-Life Extension Program. SLEP extends the shelf life of certain materials after the products go through selective periodic stability testing through the FDA and will minimize product waste.

"According to the US Food and Drug Administration, expiry dates can be lengthened through manufacturers or the Shelf-Life Extension Program. SLEP extends the shelf life of certain materials after the products go through selective periodic stability testing through the FDA and will minimize product waste."

Conclusion:

Drug shortages create many challenges for healthcare professionals and patients. Drug shortages significantly impact treatment duration, patient safety, health risks, side effects, quality outcomes, and hospital expenses and costs. Although it is difficult to predict and prepare for every drug shortage, careful planning, and preparation can prevent drug shortage crises and major disasters. Establishing clear procedures and guidelines and timely communications are critical for managing drug shortages at the hospital level.

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Guide to High-Reliability Organizing (HRO): 1, Scholarship, Words, and Clichés

Daved van Stralen, MD, FAAP, Sean D. McKay, Element Rescue, LLCn Thomas A. Mercer, RAdm, USN (Retired)

Abstract:

The gap between theory and practice is a liminal space with its own logic and language. To introduce HRO to a program, we can remove select words that interfere with thought. Replacement words from organization members will soon initiate the "HRO mindset." Terminating clichés, a method used in brainwashing is unnecessary for thinking and discussions. Therefore, they can easily be removed. These few changes can bring HRO into an organization or system with minimal effort.

"To introduce HRO to a program, we can remove select words that interfere with thought. Replacement words from organization members will soon initiate the "HRO mindset." Terminating clichés, a method used in brainwashing is unnecessary for thinking and discussions. Therefore, they can easily be removed. These few changes can bring HRO into an organization or system with minimal effort."

Introduction:

An organization's introduction or development of High Reliability seems to follow approaches that change the system or bring conformity to the workforce. Paradoxically, HRO characteristics support rapid system adaptation during a forcing function or abrupt change and initiative plus conformity rather than sole reliance on conformity. When we view events as occurring between theory and practice, a liminal space, the individual becomes visible. Increasing the individual's capability can appear to be the more involved method of change. Using "plain language," identifying "never" words, and removing thought-terminating clichés can readily initiate change toward HRO.

HRO and safety can be introduced as a DIY project –Do It Yourself. In this series of Neonatology Today articles, we will discuss some of the problems preventing the achievement of high reliability and some readily incorporated approaches for change.

The Problem:

Theories and models are part of our understanding of science. Theorizing is conceptual, explanatory, and interpretive (1). In practice, however, information is imperfect, changes, and conflicts with other information. Time becomes a measure. The future branches are becoming open to influence and change (2). What is reliable is the practitioner's skill at observation. "We can place our highest hopes in observations…The kind of knowledge supported only by observations and has not yet been proved must be carefully distinguished from the truth; it is gained by induction," Leonhard Euler (3). This is the world of practice – able to probe and then evaluate the responses of each probe.

The tension between theory and observation tests the application of that theory while challenging the individual's power of observation. Both are in eternal flux. This tension is not the problem. Instead, this tension keeps theory honest and observations accurate.

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The problem is operating within the gap between theory and practice – the application of abstract thought in a contextual situation.

The Gap Between Theory and Practice

Scientific theory and rationality assume discrete a priori themes and concepts outside the human mind (4, 5). Operators in the field develop their logic of practice built upon contextual relations entwined with people and work (6). The absence of practice within theory is how theoreticians see theory-making as themes regarding a priori scientific assumptions. This is the *scientific subject domain* (5).

We do not recognize the liminal characteristics of the Theory-Practice Gap. The liminal zone described in anthropology is that space between a world we know and a world we do not, where our old rules no longer apply, yet we have not learned the new rules (7). We either do not belong or were created to pass through these temporary spaces. We do not have context. We cannot rely on learned concepts, policies, or rules. In this area of experience, we must engage the situation to leave, yet we do not know what works (8).

The liminality of the gap influences our academic approach to this gap and HRO. Accepting the liminal zone as an operational area for HRO supports a scholarly approach for transdisciplinary and interdisciplinary studies that bridge disciplines. Such an approach could cross levels of analysis to form integrative HRO as a science (9).

Practical Wisdom

We aim to make good choices. Such judgment can be a virtue when done for the community's good or vice when done for self-interest (10). We seek the ability to perceive what is required for the greater good regarding feeling, choice, and action in *particular situations*. Practical Wisdom is an intellectual virtue or characteristic that is "bound up with action, accompanied by reason, and concerned with things good and bad for a human being" Aristotle, *Nicomachean Ethics* 1140b5-7 (11).

We no longer consider context or contingent facts when we privilege either theory. When we privilege practice, we ignore accumulated, measured knowledge. We risk making decisions out of self-interest, favoring our personal beliefs for theory or practice. Our beliefs become refractory to disconfirming evidence –scrutinizes information that conflicts with those beliefs and ready acceptance of supporting information. This is motivated reasoning (12).

The Academician

The academician is affiliated with a university, pursuing knowledge for one's purpose and gaining mastery over a singular domain. Academicians abstract from the particulars of a chosen topic and move the abstracted particulars to a theoretical construct based on how they categorize that knowledge. This gives a more general way of considering and understanding the topic (1).

Theory

Theories are commonly developed in relatively controlled settings or environments for objectivity. Theorizing with abstract information gleaned from the particulars of the circumstances is a form of proceduralization (13). The goal is to represent an "outside" view of the world, a dispassionate, objective representation disinterested in personal experience and practical concerns (14).

Two principles of classical logic also define concepts for scientific rationality: 1) *bivalence* is a statement that is either true or false, and 2) the *excluded middle* states that entities are discrete with distinct properties. The law of the excluded middle ensures that facts or concepts do not overlap. From facts, deductive reasoning guarantees the truth of the conclusion. Scientific rationality ensures theory's integrity by isolating theory from practice and context.

"Two principles of classical logic also define concepts for scientific rationality: 1) bivalence is a statement that is either true or false, and 2) the excluded middle states that entities are discrete with distinct properties."

Practice

Operators in the field have their logic of practice supported by diverse, non-classical logic (15). Practice does not follow the law of the excluded middle. In practice, nonlinear interactions generate unpredictable properties. They *emerge* from the combination of various characteristics of the source processes. Boundaries between these emergent properties are fuzzy and in flux, and they will overlap with properties from other principles and concepts. Interactions with and within the environment generate novel properties and new concepts. Such properties and concepts are imprecise and superimposed on and/or disconnected from other concepts. *Authentic practice, then, adjusts to the flux of circumstances* (14).

This does not mean we accept *all* practices as valid. We can look to "common sense" as a marker of good practice. The problem with using common sense is that everyone believes they have it – and they believe no one else does. We value the definable method of *practical common sense*. Numerous disciplines discuss common sense as an entity: high-risk occupations (16), philosophy (17, 18), science (19), psychiatry (20), psychology (21, 22), anthropology (23), sociology (24, 25), social psychology (26), logic (27), reasoning (28), artificial intelligence (29), and robotics (30).

Our *Neonatology Today* publications discuss common sense from an intimate connection with the environment, knowledge, and experience handed down, focusing on consequences from both action and inaction. This is the common sense for adaptation, a form of practical intelligence that better predicts success in everyday experiences if not real-world survival (21, 31-33). This common sense is experienced-based knowledge rather than rule-based (34). It supports continuous assessments and decisions to adjust to the conditions when unexpected situations occur. Common sense describes cultural knowledge and behaviors. Inquiry drives practical common sense. Overwhelmingly practical, common sense deals with a concrete situation on its terms (35).

"Our Neonatology Today publications discuss common sense from an intimate connection with the environment, knowledge, and experience handed down, focusing on consequences from both action and inaction."

What practical common sense decision-making is not:

- We do not accept the equivalency of common sense with common knowledge. Common sense derives from shared knowledge, but our focus is solving the problem embedded within the environment (14).
- This level of problem-solving is above that of the participant having acquaintance but superficial or surface experience. Working in direct danger with responsibility for self and others is quite different from standing alongside. We must recognize the situational and environmental effects on mental performance, awareness, reasoning, and leadership (36-39).
- Our discussion also does not include the superficial approach that relies on cliché, cool words, slang, and efforts to maintain the image of knowledge.

Much of the academic criticism of common sense is directed at these categorizations of common sense. With time and distance from events, the visibility of practical common sense will rapidly decrease.

Conflict

The theory supports Benjamin Bloom's (40) cognitive domain of learning and Jen Rasmussen's (41) rule-based and knowledge-based frameworks. Conversely, practice is supported by the affective domain of learning developed by David Krathwohl [42] and incorporates Rasmussen's [41] skill- and knowledge-based

frameworks. Relying on theories as the core of practice leads to translating contingencies into more abstract normative statements (14). We can narrow the gap between theory and practice with informed practice. That is theory and scientific rationality *support* practice rather than *guide* practice (5, 14).

Too quickly, we experience conflict between reliance on theory versus contextual practice. The argument ends with someone calling out the "art and science of medicine." Medicine "is an art, based to an increasing extent on the medical sciences, but comprising much that remains outside the realm of any science" (42). The art of medicine and the science of medicine are two different levels of analysis. "Failure to identify levels of analysis … can create false debates," Scott A. MacDougall-Shackleton (43).

"Too quickly, we experience conflict between reliance on theory versus contextual practice. The argument ends with someone calling out the 'art and science of medicine.' Medicine 'is an art, based to an increasing extent on the medical sciences, but comprising much that remains outside the realm of any science' (42)."

Science, the systematic knowledge of truth and facts often understood as objective and dispassionate, primarily organizes knowledge for understanding and prediction. Art, as its original structure, consists of the knowledge obtained through experience and is contextual, subjective, and organized for practical use. The normative, decontextualized structure of the science of medicine risks an impersonal relationship with the patient. On the other hand, the pragmatic and contextual nature of the art of medicine engenders personal relationships. Failure to develop "the intimate personal relationship between physician and patient accounts for much of his ineffectiveness in the care of patients" (42).

"And he shows me carefully, the valley where the two mountains of reason and emotion meet and twine their efforts together in winding streams that quietly defy your logic" (44). Vivienne, the author of that description, vividly describes the blending of facts and feelings generated in the debate of reason and belief. The Art of Medicine emerges when practical engagement combines the science and practice of medicine (45).

Nonetheless, we must remain aware that Evidence-Based Medicine, science, theories, and models are developed in relatively controlled settings or environments. Critical for translating to the patient's environment (social, physical, and economic) is knowledge of the research environment and the environment of practice (46). For reference, for 30 years, the conflict between theory and practice impeded high-altitude British climbers from reaching the summit of Mount Everest. "Predicting what would happen to the first human beings to climb that high [27,000 feet] was therefore literally a matter of life or death – here inaccurate models could kill" (47).

Scholar

A scholar has the qualities of learning, erudition, and character – a practical way of dealing with affairs. Scholars do not necessarily affiliate with a university.

Scholars pursue informed knowledge claims (1). For the scholar, "informed" is more than depth of information. While academicians less often go beyond their discipline to consider alternative ideas (13), the scholar pursues multiple domains and borrows from other contexts. When a theory explains a phenomenon in one context, the scholar evaluates if that theory gives insight into a similar phenomenon in another context. Scholars use conceptual blending, incorporating analogical dissonance, disanalogy, and counterfactual reasoning (48).

Scholars provide insights to extend understanding through a better or different way of thinking about something (48). On the other hand, academics construct a theory that makes sense to other academicians, such as how something can be understood or explained (1, 13). Even amongst academicians, theorizing is in the hands of 'leaders' who 'enlighten' practitioners (13).

This problem of privileged 'enlightened' academicians and theory is not new. During World War I, Germany used biochemistry to develop methods to manufacture explosives (due to the naval blockade). Carl Neuberg discovered a metabolic process that created two molecules (glycerol and pyruvate), each with three carbon atoms instead of two. Chemists could not understand the pathway to create glycerol, a three-carbon molecule. Neuberg, in 1913, proposed an equation where a molecule with one carbon would add to a molecule with two carbons.

His model produced glycerol for Germany's war production and formed the basis of productive research for two decades (49, 50). Neuberg, held in high esteem in the field of chemistry, was a co-founder of biochemistry and the editor of the leading chemical journal (51). His analysis, though, was wrong.

Gustav Embden identified a different reaction from Neuberg's. Fructose was split into two three-carbon sugars and then modified to the three-carbon glycerol. Neuburg was editor of the major biochemical journal, which delayed Embden publishing this result until 1933, and in a different journal.

Progress had been delayed by the persistence of many wrong leads and the influence of a well-respected researcher. Within six years of Embden's discovery, only one reaction was missing. However, that required ten more years of work because another well-respected researcher, Nobel laureate Otto Warburg, pronounced there was only one possibility for the reaction. This threw investigators off track (52).

We can fit the situation into our understanding and leave it there, never extending our understanding. Alternatively, we can fit the situation into our understanding and then use the situation to extend that understanding (53).

"We can fit the situation into our understanding and leave it there, never extending our understanding. Alternatively, we can fit the situation into our understanding and then use the situation to extend that understanding (53)."

Words:

Words are how we think and how we communicate. One of the first things the authors do when entering an organization is to listen to the words used. Changing words is often an efficient way to

change thinking and attitudes.

Within the gap between theory and practice is a liminal space. Liminal spaces are far more common than we recognize. A medical student entering a clinic as a professional rather than a patient has entered a liminal space. Throughout medical education and residency, what was a liminal space becomes a place where work is done. While no longer a liminal space for the now healthcare professional, it remains liminal for the new, entering medical student. Left out in this discussion of liminality are our workspaces – the clinic, healthcare, and even illness, which are each liminal spaces for our patients and families.

When medical students or patients are in these liminal zones, they are in the gap between theory (medical science) and practice (their studies or home environment, respectively). The words we use influence the meaning they give to their experience. In a scholarly fashion, we can use accessible but accurate words from diverse domains that can bring comfort, understanding, and a drive to learn. "Dr. Google" is not invincible.

"When medical students or patients are in these liminal zones, they are in the gap between theory (medical science) and practice (their studies or home environment, respectively). "

Rather than sensemaking or sense-giving, excessively technical, abstract or decontextualized terms and phrases contribute to misconstrual and miscommunication (54). While these approaches may develop into teaching, they can make surmountable problems become insurmountable in a liminal space.

Our choice of words and how we use them can reduce or increase the liminal apprehension felt by those who come to us for help when they cannot help themselves. The phrase, "We help people when they cannot help themselves," was the guiding principle for the fire department. When one of the authors (DvS) served on a fire rescue ambulance, firefighters naturally understood their workplace was a liminal space for fire victims, which was reflected in how firefighters treated them. It is embedded in the culture. We, in healthcare, should do no less. Leaving children, patients, and students in the liminality of our workspace does not advance medical treatment, education, or trust.

"Our choice of words and how we use them can reduce or increase the liminal apprehension felt by those who come to us for help when they cannot help themselves."

Scholarship and leadership for liminal spaces encompass subordinates' points of view, such as mutual sense giving. The subordinate's framing supports common sensemaking and sense-giving reciprocity with the leader, particularly in liminal situations (54). The leader, through meaning-giving, helps subordinates learn of the impact of adverse consequences and inherent moral implications of decisions and actions taken during an unstable event (55). The leader increases performance by choosing words, modeling, and sharing sensemaking and meaning-making (56). The individual's resilience emerges when veterans remain engaged with novices past the resolution of events. The presence of veterans can contribute to the internalization of words and terms while reframing events for healthier mental consolidation of the experience (36). *Meaning giving* can reduce the effects of stress that may develop into post-traumatic stress (54).

As leaders, we can offer words that accurately reflect the environment and what the individual may feel or experience. If we do not, the individual will find words they believe will. Those words will produce a different observation and way of thinking.

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Neuroanatomy of Words

The academic background of the Neonatologist supports the routine use of abstract thought. Operations with uncertainty or adversity in a liminal environment demand accurate, concrete descriptions (8, 57). This has neuroanatomic consequences. The *sensorimotor neural network* processes sentences with concrete nouns, words, and abstract words but prefers concrete terms. The *linguistic system* preferentially processes abstract nouns and verbs (58). For motor versus visual *abstract* words, *motor abstract* words will activate motor areas while visual abstract words elicit higher visual area activity (59). Concrete, active words facilitate action, while abstract words generate thinking. This seems prudent until one realizes the brain's response to stress is to constrain executive functions and impair abstract thought (38). During an emergency, abstract words send messages to areas of the brain impaired by stress.

"During an emergency, abstract words send messages to areas of the brain impaired by stress."

Operators in dangerous contexts use concrete nouns for description and emphasize action verbs for communication. Recent neuroscience findings support this behavior. Action words and motor action, noted above, share common cortical representations. Action verbs, more so than concrete nouns, affect overt motor performance dependent on timing. An action verb will interfere with a reaching movement in progress within 200 msec. The exact words processed *before* movement will *assist* the movement (60). This action, fortunately, is category-specific. A quick shout to move a hand causes hands to move, not random body parts. The category-specific, functional linking of language and motor action in the left hemispheric cortical systems link arm and leg actions with processing specific kinds of words. The two systems interact to produce meaningful information about language and

action (61-63).

The cerebellum and motor cortex also influence cognition. Executive and higher-level cognitive cortical functions draw upon interactions with cerebellar motor functions (64-66). High-level knowledge is grounded in sensory and motor experience (64). This shapes the motor system on anticipation and provides information for the meaning of potential action (63, 67). We rely on reciprocal feedback with the environment (36). We think by acting (68), and our choice of words will influence both thought and action.

How Can I Know What I Think?

Captain Chesley Sullenberger has been especially eloquent on how understanding actions come to us *after* the event.

> "During a crisis there is not time to think about each specific bit of knowledge or experience that we depend on to make sense of imperfect information and ambiguity. But having those resources immediately accessible in our minds, we use them in a conceptual decision-making process to frame the decision. We essentially quickly come up with a paradigm of how to solve the problem. It is after the fact that we retrospectively begin to attribute specific reasons for the decisions that we made."
>
> Capt. Chesley "Sully" Sullenberger (personal communication)

Sensemaking and the meaning we give experience is to think backward to explain one's actions. Karl Weick's 'sensemaking recipe applies to liminal events: "*How can I know what I think until I see what I say*?" (69). We can distinguish the neuroscience of his recipe.

I cannot know what I think until I act. Intention cannot cause our actions because conscious intention occurs *after* preparatory brain activity in the frontal and parietal brain areas (70). It would make sense that purposive action derives from intention, which would mediate between cognitive desires and purposive motor behavior. Rather than mediating, the two distinct brain operations, cognitive intention, and motor behavior, must coordinate. This is the "Interface Problem," which is made difficult because of the importance of motor representations in creating purposive behavior (71).

"I cannot know what I think until I act. Intention cannot cause our actions because conscious intention occurs after preparatory brain activity in the frontal and parietal brain areas (70)."

The subjective experience of conscious intention often contains two components: a sense of urge, or being about to move, and a reference forward to the goal object or event [22]. Our perceptions help us recognize whether a response was due to our actions, giving us a sense of agency (70). Without action, we do not gain a sense of agency.

Actions create what we think, which continuously changes until we finish acting. During our *behavioral* interactions with the environment, our brain specifies desirable actions as the environment changes (72). Continuous, bottom-up feedback for sensorimotor control detects prediction errors through the motor system, updating ongoing action. This feedback enhances or cancels some sensorimotor signals. Self-generated cancellation as a motor function also explains why we cannot tickle ourselves. It is due to the sensory feedback through the motor system (73). Alternative actions continue to be mentally processed (72). This may extend to language comprehension, social cognition (74), and interpreting sensory signals (75). This makes our intention visible to ourselves.

Words to use in the gap between theory and practice or for a liminal experience are not our routine words. Meaningful and accurate words can come from the leader and veteran or poor performers and outsiders. Expensive training can be lost with two sentences: "I know that is what they taught you. Let me tell you how it works." With good words, the right words, what we teach and what works are identical.

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Words Make Safety

Leaders and veterans are vital for bringing novices safely into the healthcare environment. Veterans in dangerous contexts (for example, underground miners and high-rise ironworkers) believe "Ignorance and lack of skill resulted in injuries" (76). A fearful worker will not act correctly, may act rashly, put self-protection over group protection, prioritize his emotions, and neglect or avoid his responsibilities (77). The novice will flounder without the "guidance and wisdom" of experienced miners (76). Prosocial empathy increases group affinity and reduces stress responses and fear reactions through oxytocin systems (78-80).

Not possessing the requisite knowledge and skills results in poor performance and injury. The focus on training and the apprentice period is to develop qualified members. Miners believed the veteran miner must guide and teach the novice miner. The new miner would learn to work in a way that avoids accidents, recognizes potential danger, and learns how to respond to such situations (76). Journeyman ironworkers told apprentices how to act by having them think out their tasks and ensure their coworkers do the same. The journeyman would present situations, even if not the apprentice's job. The apprentice would then interpret the proper actions as "part of the process of sharing this perspective about fear and threatening coworkers" (77). The US Marine Corps sees recruit training as developmental and positive despite the high personal demands. Drill Instructors are present to help, not harass the recruit (81-83).

Words make for safety and effective operations.

The Use of Words

Abstract or ambiguous words impair learning and operations. The application of abstract thought to a contextual situation is *never* a close match. "Ambiguity may lead us to construct a world that, while supported by evidence, is not true. This is the danger of ambiguity – we select evidence and interpretations for their plausibility, but later events show we were wrong" (84). Words or labels can cut out information, constrain thought and action, and even stop the activity.

Words communicate but also define and reveal information. Words from other disciplines or domains can reveal new perspectives and often do not have persuasive qualities.

Never words

These are words we have found to stop thinking or can be used for harm. Instituting this program can be rapid and is often readily accepted.

Need, Requires, Requirement, Must

- It forces more accurate descriptions, draws out physiology discussions, and induces discussion of alternatives.
- "Needs oxygen" becomes replaced by an accurate description of the situation, "Oxygen saturation on room air was 83%," or a treatment-response dyad, "5 lpm oxygen raises the saturation to 90%."
- A less challenging way for a subordinate to suggest treatment is "Needs fluid bolus" versus "Would/could benefit from fluids."

Just

- Diminishes the person.
- Medical students often self-introduce on rounds as "I'm just the student." One of the authors (DvS) would then introduce the team to the student: "She is just the resident," "He is just the patient," and "I am just the attending." No one is "just" anything.

Why

- "Why" answers tend to be abstract, linear, and simplified.
- Do we ever know why we do something?
- Use what and how.

Denies

- Do we believe the patient has the complaint but is denying it?

Comply, Compliance

- We do not learn what impairs their ability to follow through.

"Good"

- Is 85% oxygen saturation "good"?
- The rate and direction of change are not included in the description.
- Cyanotic heart disease or chronic hypoxemia may have elevated hemoglobin to compensate.
- Recovery from ARDS – the patient may have spent some time with saturations in the high 70% range.
- Removing "good" feels like an assault on a person's judgment or evaluation skills and is one of the more difficult words to remove. However, once removed, discussions readily become about physiology and response to treatment.

Patient Advocate

- We are all patient advocates.

Hard or Difficult

- The person does not know how to do it.

Good words

These are generally words and terms that staff find protective. "Did you give the treatment?" Before one of the authors (DvS) introduced "pending," staff felt in trouble if the treatment had not been given. With "pending," they could answer, and if the supervisor wanted to know the reason, that discussion could then be held.

- Pending
- Benefit from
- Action and response as a description (what I did then what happened)
- Knowledge and experience (NOT opinion or I think)
- "How can I help?" Takes a person out of the amygdala

Language:

Accuracy and Precision

Ready fire aim

Precision is a measure of reduced variance necessary for hardware's smooth functioning or operations in a white-noise environment. Error marks values exceeding what can be accepted. Accuracy is proximity to the desired value or state and will improve with feedback. Accuracy works well for moving targets. White noise environments with a Gaussian distribution more heavily rely on precision, while red or pink environments, in the absence of the Gaussian distribution, rely on accuracy [Table 1] (85).

Table 1: Precision versus Accuracy

Precision	Accuracy
Hardware	Human behavior
Assures our understanding	Extends our understanding
Applicable to white noise Gaussian distribution ("Six Sigma")	Applicable for red and pink noise Power distribution
Error identifies a structural defect.	Error generates information Error ensures safety by identifying boundaries of knowledge and performance.
Identified by feedback Short feedback only Long feedback contains too many factors	Improved by feedback Incorporates long, delayed, indirect feedback loops
	Failure as negative feedback keeps you grounded.
Assures homeostasis	Supports allostasis
Uncovers structural errors	Uncovers flux in the environment Uncovers system impairments Uncovers performance decrements
Improved by moving offline	Can be improved in real-time
Supports certitude, motivated reasoning, the hedgehog, and narcissism	Creates doubt, the fox, and psychological grounding

Table developed with Ian van Stralen.

Concrete Nouns, Action Verbs

The brain's response to stress constrains executive functions and impairs abstract thought. Abstract words send messages to areas

of the brain impaired by stress. During an emergency, we use concrete nouns for description and emphasize action verbs for communication.

"Motor cognition comes from the coupling of perception and action. The sensorimotor neural network processes sentences with concrete nouns, words, and abstract words but prefers concrete terms (58). Motor abstract words will activate motor areas, while visual abstract words elicit higher visual area activity (59). Concrete, active words facilitate action, while abstract words tend to generate thinking, a problem in a stressful situation."

Action words and motor actions share common cortical representations. Action verbs, more so than concrete nouns, affect overt motor performance dependent on timing. An action verb will interfere with a reaching movement in progress within 200 msec. The same words processed *before* movement will *assist* the movement (60). This action, fortunately, is category-specific. A quick shout to move a hand causes hands to move, not random body parts. The category-specific, functional linking of language and motor action in the left hemispheric cortical systems link arm and leg actions with processing specific kinds of words. The two systems interact to produce meaningful information about language and action (61-63).

Motor attention initiates action – we think by acting. Motor cognition comes from the coupling of perception and action. The *sensorimotor neural network* processes sentences with concrete nouns, words, and abstract words but prefers concrete terms (58). *Motor abstract* words will activate motor areas, while visual abstract words elicit higher visual area activity (59). Concrete, active words facilitate action, while abstract words tend to generate thinking, a problem in a stressful situation.

"Descriptions become valuable packets of information that carry information, drive the making of decisions, and frame the situation—objective, articulate, succinct descriptions package situations for action."

Descriptions

Descriptions become valuable packets of information that carry information, drive the making of decisions, and frame the situation—o*bjective, articulate*, *succinc*t descriptions package situations for action.

In the first years of the paramedic program, emergency physicians often did not know what equipment paramedics carried, their capabilities, or what actions they were authorized to take. Without a college education, the paramedics had difficulty with medical *terminology* (personal experience, DvS). The physician who trained the paramedics, Ron Stewart, MD, taught the paramedics to give articulate, objective, succinct descriptions.

When paramedics received orders that did not match their training or equipment, Stewart taught them to use medical *descriptions* rather than medical terminology. Then, they would increase the accuracy of their description, including the immediate environment around the patient. Persuasion or any manipulation of the patient's description was not allowed. This becomes a trait, changing disagreements into "dueling descriptions" that, rather than producing tension, produce ever-increasing accuracy.

Plain Language

Use "plain language." Avoid slang, jargon, or acronyms – particularly from another domain. Public safety services (law enforcement, fire fighting, and EMS) have long used plain language for radio communications (the method one of the authors (DvS) learned in the 1970s). In 1991, the Los Angeles City Fire Department's Radio Communication protocol "is that radio communications shall be composed of plain, commonly used English" (86).

In June 2007, the SAFECOM (**S**ecurity and **A**ssurance of **F**ederal **E**mergency **Com**munications) Emergency Response Council (ERC) agreed to encourage public safety practitioners to use plain language and common terminology to address public safety communications interoperability. The International Association of Fire Chiefs adopted this recommendation in 2008 (87).

- Clear and unambiguous radio transmissions are essential to situational awareness and integral to incident management.
- Plain language promotes greater clarity and understanding of emergency radio traffic among and between public safety agencies and political jurisdictions, thus contributing to effective interoperability.

In 2010, the Department of Homeland Security (88) adopted the definitions used by the National Incident Management System (NIMS):

- Plain language is communication that can be understood by the intended audience and meets the communicator's purpose.
- Common Terminology: normally used words and phrases—avoiding using different words/phrases for similar concepts, ensuring consistency, and allowing diverse incident management and support organizations to work together across various incident management functions and hazard scenarios.

"Unskilled, unprepared, and ill-equipped people are best advised to leave slippery slopes to those with the necessary experience"

Cliché

Thought terminating cliché.

Chinese Communists used it as one of their brainwashing methods (89). We cannot describe or argue against a metaphor or cliché. Examples include:

- Correlation and causation.
- Little knowledge is dangerous.
- Slippery slope
- "Got your back."
- The most important person is the patient.

Becoming a "slippery slope." The authors have traversed, ascended, and descended slippery slopes. This involves a good description of the slope and conditions and knowledge of the equipment and capabilities of those on the team. Unskilled, unprepared, and ill-equipped people are best advised to leave slippery slopes to those with the necessary experience – whether on a climb or as a cliché. This cliché may be the ultimate slippery slope.

Analogies

Analogies have greater applicability to support interpretation and reasoning when the comparison has plausibility, increased similarities, and correspondences between domains. Without analogical strength, the metaphors and analogies become thought-terminating cliches (89).

Often, someone unfamiliar with the field provides the analogy. For example, to learn stress, you must be put under stress.

Conclusion:

Removing a few words will change regular thinking and improve communication, particularly during confusing events. Removal of clichés from discussion will prevent individuals from terminating thinking by colleagues.

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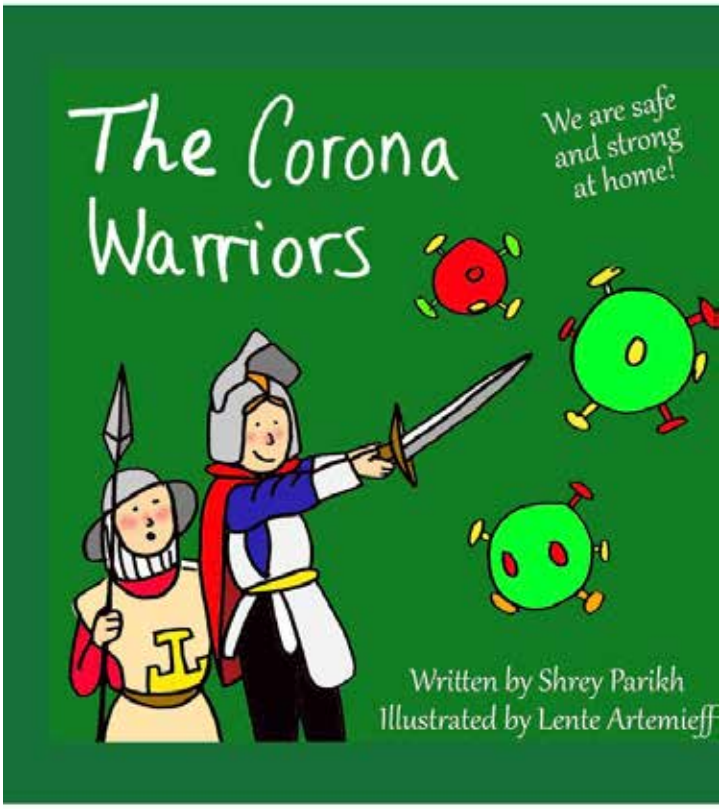

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INFANT AND FAMILY-CENTERED DEVELOPMENTAL CARE (IFCDC)

STANDARDS AND SAMPLE RECOMMENDATIONS FOR INFANTS IN THE INTENSIVE CARE UNIT

SYSTEMS THINKING IN COMPLEX ADAPTIVE SYSTEMS

- Are the baby and family central to the mission, values, environment, practice & care delivery of IFCDC in the unit?
- Are the parents of each baby fully integrated into the team and treated as essential partners in decision-making and care of the infant?
- What are the strategies and measurements used to improve and sustain IFCDC in the unit?

POSITIONING & TOUCH FOR THE NEWBORN

- Are the positioning plans therapeutic and individualized, given the care needs and development of the baby?
- Are the positioning and touch guidelines continually reviewed by the team, including the parents, and adapted to meet the changing comfort needs of the baby?

SLEEP AND AROUSAL INTERVENTIONS FOR THE NEWBORN

- Can the team confidently describe the "voice" or behavioral communication of the baby?
- Are the baby's unique patterns of rest, sleep, and activity documented by the team and protected in the plan of care?

SKIN-TO-SKIN CONTACT WITH INTIMATE FAMILY MEMBERS

- Is the practice of skin-to-skin contact supported and adjusted to the comfort needs of each baby, parent, & family member?
- Are the parents & family members supported to interact with the baby to calm, soothe, & connect?

REDUCING AND MANAGING PAIN AND STRESS IN NEWBORNS AND FAMILIES

- Are parents supported to be present and interactive during stressful procedures to provide non-pharmacologic comfort measures for the baby?
- Are there sufficient specialty professionals to support the wellbeing of the team, including parents, families, and staff? Examples include mental health, social, cultural, & spiritual specialists.

MANAGEMENT OF FEEDING, EATING AND NUTRITION DELIVERY

- Are the desires of the m/other central to the feeding plan? Is this consistently reflected in documentation with input of the m/other?
- Does the feeding management plan demonstrate a feeding & nutrition continuum from in-hospital care through the transition to home & home care?

WANT TO KNOW MORE ABOUT THE STANDARDS AND RECOMMENDATIONS?
VISIT: HTTPS://NICUDESIGN.ND.EDU/NICU-CARE-STANDARDS/

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

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National Perinatal Association

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Post-Traumatic Thriving

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Medicolegal Pitfalls in Determining the Timing, Mechanism, and Preventability of Perinatal Hypoxic-Ischemic Brain Injury

Barry S. Schifrin, MD; Maureen Sims, MD

"Understanding the timing, mechanism, and preventability of fetal neurological injury and its subsequent handicaps is vital. Statistics implicate intrauterine perinatal asphyxia (about 1-6 /1000 live births) in stillbirth and perinatal mortality (about 1 million annually) (2)."

An Overview:

Understanding the timing, mechanism, and preventability of fetal neurological injury and its subsequent handicaps is vital. Statistics implicate intrauterine perinatal asphyxia (about 1-6 /1000 live births) in stillbirth and perinatal mortality (about 1 million annually) (2). About 25% showed major neurological impairments such as hypoxic-ischemic encephalopathy (HIE), neonatal encephalopathy, as well as subsequent cerebral palsy (CP), epilepsy, and developmental delay. About half of survivors suffer from neuropsychological sequelae, including immediate or delayed onset executive functioning disorders (3, 4). As the survival of these afflicted children improves, the already high economic toll continues to burgeon.

Birth asphyxia is "a condition of impaired blood gas exchange, leading, if it persists, to progressive hypoxemia and hypercapnia." WHO defines asphyxia as "the failure of the neonate to begin breathing successfully" (5). These definitions, among others, fail to provide sufficient clinical rigor to affirm the diagnosis in any individual case or research study of outcome (6, 7). Although the finding of a low pH and base excess in umbilical or neonatal blood (cut-off values vary, sometimes considerably) is considered the most objective assessment of intrapartum hypoxia, metabolic acidosis is a poor surrogate for injury (8). The clinical risk factors for adverse outcomes, however, have not changed over the past several decades despite advances in obstetrical care and the widespread recognition that many maternal and obstetrical risk factors for adverse neonatal outcomes are potentially modifiable (9). These risk factors include nulliparity, hypertension, diabetes mellitus, and such intrapartum risk factors as emergency cesarean birth, "non-reassuring fetal status," failure to progress, intrapartum hemorrhage, and an intrapartum sentinel event (shoulder dystocia, cord prolapse, uterine rupture, placental abruption). Neonatal risk factors included male sex, birth at late preterm gestation (35+0 – 36+6 weeks), Apgar score <4 at 5 minutes, respiratory distress requiring ventilatory support, and severe acidosis at birth (9). Some require a "sentinel event" to diagnose intrapartum injury (10).

Basic controversies exist regarding the definitions of neonatal encephalopathy (NE) and hypoxic-ischemic encephalopathy (HIE) (11, 12). Similarly, while there is agreement that many "sentinel events" defined above are associated with perinatal asphyxia, the vast majority of cases do not involve a sentinel event – even if one were to consider a prolonged fetal bradycardia a "sentinel event. Further, with prompt attention, most offspring from sentinel events do well (Perlman).

This lack of consistency helps to explain the varying estimates of the relationship between intrapartum events and subsequent neurological impairment in the offspring, including not only disorders of neonatal adaptation but long-term outcomes such as epilepsy, CP, and ASD, (13, 14) after major congenital malformations and chromosomal disorders are excluded (15). These issues are thrown into stark relief during medicolegal encounters alleging substandard care as the cause of preventable perinatal injury.

Invariably, in the cauldron of the courtroom, however, the desire to assign fault competes, often energetically, with the demand for exculpation. To prevail in the encounter, too often, it seems, a blind eye has been turned to evidence-based medicine, critical thinking, and equipoise. As a result, trials of similar cases come to opposite judgments, sometimes determined based on nonobjective or ignored medicolegal and forensic evaluations (1, 16).

"To prevail in the encounter, too often, it seems, a blind eye has been turned to evidence-based medicine, critical thinking, and equipoise. As a result, trials of similar cases come to opposite judgments, sometimes determined based on nonobjective or ignored medicolegal and forensic evaluations (1, 16)."

Given the disparate outcomes in judgments and the size of any

award, there is a widespread notion that a trial is a lottery. Obstetricians argue that judges and juries cannot sufficiently comprehend medical decisions and bristle at so-called runaway verdicts. The plaintiff's bar argues about the lack of training of judges and the availability of qualified experts, while others have argued that there is more malpractice than lawsuits and that physicians already have too much immunity.

Especially in the last several decades, medicolegal claims imputing negligent perinatal care (obstetrical/neonatal) in the causation of brain injury have been increasing worldwide. Perhaps the most publicity has come from England, where allegations of obstetrical/perinatal negligence threaten to bankrupt the NHS. They have been estimated to account for about half of the UK's activities of the National Health Service Litigation Authority (17). In the US, claims of negligently inflicted perinatal injury top the list of pediatric claims (from 1985 to 2008) with an average indemnity of about 500,000 dollars (18) although large "runaway" verdicts, though uncommon, become well publicized in the lay or even medical literature (19).

In this context, we here briefly review some of the obstetrical and neuroradiological issues that continue to confound medical progress and the results of allegations of substandard care in "birth-injury cases."

Electronic Fetal Monitoring

The problems of interpreting the CTG (Cardiotocography) during litigation are numerous, and recent articles have questioned how a technology so encumbered by a classification with its high rate of inter- and intra-observer variation and its poor correlation with adverse outcomes despite a high cesarean section rate can be offered with any authority in a court of law (19), there seems to be limited cross-fertilization between obstetrical and neonatal providers. While there is considerable emphasis in the medical literature on the value of a detailed pathological examination of the placenta (20) in these cases, there seems to be little demand or appetite for an informed interpretation of the CTG tracing itself. Indeed, in many situations where the child is transported to a higher level of care, the tracing does not accompany the child (21).

"Attempting to correlate CTG findings with outcomes, one encounters numerous "medical designations" summarizing the interpretation of the CTG tracing and the urgency of intervention."

Attempting to correlate CTG findings with outcomes, one encounters numerous "medical designations" summarizing the interpretation of the CTG tracing and the urgency of intervention. The term "emergency cesarean section" may refer to the need for urgent intervention or any unscheduled cesarean section, whatever its urgency. One can only applaud the recent attempts to define a genuinely emergent cesarean section (22). Hopefully, this will be done with the understanding that eliminating the need for urgency in the first place is a much more desirable clinical objective.

Under indications for intervention, a reviewer might find such expressions as "intolerance to labor," "non-reassuring fetal status," "fetal bradycardia," and others. The terms "fetal distress" and "perinatal asphyxia," unfortunately, have been "officially" removed from the obstetricians' lexicon by the ACOG (23). The desire to be "fair of speech" impedes understanding of the impact of pre-existing fetal conditions at the onset of labor, the evolution of patterns, or the impact of contractions and pushing in the 2nd stage of labor (24-26).

Most studies dealing with the relationship between fetal heart rate patterns and outcomes start with those known to be acidotic at delivery. This approach is also common in those attempting to use deep learning to automate the interpretation of tracings. In reality, the most "severe" patterns, thought to be pathognomonic of fetal acidemia, correlate with umbilical acidemia less than 50% of the time. More telling, however, is the understanding that even severely low pH and base deficit values are even poorer predictors of either low Apgar score or the need for specialized neonatal care (27). Vintzileos has called attention to the numerous pathophysiological processes, including cerebral ischemia, that may impact the fetal heart rate pattern that is not dependent upon systemic fetal acidemia; indeed, fetal heart rate patterns along with clinical indicators may be far better predictors of outcome than is the umbilical pH (21, 28, 29).

Nor is the immediate outcome of the newborn, including pH, dispositive of either injury or freedom from subsequent birth-related handicap. Notwithstanding, it is believed that most hypoxic-ischemic injuries occur during the peripartum period (15, 30). Adding to this belief are observed benefits of therapeutic hypothermia (TH), which must be applied within 6 hours of injury (31).

"Despite the apparent relationship of fetal heart rate patterns to fetal behavior (21), including neurological injury, reviews in the literature tend to define all fetal heart rate decelerations as hypoxic in origin (32). The ACOG/AAP 3-tier classification is based on the presumed risk of fetal acidemia."

Despite the apparent relationship of fetal heart rate patterns to fetal behavior (21), including neurological injury, reviews in the literature tend to define all fetal heart rate decelerations as hypoxic in origin (32). The ACOG/AAP 3-tier classification is based on the presumed risk of fetal acidemia. Category I, with its reassuring tracing, is designated as a tracing where the fetal pH is normal and hypoxia is absent (33). The classification does not assess fetal behavior or neurological integrity. Class II patterns include fetuses with diverse FHR patterns and diverse outcomes ranging from normal to hypoxic to injured (34). While Category II patterns are considered "indeterminate" and require "close observation,"

the classification offers little guidance to the care provider and less protection if the case comes to litigation. Most Class III patterns thought to represent fetal acidemia are not acidemic at birth.

In one European schema, all variant FHR patterns are classified as hypoxic - chronic, subacute, or acute - whether or not the patterns are accompanied by fetal acidemia (35). The abnormal patterns of "chronic hypoxia" with persistently reduced / absent baseline variability seen at the onset of monitoring is found with increased frequency with placental insufficiency (fetal growth restriction, postdate pregnancy, maternal diabetes, hypertension), chorioamnionitis, genetic anomalies, and toxic exposure and may be accompanied by discreet placental pathology (36, 37). Often, however, there is no apparent clinical correlation. With "chronic hypoxia" tracing at the outset of monitoring, especially in the face of a previously normal pattern, the diagnosis of pre-existing fetal neurological injury must be entertained – fetal neurological normality may not be assumed. These patients are frequently delivered quickly with variable Apgar scores and pH and base deficit results. Notwithstanding, neurological injury in survivors is similar to those with more pronounced, acute problems appearing during labor. Again, the severity of the outcome was more dependent upon the tracing than the umbilical pH (25).

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On the other hand, it is not reasonable to presume that the growth-restricted fetus, for example, was neurologically injured prior to labor, especially if, on admission to labor and delivery, the FHR tracing was reassuring, reflective of normal fetal responsiveness and behavior. A similar question arises in a genetically challenged child: can they also suffer hypoxic-ischemic injury during the intrapartum period, and what part of the subsequent handicap is related to the time in labor?

The most important prognostic feature relative to the timing of injury appears to be the normal FHR pattern at the outset of labor. This pattern with a stable baseline rate in the normal range, moderate variability, cyclic accelerations with fetal movements, especially in association with uterine contractions, and stable heart rate in the normal range permits the inference of normal fetal responsiveness and behavior and the absence of hypoxic/ischemic/traumatic or infections assaults on the fetus. The evolution of the patterns, especially in light of the clinical correlates (*e.g.*, oligohydramnios), will provide insight into the timing, mechanism, and preventability of any neurological injury (21, 38). There appears to be no example of a previously normal fetus, subjected to any of these assaults, who fails to respond with changes in its FHR pattern. Further, though uncommon, there appear to be specific patterns that can only be explained by acute ischemic injury – not asphyxia (39, 40). This pattern, referred to as the "conversion pattern," has thus far been unerring in its prediction of neurological injury in the fetus although it does not reliably predict the specific MRI pattern of injury which might include BGT (Basal Ganglia and Thalmus), white-matter injury, stroke, or even "normal MRI". Having defined the pattern as highly predictive of injury does not, in and of itself, permit the conclusion that the injury was preventable. Indeed, though it is uncommon, the pattern may appear following a normal pattern with such speed as to preclude benefit from even the most rapid intervention (41). It must be understood that on these occasions, the deceleration represents the injury itself and not some harbinger of asphyxia.

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The confusion in obstetrical terminology is accompanied by similar issues in neonatology, pediatric neurology, and neuroradiology. Universally agreed-upon definitions of neonatal and hypoxic-ischemic encephalopathy (HIE) are still lacking (42), leading to controversy over whether the cause has been a perinatal insult (43). Complicating this picture further is the fetus's gestational age. It is well known that prematurity by itself leads to additional risks and vulnerability in the early postpartum period.

In the courtroom, it is frequently necessary to challenge the putative relationship of CP (and other disorders) to an intrapartum event (one estimate - 10–20% (44); where the presence of "severe asphyxia" is deemed a requirement for assigning the timing of the injury to the events of labor and delivery. Severe asphyxia (pH<= 7.0 was one of the "essential criteria" promulgated by the 2003 ACOG/AAP monograph (45). Absent this finding, the "defensive" guidelines require that the timing and mechanism of injury be assigned elsewhere. While this guideline has likely dissuaded attorneys from undertaking litigation in the past, there would seem to be no scientific justification for these "essential criteria" in assigning the timing of fetal neurological injury. Indeed, in a review of CP cases in which the FHR pattern on admission to labor and delivery was reassuring, over two-thirds failed to show significant

acidemia at birth. Low Apgar scores and neonatal encephalopathy were more common, but these criteria were not considered a prerequisite for fetal injury sustained intrapartum (40). Notwithstanding, one still encounters the "essential criteria" in the defense of some cases.

Notwithstanding the attention to hypoxia and acidemia, it appears that cerebral ischemia is the obligatory prerequisite of injury. Claiming that every ischemic lesion is preceded by (systemic) fetal hypoxia can no longer be maintained (1). This is supported by numerous lines of experimental and clinical evidence – reviewed elsewhere (46), as is the discussion of the molecular pathways leading to neuronal death (47). Also considered elsewhere are discussions of the impact of therapeutic hypothermia, the first therapy that has shown promise in improving the outcomes for neonates with moderate to severe NE following a presumed intrapartum insult. Fanaroff et al. discuss TH's obstetric and medicolegal implications and suggest a five-step approach to analyzing neonatal cases for causation, etiology, timing of occurrence, responsibility, and liability (48). Notwithstanding, the timing of the insult is often unknown, and the severity of encephalopathy may change under observation. Also evolving is the understanding that patients with "mild" encephalopathy" previously considered "benign", may have a significant risk of adverse long-term outcomes (49-51).

"Notwithstanding the attention to hypoxia and acidemia, it appears that cerebral ischemia is the obligatory prerequisite of injury. Claiming that every ischemic lesion is preceded by (systemic) fetal hypoxia can no longer be maintained (1)."

Ultimately, the clinical presentation of HIE appears to offer no specific link to the timing of injury. The latency for first observable seizures following a prominent asphyxial event can range from minutes to a few days, and in the case of stroke, weeks to months, and executive function problems, years to decades later (52, 53).

MRI findings in newborns with HIE are often produced and discussed in medio-legal cases. MRI interpretations are divided into those injuries of the watershed areas (the areas least perfused) multicystic encephalomalacia, ulegyria in watershed injury referred to as partial, prolonged (usually over 1 hour) hypoxic-ischemic injury to the term fetus (54, 55). This distribution pattern develops in part because the heavy sympathetic innervation of the neocortex facilitates reduced flow to this area in order to preserve the vital function assigned to the basal ganglia, thalamus, and hippocampus, which receive blood supply from the vertebral/basilar system which has little sympathetic innervation (56). The BGT pattern involving bilateral hypoxic-ischemic insults of the posterior putamina and ventrolateral thalami and involvement of the peri-Rolandic region and the inferior limb of the internal capsule are often referred to as an 'acute, profound pattern' that has been clinically linked to sentinel events (57, 58).

The problem arises, especially in medicolegal cases, when BGT injury is made a synonym for an acute, profound hypoxic-ischemic injury and, following along the syllogistic cascade, when the injury is unpredictable and unpreventable (59). Equipoise, however, demands the understanding that many, if not most, cases of GBT injury cannot reasonably be connected to any sentinel event, and issues of foreseeability and preventability cannot be derived from these findings. In each case presented by Smith et al., a prolonged, abnormal tracing was associated with BGT findings without any obvious sentinel event. Various authors report similar associations (60, 61). Martinez-Biarge et al. reported that almost 60% *of the 393 cases with* 'acute hypoxia ischemia' on MRI had no sentinel event. An abnormal cardiotocograph (CTG) was present in at least 276 of the total cohort, permitting the strong inference that the provenance of the acute hypoxic injury was "fetal distress" (62). Of equal interest, Martinz-Biarge et al. and Hartmann et al. reported overlapping risk factors for both HIE and "stroke" (63, 64).

"The problem arises, especially in medicolegal cases, when BGT injury is made a synonym for an acute, profound hypoxic-ischemic injury and, following along the syllogistic cascade, when the injury is unpredictable and unpreventable (59)."

Similarly, the documentation of periventricular leukomalacia (PVL) is often deemed pathognomonic of an insult occurring between the 24th and the 34th gestational week despite the absence of any clinical correlation. It has been shown, however, that the radiographic finding of PVL may occur in the term fetus (65). Even in the preterm newborn, the appearance of PVL is associated with obstetrical risk factors that may have benefitted from the early use of cesarean section (66).

Thus, neuroradiological images are not dispositive of the timing, the foreseeability, or the preventability of injury. As recommended by several authors, the finding of a 'BGT pattern of injury' should contain the added comment, "awaiting clinical (neonatal) and obstetrical correlation," and avoid any term related to the injury's duration, severity, or preventability. Further, sentinel events should not be deduced or imputed (67). MRI neuroimaging exams obtained in the first weeks of life appear reliable for excluding an earlier antepartum injury or malformation (1). The findings of brain swelling, cortical highlighting, loss of gray-white matter differentiation, abnormalities in basal ganglia, and thalami are generally accepted as consistent with perinatal insult but of insufficient specificity. Each has been associated with no obvious asphyxial birth event (12). Finally, it is essential to remember that even in the most accurate and advanced application, obvious neurological defects sustained around the time of birth may not be observable on MRI (68). This fact significantly limits its overall negative predictive value (1). Neuroimaging does not represent the only surrogate of a pathological assessment in these cases.

To remove the limitations of some of the conventional wisdom about the timing, mechanisms, and indicators of injury, we need to take better advantage of the evidence already available to enhance labor and delivery outcomes for both mother and child. Better outcomes beget fewer allegations of malpractice.

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Recruitment Maneuvers: Not Just for Recruitment

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.

"While high-frequency jet ventilation (HFJV) is reputed to be the gentlest form of invasive ventilation, the mean airway pressures typically generated by this mode may not be sufficient to recruit the lung. "

While high-frequency jet ventilation (HFJV) is reputed to be the gentlest form of invasive ventilation, the mean airway pressures typically generated by this mode may not be sufficient to recruit the lung. "Conventional" breaths have traditionally been superimposed on HFJV to open the lung, be it on the admission table post-resuscitation or later to re-inflate areas of collapse. They were usually referred to as "sigh breaths."

Until recently, these breaths have used inspiratory times (Ti) of 0.4-0.5 seconds at 20 cmH2O or more pressures and rates of 2 to 5 or more. Whether or not the pressures used were below or above the HFJV peak inspiratory pressure (PIP) is an ongoing debate. If the pressure of the conventional breath is higher than HFJV PIP, the jet ventilator will pause for the duration of the conventional breath, whereas HFJV ventilation will continue if conventional PIP is less than HFJV PIP. These parameters were common before the advent of volume-targeted modes. The short Ti may not have been efficient at recruiting areas of low compliance, and combined with high PIP, may have resulted in volutrauma to areas of higher compliance.

This led some clinicians to challenge the traditional parameters used in "sigh breaths" and the term "sigh breath" itself. Since the purpose of using HFJV is to avoid the damage resulting from high pressures, why use them? Rather than using high PIP and short Ti, lower PIP helps avoid volutrauma in compliant areas. Holding that pressure longer allows pendelluft to occur and gently opens up less compliant areas. Furthermore, the term "recruitment maneuver" (RM) more aptly describes the purpose for using them.

While, as a general rule, I avoid using RMs as much as possible, I (and others) have found this strategy most effective in clinical practice. Beyond initial recruitment and targeting localised collapse, intermittent use of RMs provides the pressure required to bring new alveoli into the fold and participate in gas exchange since HFJV MAP may not be sufficient. However, RMs are of greater utility than just for recruitment.

"Beyond initial recruitment and targeting localised collapse, intermittent use of RMs provides the pressure required to bring new alveoli into the fold and participate in gas exchange since HFJV MAP may not be sufficient. However, RMs are of greater utility than just for recruitment."

In previous columns, I have described using RMs to offload the cardiovascular system and facilitate venous return, mainly when cerebral congestion is a concern. Maintaining appropriate MAP is essential for oxygenation and alveolar and airway stability. Adding RMs in concert with less PEEP produces the same MAP, but while the resulting MAP is the same, the profile is different. From a mathematical perspective, the area under the curve is the same, but the curve is different. Lower PEEP between RMs provides a greater pressure gradient for venous return (potentially increasing preload and decreasing afterload). Longer RM Ti affords more time for pendelluft to occur and the higher pressure to act on areas of atelectasis.

HFJV PIP is responsible for a small portion of MAP, typically 1-3 cmH_2O. Nevertheless, as it is decreased, the resulting MAP provides less support for airway/alveolar stability and recruitment of new growth. As oxygenation improves, PEEP is reduced. Since PEEP is the largest contributor to MAP, this is when stability can be lost. Using RMs at 1-3 per minute helps preserve stability as MAP decreases during the weaning process. This is a recent ad-

dition to my practice and has helped weaning and extubate babies with significant chronic lung disease and ensured optimal recruitment should be the first preparation for dexamethasone. The anti-inflammatory effect of steroids does not improve pulmonary function if the lungs are not recruited (nothing does!), and this may be one of the reasons a baby has little or no response to "DART" (**D**examethasone dosing: **A R**andomized **T**rial) (1).

"This is a recent addition to my practice and has helped weaning and extubate babies with significant chronic lung disease and ensured optimal recruitment should be the first preparation for dexamethasone. The anti-inflammatory effect of steroids does not improve pulmonary function if the lungs are not recruited (nothing does!), and this may be one of the reasons a baby has little or no response to "DART" (1)."

Ventilating infants with chronic lung disease (CLD) presents an ongoing challenge. The use of RMs in the management of chronic lung disease (CLD) in a "hybrid approach" with HFJV was discussed in a previous column (2).

RMs are not the exclusive realm of HFJV. When using next-generation multi-mode ventilators offering high-frequency oscillation (HFOV), RMs are an available adjunct and may be used similarly. They are seldom used but may yet find their place in HFOV. In the past, conventional breaths with "sigh breath" parameters were often used at a rate of 2 during HFOV, a practice that may be resurrected but with RM Ti and PIP.

Eventually, volume-targeted HFOV (HVO-VT) will become available to American clinicians. It has been several years since my first column in Neonatology Today, titled "HFO-VG: This Changes Everything." (HFO-VG is the Draeger® name for the mode I will refer to as HFO-VT.) In the hopes regulatory approval comes sooner than later, allow me to provide a refresher and share personal practice.

Amplitude (A) and frequency (f) have independent effects on delivered volume (Vt) during HFOV. Increasing A results in larger Vt, but increasing f has an inverse effect. As f increases, less time is available to deliver volume at a given A, resulting in a decrease in Vt, while the increase in available delivery time with lower f increases Vt. Higher f also increases the risk of gas trapping. Unfortunately, when using older oscillators (such as the Sensormedics®), their high power necessitates using increased f to avoid delivering high Vt to small babies (who are at greatest risk for gas trapping), even using minimum A. Clearance of CO_2 (referred to as DCO_2) is the product of $f \times Vt^2$, thus small increases in Vt, regardless of how produced, produce a large increase in CO_2 clearance.

When using HVO-VT, CO_2 clearance is represented by the DCO_2 equation, but A and f are decoupled. Changes in f no longer result in changes to Vt size; instead, A increases or decreases as f increases or decreases to maintain the set Vt target. This avoids the constraints of traditional HFOV when delivering Vt. The big difference using HVO-VT is that Vt remains constant regardless of changes to A or f as long as A settings are sufficient to provide it. The effects of changes in a baby's position are less challenging since ventilation status is maintained by A, adjusting automatically to maintain Vt.

Without Vt monitoring, HFOV parameters are adjusted based on "chest wiggle" (a subjective measure that can result in large changes in delivered Vt.) Even though HFOV pressures attenuate rapidly, upper airways may still be subjected to damaging sheer stresses produced by large A. HVO-VT allows clinicians to provide minute ventilation (MV) at the lowest possible A by decreasing f and compensating by increasing Vt. Decreasing f linearly decreases MV, but since increases in Vt increase DCO_2 exponentially, a small increase in Vt will maintain it.

It is my practice (and a general principle in the unit in which I practice) to ventilate with A, which would be considered relatively low by clinicians used to conventional HFOV. Changing to HFJV is considered if A is required to ventilate exceeds 20-25 cmH2O and/or Vt required exceeds 2-2.5 ml/kg. I will change to HFJV if A of 20 cmH_2O is required, but I will exceed 2.5 ml/kg (my upper limit is 3 cmH_2O) if it is not expected to be required for longer than a few hours, especially in larger babies. The rationale is that as Vt increases, the lung protective benefits of HFOV wane.

Changes in f do not have an inverse effect on MV when using HVO-VT; instead, MV increases with higher f (and vice-versa) until a combination of gas trapping and less efficiency ablate the effect, at which point further increases in f will decrease MV. Furthermore, the higher A required to deliver Vt in less time may necessitate increasing MAP to avoid airway instability.

"In medicine, the lag time between evidence provided from studies to adoption in clinical practice is excruciatingly long. There may be little or no evidence when it comes to ventilation. Knowledge of physiology, the interaction between the pulmonary system and others, and judicious, objective observation may be the only guide available when modifying ventilation clinical practice."

Within the NICU where I work, HVO-VT is the first-line mode used when ventilating babies under 30 weeks PMA, and babies under 25 weeks PMA are often ventilated with HFJV within a few days, if not initially with "nano-prems". Conventional modes are rarely used and are usually reserved for larger babies requiring short-

term invasive support.

Adopting these principles has resulted in our NICU having amongst the world's lowest rates of chronic lung disease, even with the tiniest, lowest PMA babies. It is worth noting that these outcomes have not changed significantly as the use of non-invasive ventilation has increased.

"Challenge your assumptions" is good advice in any situation and topic. This includes mechanical ventilation in the NICU. In medicine, the lag time between evidence provided from studies to adoption in clinical practice is excruciatingly long. There may be little or no evidence when it comes to ventilation. Knowledge of physiology, the interaction between the pulmonary system and others, and judicious, objective observation may be the only guide available when modifying ventilation clinical practice. In my place of work, this was the primary factor (along with available published evidence) in switching from conventional ventilation to HFOV and in the increased use of HFJV.

In the quest to "first do no harm," we should all be investigators.

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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.
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3. An archive search will be available for journals older than 2012.
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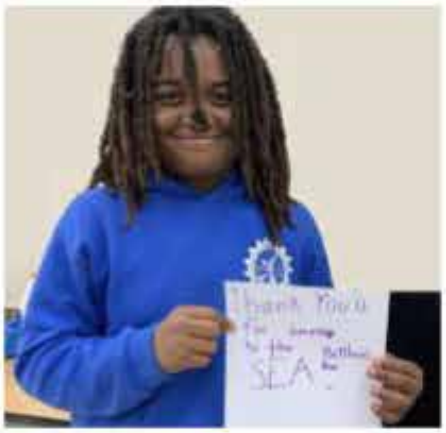

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The Village Son

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.

Houchang D. Modanlou

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TOP 10

RECOMMENDATIONS FOR THE PSYCHOSOCIAL SUPPORT OF NICU PARENTS

SUPPORT 4 NICU PARENTS

Essential evidence-based practices that can transform the health and well being of NICU families and staff

based on the National Perinatal Association's Interdisciplinary Recommendations for Psychosocial Support of NICU Parents

1 PROMOTE PARTICIPATION

Honor parents' role as primary caregiver. Actively welcome parents to participate during rounds and shift changes. Remove any barriers to 24/7 parental involvement and avoid unnecessary separation of parents from their infants.

Welcome!

2 LEAD IN DEVELOPMENTAL CARE

Teach parents how to read their baby's cues. Harness your staff's knowledge, skills, and experience to mentor families in the principles of neuroprotection & developmental care and to promote attachment.

3 FACILITATE PEER SUPPORT

Invest in your own NICU Parent Support program with dedicated staff. Involve veteran NICU parents. Partner with established parent-to-parent support organizations in your community to provide continuity of care.

4 ADDRESS MENTAL HEALTH

Prioritize mental health by building a team of social workers and psychologists who are available to meet with and support families. Provide appropriate therapeutic interventions. Consult with staff on trauma-informed care - as well as the critical importance of self-care.

5 SCREEN EARLY AND OFTEN

Establish trusting and therapeutic relationships with parents by meeting with them within 72 hours of admission. Follow up during the first week with a screening for common maternal & paternal risk factors. Provide anticipatory guidance that can help normalize NICU distress and timely interventions when needed. Re-screen prior to discharge.

6 OFFER PALLIATIVE & BEREAVEMENT CARE

Support families and NICU staff as they grieve. Stay current with best practices in palliative care and bereavement support. Build relationships with service providers in your community.

7 PLAN FOR THE TRANSITION HOME

Set families up for success by providing comprehensive pre-discharge education and support. Create an expert NICU discharge team that works with parents to find specialists, connect with service providers, schedule follow-up appointments, order necessary medical supplies, and fill Rx.

8 FOLLOW UP

Re-connect with families post-discharge. Make follow-up calls. Facilitate in-home visits with community-based service providers, including Early Intervention. Partner with professionals and paraprofessionals who can screen families for emotional distress and provide timely therapeutic interventions and supports.

9 SUPPORT NICU CARE GIVERS

Provide comprehensive staff education and support on how to best meet families' psychosocial needs, as well as their own. Acknowledge and address feelings that lead to "burnout."

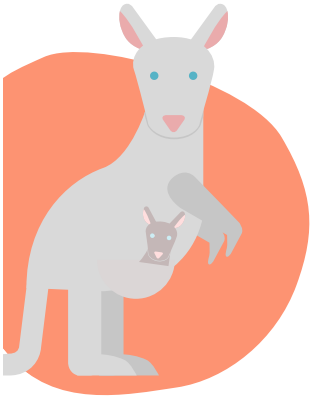
10 HELP US HEAL

Welcome the pastoral care team into your NICU to serve families & staff.

SUPPORT4NICUPARENTS.ORG

SUPPORTING KANGAROO CARE

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

National Perinatal Association

nicuparentnetwork.org

NPN NICU PARENT NETWORK

nationalperinatal.org/skin-to-skin

Position available for Neonatal Nurse Pretensioner (NNP)

Excellent practice opportunity for a NNP in an established Los Angeles neonatal practice. The Neonatal Hospitalist Group (NHG) is interviewing for an NNP to join the practice. The practice includes four NICU's in the Burbank and Glendale area. Call is from home with excellent work life balance. If you are interested, please email Robert Gall, MD, at robertgallmd@gmail.com.

Protecting your baby from

Respiratory Viruses:

What parents need to know this RSV and flu season

RSV (Respiratory Syncytial Virus) and flu infections affect the lungs and can cause serious breathing problems for children and babies.

Certain diagnoses can make children and babies more vulnerable for serious complications - including prematurity, chronic lung disease, heart conditions.

You can limit the spread of viruses by wearing a mask, washing your hands with soap & water, and using alcohol-based hand sanitizer.

The fewer germs your baby is exposed to, the less likely they are to get sick. Limit visitors. Avoid crowds. Stay away from sick people.

Immunizations save lives. Stay up-to-date with your family's flu and COVID-19 vaccinations. This helps stop the spread of deadly viruses.

Babies older than 6 months can get a flu shot. There is no vaccine for RSV, but monthly antibody shots during RSV season can help protect them.

National Perinatal Association

www.nationalperinatal.org/rsv

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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.

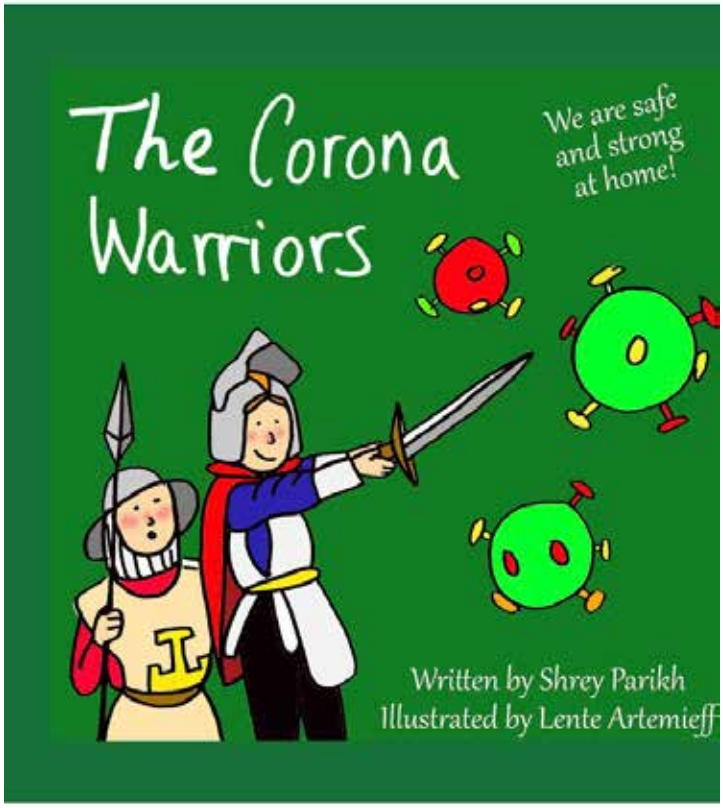
The RSV Research Group from professor Louis Bont, pediatric infectious disease specialist in the University Medical Centre Utrecht, the Netherlands, has recently launched an RSV Mortality Awareness Campaign during the 5th RSV Vaccines for the World Conference in Accra, Ghana.

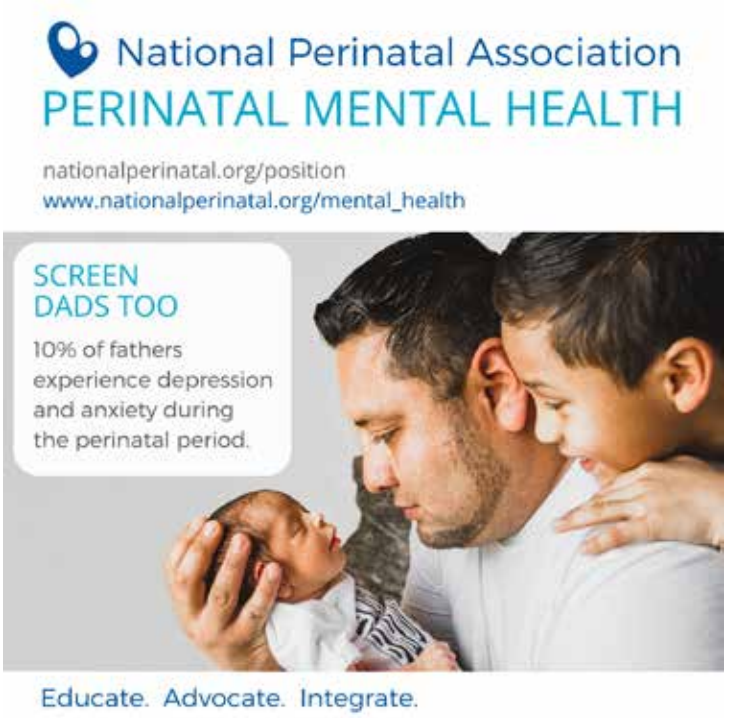
They have produced a personal video entitled "*Why we should all know about RSV*" about Simone van Wyck, a mother who lost her son due to RSV. The video is available at www.rsvgold.com/awareness and can also be watched using the QR code on this page. Please share the video with your colleagues, family,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

RSV GOLD

A Global Mortality Database for Children with RSV Infection

The RSV awareness video was produced in collaboration with the Bill & Melinda Gates Foundation





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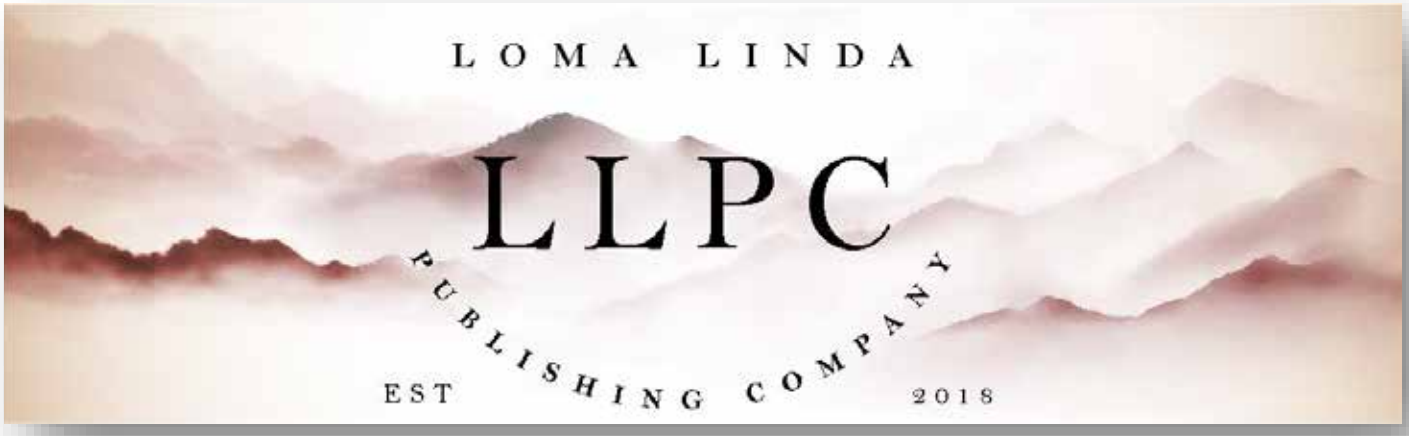


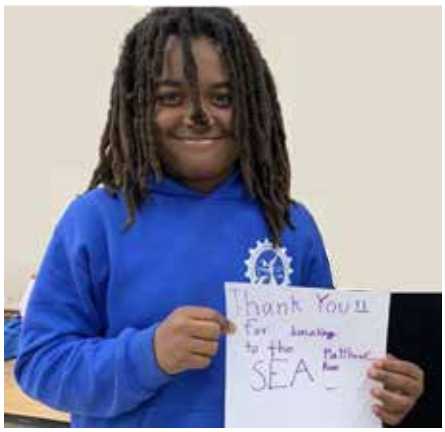
Thirteen-year-old Emily Rose Shane was tragically murdered on April 3, 2010 on Pacific Coast Highway in Malibu, CA. Our foundation exists to honor her memory.

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.

Gravens By Design: The Newborn Behavioral Observations System to Support Early Parent-Infant Relationships in the NICU

Lise C. Johnson, MD, Jessica Dym Bartlett, MSW, LICSW, PhD, J. Kevin Nugent, PhD

Parenting a child in the Neonatal Intensive Care Unit (NICU) is challenging, and transitioning from NICU to home can be daunting. The Newborn Behavioral Observations System (NBO) (1) was designed to sensitize parents and other primary caregivers to their baby's competencies, vulnerabilities, and individuality, to foster sensitive and responsive parent-infant interactions, and to contribute to the development of a positive parent-infant relationship from the very beginning. As such, the NBO may be a useful tool for various NICU professionals.

"The foundations of the NBO are based on three separate but interrelated areas of inquiry: models of neurobehavioral functioning of the newborn, psychological theories of early infant development and the centrality of the caregiving relationship to healthy child development, and the biologic sciences' deepening understanding of the critical importance of early life experience to building brain architecture and influencing lifelong mental and physical health and functioning. "

Foundational Concepts:

The foundations of the NBO are based on three separate but interrelated areas of inquiry: models of neurobehavioral functioning of the newborn, psychological theories of early infant development and the centrality of the caregiving relationship to healthy child development, and the biologic sciences' deepening understanding of the critical importance of early life experience to building brain architecture and influencing lifelong mental and physical health and functioning.

The latter half of the 20th century was marked by an explosion of research and understanding about the neurobehavioral capabilities of the human newborn. In our context, T. Berry Brazelton and colleagues published the Neonatal Behavioral Assessment Scale (NBAS) in 1973. (2) Brazelton's colleague Heidelise Als developed the Synactive Theory of Development (3) and the Assessment of the Premature Infant's Behavior (APIB), (4) and led the establishment of the Newborn Individualized Developmental Care and Assessment Program (NIDCAP), (5) which has since been adapted as a model of care in many NICUs around the world. During this era, psychological theories of development, among them Winnicott's, albeit earlier inquiry into the mother-infant relationship (6) and the work of Bowlby and Ainsworth on attachment (7,8), elevated the importance of primary caregiving relationships in early infant and child development.

The first decades of the 21st century have seen dramatic findings in the biological sciences (e.g., neuroscience, epigenetics) demonstrating down to the molecular level how the infant's experiences in the first days, months, and few years of life shape brain architecture and functioning. Over one million new neural connections form every second during a child's first years of life. This underscores the critical importance of early intervention to support safe, stable, nurturing relationships, beginning in the neonatal (or, arguably, the prenatal) period. (9)

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From Assessment to Observation:

Over the past 20 years, Kevin Nugent has led our team at the Brazelton Institute and its U.S. and international affiliates in operationalizing these foundational concepts with the NBO. The NBO moves from *assessment*, as in the NBAS or APIB, to *observation* to affirm and deepen the new parent's understanding of their baby's behavior. This understanding informs the sensitive caregiving that underpins healthy functioning for both infant and parent and all the emerging and changing relationships within the family system. In this way, the NBO is designed to support three critical transitions in the newborn period:

For the Infant: a major bio-behavioral shift from fetal to extrauterine life with accompanying rapid brain development

For the Parents: a formative stage in the transition to parenthood and a sensitive stage of both vulnerability and opportunity in the establishment of the early parent-infant relationship and family functioning

For Practitioners: a pivotal stage in the practitioner's relationship with the family: perhaps the "intervention moment par excellence."

The Contents of the NBO

The NBO consists of a series of 18 neurobehavioral items (Figure 1), which include observations of the infant's capacity to habituate to external light and sound stimuli (sleep protection), the quality of motor tone and activity level; the capacity for self-regulation (including crying and consolability); response to stress (indices of the infant's threshold for stimulation); and the infant's visual, auditory, and social-interactive capacities (degree of alertness and response to both human and non-human stimuli). Observations are made merely as a "moment in time" in terms of the strengths, vulnerabilities, and individuality that the newborn displays, and yet they provide parents with a framework to enable them to observe and respond to their child's behavioral communication in an ongoing way. The stance of the NBO is one of curiosity, and parents are

encouraged to share their observations and reflections throughout the encounter. The NBO seeks to "level the playing field" between professional and parent, asserting that, while the professional is an expert on babies *in general*, the parent is the expert on *their* baby from the very beginning. The NBO provides opportunities for confirming (or, at times, gently reframing) parental observations and tailoring anticipatory guidance. Listening closely to parents' meaning-making during shared provider-parent observation can also provide an entrée to exploring important attitudes, thoughts, and feelings accompanying the transition to parenthood. In the context of the NICU, the NBO also enables parents to process-related challenges, such as the loss of the birth experience they had hoped for, periods of separation from their baby with whom they are forging a new bond, and the emotional distress of the baby's medical challenges. (10)

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The Infant AMOR

Over the first few months of life, newborns confront a series of challenges in self-regulation as they attempt to adapt to their new extrauterine world, both the world of objects and people. Echoing Als' Synactive Theory of Development, (3) the central conceptual framework of the NBO is given the acronym Infant "AMOR," which describes four self-regulatory systems within which all observations of newborn behavior can be categorized and interpreted:

> **Autonomic System**: breathing, heart rate, temperature regulation, skin perfusion, gastrointestinal function, presence or absence of tremors, startles, hiccups, sneezes, yawns
>
> **Motor System**: Central and peripheral tone, quality and quantity of movements, self-regulatory motor strategies, reflexes including root, suck, grasp
>
> **Organization of State System**: quality and quantity of sleep and alert states and transitions among states, sleep protection, crying and consoling
>
> **Responsiveness System**: the growing awareness of the environment and capacity to respond to social and inanimate stimuli, both visual and auditory

Organizing the infant's responses during NBO activities into the four AMOR systems reveals a profile for that moment, describing how the baby uniquely functions on a continuum from premature to mature regulation within each system. The baby's behaviors are their "voice," communicating to caregivers their strengths, challenges, intentions, and individuality to guide caregiving. The following is a brief example of the infant AMOR, as it might be observed during an NBO.

A brief example of Infant AMOR:

The two-day-old 37-week newborn turns readily to the mother's voice when swaddled and in an otherwise quiet and dimly lit room but squirms and flails turns red, hiccups, and becomes fussy when arms and legs escape the swaddle and are unsupported or with prolonged efforts at social engagement. In this example, we see all four Infant AMOR systems expressed:

> *Autonomic: turning red and hiccupping with overstimulation*
>
> *Motor: swaddling contains uncontrolled movement of arms and legs, while loss of motor support or prolonged stimulation results in squirming and flailing*
>
> *Organization of State: alertness is supported with swaddling and limited external noise and light; fussiness signals that the threshold for stimulation has been reached*
>
> *Responsiveness: even in the first days, with support, the newborn can engage in social exchange, such as turning to the mother's voice*

"Even healthy parent-child dyads are out of synchrony 70% of the time, and thus, the process of mismatch and repair is foundational to the development of secure attachment, self-regulation, and positive development over the life course. (12) The parent's observations, emotions, and reactions during an NBO provide an opportunity to consider what strengths and challenges they are bringing to the caregiving relationship and, consequently, what support might be helpful."

The Parent AMOR:

While infant-focused, the NBO also attends to the role of the parent within the encounter. To paraphrase Winnicott's words, "There is no such thing as an infant. There is an infant and a mother." (11) Early brain development occurs only in the context of the caregiving relationship and is shaped by the countless moments of match, mismatch, and repair between the child and his/her primary caregivers. Even healthy parent-child dyads are out of synchrony 70% of the time, and thus, the process of mismatch and repair is foundational to the development of secure attachment, self-regulation, and positive development over the life course. (12) The parent's observations, emotions, and reactions during an NBO provide an opportunity to consider what strengths and challenges *they* are bringing to the caregiving relationship and, consequently, what support might be helpful. Parents in the NICU may require particular support given the increased caregiving needs of the sick or preterm neonate and the stress of the parental NICU experience. A conceptual framework for considering the qualities necessary for early parenting may help provide individualized support. While different than the infant's developmental tasks, these parental qualities that will influence every interaction between parent and baby may be described as the "Parent AMOR." (13) This framework consists of:

> **Affect (Emotional) Regulation:** The ability to regulate one's emotional state to be open and available for interaction and

emotional engagement with the newborn

Mentalization: The ability to be curious about the infant's experience and to wonder about the infant's intentions and responses, to attempt to see the world from the infant's perspective

Openness to the Real Baby: The ability to set aside fears as well as idealized fantasies about who the infant may or may not be and to be open to the actual person that the baby is

Responsiveness: The ability to read the baby's cues and respond in such a way that infant AMOR regulation and healthy back-and-forth interaction are promoted

Of course, our professional roles and the intensity and length of our relationship with families will impact our ability to reflect meaningfully on the various aspects of the Parent AMOR. Nevertheless, awareness of this framework brings helpful insight as we support families. While we bring this framework to the NBO, it can also be applied to many encounters, as shown below.

"Of course, our professional roles and the intensity and length of our relationship with families will impact our ability to reflect meaningfully on the various aspects of the Parent AMOR."

A brief example of Parent AMOR:

The father of a 3-week-old ex-33-weeker who is advancing on oral feeds arrives for a NICU visit to bottle-feed his partner's expressed breast milk. He hangs up from an intense work call with his boss and then spends another minute texting on his phone. He then takes a deep breath, silences his phone, and tucks it into his pocket before heading to the sink to wash his hands. By the time the nurse hands the baby to him, he seems calm, seeking out his son's face and quietly greeting him (Affect Regulation). He chuckles and compliments how comfortable the baby looks when his nurse has swaddled him and worries that he will be able to do as good a job at home (Mentalizing the baby's experience). The baby can only finish a partial feeding before becoming too sleepy to continue. Rather than persisting, the father gently removes the bottle, rubs his back to encourage a burp, and reassures his son, "That's OK, sport. You're still learning, aren't you?" (Openness to the real baby and Responsiveness)

Practitioner AMOR:

During an NBO, the practitioner makes many decisions about what to do and what to say, each dictated by both the infant's and the parent's responses, moment by moment, to the activities of the NBO. Our flexibility and nonjudgment signal to both infant and parent that we are ready to meet them where they are, respond to their needs and provide the safety upon which relational trust is built. As we navigate the encounter, we must engage in a process parallel to that of the parent to meet our role's responsibilities. Given that we are in many ways "parenting the parent" as we offer support, the Practitioner AMOR framework (13) mirrors that of the Parent AMOR:

"As we navigate the encounter, we must engage in a process parallel to that of the parent to meet our role's responsibilities. Given that we are in many ways "parenting the parent" as we offer support, the Practitioner AMOR framework (13) mirrors that of the Parent AMOR:"

Affect (Emotional) Regulation: The ability to regulate one's emotional state to be open and available to engagement with the newborn and with the family

Mentalization: The ability to be curious about the infant's experience and the parent's experience and to wonder about the infant's and the parent's intentions and responses, to attempt to see the world from their perspectives

Openness to the Real Baby and the Real Parents: The ability to see each infant and each parent as unique individuals within a unique family and community system, striving to become aware of cultural biases (knowing we can never fully succeed here!), to avoid stereotyping, and to approach every parent with respect and the assumption they want to be the best parent possible.

Responsiveness: The ability to read both baby and parent cues and to respond in such a way that the confidence and competence of the parent is supported and trust between parent and practitioner is built.

All of the qualities within the Practitioner AMOR can be found even in the briefest of encounters:

A brief example of Practitioner AMOR:

On discharge day for a one-week-old 36-weeker, the nurse practitioner (NP) weaves an NBO into her bedside visit, combining her physical examination with NBO activities. She has just walked out of another patient's upsetting family meeting and uses the routine of hand sanitizing to turn her focus to the next encounter mindfully. (Affect (emotional) regulation). The new parents of the 36 weeker appear excited, yet nervous. Sensing their anxiety (mentalization), the N.P. notes the baby's strong muscle tone and ability to hold up his head in the pull-to-sit maneuver and free his face when placed prone. The father then proudly shares how he has noticed the same neck strength when the baby is skin-to-skin with him, "He's stronger than I thought he'd be!" The N.P. endorses and

underscores the father's words by simply rephrasing them, "Yes, he's stronger than you thought he'd be." (Openness). The baby cries intermittently during the encounter, calming each time with a soothing voice, swaddling, and rocking. Noticing the mother's distress when the baby cries, the N.P. intentionally hands the baby back to his mother to hold as the encounter wraps up, reuniting and visibly calming both mother and baby (Responsiveness). She tailors her anticipatory guidance to include a conversation about coping with crying.

The tasks of the Practitioner AMOR retain relevance beyond the NBO and can be applied to many clinical situations with patients and parents. For providers in the NICU, where stress is ubiquitous, the Practitioner AMOR concepts can support meaningful relationships with families that help mitigate compassion fatigue, burnout, and turnover.

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Evidence for the Use of the NBO to Support Early Relationships:

There is a growing body of evidence demonstrating the value of the NBO in supporting early parenting, with studies targeting a variety of outcomes, including parental knowledge, confidence, anxiety, and depression; quality of parent-infant interaction; and provider knowledge and confidence. Many studies have found that using the NBO is associated with mothers' greater understanding of their babies' behavior and communication capacities (14) (15) (16). In contrast, others have shown salutary associations with maternal mental health, including reduced postpartum depression symptoms (17,18) and reduced anxiety. (19,20) Nugent et al. found that NBO was associated with enhanced mother-infant engagement in low-risk dyads at four months on the Care Index. (17) In a study of mothers at high risk for postpartum mental health disorders, Nicolson et al. found the NBO to be associated with enhanced sensitivity and nonintrusiveness on the Emotional Availability Scales at four months. (20)

Although longer-term follow-up studies are needed to assess developmental effects better, the NBO may provide meaningful developmental support. Using the Bayley Scales Infant Development-III and the Battelle Developmental Inventory-2 at six months corrected gestational age in their randomized controlled study of the NBO in Early Intervention (E.I.) services, McManus and colleagues found the use of the NBO to be associated with greater gains in cognitive and adaptive functioning at 6-months compared to usual E.I. care. McManus also found that using the NBO in E.I. services was associated with increased confidence among parents and higher perceived confidence among service providers working with at-risk infants. (21)

Research has also examined the effects on practitioners of learning and using the NBO. Two studies have found that practitioners who trained and implemented the NBO in their daily practice demonstrated more confidence in working with high-risk newborns and a higher understanding of infant competence. (14,22)

Using the NBO in the NICU Setting:

The NBO can be flexibly used in inpatient and outpatient settings. In NICUs, it can be adapted for physicians, nurses, advanced practice providers, and allied health professionals, including physical, occupational, and speech-language therapists, lactation consultants, and social workers. The NBO will look slightly different in the hands of each practitioner, and any one encounter will include only the subset of NBO items relevant to the baby's state, the parent's needs, and the goals of the moment. Indeed, at its heart, the NBO is as much the "how" of the clinical encounter as it is the "what."

NBO Training:

Practitioners wishing to learn the NBO should have ongoing access to newborns in their professional capacities and feel comfortable handling young infants. Training is provided by certified faculty from the Brazelton Institute at Boston Children's Hospital and affiliates. Group training workshops are delivered in person or remotely over two full days or three partial days. Workshops are followed by two mentoring meetings over the ensuing four months. Trainees practice the NBO and then submit documentation for NBOs conducted with five families to achieve certification. More information can be found at https://www.childrenshospital.org/research/centers/brazelton-institute-research or by contacting the Brazelton Institute at institute@chldrens.harvard.edu.

Resources for families about understanding baby behavior can be found at the Brazelton Centre U.K. website: https://www.brazelton.co.uk/. An introductory video titled "What is the NBO" has been produced by NBO Australia and can be found on YouTube: https://www.youtube.com/watch?v=hPUnq0HB2FY.

"Ending where we began, parenting a child in the NICU is challenging, and transitioning from NICU to home can be daunting. The NBO is a clinical tool that can be used flexibly by various practitioners to mitigate this stress, supporting the early parent-infant relationship in service of the baby's developmental needs, parental well-being, and the health of the family system. "

Conclusions:

Ending where we began, parenting a child in the NICU is challenging, and transitioning from NICU to home can be daunting. The NBO is a clinical tool that can be used flexibly by various practitioners to mitigate this stress, supporting the early parent-infant relationship in service of the baby's developmental needs, parental well-being, and the health of the family system. The NBO also promotes positive family-practitioner relationships, adding to

the satisfaction and meaning that sustains our professional lives.

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Disclosures: *Drs Johnson and Nugent are authors of the Understanding Newborn Behavior and Early Relationships: The Newborn Behavioral Observations (NBO) System Handbook. They receive royalties on public sales of the book. They do not receive royalties on sales of the book that are associated with NBO Training tuition.*

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Gravens Diversity Travel Award

As part of an initiative to increase diversity at the Gravens Conference, the Gravens Diversity, Equity, Inclusion, and Justice (DEIJ) Committee will provide travel awards to individuals from historically underrepresented groups (i.e., people from racially and ethnically diverse backgrounds, members of the LGBTQ+ population, individuals with cognitive disabilities, individuals with physical disabilities). Applications will open for the 2024 Gravens Diversity Travel Awards on **August 21, 2023**. Applications should be submitted no later than **Monday, October 30, 2023, at 5:00pm EST**.

Several competitive travel awards are expected to be given. The amount awarded will be based on the award availability for that year. Notice of awards are expected to be made no later than December 15, 2023. Please contact Kelly McGlothen-Bell (mcglothen@uthscsa.edu) or Christie Lawrence (Christie_Lawrence@rush.edu) for questions regarding your application.

Eligibility:

- Identify as a member of a historically underrepresented group.
- Must serve the neonatal and/or pediatric intensive care population in a professional capacity.

Application:

- Completion of Gravens Diversity Travel Award Survey, which provides contact information for the applicant and specifies the applicant's eligibility for the award.
- CV or Resume
- Submission of written or video response to the following statements:
    - Describe your personal and professional background.
    - Describe how you believe you will benefit from attending the Gravens Conference.
    - Describe how you'd like to advance DEIJ initiatives for the care of infants and their families.
- Letter of Support detailing the following attributes:
    - Administrative support from applicant's leadership team to participate at the Gravens Conference.
    - Evidence of the applicant's skills, knowledge, experiences in research, practice, service/volunteering, and/or leadership.
    - Commitment to support commitment to DEIJ in practice.

Awardee Responsibilities:

- Plan to attend the full 2024 Gravens Conference.
- Engage with an assigned Gravens Conference buddy.
- Provide post-conference statement (written or video) about the conference experience and how they plan to adopt or incorporate what they've learned at the conference into practice.
- Awardees are highly encouraged to submit an abstract to the subsequent Gravens Conference.

The Gravens Conference
on the Environment of Care for High Risk Newborns

Our message to the supporters, attendees, and participants in the Gravens conferences.

We want to acknowledge concerns regarding holding the 2024 meeting in Florida. For all those who have communicated your thoughts about attending the meeting, we want you to know that we appreciate your forthrightness and wish to offer a statement of our collective thinking on this crucial matter. As our society grows more diverse and connected, we must acknowledge how the social and political climates continue to affect how we live, move, and interact.

Our Gravens community seeks to affirm our commitment to addressing issues of racism and bias and audit our systems to ensure that we are proactive in implementing strategies that promote health equity and social justice. We strive to provide a supportive, inclusive, and welcoming space to all individuals involved in the physical and developmental environment of the neonatal intensive care unit (NICU), including family members, healthcare providers, designers, and industry supporters.

The Gravens community approach is to remain non-political. However, some of the current policies and practices in the state where the Gravens conference is historically held are not consistent with the ideals and values of the Gravens community. The Co-Chairs and Planning Committee are reviewing all opportunities to ensure that the individual identities and lived experiences of those most impacted by the current political landscape are valued and respected.

Should you choose to attend the conference in Clearwater in person, we hope you recognize that there are those whose livelihood depends on tourism and who do not hold the same views as Florida's current prevailing social and political environment. That way, you can support small businesses, specifically those owned by people of color.

As we plan for upcoming Gravens meetings, our priority is to ensure that all attendees can participate in a safe and welcoming environment. The Planning Committee for the 2024 Gravens Conference has discussed the pros and cons of going forward with holding our meeting in Florida, given the recent political decisions that threaten an open and inclusive society. We have explored the possibility of moving the conference to another state; however, we will not be able to do so for the 2024 conference due to fiscal and contractual obligations. We are actively exploring alternative sites for future meetings.

We understand that diversity, equity, inclusion, and justice are principles that must work together to result in fair treatment, access, opportunity, and advancement for all. Therefore, we respect each participant's decision to attend the conference in person or virtually, and we hope you will join us in whatever format suits you best. Through our perseverance and dedication to advancing the care of infants and families, we aim to continue to promote our message of inclusivity and health equity.

Regardless of your position on attending the Gravens conference, you might like to use these strategies right now to make a difference:

- Commit to learning and reflecting on how racism and bias impact us today and how our history led us here.
- Vote for political candidates that are in line with your values.
- Use your voice, lived experience, and privilege to bring awareness and action to address health outcomes and healthcare quality disparities.

We are continuing to work to ensure that the co-chairs, planning committee, and conference attendees reflect both the workforce and the people they serve so that we can best meet the needs of our field. You can support the Gravens Conference Diversity Fund to help ensure the participation and growth of our ever-changing society.

Together, we can create environments where every individual or group will be fully and authentically welcomed, respected, supported, and valued to shape the world for future generations equitably.

For questions or comments, please contact lomalindapublishingcompany@gmail.com.

Peer Reviewed

Fragile Infant Forums for Implementation of IFCDC Standards: Skin-to-skin Contact with Intimate Family Members

Raylene Phillips, MD, MA, FAAP, FABM, IBCLC

Introduction

After more than five years of work by an inter-professional group of neonatal experts, "Standards, Competencies, and Best Practices for Infant and Family-Centered Developmental Care in the Intensive Care Unit" was published in 2020 as a supplement to the *Journal of Perinatology(1)*. In this publication (also posted online at https://nicudesign.nd.edu/nicu-care-standards/), the specific areas addressed included: 1) Systems thinking in complex adaptive systems, 2) Positioning and touch for the newborn, 3) Sleep and arousal interventions for the newborn, 4) Skin-to-skin contact with intimate family members, 5) Reducing and managing pain and stress in newborns and families, and 6) Management of feeding, eating and nutrition delivery. This article will focus on the standards, competencies, and best practices for "Skin-to-skin contact with intimate family members."

"After more than five years of work by an inter-professional group of neonatal experts, "Standards, Competencies, and Best Practices for Infant and Family-Centered Developmental Care in the Intensive Care Unit" was published in 2020 as a supplement to the Journal of Perinatology (1)."

Skin-to-skin contact (SSC) in neonatal or pediatric intensive care (also known as skin-to-skin care or Kangaroo Care) is unique in that each of the other topics included in the standards is addressed in some way when implementing SSC, positioning and touch; sleep and arousal interventions; reducing and managing pain and stress; and feeding, eating, and nutritional delivery. SSC, therefore, can be considered to incorporate many evidence-based approaches in one effective multimodal intervention for babies and parents. Perhaps even more importantly, SSC can be a key factor in forming emotional connections between parents and their babies in intensive care, thus contributing to parent-infant bonding and attachment with lifelong effects for babies, parents, and families.

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In "Standards, Competencies, and Best Practices for Infant and Family-Centered Developmental Care in the Intensive Care Unit," (1) the term "standard" refers to a safe, evidence-based expectation, or measure, of best practice. The term "competency" refers to the action, or sequence of actions, that results in the standard's performance. Four standards are presented for "Skin-to-Skin Contact with Intimate Family Members," each with several competencies to reach that standard. Each standard includes a section describing the evidence-based rationale for its role in Infant and Family-Centered Developmental Care (IFCDC).

Standard 1 for Skin-to-Skin Contact

Parents shall be encouraged and supported in early, frequent, and prolonged skin-to-skin contact (SSC) with their babies.

- Competency 1.1: Verbal and written information about the benefits of SSC shall be provided to parents (including fathers/partners) in their primary language whenever possible and as early as possible before or after intensive care unit (ICU) admission.
- Competency 1.2: Information in a variety of appropriate formats and the parents' language should be provided about the SSC policy and how it applies specifically to them and their baby, including a) inclusion and exclusion criteria; b)

indications and techniques for kangaroo care (KC) and hand containment (HC); and c) who may be designated by parents to participate in SSC.

- Competency 1.3: Images of individuals from diverse populations doing KC and HC should be placed in prominent hospital and ICU locations.
- Competency 1.4: Parents should be given opportunities to practice SSC transfer with an appropriately sized manikin, if desired, before transferring their baby.
- Competency 1.5: Parents should be provided with comfort, including a) safe and comfortable seating or reclining accommodations that are readily available at baby's bedside; b) support pillows; c) secure wraps to support baby; d) a mirror to see baby's face; e) hydration and nutrition for parents as needed; f) privacy, if desired (in private rooms or by privacy screens); and g) a quiet, therapeutic environment for being with their baby.
- Competency 1.6: A healing environment that protects the baby's physiologic and behavioral stability shall be maintained during SSC including a) appropriate room temperature with absence of drafts; b) consistently low sound levels; c) avoidance of bright lights with individualized light as needed to assess baby; d) prominence of parent's scent (free of strong scents including perfumes and tobacco); e) proximity to mother's breast to support smell and taste (when a mother providing milk is holding her baby); and f) gentle touch and handling to protect baby's immature vestibular system.
- Competency 1.7: Parents shall be supported in recognizing their baby's behavioral communications of stress and relaxation during SSC.
- Competency 1.8: Parents shall be encouraged to support their baby in SSC during painful procedures whenever possible.
- Competency 1.9: Parents shall be encouraged to have vocal and singing interactions with their baby during SSC to enhance parental-infant connections, reduce parental anxiety, increase newborn vocal/listening interactions, and improve the baby's autonomic stability.
- Competency 1.10: Parents should be allowed to fall asleep during SSC or Kangaroo Care (KC) when safety measures are in place that include: a) parent and baby are in a non-rocking, reclining chair or bed; b) baby is well secured by an appropriate wrap to parent's chest; c) baby is electronically monitored if indicated; and d) an appropriate healthcare provider is immediately available.

"Parents need information to appreciate the therapeutic effects of SSC with their baby in the ICU and deserve information that is clear and understandable, free from medical jargon, and in their native language (2, 3)."

Evidence-Based Rationale for Standard 1:

- Parents need information to appreciate the therapeutic effects of SSC with their baby in the ICU and deserve information that is clear and understandable, free from medical jargon, and in their native language (2, 3). A pre-selected teaching DVD on SSC may be helpful for parents to watch before doing SSC for very premature or sick babies. Fathers often need specific encouragement to hold their baby in SSC and should be included in all educational efforts and SSC opportunities (4, 5). Parents need to see role models within their own culture and ethnicity doing KC and HC (6, 7).

"Wraps to secure babies in the KC position have been shown to provide comfort and safety and encourage more SSC (17)."

- Parents should be encouraged to have early, frequent, and prolonged SSC with their baby whenever possible. Parents are often intimidated by the ICU environment and their baby's size and medical condition and may need reassurance, support, and encouragement to engage with their baby in the ICU (8, 9). SSC/KC has been shown to reduce maternal anxiety in the NICU (10). Parents may need instructions on developmentally appropriate HC and may wish to practice a simulation of KC with a manikin before doing it with their baby. Supporting parents in recognizing their baby's behaviors and communicating stress and relaxation helps reduce maternal stress (11). Supporting parents in having SSC with their baby reinforces their role as a parent and as an active members of the caregiving team (12). Many parents want to be involved in comforting their baby during painful procedures and should understand how and why SSC can allow them to do so (13-15).
- Safety and comfort are essential if frequent and prolonged SSC is to be achieved (16). Comfortable seating or reclining accommodations, including adult beds or reclining chairs whenever possible (non-rocking for intubated babies), should facilitate SSC whenever parents are present. Mothers may need extra support to be comfortable for days/weeks after giving birth. Wraps to secure babies in the KC position have been shown to provide comfort and safety and encourage more SSC (17). Breastfeeding mothers need hydration and nutrition regularly. Babies being electronically monitored should continue monitoring during KC and be visually monitored by a healthcare provider when the parent is asleep during SSC.
- Many mothers (and sometimes fathers) desire privacy during transfer when their chest is exposed and during SSC for enhanced bonding with their baby. Parents often need support in just being a parent and understanding that their baby's behavioral communications can help create an emotional connection with their baby in the ICU (18, 19). Because it is sometimes difficult to see a baby's face during KC, a mirror can provide another means for parents to connect with their baby. Utilizing Kangaroo Supported Diagonal Flexion (KSDF), the positioning provides more opportunities for mother-baby eye-to-eye contact, maternal vocalizations, smiles, and caressing (20). Parental talking and singing during SSC can reduce anxiety and improve autonomic stability in stable preterm babies (21). Babies born prematurely, who spend their first weeks and even months of life in the ICU, are often exposed to excessive sound levels. If separated from their mother, they are deprived of the maternal sounds they would otherwise hear in utero. Evidence suggests that

the functional development of the auditory system is largely influenced by environmental acoustic inputs early in life, and hearing m/other's voice enhances hearing development and physiological stability (22, 23).

- While thermal synchrony with the parent will usually keep the baby warm, some rooms have extreme temperatures that should be noted and accommodations made (24). SSC stimulates oxytocin and neuropeptide release, promoting localized vasodilation and increased skin temperature of the mother's breast tissue, thus promoting newborn thermoregulation. Loud sounds are destabilizing to premature and sick babies and can interrupt sleep (25). ICU staff conversations and monitor alarms are the primary sources of loud noise levels in the ICU. In addition, direct light can interfere with sleep, and strong scents can destabilize premature and sick babies (25). Babies recognize and prefer their mother's scent (26). Mother's milk's early smell and taste provide positive oral and gustatory experiences. It is important to recognize that all baby handling should be done slowly to avoid overstimulation of the baby's immature vestibular system (27, 28).

- Having a baby in the ICU is mentally, emotionally, and physically exhausting, and parents are usually chronically tired (29). If safety measures are in place, prolonged SSC in KC is a good intervention for both baby and parent to promote rest and sleep. In addition to secure positioning and electronic monitoring (if indicated), an appropriately trained healthcare provider must be immediately present whenever a parent is asleep during KC.

"Having a baby in the ICU is mentally, emotionally, and physically exhausting, and parents are usually chronically tired (29). If safety measures are in place, prolonged SSC in KC is a good intervention for both baby and parent to promote rest and sleep."

Standard 2 for Skin-to-Skin Contact:

An interprofessional collaborative team will develop, implement, monitor, and evaluate education and policies supporting skin-to-skin contact between parents and their babies.

- Competency 2.1: A written policy and education/training plan for SSC shall be: a) known by all ICU interprofessional staff; b) reviewed by all new employees during employee orientation and annually; and c) evaluated every 1-3 years by ICU leadership for any needed updates.

- Competency 2.2: The SSC policy shall include: a) strategies for keeping the baby together with m/other as much as possible; b) clear inclusion and exclusion criteria for SSC; and c) who may be designated by parents to participate in SSC.

- Competency 2.3: The SSC staff education plan shall include didactic education about a) the developmental and physiologic expectation of all newborn babies to be in continuous SSC contact with their mothers after birth and the stress induced by separation; b) the multiple benefits of SSC for babies including decreased mortality, improved physiologic stability, reduced stress and pain, optimal sleep, enhanced neurodevelopment, enhanced gut microbiome maturity, improved feeding tolerance, increased growth, early initiation and longer durations of breastfeeding, decreased rates of sepsis, enhanced parental-infant attachment and bonding; c) the benefits of SSC for parents including reduced stress and anxiety, enhanced parental-infant attachment and bonding, and increased breast milk production for mothers; and d) the need for a healing environment during SSC including protection from loud sounds, bright lights, and strong scents and practical ways to create and maintain such an environment. (30)

- Competency 2.4: SSC staff training should include simulation training with an appropriately sized baby manikin/doll on how to safely do standing and sitting transfers of babies (including babies on mechanical ventilation and with lines) to parents' chests.

- Competency 2.5: ICU staff who are experienced and comfortable with SSC transfers should be available to mentor less experienced staff until they gain competence and confidence in facilitating SSC transfers.

- Competency 2.6: SSC educational content should include ways to individualize SSC according to the baby's medical condition, behavior, and state organization and should include a) descriptions, techniques, and indications for KC or gentle supportive HC and b) techniques and scripts for supporting use of these options to parents.

"SSC is one of the most studied interventions in neonatal care. The benefits of SSC documented in numerous studies include: decreased mortality (36, 37), improved physiologic stability (38), reduced stress and pain (13-15), optimal sleep (39), enhanced neurodevelopment (33, 40, 41), enhanced gut microbiome maturity (42), improved feeding tolerance (43), increased growth (44, 45), early initiation and longer durations of breastfeeding (37, 46, 47), decreased rates of sepsis (36, 46), reduced parental stress and anxiety (14), and enhanced parental-infant attachment and bonding (14, 36, 41, 48-50)."

Evidence-Based Rationale for Standard 2:

- Formal policies legitimize care practices as standards of care and help to standardize practice methods (31). Policies fundamental to the unit's culture must be introduced early, during orientation, and after employment begins. An SSC policy should clearly describe the inclusion and exclusion criteria for SSC/KC and define who may participate in

SSC/KC to avoid ambiguity and confusion. Staff education should explain that maternal proximity is the developmental and physiological expectation of all newborn mammals and the "natural habitat" for all newborn altricial mammals (32). Education should include evidence in neuroscience and neurobiology that supports the importance of SSC on newborn brain development (33). Much research (animal and human) documents the universal stress reactions experienced by both mothers and babies when they are separated (34, 35). Therefore, barring extreme medical circumstances, every effort should be made to keep babies with m/other as much as possible for optimal physiologic stability and neurodevelopment.

- SSC is one of the most studied interventions in neonatal care. The benefits of SSC documented in numerous studies include: decreased mortality (36, 37), improved physiologic stability (38), reduced stress and pain (13-15), optimal sleep (39), enhanced neurodevelopment (33, 40, 41), enhanced gut microbiome maturity (42), improved feeding tolerance (43), increased growth (44, 45), early initiation and longer durations of breastfeeding (37, 46, 47), decreased rates of sepsis (36, 46), reduced parental stress and anxiety (14), and enhanced parental-infant attachment and bonding (14, 36, 41, 48-50). SSC also increases maternal, paternal, and infant oxytocin levels, which support bonding and attachment and increases prolactin levels in mothers, increasing milk production (14, 51, 52).

- Since staff are responsible for creating and maintaining a healing environment in the ICU, they need information about the importance of individualizing light, sounds, and scents in ways that will protect babies in the ICU from developmentally inappropriate stimulation. In addition to knowledge of the rationale, staff need practical methods of applying this knowledge to support parents and babies during SSC. Staff need more than knowledge and theory to support SSC enthusiastically. Simulation training provides practical, hands-on experience during the learning process to develop competency and confidence in new skills. It can be done with appropriately sized baby/doll manikins to demonstrate how to safely perform standing and sitting transfers of babies (including intubated babies) to parents' chests (53). Many studies have documented the safety of SSC/KC with ventilated babies (54, 55), and at least one prospective study with 263 VLBW babies has documented the safety of SSC with umbilical lines (56). A support team for day and night shifts can provide ongoing assistance with a new skill, often needed during the early stages of practice.

"All care, including SSC, should be provided in a manner individualized to the baby's developmental stage and adapted to age, medical condition, stability, and state availability (27, 28). While KC is usually the first choice for SSC, parents should be encouraged to provide developmentally appropriate HC for their baby if it is contra-indicated."

- All care, including SSC, should be provided in a manner individualized to the baby's developmental stage and adapted to age, medical condition, stability, and state availability (27, 28). While KC is usually the first choice for SSC, parents should be encouraged to provide developmentally appropriate HC for their baby if it is contra-indicated. Providing KC or HC for a tiny, fragile baby can frighten parents, who may need reassurance and a demonstration of techniques.

Standard 3 for Skin-to-Skin Contact:

Babies shall be evaluated to a) determine their readiness for transfer to KC; b) assess stability during transfer from bed to parent's chest; c) assess baby's response to SSC (KC or HC); and d) assess their stability during and after transfer back to the bed.

- Competency 3.1: A standardized assessment of the baby's readiness, stability, and response to transfer and SSC should be utilized by ICU staff.

- Competency 3.2: Electronic or manual documentation should be created, and staff should be trained in methods of entering data to record parameters, such as: a) if the baby was eligible for KC, b) if KC and/or HC was offered to parent; c) if KC or HC was done and how long; d) which parent had SSC with baby; e) baby's response; f) parent's experience; and g) staff experience/motivation.

- Competency 3.3: Periodic quality improvement (QI) evaluations should be conducted using validated methodology to evaluate SSC implementation and sustainability.

Evidence-Based Rationale for Standard 3:

- Standardized evaluation and documentation will aid in monitoring safety and therapeutic value in SSC. A variety of valid assessments for SSC are available (16). Accurate and consistent data collection will make evaluating progress and identifying quality improvement opportunities possible. Without formal plans for a QI process, it is unlikely to occur. Participation in formal QI processes with other institutions provides a comparison of progress and motivation for improvements (58, 59).

Standard 4 for Skin-to-Skin Contact:

Parents shall be provided information about the benefits of SSC that continue for babies and parents after discharge.

- Competency 4.1: Discharge planning with parents shall include information regarding the continued value of SSC, the holding of babies, and encouragement for parents to continue SSC at home.

- Competency 4.2: Parents shall be supported in safely holding and carrying their baby after discharge, including using a baby carrier if desired.

Evidence-Based Rationale for Standard 4:

- The benefits of SSC for babies and parents continue for several months after birth and have been shown to enhance neurodevelopment and social engagement (50, 60), increase breastfeeding duration (61), and reduce the incidence of postpartum depression (60). Safety is an ongoing issue after discharge, so it should be discussed with parents during discharge planning.

Conclusions

For decades, we have had ample evidence that infant and family-centered developmental care (IFCDC) supports babies' optimal physical, cognitive, and emotional health in intensive care. It is

also well-documented that supporting nurturing relationships between parents and babies is central to the mental health of everyone involved. Practices that are integral to IFCDC and those that directly support nurturing relationships can no longer be viewed as "optional" but must be considered *essential* to medical management and caregiving for NICU babies and their families. This requires a culture change in intensive care that is growing but, regrettably, is not yet widespread.

"Practices that are integral to IFCDC and those that directly support nurturing relationships can no longer be viewed as 'optional' but must be considered essential to medical management and caregiving for NICU babies and their families."

A critical part of the culture change needed is a radical shift in perceptions about the role of families and in facilitating opportunities for them to interact and connect with their babies during skin-to-skin contact. Amid a highly technical environment where highly skilled professionals manage complex medical care, skin-to-skin contact places baby and mother (or father/partner) as close together as they can get after birth. It is where interrupted gestation can continue and where healing from birth trauma can begin for both baby and mother (and father/partner).

"While medical and surgical interventions are lifesaving for NICU babies, the formation of nurturing emotional connections between parents and infants is foundational to infant, parent, and family mental health and wellbeing. Ignoring or minimizing the importance of nurturing touch and nurturing connections can only be done at significant risk for sub-optimal physical and mental health for NICU babies and at great peril for decreasing the quality of life inherent to human experience."

SSC may be the most evidence-based intervention we have in the NICU. At the same time, it is also the most under-valued and under-used intervention in many NICUs worldwide. While medical and surgical interventions are lifesaving for NICU babies, the formation of nurturing emotional connections between parents and infants is foundational to infant, parent, and family mental health and wellbeing. Ignoring or minimizing the importance of nurturing touch and nurturing connections can only be done at significant risk for sub-optimal physical and mental health for NICU babies and at great peril for decreasing the quality of life inherent to human experience.

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Recommended Standards, Competencies and Best Practices for Infant and Family Developmental Care in Intensive Care

Fragile Infant Forums for Integration of Standards (FIFI-S)
Working Group Agenda
September 28 and 29, 2023
0900-1500 Mountain Standard Time
Virtual access
https://us02web.zoom.us/j/5665008223

Overview:
IFCDC Standards for have been developed and distributed widely for use in intensive care. With the rapidly advancing science it is time for a review and revision. Developed and published in 2020 (1) it is time for evaluation and revision. The focus of FIFI-S will be to not only update and expand the principles on which the standards are built, to provide updated supporting evidence for each standard and to streamline the standards for ease of use.

Objectives:
The result of the work during the FIFI-S working group meeting will be to

a. Integrate more perspectives into the standards (e.g. DEI, infant mental health, advocacy)
b. Rearrange how the standards are presented
c. Streamline and consolidate the standards
d. Update each of the domains with current research
e. Summarize and develop next steps in preparation for Gravens 2024

Proposed agenda:

Thursday, September 28th

0900-0915 Settling in and updates from everyone. Joy Browne
0915-0930 Objectives review, anticipated outcome discussion and overview of the agenda Joy Browne and Carol Jaeger
0930-1015 Integrating concepts into all standards (DEI, advocacy, infant mental health, etc.) Kelly McGlothen Bell

1015-1045 Group discussion about integration into the standards with examples Kelly McGlothen Bell
1045-1100 Break
1100-1130 Mapping the new format onto the standards (restructuring) Kelly McGlothen Bell
1130-1200. Group discussion about new format
1200-1245 Lunch and Break
1245-1:00 Reconvene and review morning presentation
1:00-2:00 Breakout groups for individual domain discussions
1400-1445 Large group discussion, integration, and next steps
1445-1500 Preparation for tomorrow

Friday, September 29th

0900-0915 Settling in and reflections from yesterday Joy Browne
0915-0930 Goals for today Joy Browne
0930-1030 Breakout groups to work on restructuring and integration of concepts
1030-10:45 Break
1045-1130 Reconvene to summarize work and ask questions.
1130-1215 Endnote tutorial Carole Kenner and Carol Jaeger
1215-1300 Lunch
1300-1400 Breakout group work to update evidence
1400-1445 Large group discussion
1445-1500 Summary of work and next step discussion Joy Browne and Carole Jaeger

1. Browne J, Jaeger C, Kenner C. Gravens Consensus Committee on Infant and Family Centered Developmental Care. Executive summary: standards, competencies, and recommended best practices for infant-and family-centered developmental care in the intensive care unit. Journal of perinatology : official journal of the California Perinatal Association. 2020;40(suppl 1):5-10.

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** SSESS 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.

Partnering for patient-centered care when it matters most.

nann.org nationalperinatal.org

National Association of Neonatal Nurses

National Perinatal Association

Mental Health Services for Caregivers of Premature Infants

Yanique Williams-Adeniji, MSW, LICSW

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.

National Perinatal Association
Educate. Advocate. Integrate.

"The focus of infant research is the reduction of preterm births, although the number of overall preterm births has not decreased. In 2021, the Centers for Disease Control and Prevention (CDC) reported that preterm births rose by 4%, with one in ten pregnancies classified as preterm (3)."

Introduction:

Globally, there are approximately 15 million preterm births annually (1), with almost 400,000 occurring in the U.S. The increase in preterm newborns continues to be a public health challenge. Preterm births, defined as birth before 37 weeks, continue to be the leading cause of morbidity and mortality (2). The focus of infant research is the reduction of preterm births, although the number of overall preterm births has not decreased. In 2021, the Centers for Disease Control and Prevention (CDC) reported that preterm births rose by 4%, with one in ten pregnancies classified as preterm (3). Moreover, when considering racial, ethnic, and social disparities, preterm births remain stagnant as Black Women account for 14.4% of all births, 50% higher than both White and Hispanic births (3).

Twenty percent of pregnant women will experience some form of adverse mental health outcome while caring for their babies (4). Along with preterm birth outcomes, there is considerable concern for the mental health and wellness of pregnant persons. The physical health of the infant and pregnant person is often prioritized in healthcare settings at the expense of the pregnant person's current and long-term mental well-being. With the current maternal mortality rate at 32.9 per 100,000 births and infant mortality at 5.4 per 1,000 per live births, it is not surprising that imminent health needs are paramount (3). Moreover, for minority populations, infant mortality remains the highest at 69.9 for Blacks and 28.0 for Hispanics (3). Although evidence supports health disparity in prematurity and mortality rates, both the physical and mental health concerns must be prioritized in maternal child health.

"The physical health of the infant and pregnant person is often prioritized in healthcare settings at the expense of the pregnant person's current and long-term mental well-being."

Mental Health Needs of Caregivers:

Caregivers of premature newborns are more vulnerable to adverse mental health outcomes. These pregnant persons often suffer from anxiety, postpartum depression, post-traumatic stress disorder, and obsessive-compulsive disorder (4, 5). If not assessed and targeted early in the perinatal period, the mother/infant bonding period is compromised (5, 6). In addition, the cognitive development of newborns is compromised when pregnant persons suffer from mental/behavioral health challenges (5). Maternal mental/behavioral health challenges impact the entire family system. Maternal mental health challenges can pervasively impact the system, including the marital relationship, other children, and extended family (7).

"Caregivers of premature newborns are more vulnerable to adverse mental health outcomes."

Caregivers of premature infants have higher levels of stress and have unmet needs. In a study, pregnant persons reported that their mental health needs were not effectively addressed (1). Mental health services are identified as taking place during the antepartum period and consisting only of postpartum depression screens (1). There are opportunities to assess and screen significantly earlier in the perinatal period, allowing customized, comprehensive mental health treatment and services.

Unique Needs of Women of Color:

The preterm birth rate for Black women is 50% higher compared to both White and Hispanic pregnant persons (3). The premature birth rate for Black women is attributed to long-standing racial discrimination (2, 8). Though the risk of mental health issues is high for all pregnant persons who give birth to premature newborns, studies have shown that women of color, particu-

larly Black women, are at higher risk (8). Black women do not receive adequate mental health services that are culturally sensitive. Healthcare policies and practices must focus on cultural biases and racism. Black pregnant persons report feeling invisible and misunderstood by providers and hospital staff. The "one size fits all '' health care model undercuts the multiple socio-cultural layers that affect Black pregnant persons (8). These types of experiences worsen mental health outcomes. More research is needed to explore the health care and mental health care needs of Black pregnant persons.

"Though the risk of mental health issues is high for all pregnant persons who give birth to premature newborns, studies have shown that women of color, particularly Black women, are at higher risk (8). Black women do not receive adequate mental health services that are culturally sensitive."

Reflections of a Mother:

As a woman of color who gave birth to late preterm (35 weeks) twins during COVID-19, I can attest to the necessity of ongoing dialogue around mental health services for mothers. Though my children were fortunate not to have any major medical complications, both my genetics specialist and obstetrician used each perinatal appointment to prepare me for the possibility of a newborn intensive care unit (NICU) admission due to premature birth. Though I was given adequate information regarding the best and worst scenarios concerning the health outcomes of my twins, my anxiety increased with mood swings fluctuating from anxious to depressed with constant, ongoing hypervigilance. These mental health needs were not addressed. I was clear that being a woman of color placed me at higher, elevated health risks and adverse maternal health outcomes; however, I was not aware or prepared for the mental health toll during and after my pregnancy.

"I was clear that being a woman of color placed me at higher, elevated health risks and adverse maternal health outcomes; however, I was not aware or prepared for the mental health toll during and after my pregnancy."

Interactions with healthcare providers were not ideal and further contributed to mental health challenges. Though I would voice my desire to carry my pregnancy to at least 35 weeks, I was told it was impossible due to my dynamic cervix. Early in my second trimester, I requested to be placed on bed rest; however, I was told I "was fine." Since my husband was not permitted to attend my appointments due to COVID-19 health regulations, I requested that he attend virtually via Facetime. This request was met with resistance even though his support would have benefited my mental health. My husband would try to discuss my mental health challenges and voice his own concerns, but his concerns were also ignored.

These instances often made me feel alone and that I had no autonomy over my pregnancy or my body. The lack of cultural sensitivity I encountered only heightened my fear and frustration. I, too, felt unheard, particularly when advocating for the mental health services I needed. Moreover, the lack of provider engagement after giving birth and at discharge left me anxious and concerned about my ability to effectively parent premature infant twins who were both under five pounds.

Conclusion:

The patient and health care provider relationship holds a vital key to shifting maternal mental health care services. Researchers propose using collaborative models when discussing mental health interventions to alleviate maternal stress (5). Furthermore, a host of perinatal mental health screening can detect other perinatal conditions outside of depression. Ongoing maternal health care assessments and interventions should not be limited to the hospital setting or discharge. Instead, the discharge plan should include follow-up reassessments and interventions to promote the continuity of care and progress.

"The patient and health care provider relationship holds a vital key to shifting maternal mental health care services. Researchers propose using collaborative models when discussing mental health interventions to alleviate maternal stress (5)."

As premature births continue to remain on the rise, adequate maternal mental health interventions are vital to the healthy development of newborns and serve an essential role in supporting pregnant persons during the perinatal period. When supporting the mental health of persons of color, health providers are tasked to create meaningful bonds for pregnant persons by listening, validating concerns and fears, and encouraging full family support. To help decrease stigma and increase mental health awareness, culturally relevant community education about perinatal mental health concerns and their impact on the perinatal postpartum (9).

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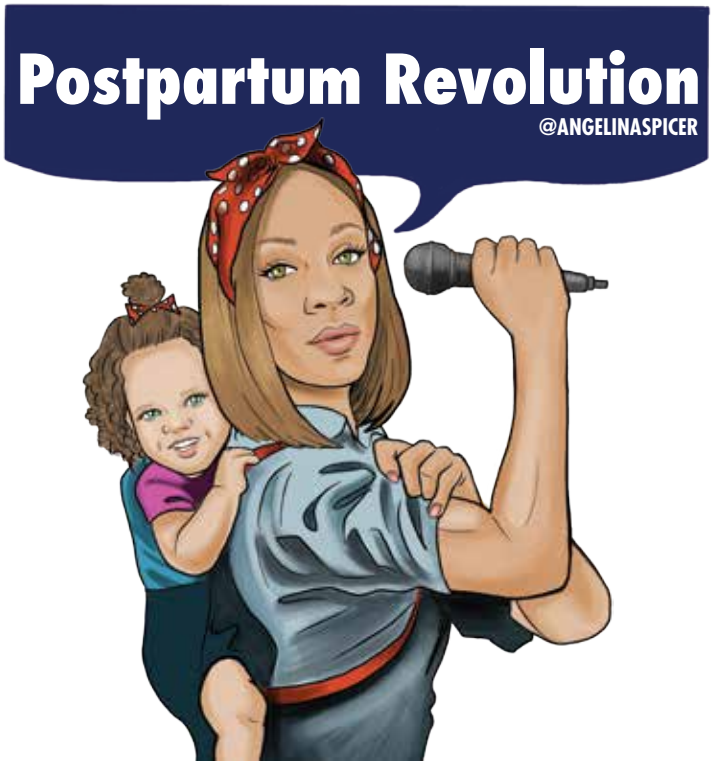


FCC TASKFORCE WEBINAR

September 28

11-12:30pm PT

FAMILY-CENTERED CARE TASKFORCE

Family Integrated Care: Where are we now?

Karel O'Brien, MD (she/her)

- Staff Neonatologist, Mount Sinai Hospital
- Professor of Pediatrics, University of Toronto

NICU Dad Perspective: Disparities in Family-Centered Care

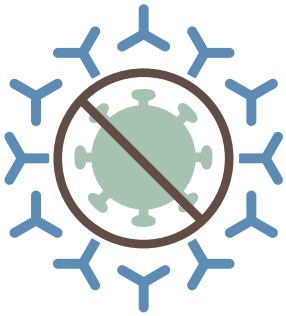
Alex Zavala (he/him)

- Founder, The NICU Dad & The NICU Dad Podcast
- VON Family Advisor
- Dell Children's Ascension NICU Network PFAC Chair
- NICU Children: Emerson & Mia

Sponsored by Dräger

Protecting your baby and family from

Respiratory Viruses:



What parents need to know this RSV and flu season

Like COVID-19, RSV (Respiratory Syncytial Virus) and flu affect the lungs and can cause serious breathing problems for children and babies. Talk to your family about the risks.

Certain diagnoses can make children and babies more vulnerable for serious complications from respiratory viruses - including prematurity, chronic lung disease, and heart conditions.

You can limit the spread of viruses by wearing a mask, washing your hands with soap & water, using an alcohol-based hand sanitizer, and getting vaccinated.

The fewer germs your baby is exposed to, the less likely they are to get sick. Let people know you need their help to stay well. Limit visitors. Avoid crowds. Stay away from sick people.

Immunizations save lives. Stay up-to-date with your family's flu vaccinations and COVID-19 boosters. This helps our community stay safe by stopping the spread of deadly viruses.

Babies older than 6 months can get a flu shot and COVID-19 vaccinations. There is no vaccine for RSV, but monthly antibody shots during RSV season can help protect them.

WE CAN HELP PROTECT EACH OTHER.

National Perinatal Association

www.nationalperinatal.org/rsv

The 37th Annual Gravens Conference

On the Environment of Care for High Risk Newborns

"The Power of Voice: Using Your Voice for Babies, Families, Staff and Beyond"

Tuesday, March 5, 2024		
Time	**Session/Event**	**Location**
4:00 pm-7:00 pm	Registration Desk Open	Lobby II
7:00 pm-9:00 pm	Welcome Reception	Exhibit Hall-Island
Wednesday, March 6, 2024		
Time	**Session/Event**	
6:30am-7:15 am	Run/Walk/Crawl on the beach (meet pool side)	
7:00 am-5:00 pm	Registration Desk Open (Lobby II)	
7:00 am-8:00 am	Continental Breakfast (Exhibit Hall-Island)	
8:00 am-5:00 pm Plenary Sessions (Grand Ballroom)		
Time	**Session/Event**	**Presenter**
8:00 am-8:15 am	Welcome & Introductions	Joy Browne
8:15 am-9:00 am	Using your voice with families	Mia Malcolm
9:00 am-9:45 am	Voices and music for the developing brain	Petra Huppi
9:45 am-10:30 am	Human voice and the brain:	Natalie Maitre
10:30 am-11:00 am Break in Exhibit Hall		
11:00 am-11:45 am	Touch as communication	Jeff Alberts
11:45 am-12:30 pm	All care is brain care	Elizabeth Rogers
12:30 am-1:45 pm Lunch on Own		
1:45 pm-2:30 pm	Putting your voice to work with systems	Scott Berns
2:30 pm-2:45 pm Gravens Award		
2:45 pm-3:30 pm	Overcoming resistance and making change happen	Cynthia Sparer & Laura Poltronieri
3:30 pm-4:00 pm Break in Exhibit Hall		
4:00 pm-4:45 pm	Words matter	Paige Church
4:45 pm-5:00 pm	Final thoughts & take home message	Bob White
6:30 pm-8:30 pm Exhibit Hall Reception & Poster Walk **7:00 pm-7:45 pm Poster Authors Available** **8:10 pm-8:30 pm Door Prize Raffle-Vincent Smith**		

Agenda is subject to change without notice.

Thursday, March 7, 2024			
Time	**Session/Event**		
6:30 am-7:15 am	Run/Walk/Crawl on the beach (meet pool side)		
7:00 am-5:00 pm	Registration Desk Open (Lobby II)		
7:00 am-8:00 am	Continental Breakfast (Exhibit Hall-Island)		
8:00am-1:00pm Themed Tracks			
Track A Developmental & Family Integrated Care Beach/Gulf		**Track B Newborn ICU Design Palm/Bay**	
Time	**Session/Event**	**Time**	**Session/Event**
8:00 am-8:15 am	Introduction & Announcements: Joy Browne	8:00 am-8:15 am	Introduction & Announcements: Bob White
8:15 am-8:45 am	Implementing IFCDC Standards of Care The Model & Systems Thinking: Carol Jaeger	8:15 am-9:00am	Using Color in the NICU: Becca Ames & Mardelle Shepley
8:45 am-9:30 am	Implementing IFCDC Standards of Care Pain & Stress in Babies Neurodevelopmental Care for Infant Pain: Carol McNair & Jean Powlesland	9:00 am-9:45 am	New Unit Presentation Cincinnati Children's: Jim Greenberg
9:30 am-10:15 am	Implementing IFCDC Standards of Care Feeding, Eating, & Nutrition Delivery: Britt Pados & Erin Ross	9:45 am-10:30 am	Families Belong Together: Tanya Ricci & Gloria Yennaco
10:15 am-10:45 am Break (Exhibitors Break down after last break)			
		10:30 am-11:00 am Break (Exhibitors Break down after last break)	
10:45 am-11:30 am	Implementing IFCDC Standards of Care: Skin to Skin Care with Intimate Family Members: Raylene Phillips & Christie Lawrence	11:00 am-11:45 am	Good NICU Design Requires A Crystal Ball (temp title): Bob White
11:30 am-12:15 pm	Panel Discussion Regarding challenges with Implementation of Evidence Based Standards	11:45 am-12:45 pm	Crowdsourcing: Experts in the Audience

Agenda is subject to change without notice.

12:15 pm-12:45 pm	Panel Discussion with Audience Experts	12:45 pm-1:00 pm	Summary & Next Steps: Bob White
12:45 pm-1:00 pm	Summary & Next Steps: Joy Browne		
1:00pm-6:00pm Rest, Play Network 6:00 pm-9:00 pm			

Friday, March 8, 2024 Abstracts & Workshops		
Time	**Session/Event**	
6:30 am-7:15 am	Run/Walk/Crawl on the beach (meet pool side)	
7:00 am-4:30 pm	Registration Desk Open (Lobby II)	
7:00 am-8:00 am	Continental Breakfast (Lobby II)	
8:00 am-12:15 pm Topics will be didactic content. Workshops will center around engaging with participants		
Time/Room	**Workshops and Topics**	**Presenter**
8:00 am-9:15 am	**J Workshops and Topics (75min)**	
Room: Beach	J-1 Topic: Family-Centered Care: Practical tips on how to implement and sustain it	Malathi Balasunduram & Keira Sorrells
Room: Gulf	J-2 Workshop: Neuroprotective and Neuropromotive Care guided by Infant State	Juzer Tyebkhan & Hussein Adamjee Burhani
Room: Palm	J-3 Workshop: Negotiating morality challenges in the NICU	Jeff Alberts
Room: Bay	J-4: Workshop: Making change happen in systems	Scott Berns
Room: Island II	J-5: Workshop: Writing for publication in neonatology today	Mitchell Goldstein
9:15 am-9:45 am Break (30 min)		
Time/Room	**Workshops and Topics**	**Presenter**
9:45 am-11:00 am	**H Workshops and Topics (75min)**	

Agenda is subject to change without notice.

Room: Beach	H-1 Topic: Discharge Planning	Cuyler Romeo and Team
Room: Gulf	H-2 Workshop: Alleviating pain and stress for babies	Jean Powlesland & Carol McNair
Room: Palm	H-3 Workshop: Loss and Bereavement	Kimberly Novod
Room: Bay	H-4: Workshop: Skin to Skin Implementing into practice	Elizabeth Rogers
Room: Island II	H-5: Workshop: Color and Design	Mardelle Shepley
11:00 am-11:30 am Break (30 min)		
Time/Room	**Workshops and Topics**	**Presenter**
11:30 am-12:45 pm	**I Workshops and Topics (75min)**	
Room: Beach	I-1 Topic: Working collaboratively with systems post discharge	Andy Gomm
Room: Gulf	I-2 Workshop: What babies can and need to hear	Natalie Maitre
Room: Palm	I-3 Workshop: Dreams and Dilemmas	Tanya Ricci, Gloria Yennaco, Jessica Clem, Ashley Sartori
Room: Bay	I-4: Workshop: Practice with communication with families	Mia Malcolm
Room: Island II	I-5: Workshop: Feeding and eating in practice	Erin Ross & Kelly McGlothen-Bell
12:45 pm-2:00 pm Lunch on Own (1hr 15 min)		
2:00 pm-5:00 pm ABSTRACTS		
2:00pm-3:15pm	**Abstract Sessions (75min)**	
Room: Beach	A: Developmental Care	
Room: Gulf	B: Family Support	
Room: Palm	C: Feeding/Lactation	
3:15 pm-3:45 pm Break (30 min)		
3:45pm-5:00pm	Abstract Sessions (75min)	
Room: Beach	A: Developmental Care	
Room: Gulf	B: Family Support	
Room: Palm	C: Potpourri	

Agenda is subject to change without notice.

Saturday, March 9, 2024		
Time	**Session/Event**	
6:30 am-7:15 am	Run/Walk/Crawl on the beach (meet pool side)	
7:00 am-5:00 pm	Registration Desk Open (Lobby II)	
7:00 am-8:00 am	Continental Breakfast (Lobby II)	
8:00am-12:00pm Plenary Sessions (Grand Ballroom)		
Time	**Session/Event**	**Presenter**
8:00 am-8:15 am	Introduction to the morning	Vincent C. Smith & Molly Fraust-Wylie
8:15 am-8:45 am	Partners parents as partners in family centered-care work done by lead family partners	Mia Malcolm & Emily Revelle
8:45 am-9:30 am	Engaging in effective teamwork	Erick Rideout
9:30 am-10:15 am Break (45 min)		
10:15 am-11:00 am	The importance and impact of teamwork and kindness in high stress environments	Brian Goldman
11:00 am-11:30 am	The Impact of the Gravens Conference: One NICU Experience and Beyond	Malathi Balasundaram
11:30 am-12:00 pm	Wrap-Up	Bob White & Joy Browne
Farewell Until Next Year! **Gravens 38th Annual Conference March 5-8, 2025** **(Welcome Reception 7:00 pm-9:00 pm March 4, 2025)** **Safe Travels!**		

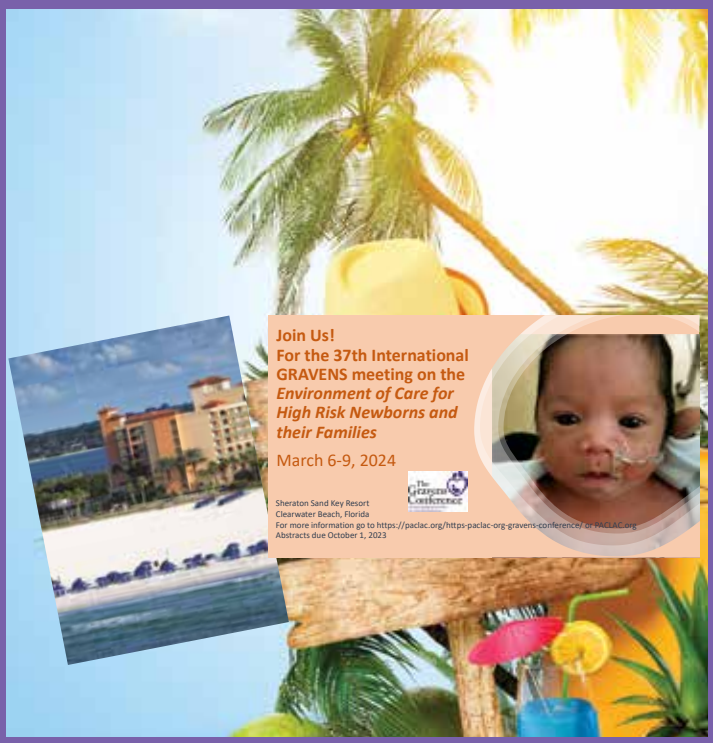
Agenda is subject to change without notice.

37th Annual Gravens Conference On The Environment Of Care For High Risk Newborns:

The Power of Voice: Using Your Voice for Babies, Families, Staff and Beyond

Attend Live, In Person Or Virtual

Wednesday - Saturday
March 6-9, 2024
Sheraton Sand Key Resort
1160 Gulf Boulevard
Clearwater Beach, FL 33767



WHY YOU SHOULD ATTEND

- Get updated on the most recent evidence for your work in supporting babies and families in intensive care.
- Have conversations with leaders in the field of developmentally supportive, family centered care and NICU design.
- Share your passion for optimizing the environment of care for babies, families and staff.
- Network with colleagues, family members and experts in the field who share similar ideas about supporting babies and families in intensive care.
- Take back ideas for change to your NICU policies and care practices.

GENERAL INFORMATION

Location

Sheraton Sand Key Resort
1160 Gulf Boulevard
Clearwater Beach, FL 33767
Hotel Phone: (727) 595-1611
www.sheratonsandkey.com

In the event in-person attendance is canceled or capacity limits modified per CDC or public health guidelines, the conference will be modified accordingly or presented entirely as a live virtual activity.

Refund Policy

Refund & Cancellation Policy: Cancellations must be requested in writing via email to gpakhanyan@paclac.org , and received by February 06, 2024 in order to receive a refund. A $100 cancellation fee will be assessed to cover administrative costs. There are no refunds for no-shows or for cancellations received after Feb. 06, 2024; however, substitutions are welcome without penalty. Eventbrite's fee is nonrefundable.

Conference Registration

We suggest you register early.

To register online, please go to:

Conference Registration, please register:
https://www.eventbrite.com/e/the-37th-annual-gravens-conference-tickets-668446410207?aff=oddtdtcreator

Or scan QR code

Conference Agenda

https://paclac.org/wp-content/uploads/2023/08/Gravens-Agenda-2024-1.pdf

Submit an abstract at:

https://event.fourwaves.com/gravensconference2024/pages

SHERATON SAND KEY RESORT

Accommodations

LOCATION: Sheraton Sand Key Resort
1160 Gulf Boulevard
Clearwater Beach, FL 33767
Hotel Phone: (727) 595-1611
www.sheratonsandkey.com

It is strongly advised that you make room reservations early.

Sheraton Sand Key Resort

A limited number of rooms have been reserved for this meeting at a special rate of $224 (plus tax). For reservations, call the hotel directly* at (727) 595-1611 (not the national sales office) and identify yourself as a participant of the Gravens Conference to receive the special group rate.

*If no one picks up at the local number, the call is automatically transferred to the national reservation line. The phone reps at the national reservations line will not know of the group and special rate. Continue to call the local number.

If you prefer to make online reservations,

Online Reservations

https://www.marriott.com/event-reservations/reservation-link.mi?id=1688650684784&key=GRP&app=resvlink

Book your group rate for Annual Gravens Conference (This will avoid the problems with reaching the national reservations line.)

The deadline to receive the group rate is February 4, 2024. This assumes the block has not sold out. If so, you will be quoted the standard rate, which is considerably higher than the group rate. The hotel sells out every year. Do not wait until the last minute. (The status of the pandemic will impact how quickly the room inventory sells out. Still, better to reserve the room in advance. You can always cancel, so long as it is within the allowable window.)

The hotel sells out every year.

Dress is casual throughout the conference. Please bring a jacket to the meeting rooms, as they are often cold. Physical distancing will be observed. Masks are optional.

The hotel has complimentary parking.

Airport & Ground Transportation

The two airports nearest the hotel are Tampa International Airport (TPA) and St. Petersburg/Clearwater airport (PIE). Both airports offer car rental.

Taxi fare from Tampa airport can exceed $60. Uber and Lyft average around $35 ish, before tips.

For more information on Tampa airport, visit https://www.tampaairport.com/guest-services and the St. Petersburg/Clearwater airport, visit http://www.fly2pie.com/

Diversity Scholarship Infomation

The Gravens Diversity, Equity, Inclusion, and Justice (DEIJ) Committee will provide travel awards to individuals from historically underrepresented groups (i.e., people from racially and ethnically diverse backgrounds, members of the LGBTQ+ population, individuals with cognitive disabilities, individuals with physical disabilities). Please contact Kelly McGlothen-Bell (mcglothen@uthscsa.edu) or Christie Lawrence (Christie_Lawrence@rush.edu) for questions regarding an application.

37TH ANNUAL GRAVENS CONFERENCE ON THE ENVIRONMENT OF CARE FOR HIGH RISK NEWBORNS

Conference Background

In a perfect world, there would be no need for a NICU. Yet our reality is that babies continue to be born too sick, too soon, and with medical conditions requiring hospitalization. Activities in the NICU have a profound impact on the babies, their families and the staff. What you do matters. Your work has the potential to impact a neonate's health outcome, as well as that of the family and staff in the NICU.

Since the 1980s, neonatal care providers have worked to mitigate the stress experienced by babies, parents and providers. Doing so has involved change and its inherent struggles, but eventually we have adapted our NICU culture, policies and approach. We strive to nurture the developmental needs of babies and the emotional and informational needs of their parents through evidence-based knowledge in neurodevelopmental science, developmental care, healthcare design, and family support. This work continues at The 37th Annual Gravens Conference.

Registration Fees

You will have access to recorded presentations after the conference is over.

Early Bird Full Conference In-Person Registration Early Bird Ends 1/22/2024	$725.00
Remote, in real time	$725.00
Full Time Students/Trainee Registration In-Person	$300.00
Group In-person Registration 3 and more	$650.00
Nurses/Allied Health Professionals In-person	$595.00
Nurses/Allied Health Professionals Remote in Time	$525.00
Single Day In-person Registration	$250.00
NICU Parent Registration In-person	$300.00
NICU Parent Registration Remote in Time	$300.00
Full Conference In-person 3/6-3/9	$800.00
Institutional Group Zoom Registration (10 Attendees)	$2,500.00
Institutional Group Zoom Registration (50 Attendees)	$10,000.00
International Low Income Country Zoom Registration	$85.00
International Zoom Registration	$250.00
Diversity Scholarship Participants	$300.00
Donation	

Course Objectives

- At the conclusion of the program, participants should be able to:
- Relate rationale for implementing optimal family centered, developmentally supportive care standards and environmental design approaches in newborn intensive care units.
- Describe rationale and evidence to keep parents and babies consistently together from delivery to discharge
- Identify current environmental design for newborn intensive care units that benefit babies, families and staff.
- Compare and contrast evidence based developmental and family centered care programs.
- Implement evidence based infant and family centered developmental care changes in your unit.

Target Audience

This program has been developed to meet the educational needs of healthcare practitioners such as Neonatal Nurses (RNs, NNPs, ARNPs), NICU Therapists, Neonatologists, Pediatricians, Psychologists, Occupational Therapists, Physical Therapist, Speech-Language Pathologist, Family Support Staff, Architects, Hospital Administration, Infant & Child Development Specialists, Social Workers & Counselors, Parents and Family members and other professionals working with high-risk infants, their families or their physical environment.

Competencies to be addressed

PATIENT CARE AND PROCEDURAL SKILLS;
Medical knowledge; Systems-based practice; Professionalism; Interpersonal and communication skills.

DISCLAIMERS:
Final number of continuing education credits maybe changed based on speakers objectives. PAC/LAC reserves the right to amend speakers, topics and scheduling at any time.

GRIEVANCES:
Any grievances may be made to info@paclac.org

Continuing Education

PAC/LAC is accredited by CMA to provide continuing medical education for physicians.

PAC/LAC is an approved provider by the California Board of Registered Nursing, Provider number CEP 5862.

Pending accreditation approval (application in process)
- Occupational Therapy
- Respiratory Care Therapist

Documentation will be provided for self-reporting:
- Physical Therapy
- Architect
- Speech/Language and Audiology Therapists

Certificate Policy:

After completion of the course evaluation, you will be provided with a continuing education certificate. Make sure to save your certificate.

PAC/LAC will assist you with finding your certificate for up to 1 year from the event without cost. For assistance with any certificates older than 1 year from the time of the event, PAC/LAC charges $20 for the first certificate, and $15 for each additional certificate requested each calendar year. A $10 processing fee will be added to requests needing fulfillment within 24 hours.

Equal Opportunity & Accommodations for Disabilities:

PAC/LAC is an Equal Opportunity /Affirmative Action / Equal Access Institution.

For disability accommodations contact PAC/LAC at 818-708-2850, or email Gayane Pakhanyan at gpakhanyan@paclac.org a minimum of fifteen (15) working days in advance of the event

Faculty

Andy Gomm, MSW

Brian Goldman, MD

Britt Pados

Carol Jaeger, DNP, RN, NNP-BC

Carol McNair RN(EC), PhD, NNP- BC, NP-Peds

Christine Lawrence, DNP, RNC-NIC, APN/CNS

Cuyler Romeo , MOT, OTR/L, SCFES, IBCLC

Cynthia Sparer

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Gloria Yennaco, RNC-NIC, C-ELBW, BSN

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Mia Malcolm, BS

Nathalie Maitre

Raylene Phillips, MD, MA, FAAP, FABM, IBCLC

Rebecca Ames, MS

Robert White, MD

Paige Church MD

Petra Huppi

Co-Chair Executive Planning Committee Members
Robert White, MD
Mitchell Goldstein, MD, MBA, CML
Joy Browne, Ph.D, PCNS, IMH-E
Vincent C. Smith, MD MPH

Please click on the QR Code then click on the Faculty Tab to view Biography and view our Planning Committee Members

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Peer Reviewed

Gravens By Design: Selected Abstracts from the 36th Annual Gravens Conference on the Environment of Care for High Risk Newborns: Resiliency and Change in the NICU

Robert White, MD, Joy Brown, PhD, Vincent Smith, MD, Mitchell Goldstein, MD, MBA, CML

Selected abstracts from the the 36th Annual Gravens Conference are presented below:

Poster Abstracts Table of Contents:

	peutic Hypothermia
Gravens2023–20	"Cool attached"
Gravens2023–21	Efficacy of Giving Oropharyngeal Mother's Milk in Extreme Preterm Infants in Early Transition to Breast Feeding and Duration of Hospital Stay: A Case Control Study
Gravens2023–22	The i-Rainbow: A flexible, evidence-based care path for providing developmental care in the neonatal intensive care setting
Gravens2023–23	A Novel Texting-Based Virtual Assistant for NICU Families is Valuable and Feasible
Gravens2023–24	Pandemic Pandemonium: The Implications of Visitation Restrictions Through the Lived Experiences of NICU Parents and Why We Must Redefine Their Role as Essential Care Partners
Gravens2023–25	Socially Distant Discharge Planning Rounds, a New Model of Care
Gravens2023–26	Targeted Developmental Interventions for 'Older' Infants in the NICU Requiring Positive Pressure Support
Gravens2023–27	Prenatal Mental Health and Emotional Experiences during the Pandemic: Associations with Infant Neurodevelopmental Outcomes
Gravens2023–28	Use of Kangarobe™—a Novel Garment to Facilitate Safe, Comfortable, and Efficient Kangaroo Care
Gravens2023–29	Nurses' implementation of skin-to-skin contact in the NICU is related to their perceptions of family-centered care
Gravens2023–30	Systematic review of neurodevelopmental outcomes of preterm infants who have experienced pain
Gravens2023–31	NICU Discharge Guideline Implementation by a Community Based Team: A Real-World Scenario
Gravens2023–32	Effectiveness of Hammock Positioning on Physiological Parameters and Sleep of Preterm Infants in NICU: A Systematic Review Protocol
Gravens2023–33	The Power of Reflection: Becoming a Trauma Informed Professional
Gravens2023–34	Full-Spectrum Circadian Lighting in a Level IV NICU
Gravens2023–35	Perinatal Characteristics and Neurodevelopmental Outcomes in a Medical Home for NICU graduates & nbsp
Gravens2023–36	Serial Brain Imaging and Targeted Neuropromotive Intervention for Very Preterm Infants in the NICU—Study Protocol and Preliminary Outcomes
Gravens2023–37	Future Intersection of NICU and Fetal Center Professionals and Facilities
Gravens2022–38	Evolution of the auditory environment by post-menstrual age in infants born very preterm
Gravens2023–39	Parent Presence and Engagement in the NICU: Trends and Relationships

	to Infant Stress
Gravens2023–40	Where you start out shouldn't determine where you end up!
Gravens2023–41	Provision of Positive Oral Experiences for Premature Infants by Offering Milk Drops: A Clinical Practice Change Initiative
Gravens2023–42	NICU Families Have Positive Perception of Doctors' Daily Progress Notes
Gravens2023–43	Improving Safe Sleep Practices in a Level III Neonatal Intensive Care Unit

Gravens 2023–2

Abstract title: The Isolette Does Not Protect from the Noise Within

Authors: Mitchell Goldstein, Munaf Kadri, Mita Shah, Perpetua Lawas, Gilbert Martin, Elba Fayard, Ricardo Peverini

Corresponding Author:
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Division of Neonatology
Department of Pediatrics
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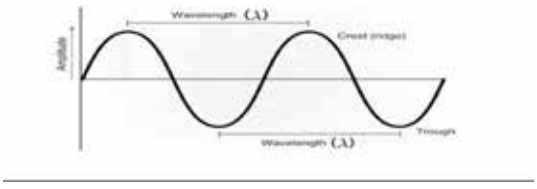
1-909-257-8573

Introduction: The isolette is an essential part of the care of the newborn. It provides appropriate humidification and warmth, protection from an outside bacterial and viral infection, and prevents room noise from penetrating and affecting the baby inside the chamber. However, the isolette is less able to protect the baby from noise emanating from inside the chamber. Despite improvements in noise abatement from outside the isolette, other than the infant mattress, there is relatively little barrier to noise propagation, especially if that noise comes from an organized waveform with a predictable repeat pattern, such as a high-frequency oscillator that uses a piston or "speaker" to generate ventilation. In these circumstances, standing waveforms can result in optimal propagation through the chamber and maximal disturbance to the baby inside.

Hypothesis: Can the potential effect of high-frequency oscillator waveforms be estimated using a model of optimal waveform propagation in an isolette?

Materials and Methods: A simulated environment was created using a typical isolette with a plastic chamber 1 meter long by 0.5 meters high by 0.5 meters wide. HFOV settings of 5, 10, and 15 Hz at a mean airway pressure of 20 cm H2O, and amplitudes varied from 10 to 40 cm H2O. For this study, a standard endotracheal tube was assumed. Although the endotracheal tube is typically situated in the trachea, in this study, the ETT was presumed to be in the closed isolette environment (e.g., to find a maximal theoretical effect). Using the simplified displacement equation (e.g., string), the displacement of the string is defined as $y(x,t) = A \sin(kx - \omega t) + A \sin(kx + \omega t) = 2A \sin(kx)\cos(\omega t)$. At position multiples of 90 degrees, the resultant waveform oscillates with amplitude $2A \sin(kx)$ in both a negative and positive direction. Wavelength (λ) was calculated by dividing the speed of sound (v = 343 meters/second) by the frequency (Hz) represented as $\lambda = v/f$. No actual human or animal subjects were involved in this stimulation. This procedure did not involve animal or human subjects, so it was exempt from IRB reporting requirements.



Anatomy of a wave

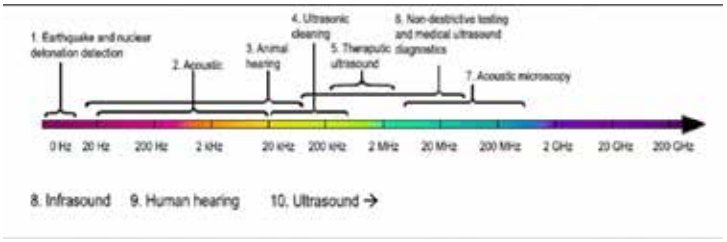
Results: Data are presented in Standing Wave ∗ Wavelength (cm-M). The calculations show lower frequencies and higher amplitudes produce more pronounced standing waves. See the table below and the enclosed figures.

Standing Wave ∗ Wavelength product in cm-m

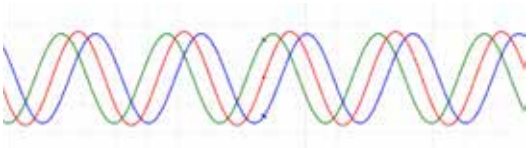
Standing Wave * Wavelength product in cm-m

	5	10	15
10	1360	680	456
20	2720	1360	912
30	4080	2040	1368
40	5440	2720	1824

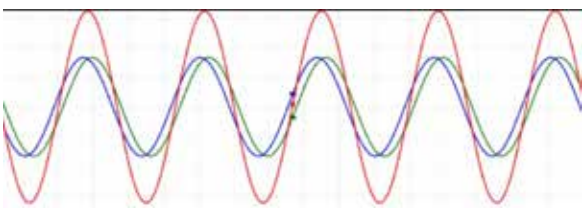
Pressure and sound waves



Out-of-phase projections



In-phase projections



Discussion: Although high-frequency ventilation resembles low-frequency sound in more than waveform construction, much like the sub-woofer of a highly optimized sound system, these lower frequencies produce dramatic effects that can permeate the room or, in this example, isolette. Standing wave formation is a given despite selectively employing higher frequencies and lower amplitudes. Padding within the isolette is a consideration, but it potentially increases the risk of infection and may not perform well in a humid environment. Other passive sound abatement technology may cause issues with the isolette's operation and may not completely resolve the issue.

Conclusion: High-frequency ventilation technologies preclude the benefit offered by the isolette environment. Further efforts to reduce sound/noise propagation in the isolette must be undertaken to maximize the quiet environmental space necessary for optimal growth and development.

Problem statement:

What is the significance of noise that enters the isolette environment from a respiratory intervention? This study identifies a barrier to the quiet environment.

Learner objectives:

1. Learners should be able to identify impediments to the quiet environment.
2. Learners should be able to identify ventilator settings that produce more disruption.

Gravens 2023–4

Abstract title: A quality improvement project to determine the suitability and efficacy of diaper wipes used in the NICU

Author: Susan Bowles, DNP, APRN-CNS, RNC-NIC

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Background and Purpose: Diaper Dermatitis is a common condition seen in infants and was first identified in the 1940s. A literature review indicated that the prevalence of diaper dermatitis in large NICUs may be as high as 29%. A simple strategy that may aid in prevention is the use of diaper wipes. The use of disposable diaper wipes in the Neonatal Intensive Care Unit (NICU) has long been discussed. Evidence from the literature indicates that disposable diaper wipes provide soft gentle cleansing and minimize skin compromise. This project is noteworthy because it evaluated the use of two commercially available wipes as opposed to evaluating a disposable wipe versus sterile water and gauze for skin cleansing.

Aim: The aim of this quality improvement project was to determine which of two commercially available diaper wipes was better at cleansing the skin in the diaper area, efficacious, and cost effective for use.

Methodology: This project was designed to compare the use of two different brands of diaper wipes to determine which wipe best cleansed and improved diaper area skin condition and barrier function. The unit was already using a popular commercially available wipe, but bedside staff were requesting a change to another commercially available wipe. Due to the large size of the NICU, 140 beds in a southeastern women's' hospital, a decision was made to limit the study to the 30-bed single room level 2. The unit was a pod configuration, and it was decided that each pod would use a different brand for the duration of the study. Pod A used the current product, and Pod B used the staff-requested product. A convenient sample of 24 neonates and their families participated. All infants in the sample were required to have a length of stay of 10 days or more in the unit. A survey assessed ease of use, family satisfaction, skin condition and appearance and was completed daily by bedside staff. **Budget and Resources:** The goal for this quality improvement project was to remain budget neutral. Prior to the start of the project, all bedside staff were educated in the correct use of diaper wipes, which occurred on their scheduled shift by the unit CNS and staff educators. Additionally, the NICU was already using a commercially available wipe and sterile water and gauze, and those costs were included in the yearly supply budget. The comparison wipe was provided to the unit for the duration of the project, and no costs were incurred for the comparison wipes, which allowed the goal of budget neutrality to be met.

Results: No diaper dermatitis occurred during the 6-week trial when using either product, as determined by chart review. It is possible that a Hawthorne effect took place due to staff education and overall awareness that the project was taking place. What was interesting to note was the clear preference of the staff and parents for the staff-requested product, as 84% of those taking part in this project recommended that the unit switch to the staff-requested project.

Conclusion: After the completion of the project and a review, a recommendation was made to the NICU Leadership and Nursing Practice Council that a change to the staff-recommended product occur. All areas of this 142 bed NICU began using the staff-requested wipes. So successful was the switch that the

use of the product spread, and staff are now using it to sponge bathe babies in the NICU when the infants require bathing but are not ready to have a swaddle bath performed. This project demonstrates how using a quality improvement project can lead to both staff and parental satisfaction in the NICU.

***Bibliography**:*

1. *The Association of Women's Health, Obstetric and Neonatal Nurses. Neonatal skin care: evidence-based clinical practice guideline. 4th ed. Washington, DC: The Association; 2018.*

2. *Esser M. (2016). Diaper Dermatitis: What Do We Do Next? Advances in neonatal care: official journal of the National Association of Neonatal Nurses, 16 Suppl 5S, S21–S25. https://doi.org/10.1097/ANC.0000000000000316*

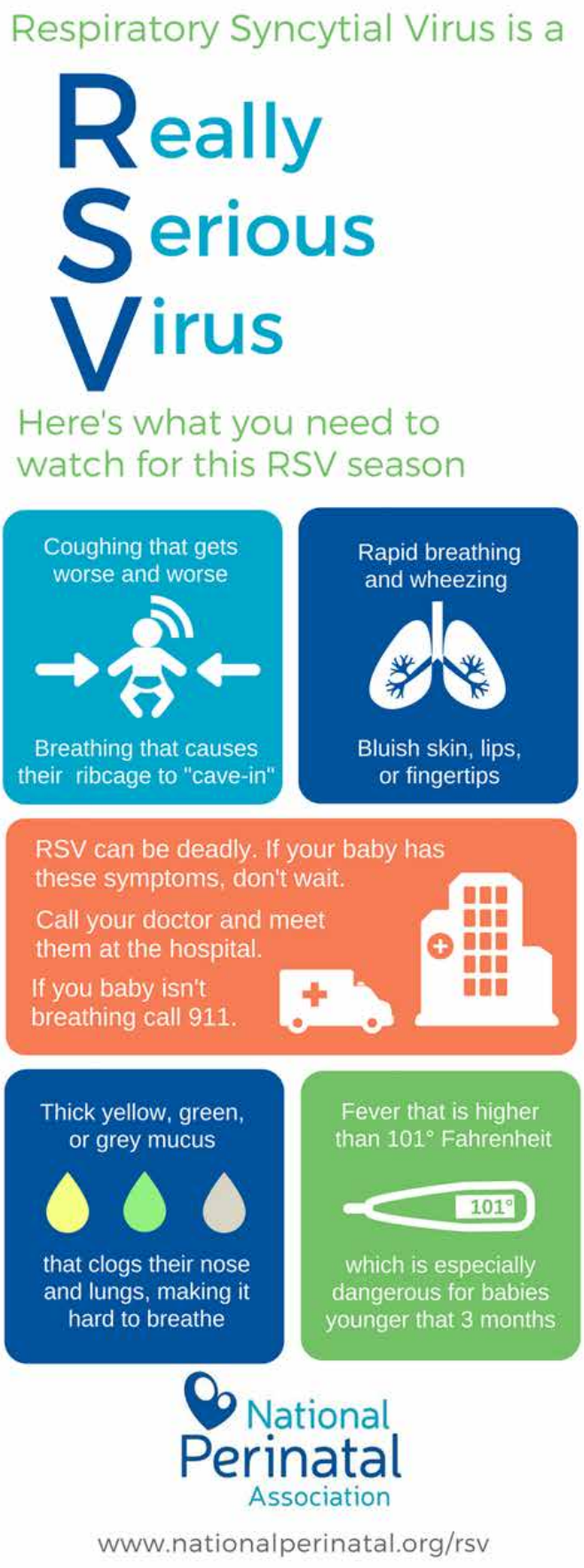
3. *Rogers, S., Thomas, M., Chan, B., Hinckley, S. K., & Henderson, C. (2021). A Quality Improvement Approach to Perineal Skin Care: Using Standardized Guidelines and Novel Diaper Wipes to Reduce Diaper Dermatitis in NICU Infants. Advances in neonatal care: official journal of the National Association of Neonatal Nurses, 21(3), 189–197. https://doi.org/10.1097/ANC.0000000000000795*

Problem statement: The use of disposable diaper wipes in the Neonatal Intensive Care Unit (NICU) has long been discussed. Evidence from the literature indicates that disposable diaper wipes provide soft gentle cleansing and minimizes skin compromise.

Needed to determine which of two most popular commercially available diaper wipes was better at cleansing the skin in the diaper area, efficacious and cost effective for use.

Learner objectives:

1. Discuss the benefits of using quality improvement methodology when considering a product change.
2. Identify the Hawthorne effect and how it can affect a project.
3. Recognize the importance of reviewing the literature and using an evidence-based approach is important when developing a quality improvement project.



Gravens 2023–6

Abstract title: Feeding Support Needs of Infants in a Level III NICU

Authors: Pamela Dodrill, PhD, CCC-SLP, BCSS, Katherine Gibson, MS, CCC-SLP, BCSS, Carmina Erdei, MD

Corresponding Author:
Pamela Dodrill
Brigham and Women's Hospital NICU, Boston
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A retrospective chart review was performed for infants admitted to a large (66 bed, >900 admissions per year) Level III NICU in 2018-2022. We utilized the FOIS-P to track PO progress in infants during their NICU stay and across the first year at home. Within- and between- rater reliability were established.

During their NICU stay, >95% of infants require PG feeds; approx. 35% of infants require modified feeding equipment/ positioning/ strategies; and approx. 5% of infants require thickened liquids. At the time of discharge home, approx. 25% of the NICU population continue to display immature/ disordered feeding skills; 2% require home PG feeding (FOIS-P 1-3), and the remainder are fully PO fed but require modified feeding equipment/ positioning/ strategies +/- thickened liquids (FOIS-P 4-5). At home, within 1 month of discharge (0-2 months corrected age), approx. 90% of NICU infants are breastfeeding/ bottle feeding without need for feeding modifications (FOIS-P 6), but 10% continue to require some compensations (FOIS-P 2-5). Approx. 35% of infants attending NICU follow-up clinic display delayed transition to solid foods at 8 and 12 month corrected age (FOIS-P 4.5 -5)

Age at attainment of age-appropriate feeding skills (i.e., not requiring therapeutic compensations – FOIS 6) is negatively correlated with gestational age at birth and is highly positively associated with the presence of certain illnesses (BPD, CHD, GER, HIE) during the NICU stay.

Evidence-based reporting tools assist in monitoring of patient outcomes. Through systematic data collection, we are better able to guide staff and parent expectations regarding age at attainment of PO feeding milestones and plan appropriate support services for infants continuing to need therapeutic compensations to feed safely. We encourage others working in this area to track functional feeding outcomes in the newborn period and throughout infancy.

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Problem statement:

Preterm and other high-risk infants often display difficulty establishing oral (per os, PO) feeding in the Neonatal Intensive Care Unit (NICU). Most initially require enteral tube (per gavage, PG) feeds. Then, as they transition to PO feeds, many require the use of therapeutic compensations (e.g., special bottle nipples, positioning, strategies) to assist them to feed safely and efficiently. Some infants continue to require therapeutic compensations +/- PG feeds post-discharge from the NICU. These infants continue to require ongoing feeding support.

We aimed to track the corrected age when infants admitted to the NICU reach key feeding milestones, including age at start of PO feeds, full PO feeds, and PO feeds without the need for therapeutic compensations.

Learner objectives:

1. List 3 potential complications of feeding impairments in the NICU
2. List 3 evidence-based therapeutic feeding interventions for use in the NICU
3. List 3 indicators of pediatric feeding disorder

Gravens 2023–7

Abstract title: Oh (Small) Baby!

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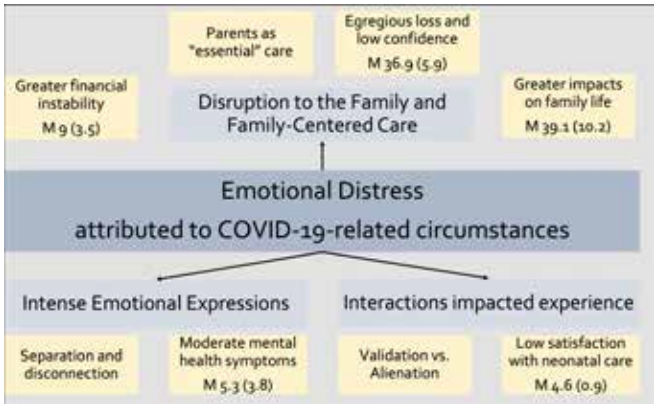
Extremely low birth weight patients are considered by many

the new generation NICU population. Their survival requires specialized care and practice. Development of a Small Baby Unit is pertinent in improving both morbidity and mortality rates among our smallest NICU patients.

We utilized the Neuroprotective Family-Centered Developmental Care Model by Altimier & Philips (2013) to begin the framework of the development of our Small Baby Unit. We used evidence-based research on the seven core measures that Altimier & Philips' developed to drive our Small Baby practice in protecting and promoting optimal neurodevelopmental care. These seven measures include: Safeguarding sleep, positioning and handling, protecting skin, minimizing pain and stress, nutrition, partnering with families, and healing environment. In our unit we felt that adding an 8th core measurement of 'Golden Hour' was important for this patient population since much of the time it sets the tone for their stay in the NICU (2021).

Data was collected by chart audits on factors that are known to alter long-term developmental outcomes of our small-



est patients. Some of these factors included intraventricular hemorrhage, sepsis, retinopathy of prematurity, bronchopulmonary dysplasia, necrotizing enterocolitis, mortality, and length of stay. We compared our data points from the year prior to the implantation of our small baby unit, to our data at the end of our first year of our small baby unit. The previous year (year prior to implementation) we had 88 patients that met the criteria to be considered a small baby. The criteria included patients less than or equal to 26 6/7 weeks of gestation and admitted within 48 hours of birth. Our first year of the SBU implemented ended with a total of 83 patients that went through the small baby unit. When comparing our data, we have shown great strides in decreasing our necrotizing enterocolitis rates and overall length of stay. In efforts of aiding in decreasing our necrotizing enterocolitis rates we focused on a strict human milk-based diet, particularly mothers' own milk, and the time to initiation of the first feed. Our goal is to feed patients within the first 48 hours of life if they are stable enough to do so. After implementation of this feeding guideline, we had 56% of our small babies fed within 48 hours, compared to our pre-implementation cohort of 38%. We believe this supports our necrotizing enterocolitis rates going from 10% pre-implementation to 4% post-implementation.

Prior to the implantation of our small baby unit, neurodevelopmental care often got trumped by the medical management of these patients. Neurodevelopmental education and training were and continue to be a crucial topic that we educate our small baby bedside providers on. Small elements of insuring quiet closure of incubator portholes, opening alcohol pads outside the incubator, and limiting loud noises/voices in the patient's room to the bigger elements on proper positioning, family centered care, and skin to skin care were some focuses of our training. During our first year, the Supporting and Enhancing NICU Sensory Experiences (SENSE) program (2019) was rolled out to these small babies to help not only encourage family involvement but also give age-appropriate care to these patients. To facilitate family education and involvement, a small baby brochure was developed to give to all families upon admission to the NICU.

Some data did not show improvements in rates. Bronchopulmonary dysplasia was shown to be an area of needed improvement. Seeing this allowed our small baby team to collaborate with the NICU respiratory team on how we could improve our bronchopulmonary dysplasia rates. With this collaboration we implemented Bubble CPAP as an additional respiratory modality for our smallest patients.

With any new program there are also barriers. Some identified during our first year was location of admitting these patients that require specialized care. When we first rolled out our small baby unit, the patients were admitted anywhere in our 70-bed private/semiprivate unit. The unit consists of 3 neighborhoods with 2 pods within each neighborhood. It was difficult to have the patients assigned to the properly trained nursing staff when they were scattered throughout the unit. We implemented having our small babies admitted into one neighborhood of the unit. With this implementation it ensured that the patients would have the specialized nursing care but also have these patients in the same area where specialized equipment and environmental awareness would be consistent. Over the last year, we have learned many things and implemented change to ensure that our patients are receiving excellent, high-quality care. We continue to track and analyze data to identify areas of improvement and also highlight the areas of success.

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Problem statement:

As the age of viability decreases the rate of mortality and morbidities increase. How can we, as providers, tailor our knowledge, understanding, and skill set for these patients to improve their outcomes?

Learner objectives:

1. List three core measures from the Neuroprotective care guidelines.
2. Identify one factor that is linked to decreased morbidity and mortality in very low birth weight patients.
3. List three nursing interventions that focus on small baby care.

Gravens 2023–8

Abstract title: Recognizing Parents as Essential Care in the NICU

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Introduction: While there is sufficient evidence demonstrating negative parental outcomes secondary to having an infant in the NICU, it was unknown how parents were impacted and experienced a NICU hospitalization in the context of COVID-19. Therefore, the aim of this study was to explore parent experiences and impact of a neonatal hospitalization during the COVID-19 pandemic.

Methods: An anonymous online survey was developed to gather data on family life, financial stability, mental health, confidence, satisfaction with neonatal care, and family demographics. Participants were recruited through social media platforms and study inclusion required a NICU admission between February 1–July 31, 2020. The survey included the following validated measures: Impact on Family Scale, Karitane Parent Confidence Scale, PHQ-4, and EMpowerment of PArents in THe Intensive Care (EMPATHIC-N) and five open-ended questions about their hospital experience. Results were summarized descriptively and thematically using STATA and NVivo 11 qualitative software.

Results: Our sample included 169 parents from 36 US states, of which 97% were mothers, 60% were non-Hispanic white, and 70% had an infant born preterm (< 37 weeks). Parents reported significantly higher impacts on family life and finances (M 39.1 SD 10.2; M 9 SD 3.5, respectively), low confidence (M 36.9 SD 5.9), moderate anxiety and depressive symptoms (M 5.3 SD 3.8) and low satisfaction with neonatal care (M 4.6 SD 0.9). Three broad themes were identified: 1) intense emotional expressions, 2) interactions impacted experiences, and 3) disruption to the family and family centered care (Figure 1). These themes provide greater context to the quantitative results highlighting disruption to family life and emotional distress. To quote a parent, "hospital policies [were] not in touch with the reality of families, making the impossible pain of [having] a baby in the NICU even more impossible." NICU parents experienced feelings of painful separation, disconnection, and isolation and expressed intense and frequent disappointment at having their visitation restricted. Lastly, there was a desire for more empathy, validation, and inclusion in decision making.

Figure 1

Discussion: Results from this study indicate that families experienced significant impacts on family routines, mental health, and financial wellbeing while their infant was hospitalized in the NICU during the initial phase of the COVID-19 pandemic. The descriptions of parent experiences document the emotional struggle of being separated from support systems, feelings of isolation, lack of family-centered care, and exacerbation of emotional distress already known to be common to the NICU journey. The consensus statement entitled "Essential Care in the NICU during the COVID-19 Pandemic" was developed in response to these findings to advocate for parents during hospitalization and endorsed three professional organizations. The unintended consequences and lessons learned during the initial phase of the pandemic can help leaders implement more family-focused, evidenced based policies that do not undermine well established family-centered care practices. This presentation will conclude with how unlimited parental presence can be an effective strategy to advance health equity, improve family health, and empower clinicians to advocate for unlimited parental presence and supportive family practices.

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Problem statement:

Parenting and family life were exceptionally susceptible to unanticipated changes during the COVID-19 pandemic. Prior to COVID-19, parental presence was encouraged through unrestricted visitation and family-centered care practices in neonatal intensive care units (NICU) knowing that parental caregiving is essential for infant healthy development. Yet, during the COVID-19 pandemic, hospitals across the world responded to the public health crisis by modifying hospital visitation practices, which impacted parent and family presence during hospitalization. This presentation will review changes to visitation practices, describe unintended consequences of limiting parental presence, discuss study results from the NICU COVID Experiences study, and review the global zero separation guidelines.

Learner objectives:

1. Describe modifications to visitor guidelines throughout the US and globally and challenges reported by families.
2. Discuss the benefits of parental presence on infant, child, and family health in a review of results from the NICU COVID Experiences Study.
3. Discuss polices and strategies to overcome challenges and barriers to unlimited parent presence and implementation of zero separation guidelines.

Gravens 2023–9

Abstract title: The NICU blues: "Am I losing my mind?"

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Introduction: Approximately 10% of U.S. babies will spend time in a newborn intensive care unit (NICU).(1) There remains a significant percentage of infants born at the earliest gestational age who die in the NICU.(2) Family-centered NICUs often lack a single, clear definition for common, transitory parental levels of distress.(3) There does not exist a parental non-pathological term to capture this distressing sequel. Further, we often have limited time to have a positive impact with families and babies in the NICU. This time in the NICU can have long lasting effects on the parents and their neonate's well-being during infancy. Hence, we propose the use of an adaptive intervention of a novel term to identify common parental experience specific to the NICU.

Methods: Over ten years, the principal author collected confidential qualitative comments from hundreds of mothers and fathers with newborns in a Level III family centered NICU. Generally, parents' concerns and expressions of suffering and pain were *not* pathological. Fathers' express feelings such as "I am going to lose my entire family," and mothers express guilt and shame such as "I caused my baby to be born too soon." Both parents collectively declared, "This is not how we imagined our newborn's birth." These comments are common narrative themes to an unexpected birth event. However, research clearly documents higher rates of Diagnostic Statistical Manual-5 (DSM-5) diagnoses for parents in the NICU.(4-7) A literature review revealed there exists a common level of acute disorientating parental distress lacking a non-pathological term. We organized these parental narratives into four factors, including NICU trauma, baby blues, postpartum mood and anxiety disorders, and NICU grief to formulate a novel paradigm, the NICU blues.

Results: With the accumulated parental narratives, multidisciplinary staff insights and the literature review, we developed a new paradigm for the non-pathological term experience and named it the "NICU blues." We found that giving name to "NICU blues" for parents provided optimal relief and meaning for parents and other caregivers moving through a unique and challenging NICU journey. NICU blues provides both parents and the multidisciplinary staff a voice for expected and understandable transitory states of parental functioning. The term NICU blues normalizes common parental experiences for transitional parental adaptation within a unique NICU setting.

Conclusions: We propose the inclusion of a predictable term, NICU blues, into protocols of robust universal clinical standards of family-centered care. Identification and early intervention of NICU blues by staff and parents may ultimately foster bonding, establish a sense of parenthood, and increase communication between NICU staff and parents promoting a more positive NICU experiences.

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Learner objectives:

1. Identify parental factors for a novel term "NICU blues" as a predictable, common, and non-pathological adaptation to a unique NICU experience.
2. Describe how awareness and early intervention for parents and NICU staff can mitigate the experience of NICU blues, foster increased bonding between parent and baby, increase interactions among multidisciplinary NICU staff and parents, promoting a positive NICU experience.

Gravens 2023–10

Abstract title: Time is More Precious than Gold: A Golden Hour Improvement Project

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In January 2021, we began tracking patients who met the criteria for golden hour (GH). These included patients ≤32 weeks gestation or 1500 grams, and born at the neighboring facility, Sentara Norfolk General Hospital (SNGH). The NICU Data and Project Coordinators performed chart audits in the Electronic Medical Record (EMR) to track certain metrics. A GH Admission Form was also created and completed by bedside staff. Simultaneously, staff was educated on the GH components and the use of the form.

From January 2021 to October 2022, there were 238 patients that met inclusion criteria. We obtained quantitative data to assess areas of improvement and success, and qualitative data to understand staff perceptions of the GH process. Baseline data from 2019 included 78 patients. We chose to measure the following metrics: Time to Admission from Delivery Room (DR), 1st and 2nd admission temperatures and glucoses, time to 1st glucose, initiation and confirmation of central line placement, antibiotic and fluid administration, Amikacin delivery at the bedside, and incubator top down.

To help reduce hypothermia (<36.5°C), we implemented utilizing a thermal hat, Neowrap, and thermal mattress in the DR (of which is in a Preemie Pack on our transport isolette) and using a clear drape used for line placement to preserve heat. The percentage of patients arriving hypothermic decreased from 17% to 14%. Hypothermia is also impacted by the time it takes to get from the DR to the NICU. This time decreased from to 35 to 29 minutes.

To reduce hypoglycemia (≤45 mg/dL) and to intervene early, we reduced the time to obtaining an initial glucose by placing a heel warmer on the patient in the DR (in the Preemie Pack). The time to obtaining the initial blood glucose decreased from 21 to 17 minutes.

To reduce respiratory distress, surfactant is given in the DR within 10 minutes of birth. A standardized algorithm was created that patients born at <25 weeks are placed on the High Frequency Jet Ventilator, and >25 weeks are placed on the Conventional Ventilator.

Another factor addressed is central line placement, which impacts the time to treat hypoglycemia, and used to administer fluids/antibiotics. We started having one provider remain sterile until lines are confirmed. Additionally, we instituted an admission order set of 3 x-rays, so the provider didn't need to place additional orders after getting sterile. The time to initiation of central line placement decreased from 18 minutes to 13 minutes. The time to central line confirmation on x-ray decreased by 1 hour and 21 minutes.

To reduce the risk of early-onset sepsis, we worked to ensure Amikacin arrived at the bedside earlier (decreased by 1 hour and 2 minutes during this project). The time to Amikacin administration decreased from 3 hours and 6 minutes to 1 hour and 29 minutes. The time to D10PNC Administration reduced from 2 hours and 40 minutes to 1 hour and 20 minutes.

The time to incubator top down was the last quantitative measure tracked. In 2019, it took 4 hours and 26 minutes and recently, 1 hour and 27 minutes. We did not implement anything specific to closing the top earlier but identified that

prompt central line placement confirmation results in earlier closure of the top.

For the qualitative data, we measured various communication metrics; one including calling from the DR to the NICU with the patient's Length, Weight, Head Circumference, and mode of ventilation. Confusion was reduced as orders could be placed and equipment prepared prior to admitting the patient (improved from 0% to 71%). We also had the team ring the NICU doorbell when coming through NICU doors. This acted as an audible cue for the Secretary and therefore announced "Golden Hour Admission" on the NICU overhead speaker (improved from 0% to 86%). Additionally, the Secretary tracked the time of birth and the time of being able to enter the patient into our EMR. This allowed us to identify delays in this process, although we have not recently identified any.

Two final interventions included a Pre-Admission Huddle (July 2022) and Admission Huddle (October 2022). The Pre-Admission Huddle is done prior to the admission and serves to share known information about the patient, to ensure all equipment is at bedside, and for delineation of roles and preparation for line placement. This is occurring ~60% of the time. The Admission Huddle is done once the patient arrives. The patient remains in the NICU transport isolette until a DR provider gives a GIMME 5 report (Gestational Age, Indication for delivery, Mode of delivery, Major delivery room interventions, ETT size/depth & vent settings). This ensures a Shared Mental Model amongst the team and has occurred in 100% of the October 2022 GH admissions. Overall, staff feels that the admission process has improved, and they are more aware and better prepared for the patient that they are taking care of.

One major barrier that we faced was relying on paper audit forms, as there are various audited elements that are left unknown. Additionally, it was challenging to ensure all team members are knowledgeable of the GH practices. Particularly when x-rays are needed on the night shift, as there are limited resources of which are spread all over the hospital. Overall, although there were identified barriers, we have made great strides in the time to complete all golden hour tasks.

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Problem statement:

How will improved communication and a streamlined admission process impact the time it takes to complete all golden hour tasks of very low birth weight patients? By improving communication and working as an interdisciplinary team, the golden hour admission process will be more efficient and patient outcomes will be improved.

Learner objectives:

1. Describe the importance of a shared mental model and effective communication during the admission process of very low birth weight patients
2. Identify nursing interventions to reduce the risk of hypothermia and cold stress in very low birth weight patients
3. Describe patient outcomes that can be impacted by having a more efficient and standardized admission process

Gravens 2023–11

Abstract title: Salivary Oxytocin and Cortisol Release Are Associated with Premature Infant Neurobehavioral Patterns

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Objective: Oxytocin is critical in experience-dependent plasticity underpinning neurobehavioral functioning during sensitive periods of development. The research study purpose to examine infant salivary oxytocin and cortisol levels related to SSC and infant neurobehavioral functioning.

Design/Setting: A randomized cross-over design study was conducted in the Neonatal Intensive Care Unit, NICU. The sample of 28 healthy premature infants contributed to 168 saliva samples for oxytocin and cortisol were collected pre-SSC, 60-min during-SSC, and 45-min post-SSC randomized to whether the infant was held first by mother or by father.

Methods: Infant neurobehavioral assessment using NICU Network Neurobehavioral Scale prior to hospital discharge generated 13 NNNS Summary scores. Data were analyzed using R version 4. 0. 3. Linear regression models included four predictor variables: salivary oxytocin and cortisol levels after SSC, two measurements for each for maternal and paternal SSC. The outcome measures: saliva was collected by infant swab (Salimetrics© State College, PA) methods typically using swabs for five minutes can obtain at least 120 µL of saliva, whereas the minimum saliva needed for testing salivary oxytocin is 70 µL. The swab is 5 x 90 mm, an appropriate size for mouths of young infants. The infants were found not to be disturbed by the sampling process. The saturated oral swabs are then placed in a small insert tube with snap cap. Saliva samples

were immediately stored in a -80°C freezer until thawed for analysis. Salivary oxytocin was collected and analyzed via an enzyme immunoassay (EIA) (Assay Designs, Ann Arbor, Michigan). This method is similar to that specifically developed and validated for salivary oxytocin. The sensitivity limit without correcting for the concentration is at 11.7 pg/mL, and the lower limit of sensitivity is at 2.0 pg/mL with correction for the extraction. The intra- and inter-assay coefficients of variation were 4.8% and 8%, respectively. Salivary cortisol was collected and analyzed via an EIA (Salimetrics, State College, PA) with a detection limit of < 0.007 µg/dL. The average intra- and inter-assay coefficients of variation were 4.13% and 8.89%, respectively. The NNNS has 115 items that are administered and computed into scores that create 13 summary scales. The summary scales include: habituation, attention, handling, quality of movement, regulation, nonoptimal reflexes, asymmetric reflexes, stress/abstinence, arousal, hypertonicity, hypotonicity, excitability, and lethargy scores. The Score for Neonatal Acute Physiology with Perinatal Extension, SNAPPE-II, score is a valid indicator of an infant's severity-of-illness and predictor of mortality risk with a composite range of 0–162.

Results: The majority of infants were White (61%) males (68%). The infants were relatively healthy, with a mean SNAPPE-II score of 3.93. Results indicate a significant inverse relationship for infants held SSC with their mothers demonstrating higher oxytocin levels and lower Stress Summary scores (t= -3.48, *p*=.003) and also a significant relationship with higher Self-Regulatory Summary scores (t=2.104, *p*=.049). Interestingly, infants held SSC by mothers that demonstrated higher cortisol levels also demonstrated higher Asymmetrical Reflexes Summary scores (t=2.413, *p*=.026). Infants held by mothers with higher cortisol levels (t=2.249, *p*=.037) also had similarly high levels with fathers (t=2.156, *p*=.044) and were also associated with higher infant Stress Summary scores.

Table 1. Infant Sample Characteristics (N=28)

Characteristic	*n* (%)	Mean	SD
Gender			
Female	9 (32)		
Male	19 (68)		
Race/Ethnicity			
Asian	2 (7)		
Black	4 (14)		
Hispanic	5 (18)		
White	17 (61)		
Gestational age at birth (weeks)		33	1.57
30-30 6/7	4 (14)		
31-31 6/7	5 (18)		
32-32 6/7	1 (3)		
33-33 6/7	3 (11)		
34-34 6/7	15(54)		
Weight (grams)		1882	416.66
900-1300	3 (7)		
1301-1700	5 (18)		
1701-2100	12 (43)		
2101-2500	5 (18)		
2501-2900	3 (3)		
Snappe II		3.93	7.78
0	21 (75)		
7-10	3 (11)		
18-21	3 (11)		
22-27	1 (3)		
Apgar Score (1 minute)		7.11	2.04
0-4	4 (14)		
5-7	7 (25)		
8-10	17 (61)		
Apgar Score (5 minutes)		8.29	1.27
0-4	1 (3)		
5-7	4 (14)		
8-10	23 (87)		
Mode of Delivery			
Vaginal	11 (39)		
Cesarean	17 (61)		

Modified from (Vittner et al., 2018)

Conclusion: We found oxytocin is an important biomarker that improves infant neurodevelopmental competence. These findings are an important step in exploring oxytocin as an important biomarker that provides evidence that demonstrates potential improvement in infant neurodevelopmental functioning and competence. The organization of oxytocin availability is critical to the limbic and neocortical systems, and those nervous system structures related to emotion depends on early caregiving experiences. SSC is an intervention that increases oxytocin and decreases cortisol.

Additionally, these findings provide further evidence that neurobehavioral assessments can and should be incorporated into the care of preterm infants to identify individualized plan of care to support the unique strengths of the infant's current level of behavioral functioning. Nurses can use SSC as a strategy to activate oxytocin release as a means to enhance infant neurodevelopmental outcomes.

Table 2. NNNS Summary Scores of study sample

NNNS Summary Scale	Mean	(SD)
Habituation Summary Score	6.64	1.78
Attention Summary Score	5.19	1.09
Arousal Summary Score	3.48	0.43
Regulation Summary Score	5.01	0.61
Handling Summary Score	0.51	0.20
Quality of Movement Summary Score	3.97	0.61
Excitability Summary Score	3.71	1.74
Lethargy Summary Score	4.68	2.20
Non-Optimal Reflexes Summary Score	5.25	1.84
Asymmetry Summary Score	1.43	1.60
Hypertonicity Summary Score	0.00	0.00
Hypotonicity Summary Score	0.75	0.97
Stress/Abstinence Summary Score	0.21	0.10

Table 3.

Adjusted Regressions between NNNS Summary Scores and Infant Oxytocin and Cortisol Levels (N=28)

NNNS Summary Scores	Predictor	Estimate	Std. Error	t value	*p* value
Attention Summary Score	Oxytocin (F)	0.411	0.205	2.004	0.006
	PCGA	1.142	0.419	2.724	0.014
	Bachelor	-1.159	0.516	-2.245	0.038
	Oxytocin (M)	-0.071	0.021	-3.428	0.003
Self Regulation Summary Score	Oxytocin (M)	0.376	0.179	2.104	0.049
	PCGA	0.483	0.236	2.048	0.050
Handling Summary Score	Bachelor	0.235	0.088	2.669	0.015
Excitability Summary Score	Oxytocin (M)	-1.122	0.497	-2.256	0.036
	Cortisol (M)	1.055	0.498	2.121	0.047
	PCGA	-1.483	0.656	-2.259	0.036
	Graduate	2.151	0.847	2.541	0.020
Asymmetric Reflexes Summary Score	Cortisol (M)	1.211	0.502	2.413	0.026
Stress/Abstinence Summary Score	Cortisol (M)	0.045	0.021	2.156	0.044
	Cortisol (F)	-0.033	0.014	-2.249	0.037
	Bachelor	0.121	0.032	3.732	0.001

Note: Oxytocin (M): oxytocin level when held by mother, Oxytocin (F): oxytocin level when held by father, Cortisol (M): cortisol level when held by mother, Cortisol (F): cortisol level when held by father, PCGA = post conceptual gestational age

*n = 26

Problem statement:

It has been optimistically, yet incorrectly proposed, that healthy preterm infants without major complications eventually catch-up developmentally to term infants. This research explores the bio-behavioral mechanisms that modulate high-risk infants' behavioral, autonomic and stress responses utilizing an individualized developmental family-centered care approach. Skin-to-skin contact is an evidenced-based holding strategy that increases parental proximity to their infant. This physical proximity allows for a continuously interactive environment that is known to enhance infant physiologic stability and affective closeness between parent and infant. Uncovering the neurobiological basis of early parent-infant interaction is an important step in developing therapeutic modalities to increase parent engagement and improve health outcomes. Oxytocin is critical in experience-dependent plasticity underpinning neurobehavioral functioning during sensitive periods of development. The purpose of this research study was to examine infant salivary oxytocin and cortisol levels related to SSC and infant neurobehavioral functioning.

Learner objectives:

1. Participants will describe the role of oxytocin for premature infants
2. Participants will critically reflect on premature infant experiences in the NICU to improve neurobehavioral functioning.

Gravens 2023–12

Abstract title: Acceptability and Feasibility of a Digital Educational Intervention for Parents with a Preterm Infant at The Neonatal Intensive Care Unit: A Pilot Randomized Controlled Trial

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Methodology: A pilot randomized controlled trial (RCT) was conducted. Parents were invited to participate if they met the following inclusion criteria: 1) 18 years of age or older; 2) speak and read French; and 3) have a preterm infant born at 36 weeks gestation or less, who was hospitalized in a neonatal unit in the province of Quebec (Canada) at the time of recruitment. Following recruitment via an advertisement on a social networking site (Facebook®), participants were randomized to either the intervention or the control group. The intervention *Information pour les Familles ayant un Enfant* né *Prématurément* (Info FEP)/Information for Families of Prematurely Born Children is an educational website, and the content included was developed based on a qualitative study conducted with the population of interest. Parents in the control group received an electronic general information leaflet on prematurity following recruitment.

Data collection took place over a five-week period. First, parents completed the online socio-demographic data questionnaire after enrolment. Shortly after, a team member sent them their group assignment (intervention vs. control) via email according to a randomized sequence developed by a research assistant not involved in the study. For the following weeks, parents were invited to consult the website or leaflet as often as they desired. Then, two and four weeks after recruitment, participants from both groups were invited, via email (Lime Survey link), to complete the Parental Stress Scale: Neonatal Intensive Care Unit questionnaire (PSS: NICU) and the Edin-

burgh Postnatal Depression Scale (EPDS) questionnaires. The adapted online Treatment Acceptability and Preference (TAP) questionnaire regarding the acceptability and feasibility of the intervention was sent by email five weeks after recruitment.

Descriptive statistics (i.e., means, standard deviations) were conducted to describe the participants' characteristics, to present results of the adapted TAP Questionnaire and describe the use of the Info FEP educational website.

Results: A total of 20 parents participated. Almost all were mothers (n = 19). For 25% of parents, the infant was their first child, and the mean gestational age at birth was 29 (± 1.31) weeks. The majority of parents (65%) had a yearly household income between $50,000 and $100,000 (CAD), and 60% had a post-secondary education.

Regarding the acceptability of the educational website, 100% of participants who had access to the website considered it appropriate or very appropriate to meet their information needs. All participants (100%) thought the convenience of consulting the website was appropriate or very much appropriate, as the website was accessible at whatever time and location they wished to access it. In addition, 100% viewed the website as an effective or very much effective method to receive information. The majority of parents (85%) who had access to the website consulted it 1 to 3 times per day and 54% of them spent 5 to 10 minutes each time on the website, while 15.4% spent 10 to 20 minutes per visit.

In the comments section included in the adapted TAP questionnaire, many parents indicated that the website is beautiful, accessible, easy to understand, helps to normalize their experience, and that it meets their information needs. A few parents also provided suggestions for additions/modifications to the content, such as addressing the period before preterm delivery (e.g., preterm labor), and adding a chat with other parents or health professionals.

Scores about the stress and depressive symptoms questionnaires were not compared between the two groups, since pilot studies are not designed to evaluate efficacy (Feeley & Cossette, 2017). Two weeks after enrolment, PSS: NICU and EPDS scores were respectively 3.69 (±0.63) and 16.1 (±4.95) for parents in the website group, as well as 3.71 (±0.16) and 12.67 (±10.07) for parents in the control group. Four weeks after enrolment, those same scores were 3.32 (±0.52) and 15.33 (±6.28) for parents in the website group, as well as 3.42 (±0.22) and 14.71 (±4.35) for parents in the control group.

In conclusion, the educational website Info FEP developed by the research team, collaborators, and parents of preterm infants proved to be an acceptable and feasible way to provide parents with such information during their infant's NICU stay. Educational websites may be convenient for parents, easy to update with current evidence, and may reduce the costs and environmental impacts of paper educational tools. A large-scale study must be conducted to assess the effect of this educational website on parents' psychological well-being.

Problem statement: Families experience psychological distress when their preterm infant is in the Neonatal Intensive Care Unit. A tailored educational intervention may be beneficial for their psychological well-being. Unfortunately, there are very limited digital educational interventions designed to improve the psychological well-being of parents and existing websites have moderate to low information quality. The aim of the present study is to measure the acceptability and feasibility of a digital educational intervention (a website) designed to improve the psychological well-being of parents.

Learner objectives:

1. To understand the acceptability and feasibility of a website designed to improve the psychological well-being of parents.
2. To understand parent's point of view regarding a website designed to improve their psychological well-being.

Gravens 2023–13

Abstract title: Developmental Participation Skills Assessment

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Methodology: The research focus was to complete content development and validation for the Developmental Participation Skills Assessment (DPS). Following a literature review, the development of the DPS items was extrapolated from well-established tools to achieve the most evidence-based criteria. Following item inclusion generation, the DPS went through five phases of content validation: (1) Initial tool development and use by five NICU professionals as part of their developmental assessment and expansion of the use of the DPS to include three more hospital NICUs within the health system. (2) Item adjustment and use as part of a bedside training program at a Level IV NICU. (3) Focus group of professionals using the DPS provided feedback and scoring was added. (4) Pilot of DPS by a multidisciplinary focus group in a Level IV NICU. (5) Feedback form sent to 20 NICU experts and content of DPS finalized with reflective portion added. A total of 50 professionals across the Midwest (4 OT, 2 PT, 3 SLP, 41 nurses) utilized the DPS as a part of standard practice throughout the phases of development. Assessments were completed on both full-term and preterm hospitalized babies. Professionals within these phases utilized the DPS with babies within a wide range of adjusted gestational ages from 23 weeks to 60 weeks (20 weeks post term). Babies ranged in severity from breathing room air to being intubated on a ventilator.

Main Outcome Variable: The establishment of an observation-

Table 2. Infant Medical and Contextual Characteristics across each Time Point

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

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

al instrument, the Developmental Participation Skills Assessment, that provides a means for identifying baby readiness, assessing the quality of baby participation and prompting clinician reflective processing.

Impact and Results: After all phases of development and expert panel feedback, the final result was the formation of an easy-to-use observational tool (see attached upload) for assessing baby readiness prior to caregiving, participation during caregiving, and stability following caregiving. In addition, there is the opportunity for the clinician to reflect following the caregiving interaction in a concise, consistent way**.**

Conclusion: The DPS is an observational instrument that provides a means for identifying baby readiness, assessing the quality of baby participation, and prompting clinician reflective processing. It has the potential to guide practice by inviting the clinician to initiate care based upon the baby's inherent capabilities for a positive caregiving interaction. This bedside assessment tool supports the caregiver's mindful presence and opportunity to attune to the baby thereby enhancing the quality-of-care experience for both the baby, family and clinician. Implementation of the DPS as a guide for mentorship and orientation for clinicians has also shown to be beneficial. The DPS shows potential to be a clinically useful tool for all hospitalized babies.

DPS Assessment

Developmental Participation Skills Assessment (DPS)

Name: _____ Date: _____ DOL: _____ GA at Birth: _____ Adjusted Age: _____

Readiness for Caregiving Interaction

Baby does not wake or show signs of readiness for care. Minimal fluctuations in autonomic system (heart rate, breathing and oxygen saturations)	1
Baby is beginning to stir but remains drowsy or returns to sleep. Limited rooting and/or minimal active hands to face and mouth. May show fluctuations in heart rate or have fast breathing	2
Baby is awake prior to caregiving. Beginning to show signs of readiness for care. May show fluctuations in heart rate and have variable breathing. Baby may require more than 2L breathing support	3
Baby is beginning to stir but initially drowsy. Begins to wake, showing signs of readiness for care and eating through rooting/mouthing/sucking. Steady breathing less than 60 breaths per minute. Baby on 2L or less oxygen	4
Baby is awake prior to caregiving. Showing more eager signs of readiness for care and eating through rooting/mouthing/sucking. Steady breathing less than 60 breaths per minute. Baby on 2L or less oxygen (If baby is on greater than 2L of oxygen, they receive a score of 3)	5

Readiness Indications for Care: (Skin to skin holding is always encouraged regardless of readiness score)

1- Protect sleep. Provide only medically necessary care for urgent needs or adjustments to promote stability and comfort

2-3 Great baby. Initiate supportive, calming interaction. Offer pleasurable, nurturing experience and/or opportunity at breast

4-5 Great baby. Initiate supportive, calming interaction. Offer pleasurable, nurturing pre-feeding or calming experiences (breast OR bottle)

Participation During Caregiving

AUTONOMIC	3	2	1
Stable heart rate	Maintains stability	Occasional rise or dips 10-20% from baseline	Frequent rise or dips 20% from baseline
Stable oxygen saturations	Maintains stability	Occasional dips below desired range	Frequent or prolonged dips below desired range
Regular, even breathing pattern	Steady breathing	Variable breathing	Prolonged pauses OR fast breathing
Maintains steady, even color	No color change	Occasional color change	Frequent or prolonged color change
Comments:		**Autonomic Score** (Range 4-12):	

MOTOR	3	2	1
Actively brings hands to face/mouth	Frequently	Occasionally	Rarely
Grasping and holding on	Frequently	Occasionally	Rarely
Bracing legs gently against support	Frequently	Occasionally	Rarely
Active movement of body/arms/legs	Frequently	Occasionally	Rarely
Comments:		**Motor Score** (Range 4-12):	

STATE	3	2	1
State	Awake	Drowsy OR Fuss/cry	Asleep OR Shutdown
Energy level	Maintains	Decreases	Minimal/depleted
Comments:		**State Score** (Range 2-6):	

REGULATION	3	2	1
Hand on hand OR Foot on foot	Frequently	Occasionally	Rarely
Rooting and mouthing hands	Frequently	Occasionally	Rarely
Initiates non-nutritive sucking	Frequently	Occasionally	Rarely
Signs of stress [a]	Rarely	Occasionally	Frequently
Comments:		**Regulation Score:** (Range 4-12)	

a) Examples: Eyebrow raise, eyelid flutter, looking away, worried look, grimace, hiccups, yawning, extending arms/legs, "stop sign", flailing, fuss/crying

Following Caregiving – Impact on the baby: Which best describes the baby 10 minutes following care?

☐ Baby is settled, content, well regulated (autonomic-motor-state)

☐ Baby is unsettled or fatigued, more dysregulated (autonomic-motor-state)

Total DPS Score: Raw (Range 14-42): _____ **Percentage:** _____/42 x 100 = _____%

Raw Score

DPS Assessment Discussion

Developmental Participation Skills Assessment Discussion

Optional: Complete in order to describe the baby's experience, guide team discussion or provide opportunity for teaching

CONTEXT OF CAREGIVING

Activity/Environment:
- ☐ Calm/relaxed
- ☐ Increased or unexpected noise/activity
- ☐ Loud/active
- ☐ Other: _____

Care Provided:
- ☐ Routine care ☐ Swaddled bath ☐ IV placement
- ☐ NG/OG placement ☐ Skin to skin transfer
- ☐ Suctioning ☐ Intubation
- ☐ Other care: _____

Care Providers:
- ☐ Parent ☐ Nurse
- ☐ Medical provider ☐ RT
- ☐ Other provider: _____

Care utilized a second person: ☐ Yes ☐ No

Length of caregiving interaction (min)_____

Comments:

REFLECTIVE PROCESSING

How did the caregiving interaction feel for you?

How do you think the caregiving interaction felt for the baby?

How do you think the caregiving interaction felt for the parents?

What comes to mind for next time?

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Problem statement: Non-contingent caregiving impairs a baby's autonomic, motor, and state stability, which interferes with regulation and negatively impacts neurodevelopment and nbsp. By providing an organized way to assess readiness for care and capacity to participate in care, the baby will experience less stress and trauma.

Learner objectives:

1. The learner will list three benefits of the Developmental Participation Skills Assessment (DPS).
2. The learner will discuss the DPS as a tool to reduce toxic stress and create safe, supportive nurturing experiences.
3. The learner will demonstrate application of the DPS to score readiness and baby participation in care on at least one baby through video examples.

PRE IMPLENTATION SURVEY RESULTS NNP – 3 TOTAL RESPONSES (75%)					
	Always	Almost Always	Neutral	Almost Never	Never
I utilize input from nursing staff when developing my plan of care.	1 (33%)	1 (33%)	1 (33%)		
Nursing staff is able to express concerns about their patients to the NNP team.	3 (100%)				
I am able to review lab and imaging results with nursing staff daily.	1 (33%)	2 (66%)			
I am satisfied with the collaboration among members of the multi-disciplinary team.		3 (100%)			
There is good communication between providers and nurses.		3 (100%)			
The nursing staff has a good understanding of the rationale behind the provider's daily orders and plan of care for my patients.		1 (33%)	2 (66%)		
Key:					
Communication Theme					
RN-Provider Collaboration Theme					
Nursing Knowledge of Plan of Care Theme					

Gravens 2023–14

Abstract title: Mother-Infant Interaction Patterns in the NICU: Variations Across Time and by Social Context

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This study used a within-subjects repeated time series design to observe changes in frequency and duration of interaction patterns in 12 mother-preterm infant dyads hospitalized in a level-IV NICU (see Table 1). Beginning when infants were between 32-weeks gestational age (M=32.7), dyads were video recorded across three time points in three social situations (routine care, feeding, and nurturing), resulting in a total of 27 total minutes per dyad. Applying a predefined coding scheme grounded in the Biobehavioral Model of Synchrony (Feldman, 2012), codes included maternal communicative behaviors (task touch, nurturing touch, vocal, gaze, and vestibular stimulation) and infant communicative behaviors (touch, gaze/eyes open, vocalization, and movement). Using Observer XT software, maternal and infant behaviors were coded using frame-by-frame microanalysis.

Table 1. *Participant Demographic and Medical Characteristics*

Characteristics	*M (SD)*	Range
Infants (*N*=12)		
GA at birth (days)	210 (20.9)	180-261
Weight at birth (kg)	1.34 (.38)	.61 – 2.12
NICU length of stay (days)	63 (18.9)	38-99
	f	
Males	5	
Females	7	
Twins	6	
Singletons	6	
Mothers (*N*=9)		
Age (years)	27.8 (6.7)	20-38
	f	
Married	4	
Single	5	
First-time parent	6	
Race/Ethnicity		
Latino/Hispanic	4	
White/Non-Hispanic	4	
Black/African American	1	

Note: GA = gestational age

To estimate intercoder reliability for infant behaviors and maternal behaviors, 15% of the videos were randomly selected and coded by all members of the coding team which included the study investigator (i.e., gold standard coder) and three additional trained coders. Using a 1-s window with the frequency/sequence setting in the Observer XT software, the average Cohen's kappa for infant behaviors was 0.82 (range: 0.77-.0.89) and for maternal behaviors was 0.88 (range: 0.85-0.92). In addition, intra-coder reliability was calculated using another set of 15% randomly selected videos and averaged a Cohen's kappa of 0.92 (range: 0.81-1.00) for maternal behaviors and 0.87 (range: 0.69-1.00) for infant behaviors.

Using Observer XT, the mean duration, total duration, rate per minute, and frequency of each communicative behavior for mothers and infants were calculated for each social interaction context and across each time point. Next, a one-way repeated measures ANOVA with pairwise comparisons was performed for each interaction behavior for mothers and infants, respectively, using SPSS (Version 28.0.0.0), to determine if there were any significant differences in infant and/or maternal behaviors across time points as well as according to social contexts.

Results: Descriptive statistics of infant medical factors and the contextual characteristics for each observation session are reported in Table 2. Infants demonstrated variability in medical characteristics with some infants requiring greater respiratory support than others across all time points of data collection. Contextual factors varied across social interaction situations and time, most notably in feeding contexts.

Table 3 displays the summary statistics for all behaviors across each time point. For mothers, results across time showed a significant increase in their duration of task touch behaviors, F (2,22) = 5.48, p = .012. We also detected a decreased trend in duration of nurturing touch behaviors over time. No changes in other maternal behaviors were found. For the preterm infants, results showed a significant increase in duration of non-distressed vocalizations, F (2,22) = 12.84, p < .001, and a significant decrease in touch behaviors, F (2,22) = 3.60, p <.05, over time. We also observed a trend upward for duration of time infants' eyes remained open.

Table 3. Mean duration, total duration, rate, and frequency of mother-infant behaviors across time series

	Time 1 (*n*=35)				Time 2 (*n*=36)				Time 3 (*n*=36)			
	M Dur (SD)	% Dur Observed	RPM	*f*	*M* Dur (SD)	% Dur Observed	RPM	*f*	*M* Dur (SD)	% Dur Observed	RPM	*f*
Infant Behaviors												
Eyes Open	8.8 (9.1)	10.1	0.7	74	13.8 (23.4)	17.3	.8	82	15.0 (32.8)	19.3	.8	84
Touch	18.1 (34.7)	28.8	1.0	101	13.3 (20.8)	15.2	.7	75	8.2 (24.6)	9.2	.7	73
Vocal Calm-MF	2.1 (2.4)	5.3	1.5	162	3.0 (5.0)	10.2	2.0	221	4.1 (5.2)	16.3	2.4	257
Vocal Distress	10.9 (8.1)	1.7	.09	10	12.3 (15.1)	1.5	.07	8	11.1 (10.6)	2.4	.15	14
Mvt Calm-MF	13.7 (20.4)	48.6	2.1	226	15.1 (19.8)	50.0	2.0	217	15.6 (27.5)	54.2	2.1	227
Mvt Distressed	13.1 (7.7)	1.9	.08	9	29.8 (37.7)	1.8	.04	4	13.2 (10.3)	2.4	.1	12
Mother Behaviors												
Gaze	53.7 (64.0)	85.3	1.0	101	40.2 (53.7)	85.9	1.3	140	44.2 (52.6)	89.9	1.2	133
Nurt Touch	15.1 (25.2)	34.1	1.4	144	13.8 (29.4)	29.2	1.3	139	10.7 (17.9)	24.9	1.4	152
Task Touch	17.5 (23.3)	28.9	1.0	105	20.4 (28.0)	34.0	1.0	109	24.2 (33.8)	44.6	1.1	120
Vestibular	21.9 (23.6)	10.7	0.3	31	13.0 (8.5)	4.0	.2	20	39.5 (29.9)	6.7	.1	11
Vocal	4.6 (4.1)	24.0	3.2	335	5.6 (5.9)	24.6	2.6	286	5.3 (6.5)	22.2	2.5	227

Note: *N*=12 dyads; MF = mildly fussy; Mvt = movement; Nurt = Nurturing

Table 4 displays the summary statistics for all behaviors for each social context. In analyzing maternal behaviors, significant differences were identified for both nurturing, F (2,22) = 11.81, *p* < .001, and task touch, F (2,22) = 37.76, *p* < .001,

behaviors. Overall findings for maternal touch behaviors indicated that mothers provided a significantly greater duration of nurturing touch in nurturing contexts followed by feeding and then routine cares. In contrast, mothers were observed using a significant duration of task touch behaviors during routine cares, followed by feeding and nurturing contexts, respectively. Analyses for infant behaviors between contexts showed significant results for touch, F (2,22) = 4.54, $p < .05$, gaze, F (2,22) = 6.64, $p < .01$, non-distressed vocalization, F (2,22) = 21.39, $p < .001$, and non-distressed movement, F (2,22) = 25.07, $p < .001$, behaviors. Pairwise comparisons showed infants demonstrated longer durations of touch during feeding and nurturing contexts, longer duration of eyes opened during feeding contexts, and longest duration of non-distressed vocalizations and non-distressed movement during routine cares.

Conclusion: This present investigation documented behavioral trends across time and social contexts as an important step to understanding early interaction patterns between mothers and their preterm infants in the NICU. Findings indicated that interaction behaviors for both mothers and infants varied according to social context. Infant vocal and touch behaviors changed over time whereas maternal behaviors, except for touch, remained consistent. Overall, each social context presented unique differences in the duration of maternal and infant interaction behaviors. This study builds on developmental science principles in furthering understanding of early relational communication patterns between mothers and preterm infants as they naturalistically unfold in the NICU (Provenzi et al., 2018). Subsequent studies may illuminate understanding if these dyadic interaction patterns are generalizable across other NICU settings. Ultimately, the results of this study are positioned to inform early interaction patterns and establish best practices that promote the emergence of synchronous exchanges that impact preterm infant's developmental trajectory.

Table 4. Mean duration, % duration observed, rate, and frequency of mother-infant behaviors according to interaction context

	Routine Cares (n=35)				Feeding (n=36)				Nurturing (n=36)			
	M Dur (SD)	% Dur Observed	RPM	F	M Dur (SD)	% Dur Observed	RPM	F	M Dur (SD)	% Dur Observed	RPM	F
Infant Behaviors												
Eyes Open	9.4 (15.1)	11.3	.72	76	17.3 (32.6)	28.5	.9	108	8.1 (11.2)	6.9	.51	56
Touch	3.1 (4.9)	5.6	1.1	116	23.7 (31.4)	22.7	.58	63	22.6 (40.2)	24.1	.64	70
Vocal Calm-MF	3.6 (4.3)	20.7	3.5	366	2.7 (5.0)	6.2	1.4	153	2.9 (5.0)	5.4	1.1	121
Vocal Distress	3.6 (10.9)	5.7	.3	32	-	-	-	-	-	-	-	-
Mvt Calm-MF	25.9 (32.6)	76.3	1.8	187	11.6 (17.6)	46.7	2.4	263	9.1 (13.3)	30.7	2.0	220
Mvt Distressed	15.8 (16.9)	6.2	.24	25	-	-	-	-	-	-	-	-
Mother Behaviors												
Gaze	52.6 (50.1)	91.3	1.0	110	37.5 (55.2)	85.3	1.4	149	48.2 (62.4)	84.7	1.1	115
Nurt Touch	6.0 (8.2)	8.0	.8	84	12.1 (25.2)	31.3	1.6	170	17.4 (27.4)	48.1	1.7	181
Task Touch	22.1 (24.6)	67.7	1.8	194	21.3 (37.5)	34.8	1.0	107	12.2 (18.5)	6.2	.3	33
Vestibular	-	-	-	-	21.4 (18.24)	6.5	.2	20	22.5 (25.1)	14.4	.4	42
Vocal	4.6 (4.8)	26.4	3.4	361	5.1 (5.2)	21.8	2.6	281	5.8 (6.6)	22.7	2.3	256

Note: N=12 dyads; MF = mildly fussy; mvt = movement; Nurt = Nurturing

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Problem statement:

The NICU is a high-risk context for mother-infant relationship development, yet few studies have examined mother-preterm infant interaction patterns during the NICU hospitalization (e.g., Reyna et al., 2012; Stefana et al., 2020). This study aimed to identify the variations in frequency and duration of mother-infant communication patterns in the NICU and measure variations across time and across social contexts.

Learner objectives:

1. Participants will identify how mother-infant interaction patterns vary across time and across social contexts during the NICU hospitalization period.
2. Participants will acquire information regarding systematic observational methods that can be used to measure familial interaction processes in the NICU.

Gravens 2023–15

Abstract title: Implementation of Nurse Led Multi-Disciplinary Rounds in a Level II NICU

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This quality improvement project took place at Bellin Hospital in Green Bay, WI in an 18-bed, private room, Level II unit, and the only Family-Integrated Care Unit (FICU) in the state of Wis-

consin (Bellin, 2022). The FICU model allows infants requiring intensive care to share hospital rooms with their mother while mom remains an inpatient, post-partum, hospitalized patient. The NICU staff consists of approximately 25 RNs, 4 full-time Neonatal Nurse Practitioners (NNP), 4 Neonatologists, Case Management, Speech Therapy, Occupational and Physical Therapy, Dieticians, a Clinical Nurse Educator, and a Team Leader.

An implementation roadmap was created using a Plan, Do, Study, Act (PDSA) format. During the planning phase, a literature search was conducted to determine the benefits of multidisciplinary rounding, as well as the benefits utilizing the bedside nurse to lead rounds. Results of the search were evaluated to determine both the benefits of both multidisciplinary rounds and nurse-led rounds individually. The review of the literature revealed several benefits of nurse-led multi-disciplinary rounds, including improved medical team collaboration, better communication among team members, and enhanced nurse understanding of the plan of care. These themes became the overall goal of the project.

NICU RNs and NNPs were asked to complete an anonymous, pre-implementation survey. A nine question Likert scale survey was distributed to nurses with the option to respond with "always," "almost always," "neutral," "almost never," and "never." Nurses were asked if they felt their input was utilized in creating the daily plan of care, if they understood the rationale behind the plan of care, how they felt about communication between providers and nurses, and if they felt they were able to advocate for patients to the Providers. NNPS were also given a Likert scale survey utilizing the same ranking options.

Appendix--Tool 1: FSAC (Family Snapshot Antenatal Consult) Tool–3 pages

Antenatal Consultation

Indicate those that apply with [x]

Reason for Consultation:

Maternal History

Gestational age:

Gravida:	Term:	Preterm:	Abortion:	Live:

Estimated date of delivery: (yyyy/mm/dd)

Maternal age:

Labs and serologies:

HBsAg:	Urine Culture:
HIV:	Blood group:
Rubella:	Rh:
Syphilis:	Antibody screen:
Gonorrhea:	Group B Strep:
Chlamydia:	Other:

Past medical history and family history:

Past obstetrical history and outcomes:

Current pregnancy:

Antenatal genetics screening:

NIPT:	Amniocentesis:
FTS:	Other:

Ultrasounds:

Date (yyyy/mm/dd)	Gestational age	Estimated Fetal Weight	Biophysical Profile	Other findings

Maternal Medications *(please indicate which of the following and add dates/specifications as necessary)*:

[ ] Antibiotics:	[ ] Betamethasone (please indicate dates)
[ ] Indomethacin	[ ] Other medications:
[ ] MgSO4 (please specify number of hours):	

Substance use during pregnancy:

They were asked if they utilize nursing input when creating a plan of care, how they felt about communication with nurses, and if they felt that nurses understood the rationale behind the treatment plan. Staff was given two weeks to complete the survey.

The survey completion rate was 60% for nurses and 75% for NNPs. All NNPs felt that there was "almost always" good communication between nurses and providers, whereas 87% of nurses stated that there is "almost always" good communication, and 13% felt that there is "always" good communication. All NNPs that completed the survey felt satisfied with collaboration between members of the multi-disciplinary team, selecting "almost always," which is contrasted to only 60% of nursing staff responding the same way. There was a stark contrast in survey responses between NNPs and RNs surrounding understanding of the rationale behind the plan of care and review of lab and imaging results: 73% of nurses felt they "almost always" understood the rationale behind daily orders and plans of care, contrasted to only 33% of NNP feeling nurses "almost always" understood rationales. Overall, however, results were consistent between RNs and NNPs on the themes of communication and collaboration.

NNP Pre-implementation survey results

Staff RNs and NNPs were given a follow-up survey one month after rounds were implemented. 64% of RNs and 75% of RNs completed the survey. 63% of RNs and 100% of NNPs felt that rounds improved communication and collaboration. Addition-

Description provided about preterm birth and expected NICU course (please elaborate on what was discussed, specify any statistics if any given):

Have you or anyone you know had any experience with babies born prematurely? Can you tell me what you know, heard, or read about prematurity? (From friends, reading, the internet, etc.)? If so, what do you know so that I can help fill in the blanks.

That is a brief overview of what the NICU stay for a baby born at ____ gestation/__lbs will look like. When your baby is admitted to the NICU, it can be overwhelming as there are lots of machines but none of these are as important to your baby as you are. The machines are temporary, you will be with your child forever. Your baby will know your smell, touch, and voice. There are lots of ways that you can support your baby while they are in the NICU. Some examples include:

Please check off which of the following were expanded on:

[ ] Feeding – early hand expression, breastfeeding
[ ] Hand hugging
[ ] Kangaroo care
[ ] Scented cloths
[ ] Being present for your baby whenever you can

I just shared a lot of information with you about what might happen next and about prematurity. Do you have any questions?

[ ] Potential transfer addressed. Preferred hospital:

Impression and Plan:

Staff Neonatologist Sign off Comments:

ally, 75% of RNs and 100% of NNPs responded that they find rounds to be beneficial. 50% of RNs and 100% of NNPs responded that rounds have improved RN understanding of the plan of care. One RN stated that rounds help to "understand why we do the things that we do, why we are seeing certain things with our babies, and helps me understand the changes that are made for our babies to help them grow and thrive. Nurse-led rounds also help me feel like a part of the team and decision making." While Neonatologists were not included in the surveys, one Neonatologist stated, "It really gets the nurses speaking the same language as the physicians and NNPs, and I think creates a deeper understanding of what we're doing and why. It helps create engagement with the nurses as part of the team with important input to provide."

RN Pre-implementation survey results

PRE IMPLENTATION SURVEY RESULTS RN – 15 TOTAL RESPONSES (60%)	Always	Almost Always	Neutral	Almost Never	Never
My input is well-received by the providers.	3 (20%)	11 (73%)	1 (7%)		
It is difficult to have my voice heard by providers.				14 (93%)	1 (7%)
I am able to express concerns about my patients with the providers during rounds.	4 (27%)	11 (73%)			
I am able to review lab and imaging results with providers daily.	1 (7%)	4 (13%)	6 (40%)	4 (13%)	
I feel included in developing the daily plan of care for my patients.	1 (7%)	9 (60%)	5 (33%)		
I feel the providers create a plan of care for patients without utilizing my input.		2 (13%)	6 (40%)	4 (13%)	
I am satisfied with the collaboration among members of the multi-disciplinary team.	2 (13%)	9 (60%)	3 (20%)		
There is good communication between providers and nurses.	2 (13%)	13 (87%)			
I have a good understanding of the rationale behind the provider's daily orders and plan of care for my patients.	2 (13%)	11 (73%)	2 (13%)		
I am able to advocate for my patients and families.	3 (20%)	11 (73%)	1 (7%)		
Key: *Communication Theme* *RN-Provider Collaboration Theme* *Nursing Knowledge of Plan of Care Theme*					

NNP Post-implementation survey results

POST IMPLENTATION SURVEY RESULTS NNP – 3 TOTAL RESPONSES (75%)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Rounds have improved nurses' understanding of the rationale for orders and the plan of care	3 (100%)				
Rounds have improved my ability to review lab results with nurses.	2 (67%)	1 (33%)			
Nurses are able to express concerns about patients during rounds.	3 (100%)				
Nurses contribute to the patient's plan of care.	1 (33%)	2 (67%)			
Rounds have improved the communication between members of the medical team.	3 (100%)				
I found the rounding tool to be helpful in guiding the nurses in the presentation of their patients	2 (67%)	1 (33%)			
Rounds have increased my satisfaction with collaboration among members of the multidisciplinary team.	3 (100%)				
I find rounds to be beneficial.	3 (100%)				
Key: *Communication Theme* *RN-Provider Collaboration Theme* *Nursing Knowledge of Plan of Care Theme* *Rounding and Script*					

RN Post-implementation survey results

POST IMPLENTATION SURVEY RESULTS RN – 16 TOTAL RESPONSES (64%)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Rounds have improved my understanding of the rationale for orders and the plan of care.	3 (19%)	5 (31%)	7 (44%)	1 (6%)	
Rounds have improved my ability to review lab results with providers.	3 (19%)	6 (38%)	5 (31%)	2 (13%)	
I am able to express concerns about patients during rounds.	4 (25%)	9 (56%)	3 (19%)		
I contribute to the patient's plan of care.	2 (13%)	10 (63%)	4 (25%)		
Rounds have improved communication between members of the medical team.	2 (13%)	8 (50%)	5 (31%)	1 (6%)	
I find the rounding tool to be helpful in guiding the presentation of patients.		6 (38%)	6 (38%)	4 (25%)	
Rounds have increased my satisfaction with collaboration among members of the multidisciplinary team.	3 (19%)	6 (38%)	5 (31%)	2 (13%)	
I find rounds to be beneficial.	3 (19%)	9 (56%)	4 (25%)		
Key: *Communication Theme* *RN-Provider Collaboration Theme* *Nursing Knowledge of Plan of Care Theme* *Rounding and Script*					

While the implementation of nurse-led rounds has aided in improving communication and collaboration, as well as increasing nurse understanding of the plan of care, the project was limited by inconsistent daily attendance at rounds. Additionally, rounds are completed daily during the day, without involvement of night shift RNs, however all RNs were

surveyed, which may have impacted survey results. There was also dissatisfaction with a detailed rounding script that was created for RN use during rounds. The rounding script has since been changed, with subsequent positive feedback.

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Problem statement:

Multidisciplinary rounding improves communication among members of the care team. Communication breakdowns can result in errors and patient harm, especially in the vulnerable NICU population. To improve communication and collaboration among members of the NICU team, nurse-led multidisciplinary rounding was implemented in a Level II NICU. Prior to implementation, a review of the literature was conducted, a rounding script was created, and staff education was completed. A survey of staff RNs and NNPs was conducted before multi-disciplinary rounding was initiated and revealed an overall feeling that there was good communication and collaboration among members of the team. A post-implementation survey of RNs and NNPs was conducted 30 days after implementation. Survey results indicated improved collaboration and communication. Feedback from RNs, NNPs, and Neonatology was favorable and indicated improved engagement, critical thinking, and understanding of the patient's plan of care.

Learner objectives:

1. Understand the implementation process for nurse-led multi-disciplinary rounding
2. Summarize benefits of nurse led multi-disciplinary rounds

Gravens 2023–16

Abstract title: Improving communication in the NICU: the implementation of the Family Snapshot Tool

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Background and Purpose: Individualized decision making has become the standard of care in pediatrics and in neonatology[1]. The process of individualized decision-making in the Neonatal Intensive Care Unit (NICU) is grounded in the clinician's ability to understand each family's context and tailoring their guidance to each family's unique needs[2,3]. The family context includes everything that makes a family unique–their names, preferred pronouns, family structure, cultural and religious backgrounds, family values etc. Despite guidelines advocating for the medical team to better understand the family context to allow clinicians to engage in individualized decision making, minimal literature exists to guide its practical application by a multi-disciplinary inter-professional team[4,5].

Based on this evidence, our transformational goal was to embed an understanding of the family context into all interactions. In the Sunnybrook NICU in Toronto, Canada, it was felt that sharing information between families and clinicians, and between clinicians, was inconsistent, especially with the large interprofessional team. Through semi-structured interviews with clinicians and parents at our center, we previously explored in depth if and how family context was currently being shared, and what real and perceived barriers existed[6]. These interviews highlighted inconsistent handover and poor documentation practices of information about the family's context.

The purpose of this study is to describe the creation and im-

plementation of two tools aimed to improve both family and clinician experience, by improving documentation about a family's context.

Innovation: Previous qualitative work helped guide the innovation. Surveys were used to validate and triangulate the issues identified in previous semi-structured interviews done with clinicians. There was a 75% response rate of full-time clinicians (143/190). Given the sensitivity of the topic and families only having a singular NICU experience, surveys were not done with families. The surveys and interviews identified the basic need for improved documentation of information around family context to avoid fragmented and miscommunication. Equipped with these gaps, an interprofessional leadership team including parent representatives brainstormed practical ways to address them. A process map was created to outline how information gets collected and shared throughout the NICU stay of a patient. Two gaps in the communication around family context were identified and this guided the development of two associated tools, The Family Snapshot Antenatal Consult (FSAC) and the Family Snapshot Tool (FST), and the processes for their implementation.

The first identified gap was eliciting and documenting the family context in an antenatal consultation, the first opportunity for the neonatal team to meet with families. At the time, the antenatal consult in our institution were handwritten on carbon copy sheets with no dedicated space on the sheet to write any information about the family context. The consult was reimagined using an experience-based co-design approach. A specific section, nicknamed the Family Snapshot, was designed to facilitate the collection and documentation of the family and adapted to help support trainees in these potentially difficult conversations. The FSAC was tested and tried by trainees and neonatologists (Appendix - Tool 1).

The second gap identified was the ability to transition the information gleaned during the antenatal consult to the newborn's chart after the delivery. Again, using experience-based co-design, the FST was created. The FST (Appendix - Tool 2) is a continuation of the FSAC and exists as a consolidated platform on the electronic medical record (EMR) in the Sunnybrook NICU. It allows information about the family context to be elaborated on as the relationship progresses between the family and the NICU team. The goal is to help the clinician team build on relationships and conversations about family context, so that families do not need to restart conversations with each new clinician. It is created as a dynamic tool that could be edited as new information is learnt and as a family's context evolved with time.

Implementation: The same interprofessional leadership team that designed the Family Snapshot Antenatal Consult (FSAC) and the Family Snapshot Tool (FST) were also the leaders for their implementation. Implementation of both tools required 1) information technology development to make the data collection tools compatible with the EMR, 2) the delineation of a new workflow for staff and 3) education to clinicians. Both tools were implemented in April 2022. Process measures are continuously being collected to quantify their uptake and help target interventions to refine the process. Measures include the frequency of these tools being completed, audits as to how they are being completed and who is using them and completing them.

Conclusion: This implementation serves as an intermediary step in a larger quality improvement initiative aimed to improve communication between clinicians and families. The tools and process described here are continuously being reassessed and improved upon based on feedback from the clinicians using the tools and our interprofessional leadership team. Future steps include 1) further semi-structured interviews to assess the experience of families with sharing their family context now that these tools are in place and 2) repeating the surveys with clinicians to see if there has been any change in their experience with sharing information about the family context. Ongoing targeted initiatives to improve communication around family context will allow our NICU to engage in more family centered and individualized decision making.

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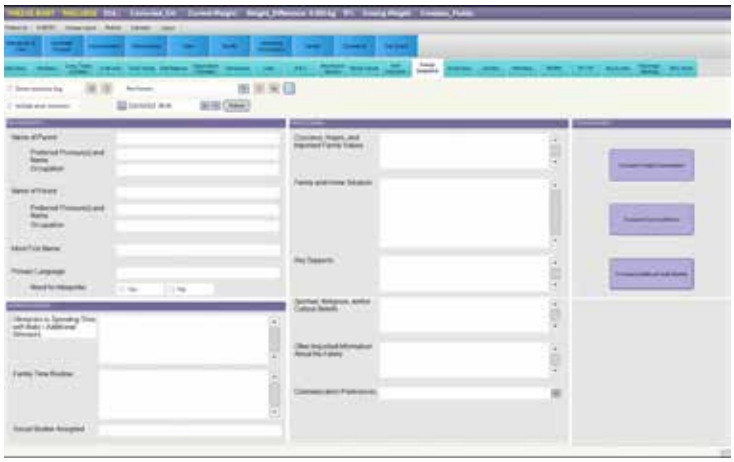
Problem statement:

We are describing the creation and implementation of the Family Snapshot Tools in the Sunnybrook Neonatal Intensive Care Unit (NICU) as a means of improving communication around family context.

Learner objectives:

1. Identify the strengths and gaps in understanding and communicating family context between families and clinicians, and between clinicians
2. Learn about a quality improvement (QI) initiative designed to address these gaps and improve communication around family context.

Appendix --Tool 2: FST (Family Snapshot Tool)



Building a relationship

[ ] Significant person(s) present (please specify name, relationship to person who is pregnant, etc.):
This is an important conversation to have. Is there anyone else you want to call/video conference in?

[ ] Interpreter used (please specify language):
What language are you most comfortable with? Are you okay to have this conversation in English or would you like a translator?

[ ] Neonatal role introduced

[ ] NICU team and goal of the consult introduced
Describe what the NICU is, where it is, etc.

*The goal of our discussion is for us to get to know you and introduce you to the NICU. We know that getting to know a family can help us better help individualize our care for you. **These are conversations and questions we have with all families who are about to have a baby that may be admitted to the NICU.***

	Name	Preferred name and pronouns	Occupation
Parent			
Parent			

Baby's sex (if known):

Baby's name (if known):

About the family

About the family and key supports:
Can you tell me a bit about you, and your family?

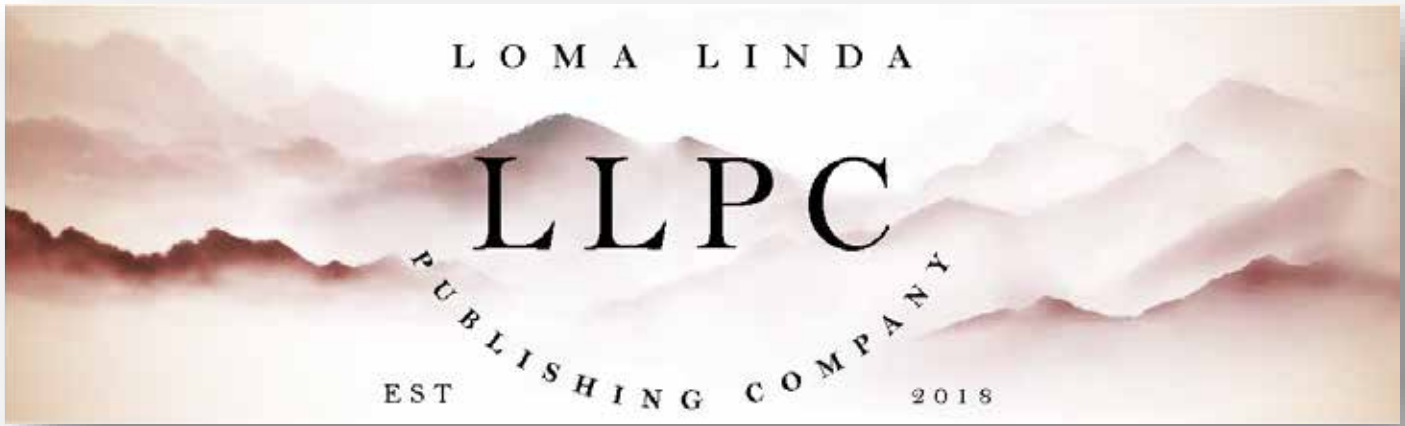
Spiritual, religious, or cultural beliefs:
Are there any spiritual, religious, or cultural beliefs or practices that are important to your life?

Concerns, hopes and important family values:
What are your thoughts and feelings about having a preterm child? Any or all thoughts are welcome. Anything that makes you nervous? Hopeful?
What are your hopes for the birth, and care after birth for you and your baby?

Additional information about family:

Sharing information

How do parents prefer to receive information?
Some parents want a general overview of what can happen, and some parents want to hear specific numbers and statistics. What works best for you?



Gravens 2023–17

Abstract title: A Multi-Tiered Systemic Approach to Helping Families Thrive in the NICU and Beyond

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773-909-1112

Program: The Family Development Program (FDP) is a relationship-based preventive intervention that supports caregivers to approach parenting so it can be joyful, intimate, and child-centered. Built on a randomized-controlled trial funded by the National Institute of Mental Health, the program now boasts over 30 years of results to support its effectiveness with parents from vulnerable backgrounds and continues to serve families with an infant born into the Neonatal Intensive Care Unit (NICU) via telehealth and in-person services. FDP also provides workforce education and training to NICU teams to improve outcomes for infants and their families. FDP uses a multi-tiered approach that aligns with the Institute of Medicine's (1994) prevention framework and includes: 1) system-wide education in trauma-informed, resilience-promoting care to equip NICU staff and leadership with tools to promote positive parenting practices right from the start while also helping to promote professional wellbeing of staff members, 2) family and staff consultations to address current challenges, and 3) targeted individualized therapeutic services to families who are struggling emotionally and are most at-risk for mental health challenges.

We will present program evaluation data, including both staff training outcomes and family outcomes and from 2017–2022. Staff training and support consisted of workshops, consultations, and presentations at staff meetings which included educational materials (handouts, videos, articles, presentations) on topics related to trauma, child development, and increasing equity in the NICU. Evaluation measures included knowledge checks, retrospective pre-post skill ratings, and satisfaction. Family consultations consisted of psychoeducation, brief coping and communication skills, and support. Outpatient interventions were selected based on family need but largely focused on treating mental health symptoms, increasing parent-child attunement, strengthening social support, and healing trauma. Parents completed the Patient Health Questionnaire (PHQ-9), General Anxiety Disorder (GAD-7), PTSD Checklist-Civilian (PCL-C) version, Perceived Stress Scale (PSS), Coping Self-Efficacy (CSE), Post-partum Bonding Questionnaire, and Revised Relationship Quality Satisfaction Survey (RDAS) before and after completing services.

Impact and results: Over 150 staff members have participated in trainings over the last 4 years. Training participants indicated that their "ability to find effective solutions for the people I serve" were improved because of participating in the training. Additionally, their confidence in both "serving my clients" and "implementing skills" were enhanced. Ninety-eight percent (98%) thought that others should receive the training and 100% rated the course favorably (Good 9%, Very Good 27%, Excellent 64%). We have translated the training into a one-hour e-learning course and downloadable tip sheets that are publicly available and received similarly positive ratings.

On average our team serves 90 families each year, including 110 family consultations, and 330 therapy sessions. At intake, we obtain baseline measures of parent mental health (i.e., depression, anxiety, and posttraumatic stress) as well as family functioning and coping. Our families see an average decrease of 2.5 units in mental health symptom severity (average change by symptom type is as follows: Anxiety -2.4, Posttraumatic Stress -3.8, Depression -1.3, Perceived Stress -3.5). Most clients experience a decrease in symptom severity from the moderate to severe range into the mild or minimal range across these domains. Further, our clients report an average increase in positive coping utilization of 9.7 units.

Conclusions: NICU families and staff are eager for psychological services and will make full use of them. Families have unique needs and present with differing trauma histories and pre-existing symptoms, which necessitates that providers titrate support. The transition home is a time of incredible vulnerability and change, and many families benefit from family-wide support that extends beyond the NICU stay. Indeed, our empirical findings suggest that receiving outpatient family services after NICU discharge reduces psychological distress and increase coping and bonding. Finally, providing training and support to staff ensures that all families will receive some level of service and helps cultivate a family-oriented and trauma-informed NICU environment.

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Problem statement:

Medical teams working with infants serve a unique role, as caring for an infant also entails caring for the family and equipping them to provide a nurturing environment for their child during a Neonatal Intensive Care Unit (NICU) stay and beyond. To complicate matters, more than 20% of parents with a medically ill child experience depression, anxiety, and/or posttraumatic stress disorder within the infant's first year life (2), which can have negative downstream effects on the child's so-

cioemotional development. To help infants and families thrive and set them up for long-term developmental success, NICUs must offer multi-tiered approaches to equip staff with education about parental mental health and support families using an accessible and flexible approach during this critical period.

Learner objectives:

1. Describe the Family Development Program (FDP) and three tiers of support provided to NICU families and staff.
2. List best practices and strategies to support caregivers in the NICU
3. Apply trauma-informed care strategies to promote future developmental success for families and professional wellbeing among staff

Gravens 2023–18

Abstract title: Interdisciplinary Guidelines and Recommendations for NICU Discharge Preparation and Transition Planning

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Problem statement:

This presentation will provide attendees with a high-level view of the guideline sections and a roadmap for integration into their own unit. Additionally, attendees will be oriented to the NICUtohome.org landing page, a source for the tools and information needed to put the Interdisciplinary Guidelines and Recommendations for NICU Discharge Preparation and Transition Planning into action.

Learner objectives:

1. Attendees will be able to identity at least three risk factors for readmission or health decline in infants recently discharged from the NICU.
1. Attendees will be able to list the five impact areas recommended for inclusion in NICU transition planning and discharge preparedness programs.
2. Attendees will be able to access at least 2 resources for transition planning and discharge preparedness to be integrated into their NICU.

Gravens 2023–19

Abstract title: Cardiac, Renal and Liver Function in Neonates with Hypoxic Ischemic Encephalopathy Treated with Therapeutic Hypothermia

Authors: Gospodin Stefanov, Preetha Prazad, Ramona Donovan, Lorene Schweig

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Background: Therapeutic Hypothermia (TH) reduces the impact of perinatal asphyxia in neonates. Cardiac dysfunction, kidney and liver injury have also been shown to present in these infants. TH is an established treatment, and its success in reducing HIE incidence is well documented in the literature,

but there is a lack of research data to explain how TH modulates neonatal cardiac, renal, and hepatic function. Moreover, it is unclear if the cardiac, renal, or hepatic function changes that occur during and post-TH can predict neonatal outcomes.

Objective: To evaluate cardiac, renal, and liver function in neonates with HIE treated with TH and to determine whether various biochemical/functional parameters of cardiac, renal, and hepatic function are significant predictors of mortality.

Methods: A retrospective electronic medical record review of 47 neonates, who qualified for TH because of HIE, over a seven-year period in a Level IV NICU. All study procedures were approved by the local Institutional Review Board. The subjects were divided into groups dependent upon: 1) their gestational age at birth—Late Preterm (PT) (36 0/7 to 36 6/7 weeks) and Term (37 0/7 to 42 0/7 weeks); 2) their Size-at-Birth—small for gestational age (SGA), and appropriate for gestational age (AGA); and 3) their Outcome—Alive (n=40) and Deceased (n=7). Data collected for analyses include cardiac, renal, and hepatic function parameters; diagnoses; and concomitant medications/treatments throughout the entire NICU course, and maternal and perinatal factors. One-way ANOVA and Pearson correlation analyses were used to compare continuous variables between the independent groups. Fisher exact test was used for categorical variables.

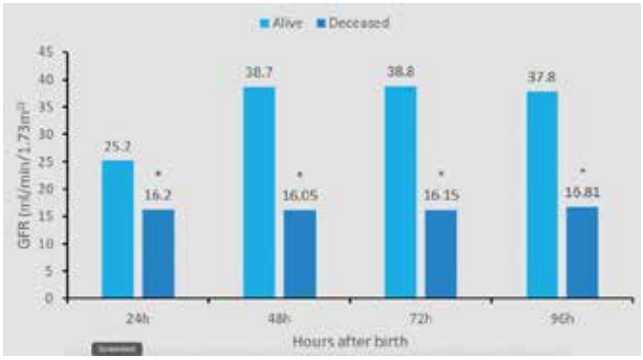
Results: There was no significant difference in echocardiogram's cardiac function parameters (EF, SFx, or LVIDd) between the alive and deceased groups (p>0.05) (Table 1). No significant correlation was found between EF, LVIDd, or SFx and any measured biomarker of cardiac (Troponin I and CK-MB), renal (BUN, Cr BUN/Cr, GFR), or hepatic (ALT, AST, Alk-Phos, LA) injury (p>0.05).

Table 1

(insert)

Mean GFR and urine output were significantly lower and serum Creatinine was significantly higher in the deceased group than the alive group at 24, 48, 72, and 96 (±4) hours after birth (p<0.05 and p<0.005) (Fig.1). Mean serum BUN was not significantly different at any time point between the alive and deceased groups (p<0.05).

Figure 1



Mean serum ALT, AST, and Lactic Acid were significantly higher in the deceased group than the alive group at 24 hours of life. (p<0.05) (Table 2).

Table 2

Parameter	Alive	Deceased	Significance
24h ALT (U/L)	87.0 ± 98.6	359.4 ± 216.9	p < 0.00001
24h AST (U/L)	207.6 ± 296.9	1214.0 ± 847.7	p < 0.00001
24h Alk Phos (U/L)	142.8 ± 38.7	165.3 ± 105.5	p = 0.33
24h Lactic Acid (mmol/L)	2.9 ± 1.5	8.6 ± 4.9	p = 0.000013

No significant differences were found in the cardiac, renal, and liver function parameters between the Gestational age or Size-at-Birth groups (p>0.05).

Conclusions: Cardiac, renal, and liver function parameters did not significantly differ based on gestational age or by weight for gestational age. Markers of renal and hepatic function may be predictive of survival in neonates with HIE being treated with therapeutic hypothermia.

Problem statement:

Can the cardiac, renal, or hepatic function changes that occur during and post-Therapeutic Hypothermia predict neonatal outcomes of HIE?

Learner objectives:

1. The effect of Therapeutic Hypothermia on cardiac, renal, and liver function in term and late preterm neonates with HIE.
2. The biochemical/functional parameters of cardiac, renal, and hepatic function can be predictors of post-Therapeutic Hypothermia mortality in neonates with HIE.

Gravens 2023–20

Abstract title: "Cool attached"

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Background: Therapeutic hypothermia (TH) in the neonate with hypoxic ischemic encephalopathy is a very stressful experience for both the neonate and its parents.

Research on the safety and effect of kangarooing during therapeutic hypothermia has been limited.

In the Dutch Neonatal Intensive Care Units (NICU's) no protocols or guidelines are available for kangarooing during TH. Kangarooing is often not allowed due to fear of dislocation of a tracheal tube or central venous line. In addition, there's no knowledge of the effect of kangarooing during TH on vital parameters. This may lead to a disturbed attachment between the neonate and parents.

Aim: Validation of the protocol "kangarooing with neonates in therapeutic hypothermia"

Methods: Observational study, conducted in 2020 at the level III NICU of Isala, Zwolle, the Netherlands.

Neonates who underwent TH were included. They kangarooed according to established agreements in the protocol "kangarooing with neonates in therapeutic hypothermia." During kangarooing, vital signs (blood pressure, respiratory rate, and heart rate) were monitored. Vital signs were assessed before, 15 minutes after installing, just before ending, and 30 minutes after kangarooing.

Any dislocations of tracheal tubes or central lines were tracked.

Afterwards, parents and nurses completed surveys about safety and experiences during kangarooing.

Results: Ten neonates with hypoxic ischemic encephalopathy who underwent TH were included.

We observed no major fluctuations in vital signs (Table 1). Differences in respiratory rate and heart rate were minimal and were even calmer during kangarooing. Mean arterial blood pressure (MAP) showed a decrease during kangarooing but recovered fast spontaneously afterwards. There was no bradycardia (heart rate <80 beats per minute) (Fig 1) or apnea in any of the participants. The mean core temperature was 33.5°C prior to and 33.5°C after kangarooing (Fig 2).

Table 1

	Respiratory rate (/min)	Heart rate (BPM)	Mean blood pressure (mmhg)	Core temperature (°C)
T0	40	105	49	33,5
T1	31	106	42	33,6
T2	36	102	43	33,6
T3	39	102	51	33,5

Table 1 Shows mean values of vital sign of all participants.T0= Before holding, T1= 15 minutes after installation, T2 just before ending procedure, T3=30 min after the procedure

Figure 1

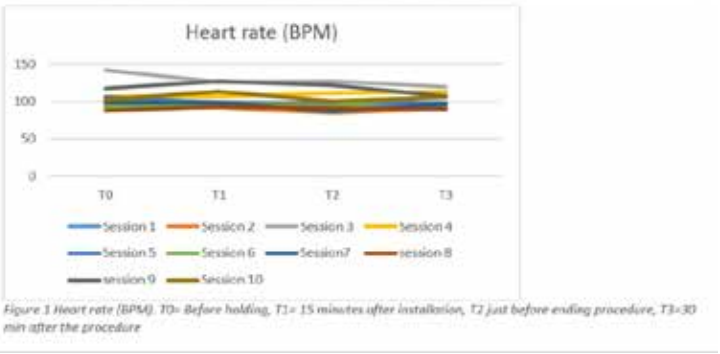

Figure 1 Heart rate (BPM). T0= Before holding, T1= 15 minutes after installation, T2 just before ending procedure, T3=30 min after the procedure

Figure 2

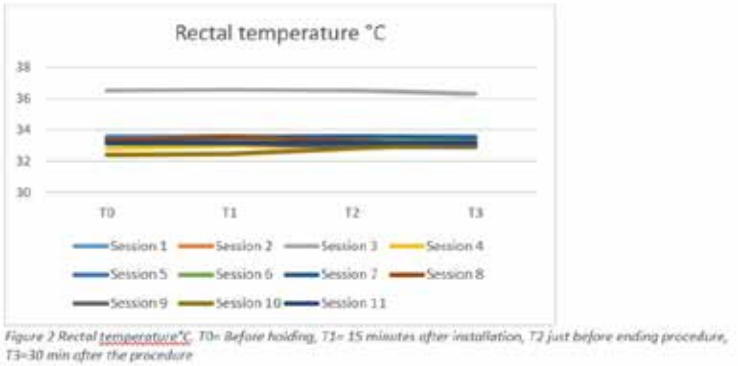

Figure 2 Rectal temperature°C. T0= Before holding, T1= 15 minutes after installation, T2 just before ending procedure, T3=30 min after the procedure

No dislocation of tracheal tubes or central lines occurred.

The cooling period was very stressful for all parents, with half of the parents experiencing bonding issues. Nurses (87%) confirmed this. According to parents, kangarooing provided a significant stress reduction and strengthened the bond with their child. Nurses observed that parents connected with their child, could access emotions, and finally feel like "parents". Nurses (87%) saw positive changes in parents' emotions relative to the treatment, which may have increased confidence in the treatment.

Sometimes nurses observed reactions in the neonate, such as more relaxation and opening their eyes during kangarooing.

Conclusion: Our results confirm the safety of kangarooing during therapeutic hypothermia. Besides that, during kangarooing there was a decline in MAP, respiratory rate and heart rate, which makes a reduction in stress plausible. Above all, kangarooing stimulates bonding between parents and the neonate and contributes to a reduction of the stress level of

parents during a very difficult period in life.

Problem statement:

1. Research on the safety and effect of kangarooing during therapeutic hypothermia (TH) has been limited. In the Dutch Neonatal Intensive Care Units (NICU's), no protocols or guidelines are available for kangarooing during TH. Kangarooing is often not allowed due to fear of dislocation of a tracheal tube or central venous line. In addition, there's no knowledge of the effect of kangarooing during TH on vital parameters. This may lead to a disturbed attachment between the neonate and parents.
2. Validation of the protocol "kangarooing with neonates in therapeutic hypothermia" to stimulate bonding between the child and its parents

Learner objectives:

1. Can kangaroo care be safely performed during therapeutic hypothermia?
2. Do vital parameters remain stable during the procedure?

Gravens 2023–21

Abstract title: Efficacy of Giving Oropharyngeal Mother's Milk in Extreme Preterm Infants in Early Transition to Breast Feeding and Duration of Hospital Stay: A Case Control Study

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Method: This was a prospective study conducted at tertiary neonatal unit in preterms <32 weeks across one year (2020). 182 babies were enrolled (96 cases and 86 control). The study group received 0.1 to 0.5 ml of mother's milk as early as possible (mean 3.4 days of life) every 6 hourly until 30-32 weeks of gestation and were compared to a control group. The initiation & progression of paladai and breast feeding was assessed by using SOFFI®: Supportive Oral Feeding in Fragile Infants (1). SOFFI® has been associated with fewer days to reach bottle feeding in preterm infants (2). SOFFI® uses developmentally supportive care principles to assess readiness and progression for feeding, emphasizes the need to consider oral feeding outcomes beginning at admission, and offers interventions to improve oral outcomes beginning at birth (3).

Results: In the study group (mean gestation 29 weeks ± 1.62), 1st paladai feed was started at 32.8 vs 34.05 weeks ($p < 0.001$) and infants achieved full breastfeeding at 33.5 vs 34.3 weeks ($p < 0.008$), which was significantly earlier as compared to control group. The hospital stay decreased from 42 to 30 days in study group (95% CI -18.9, -6.2, $p < 0.001$). During the intervention, there were no adverse events and no significant difference in sepsis or NEC (Necrotizing Enterocolitis).

Conclusion: Providing OMM to extreme preterm babies in early days of life appears safe and leads to an early and smooth transition to breastfeeding while decreasing hospital stay.

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Problem statement:

The objective of this case-control study was to compare the effect of oropharyngeal administration of mother's milk (OMM) in early days of life in transition to breastfeeding and hospital stay. In India where this study was conducted, no bottles are used in this hospital.

Learner objectives:

1. Describe paladai feeding
2. List the age at full breastfeeding for case and control groups

Gravens 2023–22

Abstract title: The i-Rainbow: A flexible, evidence-based care path for providing developmental care in the neonatal intensive care setting

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Methods: The i-Rainbow is a 6-Stage developmental pathway that was designed to 1) be flexible in the NICU setting to easily accommodate fluctuation in infant clinical status and 2) offer a menu of evidence-based developmental activities that are easily understood and used by parents, nurses, and other developmental experts in the NICU. Prior to implementation of the i-Rainbow in our unit, training sessions instructing in the use of the i-Rainbow were conducted. Also prior to implementation, the authors 1) collected pre-implementation data on rates of developmental care (minutes/day of: total developmental care by nurse and parent, swaddled holding, kangaroo care holding, containment touch, and voice therapy) in a level 4 NICU and 2) surveyed parents (n=12) and healthcare professionals (n=200) in the NICU to assess nurse-to-nurse conflict over developmental care plans, as well as nurse and parent knowledge and comfort level with developmental activities for preterm infants.

Impact: After implementation of the i-Rainbow at Lucile Packard Children's Hospital Stanford, data on developmental care rates were compared to pre-care path rates. Statistically significant improvements in total minutes of developmental care ($p<0.05$), swaddled holding ($p<0.05$), and nurse administered developmental were found ($p=0.05$), and trends for improvements in kangaroo care holding ($p=0.06$) and containment touch were also seen. Feedback on the path was obtained through follow-up nurse (post n= 91) and parent survey data (n=9), and statistically significant decreases in nurse-to-nurse conflict was demonstrated ($p=0.003$). In addition, 7/9 parent respondents agreed or strongly agreed to interacting more with their infant because of the i-Rainbow, and 9/9 respondents recommended the i-Rainbow for other parents in the NICU. The results from the research and development of the i-Rainbow will be shared with learners and instruction in the use of this tool will be provided and illustrated through cases, allowing the learners to see the developed tool in detail.

Table

	Pre path (n=19)	Post path (n=30)	P value
GA at birth (weeks) Mean (SD)	26.3 (1.37)	26.3 (1.78)	0.93
Sex-n (percent female)	6 (31%)	11 (36%)	
BW (gm) Mean (SD)	952 (268.5)	883 (272.5)	0.38
Length of stay (days) Mean (SD)	89.0 (22.8)	93.4 (37.9)	0.65
Total dev care (min/infant/day) Mean (SD)	96.6 (44.2)	123.9 (38.2)	
Total dev care by RN (min/infant/day) Mean (SD)	33.7 (44.2)	44.1 (38.2)	0.05*
Total dev care by family (min/infant/day) Mean (SD)	62.8 (40.9)	79.8 (35.5)	0.13
KC (min/infant/day) Mean (SD)	22.5 (22.2)	29.8 (15.2)	0.17
Swaddled holding (min/infant/day) Mean (SD)	54.2 (25.2)	69.7 (21.9)	<0.05*
Containment Touch (min/infant/day) Mean (SD)	17.7 (9.7)	22.6 (8.6)	0.06
Infant directed speech (min/infant/day) Mean (SD)	13.2 (12.8)	11.7 (5.5)	0.56

Conclusions: The i-Rainbow, a straightforward, infant-led tool that standardizes communication and approach to developmental care in the NICU, helped significantly improve developmental care rates in our unit. The continuum of stages follows the ups and downs in the infant's journey in the NICU and empowers parents through choice. It is unique in that it relies on objectively defined infant cardiorespiratory status and physiologic maturity and, because the i-Rainbow has identified developmentally beneficial interventions for even the most critically ill infant, it excels in a highly complex neonatal intensive care setting where other programs/paths may not. In addition, the i-Rainbow is free and requires minimal training for qualified health professionals. Regarding sustained successful implementation, having a plan for ongoing (perhaps annual) education on the i-Rainbow is critical. This is especially necessary in units with nurse travelers or other types of staff turn-over. Future work with i-Rainbow includes further study on the parent perspective and potential health benefits, education to enhance voice therapy/intentional speech with the infant, and adherence to the i-Rainbow in the NICU on longer term infant health outcomes.

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Problem statement:

Evidence demonstrates that clinically indicated and appropriately timed interventions improves infant outcome and parent-infant bonding. However, since infants develop at different rates, and with varying degrees of neurologic maturity, relying on gestationally aged-based timelines is problematic. Therefore, the authors designed and studied a novel developmental care path for providing evidence-based interventions based on objectively defined infant clinical status, not post menstrual age.

Learner objectives:

1. Learners will be able to describe how the implementation of the i-Rainbow changed developmental care rates in our unit.
2. Learners will understand how implementation of the i-Rainbow impacted parental comfort with providing developmental care and interacting with their infant.
3. Learners will know how to use (apply) the i-Rainbow to guide them in choosing evidence-based developmental interventions for caregivers to do with their infants, based on infant clinical status.

Gravens 2023–23

Abstract title: A Novel Texting-Based Virtual Assistant for NICU Families is Valuable and Feasible

Authors: Ashley Osborne MD, Srija Reedy BA, Lorissa Snaith RN, Kyle White BS, Ryan Schumacher BA, Caleb Johnston RN MBA, Diana Worsley MPH, Catherine Cullen MD, Kirstin Leitner MD, Lori Christ MD,

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Background: Many parents of preterm infants feel stressed and unprepared for discharge from the neonatal intensive care unit (NICU). Little is known about the moderately preterm infant (MPTI) birth parent experience despite this population's prevalence and cost to the healthcare system. Electronic health interventions have been shown to be accepted by NICU parents. Mobile phone texting or short message services (SMS) is preferred by many parents. MPTI parents may benefit from a texting intervention to ultimately improve child and family outcomes.

Objectives: (1) To design a novel, augmented intelligence, text-messaging virtual assistant for MPTI birth parents, (2) To test the feasibility and acceptability of the virtual assistant

Methods: To inform the design and focus the virtual assistant content, a needs assessment was performed via semi-structured qualitative interviews with English-speaking birth parents of infants born between 32-34 weeks gestation who were recently discharged from the Hospital of University of Pennsylvania (HUP) NICU (38 bed, level III unit). Two team

members analyzed the recorded, transcribed interviews using a modified grounded theory approach, and enrollment was stopped when the data reached thematic saturation. NVivo 12 facilitated the analysis.

Table

Behavioral Signs of Respiratory Instability (BSRI)

	Observed/Not Observed		
	2	1	0
Interaction (okay to swaddle)	0-3 mos- * Visual focus when presented with a stimulus 2 seconds or more 3 m-6m - *Visual tracking in a vertical and horizontal plane 3x at onset of treatment 6-12 months: pt brings small toy to mouth and engages with toy	0-3 mos- *Visual focus less than 2 when presented with a stimulus 3 m -6m - *Horizontal or visual tracking 1/3 trials 6-12 months: pt grasps toy >5 sec, but not bringing to mouth or exploring	0-3 mos- *Unable to visually engage/not alert 3 m-6m - *Unable to visually track horizontally or vertically 6-12 months: pt grasps toy <5 sec, no engagement with toy
Midline (unswaddled)	Term-3 mo- *able to maintain head in midline *supine* appropriately for CCA (over 5 sec.) 3 m-6 m: *Head maintained in midline in *supported sitting* >5 sec. 6-12 months: *Head maintained in midline in *supported sitting*>10 sec.	0-3 mo- *in *supine* head in midline for 2-5 seconds 3 m to 6 m: *Head in midline in *supported sitting* 2-5 sec. 6-12 months: *Head maintained in midline in *supported sitting* 5-10 sec.	0-3 mo- *unable to maintain head in midline in *supine* for >2 seconds 3 m to 6m- *unable to maintain head in *supported sitting* for > 2 seconds 6-12m - *unable to maintain head in midline in *supported sitting* for >5 sec.
Persistently Observed in 15-30 Minute Treatment Session			
Extension patterns of movement (Sitting tolerance for 1-5 minutes)	Term-6 months- *0-15° cervical extension in *supported sitting*, without oxygen saturation drifting below 95. 6 months-12 months: *Tolerates *supported sitting* over 5 minutes	Term – 6 months: *16-45° cervical extension in *supported sitting*, without oxygen saturation drifting below 95. 6-12 months: *Tolerates *supported sitting* 1-5 minutes, but extends out of this position.	**Oxygen saturation drifting below 95 in supported sitting OR** Term – 6 months * occipital skull rests on cervical spine OR *inability to rest chin on chest in *supported sitting*. 6-12 Months: *Extends out of *supported sitting* within 60 seconds.
Tachypnea (count 30-60 seconds)	* Respiration rate is between 30-60 breaths per minute *with activity*	* Respiration rate is between 61-80 *with activity*	* Respiration rate is greater than 80 *with activity*
Work of breathing	* No evidence of head bobbing or retractions *with activity*	* Intercostal or subcostal retractions observed *with activity*	* Intercostal, subcostal, or supracostal retractions observed with associated head bobbing , nasal flaring, expiratory grunting, or wheezing *during activity*

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0- work of breathing interferes with ability to perform activities
1- respiratory effort intermittently affects ability to perform age-appropriate activities
2- no evidence of respiratory distress with activity

The virtual assistant, named "Penny," was then created to fill the gaps of knowledge and needs identified by parents with HUP's technology partner, Memora Health. Multidisciplinary stakeholders from nursing, lactation, social work, and psychology, were engaged to aid in design. Penny's functionality includes responding to commonly asked questions, sending scheduled educational content relating to prematurity and maternal postpartum care, and a discharge program to aid in discharge preparedness and the transition home. Penny is designed for parent use during the NICU admission and for 6 weeks after discharge. Internal iterative testing and Amazon Mechanical Turk crowdsourced testing were performed. A convenience sample of 10 birth parents were enlisted to try Penny to assess the program's feasibility and user acceptability. Parent satisfaction was measured by the Net Promoter Score (NPS), a widely used market research metric of customer experience (range -100 to 100). The qualitative study and Penny implementation met eligibility criteria for IRB review exemption.

Results:16 birth parents of MPTIs were interviewed, and 4 major themes emerged: (1) Parents had mixed feelings regarding the connection and communication with the medical team; (2) There was confusion around the NICU admission and care; (3) The discharge process felt rushed; (4) Parents would appreciate information sent via electronic methods. After discharge, parents desired more education regarding feeding, reflux, breathing patterns, and routine infant care.

10 birth parents were enrolled in Penny. No parents declined enrollment. Penny's NPS was 80. Parents felt Penny provided "reliable," "helpful," and "comprehensive" information and kept "mothers updated on their (infant's) journey after birth." Users sent 149 messages, and Penny sent 797 outbound messages, which were all automated except 1 message. The overall survey response rate was 41% of 12 surveys sent per user. Highest engagement was seen related to breastfeeding/pumping content, with greater than 75% of parents responding to Penny's questions. 23% of Edinburgh Postnatal Depression Scale (EPDS) surveys were completed, with no parents screening positive for postpartum depression. All responding parents agreed strongly with "Penny increased my understanding of my premature baby both during and after their NICU stay." Time spent by a clinician overseeing the program to ensure safety was minimal (1-2 minutes/day).

Conclusions: Implementation of a texting virtual assistant is feasible and highly accepted by parents of MPTIs. In this small sample, Penny's NPS is excellent by industry standards and clinician oversight time was minimal. Penny has the potential to improve MPTI parental understanding of the implications of prematurity, discharge readiness, emotional well-being and overall NICU experience.

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Problem statement:

When parents seek knowledge relating to their premature child, popular options are calling a medical provider or turning to the unqualified internet community. We hypothesize that a novel text-messaging virtual assistant will be feasible and well-received by birth parents of moderately preterm infants with the potential to improve their NICU experience and their understanding of prematurity implications.

Learner objectives:

1. Describe the methods used to create a text-messaging virtual assistant for birth parents of moderately preterm infants
2. Summarize a level III NICU's experience with virtual assistant implementation

Gravens 2023–24

Abstract title: Pandemic Pandemonium: The Implications of Visitation Restrictions Through the Lived Experiences of NICU Parents and Why We Must Redefine Their Role as Essential Care Partners

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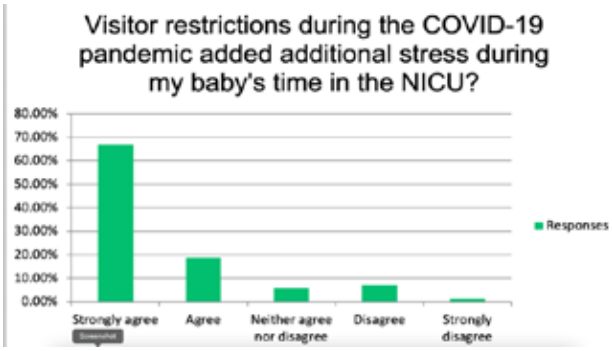
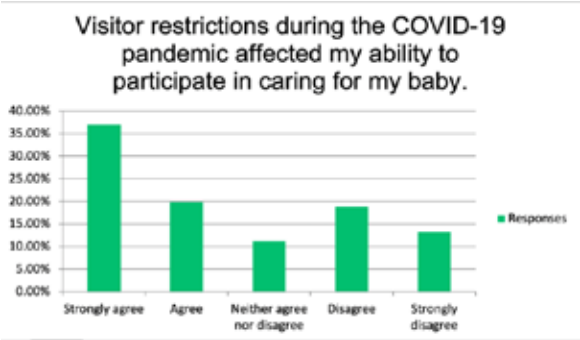
The methodology used to research our problem was completed through a literature review and an online survey tool. Articles included in the literature review were published from 2020 to present and focused on NICU parents' experiences during the COVID-19 pandemic. Additionally, a 24-question online survey was utilized using the SurveyMonkey platform to further evaluate how the visitation restrictions in NICUs affected parental trauma, mental health, their ability to care for their infant, as well as bond with their infant individually and as a family.

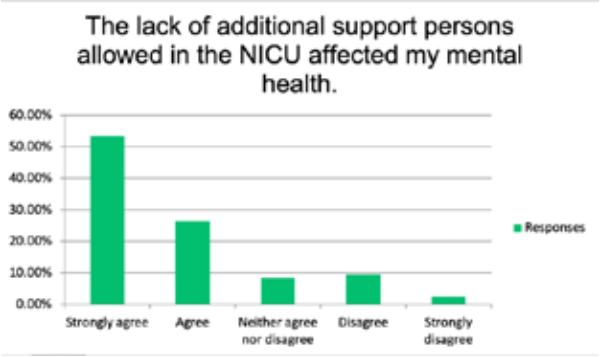
We utilized research articles and an online survey for our materials. Primarily, our data was collected from our online questionnaire. The sample size for our study consisted of 287 parents who had children admitted to the NICU during the COVID-19 pandemic. The majority of our participants' infants were in the NICU for greater than 30 days and between 25–34 years of age. The participants were obtained via several online NICU Parent groups. Demographically, the participants in our study were from a variety of countries, including the United States, Australia, Canada, China, Dubai, India, Ireland, Singapore, Switzerland, and the United Kingdom. We obtained both qualitative and quantitative data.

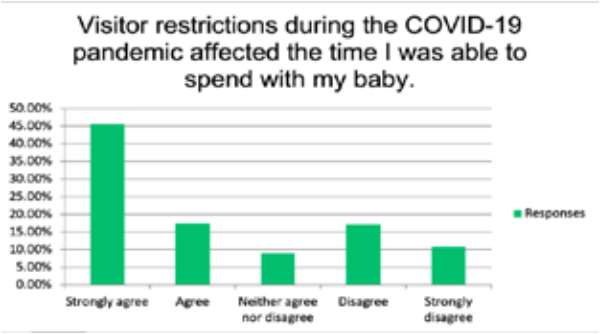
The main outcome measurements of our study were to evaluate the variations in visitation policies throughout NICUs globally. We measured the percentage of NICU parents who felt that the COVID-19 visiting restrictions limited the time they were able to spend with their infant, their ability to care for their infant, and bond with their infant individually and as a family. Additionally, we reviewed if the restrictive NICU visitation policies exacerbated the parent's trauma and if it had an impact on their mental health.

The results of our research confirmed that 67% of NICU parents strongly agreed that the visitor restrictions added additional stress for them during their infant's time in the NICU. Parents included in our survey agreed and strongly agreed for a combined 63% that the visitor restrictions affected the time they were able to spend with their baby in the NICU. Fifty-seven percent of parents agreed and strongly agreed that the visitation restrictions affected their ability to participate in caring for their infant. Eighty percent of parents in our study agreed and strongly agreed that the visitor restrictions affected how they were able to bond as a family. The participants in our survey also agreed and strongly agreed for a combined 85% that the visitor restrictions during the pandemic exacerbated the trauma they were already experiencing. Parents agreed and strongly agreed for a combined 80% that the lack of additional support persons allowed in the NICU affected their mental health.









In conclusion, parents who had children admitted to the NICU during the COVID-19 pandemic were both mentally and physically affected by the restrictive visitation policies in their NICU. Parents reported feeling anxious and lonely throughout their NICU journey because their significant other was unable to be present at the same time. Parents felt additional stress due to the burden of making important medical decisions without their partner's presence.

For positive impacts, our participants most commonly reported feeling comfort in knowing that their infant was kept safe from COVID. They appreciated that the restrictions allowed more one-on-one time with their infant and limited unnecessary, unwanted, and/or unannounced visitors.

The most difficult component of their NICU experience due to the limited visitation policy was the inability to visit the NICU at the same time with their parental partner or significant other. One parent stated, "Not being able to bond as a family and not being able to discuss life-altering decisions in person with my spouse was very difficult." An additional common response was the inability for the siblings to meet the infant in the NICU for several months or as one respondent stated, "My children were not able to meet their sister before she passed away." Parents also reported that the visitation policies left them feeling very lonely, depressed, and anxious as one mother stated, "The NICU was so lonely" and another participant said, "It was detrimental to my mental health" when describing her daily visits to the NICU alone without her spouse or additional support persons.

Research has clearly demonstrated that early and consistent parental engagement in the NICU significantly influences the long-term trajectory of the infant and the entire family unit. The lack of consistent parental presence in the NICU minimizes the parent's ability to bond with their baby, which leads to decreased involvement and confidence in caring for their baby, resulting in an increase in parental anxiety which has been linked to compromised neurodevelopmental outcomes in infants. Research has shown any parent who has endured trauma and has a baby in the NICU will interact with their baby differently than a parent who has not. With the restrictive visitation policies implemented during the COVID-19 pandemic, NICU parents endured additional trauma due to the limited visitation with their infant and the lack of presence from their support system caused a compounding negative effect.

In the NICU, parental presence and engagement should be encouraged, not limited. Additionally, parents should be given additional support throughout their NICU journey and beyond to promote mental well-being, adequate bonding, and a cohesive family unit. With the next pandemic, parents must be embraced as essential care partners. Family caregivers are critical to positive and successful patient outcomes. A family-integrated model intimately involves parents in all aspects of their infant's care in the NICU. Once parents are included as respected care partners, it minimizes parental stress, promotes familial bonding, increases parental confidence, and creates a thriving environment for the infant and parents while in the NICU and post-discharge.

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Problem statement:

The progressive movement of Family-Integrated Care that had previously been established ensuring all NICU parents are considered partners and essential members of the care team has regressed since the COVID-19 pandemic. During the pandemic, NICU parents endured a variety of visitation re-

strictions that negatively affected their mental state and their ability to bond as a family with their infant. Previously established research findings have shown that in the NICU, parental presence and engagement promotes bonding, builds parental confidence, improves parental mental health, and positively impacts long-term outcomes for the infant and family unit; therefore, parents must be considered essential care partners and a zero separation policy must be followed with the next pandemic.

Learner objectives:

1. Discuss the positive impact of parental involvement and family-integrated care in the NICU and how it impacts the long-term trajectory for the infant and parents.
2. Examine how the visitation policies implemented in the NICU during the COVID-19 pandemic impacted parental mental health, the time they were able to spend with their infant, and their ability to bond as a family with their infant.
3. Identify the importance of including NICU parents as essential care partners to promote familial bonding, parental presence, confidence, and improved outcomes for the infant and entire family unit.

Gravens 2023–25

Abstract title: Socially Distant Discharge Planning Rounds, a New Model of Care

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Background and Purpose: The Cleveland Clinic Children's Neonatal Intensive Care Unit (NICU) at Hillcrest Hospital is a 35 bed, level III unit. The NICU is staffed 24 hours with designated experienced NICU nurses, neonatologists, advanced practice nurse practitioners, and designated respiratory therapists. Other members of the caregiver team include music, occupational, physical and speech therapy, pharmacy, nutrition, social services, spiritual care and family support. The NICU strives to deliver exceptional safe and quality care while placing emphasis on the value of family-centered care and inclusion. Our unit is considered one of the main referral centers in northeast Ohio with approximately 4,500 deliveries and about 500 admissions per year. Multidisciplinary discharge rounds (MDRs) are defined as a model of care in which multiple members of the care team representing different disciplines come together to discuss the discharge planning needs of a patient in real time. MDRs can increase communication between team members, shorten a patient's length of stay (LOS) and have proven to be a valuable tool in improving the quality, safety, and patient experience of care. In the state of Ohio, evidence, in the form of chart reviews, of Interdisciplinary discharge planning is a requirement for Ohio NICU Maternity Licensure. Additionally, discharge process parent satisfaction is assessed using a Press Ganey patient satisfaction survey. This survey asks questions regarding discharge instruction/education, discharge readiness, and coordination of arrangements. Prior to the COVID-19 pandemic, MDRs were walking rounds that included up to 20 caregivers along with the infant's parents. The team moved from bedside to bedside in the single patient room NICU, discussing any patient that may be discharged in the next two to three weeks. Once the pandemic began, having this large group did not allow for social distancing, however the multidisciplinary team needed to ensure that the same level of care was being provided while keeping the patients, families, and team member socially distanced and safe. Thus, virtual MDRs became the standard. Parents and clinical nurses remained in the patient's room, and the others were all on a secure video/audio connection; or as we like to say, the rest of the team was really socially distanced, including some members logging/calling in from home.

Program, materials, or methodology: Understanding the benefits and importance of ensuring an effective transition home, the team used Microsoft Teams on existing workstation of wheels to hold rounds at a scheduled time each week. The patients to be discussed were determined at least one day in advance to allow families time to prepare if they chose to attend in person. Following MDRs, a summary of the discussion and a plan of care were written in the patients' medical record. This plan of care was then shared with families electronically.

Budget and Resources: Costs for this project were minimal since existing equipment and communication platforms were used.

Impact or Results: As of September 30, 2022, the Press Ganey Parent satisfaction score in the discharge domain has continued to increase (90th percentile for the past 2 quarters) even though rounds are now held virtually. Additionally, parents provided written feedback and comments, all supporting the use of virtual MDRs. The care team has continued to build on this success and is now using MDRs to audit safe sleep practices prior to discharge.

Conclusion: This project demonstrated the effectiveness of non-traditional virtual MDRs as an effective and efficient tool in the discharge planning processes.

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ing Reviews, 16(4). doi:10.1053/j.nainr.2016.09.024

Problem statement:

Can multidisciplinary discharge rounds continue despite the need for social distancing, and will these rounds be meaningful to parents and staff? Multidisciplinary discharge rounds (MDRs) are defined as a model of care in which multiple members of the care team representing different disciplines come together to discuss the discharge planning needs of a patient in real time. MDRs can increase communication between team members, shorten a patient's length of stay (LOS), and have proven to be a valuable tool in improving the quality, safety, and patient experience of care.

Learner objectives:

1. Caregivers will identify challenges/barriers to Multidisciplinary Discharge Rounds during a Pandemic.
2. Caregivers will gain knowledge of the benefits of virtual Multidisciplinary discharge rounds.
3. Caregivers will identify ways to enhance Multidisciplinary discharge rounds to address quality monitoring needs of NICU patients.

Gravens 2023–26

Abstract title: Targeted Developmental Interventions for 'Older' Infants in the NICU Requiring Positive Pressure Support

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Infants in the NICU with BPD, airway anomalies or cardiac conditions may require positive pressure ventilation for months past term age. Developmental interventions, including gravitational challenges, visual engagement, and opportunity for free movement can be limited for these infants for a variety of reasons. Respiratory interfaces, such as ETT, can pose a challenge to providing movement due to the primary need to maintain security of the tube. Social and visual opportunities can be impacted by the presence of an interface such as CPAP or NIV at midline. Infants requiring positive pressure support are also often challenged by reserve limitations and decreased regulatory skills for their age. Unfortunately, reduced age-appropriate opportunities place these high-risk infants at further risk for delay and could potentially also expose these infants to higher levels of stress due to restrictions in human interaction and play.

Early mobility programs in adult ICUs, which include movement and participation in activities in daily living, have shown decreased ventilator dependent days, shorter length of stay, and better functional outcomes. A growing body of knowledge supports similar outcomes in the pediatric population, and novel programs have been noted in the literature in the NICU. In the Nationwide Children's NICU, a program has been developed to support consistent developmental opportunities for infants on positive pressure support with specific strategies to promote safety, by engaging all team members including families, and having objective measures to track tolerance and progress. With these protocols in place, infants, with a range of respiratory support interventions, are able to participate out of the crib in holding, movement and play with similar frequency and intensity as NICU peers that do not require respiratory support. With the exception of weekly reviews, data has not been collected of the frequency of developmental treatment sessions for all infants in the NICU, regardless of respiratory support measures, to ensure equal distribution of individualized sessions.

Team members collaborated to establish roles that each caregiver was responsible for providing to support developmental opportunities for infants on positive pressure support. First and foremost, families establish their primary developmental goal for their baby on a monthly basis, which is expressed verbally in rounds and is updated for all team members to note in the chart. Respiratory therapists (RTs) are responsible for ensuring ETT tube security and monitoring safety of out of bed transfers. RTs also partner with the nursing staff to maintain best NIV and CPAP hat and mask fit. Nurses communicate optimal timing for developmental opportunities based on the infant's schedule. Neonatal therapists, including OTs, PTs, Speech Therapists and Music Therapists (MTs) provide specific readiness assessments prior to initiating any movement, titrate and modify experiences as the infant demonstrates need and maintains consistent documentation and communication to the team of the infant's response with use of the Behavioral Signs of Respiratory Instability© (Table). Hands on engagement by family is primary, with all bedside caregivers present to support the parents and promote confidence in their handling and holding, and to ensure safety of interfaces. Neonatologists and Neonatal Nurse Practitioners are responsible for maintaining awareness of the treatment sessions by reading progress notes and through participation in weekly multidisciplinary rounds with comprehensive reports provided by the

Neonatal Therapy team.

Barriers to the program include staffing challenges and the need to strategize timing of interventions. Nursing education regarding their unique and important developmental role has been critical to the success of the program, therefore the NICU therapy team has continued to collaborate with nursing leadership to maintain mentoring for new nurses. Team morale, trust between team members, and engaged family members are all factors that are continually addressed through strategic partnership meetings for the entire team and discussions and actions through a unit Developmental Committee. Ultimately, the mission of the program is to promote parent engagement, facilitate positive neurosensory experiences for the infant, and allow all infants play and free movement opportunities in the NICU regardless of their respiratory support needs.

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Problem statement:

Opportunities for developmental intervention for 'older' (past term) infants in the NICU on positive pressure support, including SIMV via ETT, NIV and CPAP, can be impacted by many factors including delivery of respiratory support. Creating a team approach to provide consistent, appropriately timed interventions to infants requiring positive pressure support could positively impact neurosensory development in the NICU and long-term developmental outcomes.

Learner objectives:

1. The learner will identify key infant behaviors that indicate readiness for developmental interventions for infants on positive pressure support.
2. The learner will identify strategies for moving and handling infants with CPAP, NIV and ETT.
3. The learner will identify at least one objective measure to monitor an infant's tolerance to activity.

Gravens 2023–27

Abstract title: Prenatal Mental Health and Emotional Experiences during the Pandemic: Associations with Infant Neurodevelopmental Outcomes

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Program and/or methodology: Wave 1 of the Perinatal Experiences and COVID-19 Effects (PEACE) Study was conducted from 21 May 2020 to 15 September 2021 and consisted of an online survey. Wave 2 was conducted from 19 November 2020 to 31 August 2022 to follow up with participants and consisted of an online survey and a virtual activity session between mothers and their infants between the ages of 8–10 months. The participants of this study included 133 adults who were living in the US and were either pregnant or had given birth within the 6 months prior to their participation in the study. Quantitative survey data and behavioral data were collected remotely using REDCap and Zoom, respectively, due to COVID-19 safety guidelines. Materials included a sociodemographic questionnaire (assessing variables such as age, race, educational level, and income); the Center for Epidemiological Studies-Depression measure (CES-D) which assessed depressive symptoms; the Generalized Anxiety Disorder Scale (GAD-7) which assessed anxiety symptoms; the Maternal Fetal Attachment Scale (MFAS), which assessed maternal-fetal bonding; and adapted measures which assessed COVID-19-related pregnancy grief and pregnancy worries. The primary study outcome was infant developmental performance at 8–10 months, assessed on the five domains of development of the Ages and Stages Questionnaire, Third Edition (ASQ-3): communication, gross motor, fine motor, problem solving, and personal-social.

Impact and results: Of the 133 participants whose data were analyzed, mean maternal age was 32.7 years and mean pregnancy week was 32.8 at Wave 1 (Table 1). At the time of completing the survey, 2.3% of parents had been diagnosed with COVID-19; 9% reported that their infants were admitted to the NICU, and 3.8% reported that their infants were born prematurely or before 37 weeks of gestation. Average ASQ-3 scores were highest in the fine motor skills domain (48.4), fol-

lowed by problem solving (48.0), personal social (44.0), gross motor (42.4), and communication skills (37.7) (Table 2). The communication domain score of this cohort was lower than the average, though it remains within the normal range. The gross motor domain had the highest rate of infant developmental delays (28.9%) based on the ASQ-3 standard cutoffs, and the problem-solving domain had the lowest rate of delays (8.6%). A multiple regression analysis revealed that maternal generalized anxiety symptoms were positively associated with infant communication (β = .35, p < .05), while maternal-fetal bonding was positively associated with infant communication (β = .18, p < .05) and personal-social performance (β = .20, p < .05) (Table 3). COVID-19-related worry was negatively associated with infant communication (β = -.28, p < .05) and fine motor performance (β = -.25, p < .05).

Table 1

Table 1. Key participant characteristics from T1 and T2 of the PEACE Study.

	Means (Range) or %
T1 Variables (Pregnancy)	
Maternal age (years)	32.7 (22.0-42.0)
Pregnancy week	32.8 (21-40)
Maternal race	
White	94.7%
Hispanic or Latino	2.3%
Asian and Pacific Islander	1.5%
Other	1.5%
Education	
Less than college	2.3%
College	27.1%
Masters	41.4%
Doctorate	29.3%
Income	
<$74,999	9.0%
$75,000-149,999	37.6%
$150,000-224,999	27.1%
>$225,000	21.1%
Missing	5.3%
Pandemic duration (days)	106.0 (69-192)
T2 Variables (Postpartum)	
Infant sex (female)	48.1%
Premature <37 weeks	3.8%
NICU admission	9.0%
Maternal diagnosis of COVID-19	2.3%
N = 133	

Table 2

Table 2. Key predictors from T1 and infant neurodevelopmental outcomes (ASQ subscales at 8-10 months) at T2 of the PEACE Study.

	Means (Range, SD)	Below Cutoff N (%)
T1 Key Predictors (Pregnancy)		
Depression (CES-D)	14.80 (0-42, 9.63)	
Generalized anxiety (GAD-7)	5.72 (0-21, 4.56)	
COVID-19-related experiences		
Grief	20.76 (10-31, 4.76)	
Worry	27.61 (13-52, 8.94)	
Maternal-fetal bonding		
Attachment (MAAS)	70.76 (55-88, 6.31)	
T2 Neurodevelopmental Outcomes		
Communication	37.71 (5-60, 12.84)	15 (11.7)
Gross Motor	42.41 (5-60, 15.96)	37 (28.9)
Fine Motor	48.42 (15-60, 12.16)	26 (20.3)
Problem Solving	48.01 (15-60, 10.71)	11 (8.6)
Personal Social	43.95 (10-60, 12.25)	16 (12.5)
	N = 133	*N* = 128*

*Infants born preterm (<37 weeks) were dropped calculation of ASQ cutoff scores; scores were determined based on 8 and 10 month old norms.

Table 3

Table 3. Multiple regression predicting ASQ subscales at 8-10 months (T2) based on key characteristics (T1, T2) and prenatal experiences (T1).

Predictors	Communication		Gross Motor		Fine Motor		Problem Solving		Personal Social	
	B	β	B	β	B	β	B	β	B	β
Maternal age at T1	0.57	0.15	-0.25	-.05	-0.25	-0.07	0.15	0.05	0.19	0.05
Maternal education at T1										
College	-6.77	-0.24	3.50	0.10	-10.68	-0.37	-11.33	-0.47	0.49	0.02
Masters	-7.06	-0.30	3.89	0.12	-1.84	-0.08	-7.29	-0.34	2.96	0.12
Doctorate	-10.39	-0.37	2.31	0.07	-5.57	-0.21	-9.71	-0.41	-3.76	-0.14
Pregnancy weeks at T1	0.29	0.11	0.29	0.09	-0.17	-0.07	-0.18	-0.09	0.24	0.10
Pandemic days at T1	0.01	0.02	0.04	0.08	-0.03	-0.07	0.06	0.16	0.07	0.16
COVID-19 diagnosis at T2	-3.65	-0.04	14.21	0.13	-5.61	-0.07	3.27	0.05	-4.01	-0.05
NICU admission at T2	-6.89†	-0.15†	-3.67	-0.07	-1.42	-0.03	-3.00	-0.08	-5.51	-0.13
Prenatal Experiences at T1										
Depression	-0.24	-0.18	-0.28	-0.17	-0.14	-0.11	0.02	0.02	0.03	0.03
Anxiety	**0.39***	**0.35***	0.63	0.18	0.38	0.14	0.24	0.10	0.20	0.07
Maternal-fetal bonding	**0.37***	**0.18***	-0.24	-0.09	0.10	0.10	0.16	0.09	**0.40***	**0.20***
COVID-19-related grief	0.52	0.19	-0.10	-0.03	0.39	0.15	0.34	0.15	-0.17	-0.07
COVID-19-related worry	**-0.40***	**-0.28***	-0.02	-0.01	**-0.34***	**-0.25***	-0.22	-0.18	0.01	0.01

N = 133, †p<0.1, *p<.05, **p<.01, ***p<.001

Conclusions: The COVID-19 pandemic has affected the mental health and emotional experiences of pregnant women in unprecedented ways, and maternal mental health and emotional experiences may have in turn contributed to infant developmental outcomes. Our findings indicate that children born during the pandemic may experience vulnerabilities in early development, which may be helpful in informing pediatricians and pediatric providers when providing guidance to families with infants and young children born during the pandemic.

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3. *Wei SQ, Bilodeau-Bertrand M, Liu S, Auger N. The impact of COVID-19 on pregnancy outcomes: a systematic review and meta-analysis. CMAJ. 2021;193(16):E540-E548. doi:10.1503/cmaj.202604*

Problem statement:

Despite millions of children being born since the start of the COVID-19 pandemic, little is understood about the impact of perinatal experiences on infant development during the pandemic. This study sought to determine whether mental health and emotional experiences during the prenatal period are linked to infant developmental outcomes as assessed by the Ages and Stages Questionnaire (ASQ-3). Our hypothesis was that greater severity of maternal depressive and anxiety symptoms, lower maternal-fetal bonding, and higher endorsement of COVID-19-related grief and worry would be associated with lower infant developmental performance was formed after data collection began.

Learner objectives:

1. Identify effects of the COVID-19 pandemic on maternal

mental health and emotional experiences.

2. Describe the ways in which the maternal mental health and emotional experiences during pregnancy may impact infant developmental outcomes.

Gravens 2023–28

Abstract title: Use of Kangarobe™—a Novel Garment to Facilitate Safe, Comfortable, and Efficient Kangaroo Care

Authors: Aviva Presser Aiden, Alexandra McMillin, Jules P Sherman, Ruth Ann Crystal, William D Rhine

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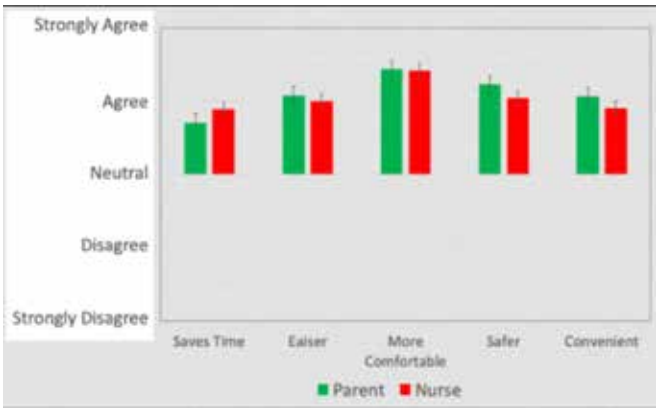
Program/Methodology: We designed a novel garment (Kangarobe™) to enable the safe and comfortable holding of infants with medical support devices and to facilitate the safe and efficient transfer of the infant from the bed to the caregiver and back.

The Kangarobe™ is a wrap garment with multiple snap-close loops to secure medical support devices the infant requires, as well as an easy-access window to perform evaluations of the infant during KC. We tested this garment with 30 infant-parent dyads in a level IV NICU. Parent and staff were surveyed to assess their perspectives on the use of the garment as compared to the standard approach in the unit (infant devices secured with tape, foam limb holders/straps, and clamps to parents' garments and chair).

The Kanga-Robe

Impact & results: Transfer of infants to caregivers wearing Kangarobe™ was completed by either one or two medical providers. Transfer to caregiver took an average of 4.5 minutes and return of infant to bed took an average of 5.9 minutes. On 5 axes (time saving, ease of setup, comfort, safety, procedure access), both parents and nurses reported improvement using the Kangarobe™ as compared to the standard method in the unit.

Figure: Parent and Nurse Satisfaction



Conclusions: This study does have limitations. The average gestational age of our participants was 33w (25w–47w corrected gestational age), and the average weight was 2.2 kg (0.96–5.94 kg). The data on very small or extremely premature infants is limited. The most common respiratory support our participant infants required was continuous positive airway pressure (CPAP). We have more limited data on higher acuity support devices (e.g., endotracheal tubes and tracheostomy

tubes), whose stability is more critical to patient safety than lower acuity devices. We experienced no safety events while testing the Kangarobe™. However, given the relatively low rates of transfer- and KC-related safety events, a much larger study would be required to quantify the benefits of the Kangarobe™. Despite these limitations it appears that Kangarobe™ offers an improved KC experience for parents and nurses caring for infants in the NICU, with the potential for improving patient safety, family experience, and staff efficiency.

References:

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2. *"Challenges to skin-to-skin kangaroo care: cesarean delivery and critically ill NICU patients" Neonatal Network 31(4) p. 259-260 (2012)*
3. *"Reducing Pediatric Unplanned Extubation Across Multiple ICUs Using Quality Improvement." Pediatrics 149(5) p e2021052259 (2022)*

Problem statement:

Parental holding and Kangaroo Care (KC) have been shown to have a significant positive effect on the short-term health and long-term neurodevelopmental well-being of infants hospitalized in neonatal intensive care units (NICUs). However, this needs to be done in a way that is safe, comfortable, and efficient.

Learner objectives:

1. Appreciation of the importance and challenge of safe Kangaroo Care
2. Benefits of using a garment designed for safe and efficient Kangaroo Care

Gravens 2023–29

Abstract title: Nurses' implementation of skin-to-skin contact in the NICU is related to their perceptions of family-centered care

Authors: Marilyn Aita, Gwenaelle De Clifford-Faugère, Geneviève Laporte[1] Sébastien Colson, Nancy Feeley

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Methodology: Secondary analysis was conducted from a larger comparative international study where 202 nurses working in level III universities affiliated NICU. The FCC questionnaire had included 20 items including 3 subscales (support, collaboration, and respect), where higher scores indicated more favorable perceptions of FCC[1]. The SSC questionnaire contained 20 items separated in four distinct subscales (knowledge, beliefs and attitudes, education, and training implementation)[2,3]. Higher scores were also indicative of favorable perception towards SSC.

Findings: Nurses' FFC total score was significantly correlated with all SSC subscales scores, ranging from weak (0.17) to moderate (0.31) correlations. The highest correlations were found between the nurses' perceptions of their NICU providing support to families and SSC available training and education (0.29) as well as SSC implementation on their unit (0.31). In addition, a similar association (0.30) was found between the implementation of SSC and the total score of their perceptions of care being family-centered in their NICU.

Conclusion: These results suggest that the nurses' perceptions of their care being family-centered are higher with greater SCC training and education and implementation of SSC in the NICU. These results shed a light on the association of these practices and might highlight a theoretical and practical perspective to better understand developmental care as an integrated concept. Thus, considering these findings, it seems possible that encouraging the practice of SSC among nurses, through the adoption of practice guidelines, training and education, and adequate implementation on the unit, would lead to a better perception of FCC, which translates into positive outcomes for preterm infants and their parents.

References*:*

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3. *Aita, M., De Clifford Faugère, G., Laporte, G., Colson, S., & Feeley, N. (2022). French translation and preliminary psychometric validation of a skin-to-skin contact instrument for nurses (SSC-F). Journal for specialists in pediatric nursing JSPN, 27(1), e12359. https://doi.org/10.1111/jspn.12359*

Problem statement:

Driven by the philosophy of developmental care [DC], nurses should provide opportunities for collaboration and involvement for parents in the NICU to equally encourage both family-centered care [FCC] and skin-to-skin contact [SSC]. As optimal implementation of FCC and SSC may depend on the nurses' perceptions of these DC practices, it appeared relevant to explore the association between NICU nurses' perceptions about their unit providing FCC and SSC.

Learner objectives:

1. Comprehend how SCC and FCC as DC practices are related.
2. Recognize that the adoption of SCC practice guidelines, training and education, and adequate implementation in the NICU lead to better perceptions of FCC by nurses.

Gravens 2023–30

Abstract title: Systematic review of neurodevelopmental outcomes of preterm infants who have experienced pain

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Introduction. In the neonatal unit, preterm infants undergo many painful procedures (1). Preterm infants, who have immature nervous systems, show consequences of these repeated painful procedures in their neurodevelopment (2). The aim of this systematic review is to assess the association of painful procedures performed on preterm infants while hospitalized in the neonatal intensive care unit and short-, mid-, and long-term neurodevelopmental outcomes.

Methods. This systematic review was conducted in accordance with JBI methodology for systematic reviews of etiology and risk (3) and the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (4, 5). For this systematic review, an electronic search was conducted from inception to August 2022 in CINAHL, PubMed, MEDLINE, Embase and Cochrane Central Register of controlled trials. Inclusion criteria: participants were preterm infants (less than 37 of gestational age) who underwent painful procedure, with or without skin breaking. The primary outcome was neurodevelopment assessed by various indicators such as brain structure, brain electrical activity, neurological examinations, and developmental examinations (motor, cognitive, sensorial, or emotional outcomes). Study selection, data extraction and critical appraisal was conducted by two independent reviewers. This review has been registered in PROSPERO (CRD42020189762).

Results. Of the 12,601 studies screened, 23 prospective and retrospective study designs were included in the review. The impact of pain on neurodevelopment was assessed in the short term (so before the age of the term corrected [n = 7]), in the middle term (so between the corrected age of the term and 3 years [n = 8]) and in the long term (after 3 years [n = 8]). These studies have found important consequences: hypersensitivity to pain present from a few weeks of life and always present at 7 years; an increase in the level of basic stress, reflecting an alteration of the HPA axis persisting up to 7 years; as well as a decrease in volume and brain activity, having an impact on motor, intellectual, and sensory developments in the short, middle, and long term.

Conclusion. Given these results, professionals are encouraged to relieve pain at every painful procedure and diminish their numbers. Higher quality studies are needed on all short, middle, and long-term neurodevelopment variables.

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Problem statement

What is the association between painful procedures performed on preterm infants while hospitalized in the neonatal intensive care unit and short-, mid-, and long-term neurodevelopmental outcomes?

Learner objectives:

1. learn about the different consequences of neonatal pain on neurodevelopment

2. be sensitive to the importance of pain management in preterm infants

Gravens 2023–31

Abstract title: NICU Discharge Guideline Implementation by a Community Based Team: A Real-World Scenario

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Workshop description:

1. Brief formal presentation of the guidelines the pilot targeted for implementation
   a. Familiarize participants with the content being discussed
   b. Explanation of why the specific guidelines were chosen
2. Description of the implementation plan
   a. Unit description including description of the broader community context
   b. Team identification and methodology of identification
   c. Outcomes assessed and associated metrics
   d. Identification of resources required for implementation
   e. Anticipated barriers and barriers encountered during implementation
3. Crowd source/think tank discussion
   a. Interactive exploration of other considerations
      i. What other outcomes could have been included or explored?
      ii. What process and/or clinical gaps exist?
      iii. Are there any other team members to include? How might the implementation methods and outcomes have differed if these persons were included or broadly represented?
   b. Small group breakout activity
      i. Skilled facilitation will be provided to support participant discussion.
      ii. Participants will have the opportunity to share their own experiences and how they might benefit from guideline implementation.
   c. Sharing of resources
      i. Participants will receive open access resources provided by the NPA and Feeding Matters.
      ii. Participants will have the opportunity to share additional resources and discuss utilization of related materials.

Problem statement:

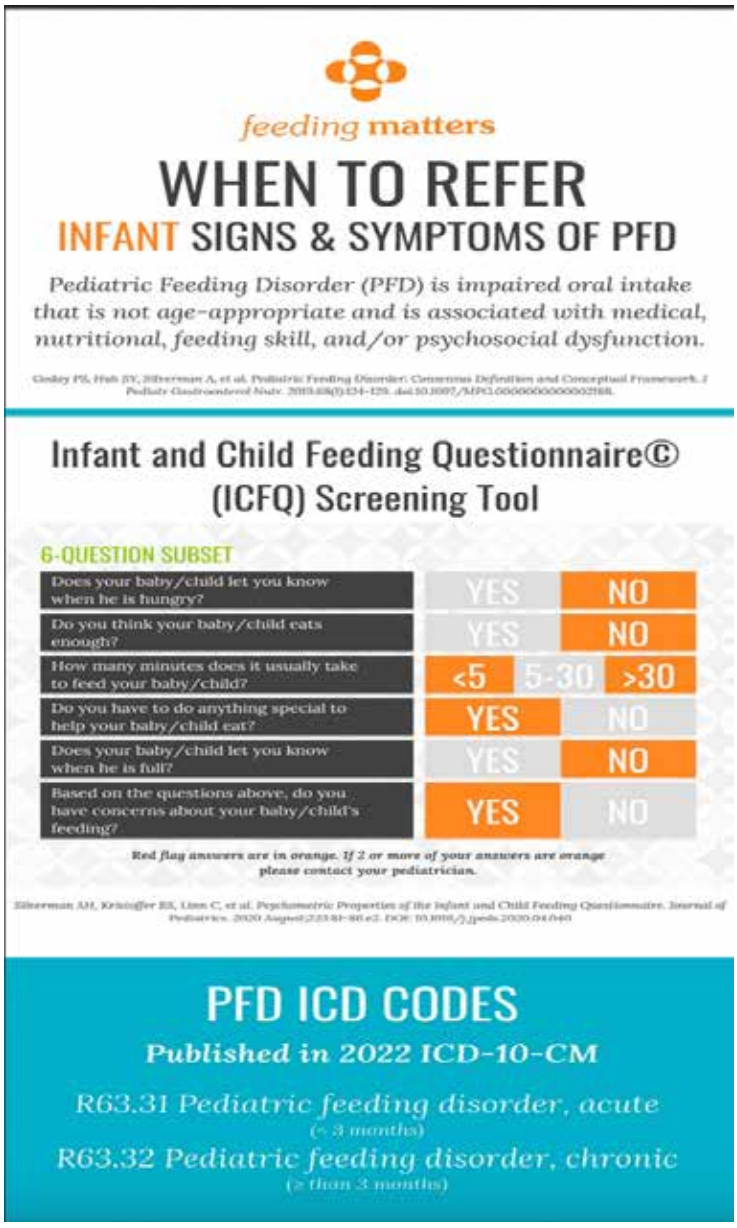
The National Perinatal Association (NPA) has published Interdisciplinary Guidelines and Recommendations for NICU Discharge Preparation and Transition Planning. This robust resource provides insight into what to do for NICU discharge preparation but no detail on how to implement the guidelines.

As a next step in furthering evidenced-based care, the NPA has partnered with an international non-profit, Feeding Matters, and a community Level III NICU to pilot implementation of select guidelines. This pilot's aim is to identify factors for success and to outline process barriers and pave the way for guideline implementation in other units.

This interactive workshop, facilitated by a multi-disciplinary team from the piloting NICU, will utilize didactic lecture, visual aids, open discussion, breakout sessions, and resource sharing to support participants as they are identifying pathways for guideline integration in their units and/or communities.

Learner objectives:

1. Attendees will be able to list 3 key steps to successful implementation of the Interdisciplinary Guidelines and Recommendations for NICU Discharge Preparation and Transition Planning.
2. Attendees will be able to identify barriers and follow a problem-solving process to support measurable change in their unique health-care systems.
3. Attendees will be able to access 2 resources designed to identify family needs for a safe transition from NICU to home.



Gravens 2023–32

Abstract title: Effectiveness of Hammock Positioning on Physiological Parameters and Sleep of Preterm Infants in NICU: A Systematic Review Protocol

Authors: Adèle Saives, Marjolaine Héon, Marilyn Aita

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The care offered to premature infants in the neonatal unit attempts to reproduce sensory stimulation similar to that of the intrauterine environment (1,2). This seeks to optimize the

neural development of preterm infants, and to minimize the impact of short- and long-term prematurity (1,2). Positioning in a hammock in an incubator would be an innovative intervention that could allow stimulation of the vestibular system similar to that of the uterine environment (3,4). This could promote a more neurotypical development in premature infants.

1. A systematic review will be conducted to evaluate the effectiveness of hammock positioning on preterm infants on the stability of physiological parameters of preterm infants and their sleep compared to standard dorsal positioning, standard prone positioning, and standard lateral positioning.

2. To conduct the review, the PRISMA recommendations (5) will be followed. CINAHL, PubMed, Medline, Joanna Briggs Institute, Cochrane, Web of Science, Embase, ScienceDirect, Cairn and LiSSa databases will be explored with the following keywords: neonatology, prematurity, premature babies, neonatal unit, hammock, positioning, sleep, and physiological parameters without any year of publication restrictions.

3. The Covidence © Software will make it possible to select and extract the articles that met the selected inclusion criteria. Two independent reviewers will examine the titles and abstracts, then, in a second step, the full texts in order to select all relevant articles. Any conflicts will be resolved by a third reviewer. The number of articles examined and selected, as well as the reasons for the exclusion, will be reported exhaustively.

4. An extraction grid will be developed based on the requirements of the Cochrane Institute, and the extraction will be carried out by two independent experts. Piloting will take place for five studies. The following data will be extracted: authors, year and country of publication, participants' characteristics, description of the experimental and control groups, including type and modalities (i.e., duration, frequency…) of the intervention, measurement times, outcomes, results. If appropriate, the extracted data will be entered into the Review Manager © software, and, in order to avoid quantitative errors during analysis, two reviewers will review the data before analysis.

5. The preliminary literature search resulted in the selection of 1578 articles to be further analyzed.

6. Study data will be synthesized quantitatively with a meta-analysis if at least two studies with comparable variables are available, using Review Manager © software. In case of missing data, the authors will be contacted. Due to the nature of the variables, the results will be analyzed using means and standard deviations, with a significance level of 0.05. Heterogeneity will be calculated statistically using the I^2 test, where a result of 0 to 40% does not represent significant heterogeneity, 30 to 60%, moderate heterogeneity and 50 to 90%, significant heterogeneity (6), where unity of analysis is the hospitalized preterm infant. The results will also be reported qualitatively for any variable that is not quantitatively analyzable for each study.

7. The primary outcomes will be physiological parameters of infants. These parameters include heart rate, respiratory rate, and transcutaneous oxygen saturation. Normal values for these parameters are 100 to 200 bpm for heart rate, 30 to 60 rpm for respiratory rate, and greater than 95% for transcutaneous oxygen saturation. The secondary outcomes will be sleep; any type of sleep measurement will be considered as well as sleep duration and quality. Any type of scale quantifying sleep will be considered, including the Brazelton scale and the APIB scale.

Impact and Results: This systematic review has the potential to contribute to the development of knowledge about the effectiveness of hammock positioning on the physiological parameters of preterm infants and their sleep.

Conclusion: The conduct of this systematic review will help to have a better understanding of the effects of hammock positioning on preterm infants and will guide the development of future nursing intervention.

References:

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Problem statement:

1. Preterm infants hospitalized at the NICU are often deprived of vestibular stimulation, normally present during pregnancy during mothers' movements, which is essential for infants' brain development. We hypothesize that infants' positioning in a hammock in the incubator could help recreate a vestibular stimulation, contributing to their physiological parameters' stability and their sleep. Existing systematic reviews have methodological shortcomings and did not compare hammock positioning to specific positioning in the incubator (i.e., dorsal, prone, and lateral positioning).
2. Therefore, this systematic review aims to answer the following question: For preterm infants less than 37 weeks gestational age (P), does hammock positioning (I), compared to standard dorsal, ventral or lateral positioning (C), improve the stability of their physiological parameters (primary objective) and sleep (secondary objective)?

Learner objectives:

1. Primary objective: The learners will be able to appreciate the existing literature the hammock positioning of preterm infants.
2. Secondary objectives: The learners will be able to appreciate the existing literature on the effectiveness of hammock positioning compared to standard positioning (dorsal, lateral, or prone) on the stability of physiological parameters and sleep of preterm infants.

Gravens 2023–33

Abstract title: The Power of Reflection: Becoming a Trauma Informed Professional

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Background: Awareness of the experience of trauma in the NICU for babies, families and clinicians is a first step to transform and humanize this fragile, yet critical care environment. Developmental care has existed for centuries; dating back to Florence Nightingale, expanded upon by Drs. Brazelton and Als and becomes even more biologically relevant within the context of early life adversity, toxic stress, and infant medical trauma. The babies, families, and clinicians are each greater than the sum of their parts. The healthcare system and pediatric service lines can no longer ignore the multidimensional needs of clinicians, patients, and their families. Trauma informed developmental care is the overarching foundation encompassing all aspects of wholeness for baby, family, and professional.

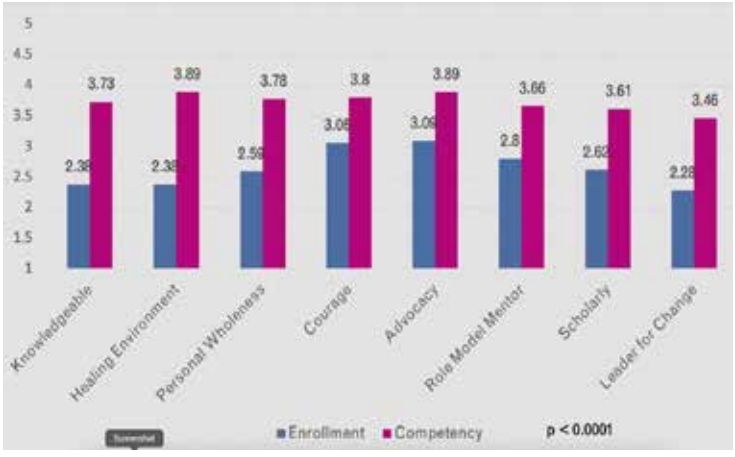
Program/Methodology: The study cohort comprised the first 100 graduates with complete transcript records from the Trauma Informed Professional Certificate Program. A quantitative evaluation of their pre- and post-self-assessment ratings across each of the 8 attributes of a Trauma Informed Professional was collated and analyzed for statistical significance using the paired t test. Additionally, qualitative reflections of how each attribute was perceived by the learner was evaluated through thematic analysis.

Main Outcome Measures: *P* value of the quantitative data and the identification of common themes that emerged through the thematic analysis

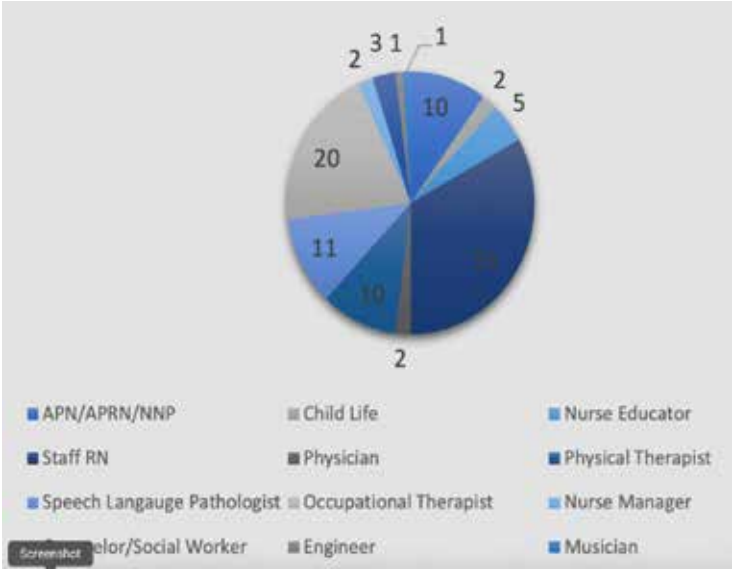
Impact/Results: The quantitative data demonstrated statistical significance with a p value < 0.0001. The qualitative data revealed that the graduates experienced a deeper understanding and insight into each of the eight attributes of a Trauma Informed Professional.

Conclusions: Graduates of the Trauma Informed Professional Certificate Program experience growth and transformation, both quantitatively and qualitatively. A next step is to evaluate how this growth and transformation translates into clinical practice.

Trauma Informed Professional Attributes Before and After Certificate Program

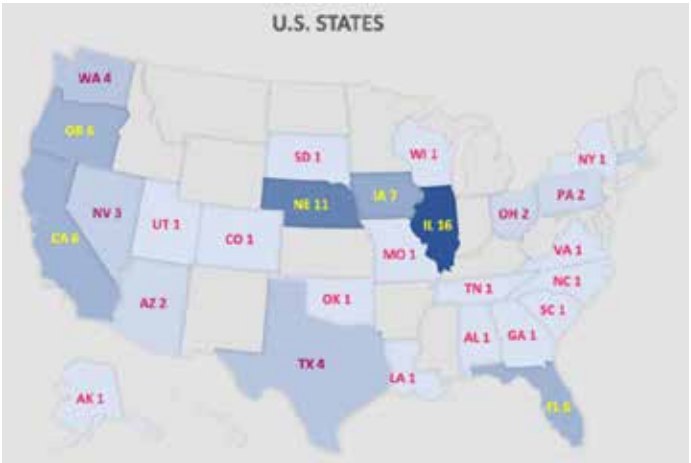


Discipline Demographics



Country Demographics

US State Demographics



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Problem statement:

Trauma-informed care is an effective, compassionate, and evidence-based strategy that protects and preserves the mental health and moral integrity of clinicians, subsequently improving safety and quality of care, communication, and collaboration in the NICU and beyond. Evaluating the Trauma Informed Professional Certificate Program provides insight into the growth that enables professionals to move past a procedure-driven mindset and recognize the pivotal nature of the lived human experience associated with critical care for the infant, the family, and the clinician.

Learner objectives:

1. Participants will understand the power of reflection and reflective practice
2. Participants will discover the 8 attributes of a Trauma Informed Professional
3. Participants will describe 2 themes that emerged from the analysis

Gravens 2023–34

Abstract title: Full-Spectrum Circadian Lighting in a Level IV NICU

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Program and Methodology: A collaboration among developmental neurobiologists, clinicians, designers, and engineers led to creation of a unique NICU lighting system that emulates the spectral distribution of natural daylight in the Critical Care building's NICU. The concept and development of this lighting system was driven by new knowledge generated by us and others documenting the significant relationship between full spectrum light, health, and wellness. Standard lighting devices do not deliver full spectrum of light, in particular, much of the blue and all violet wavelengths within the visible daylight spectrum. We now know that these blue and violet wavelengths activate non-visual opsins that are integral to key neurodevelopmental and physiologic processes, including metabolic homeostasis and thermogenesis.

Our NICU system incorporates 6 tunable LED channels to provide full-spectrum coverage. This allows for the circadian stimulation of biologically relevant opsins.

The importance of cycled lighting in the NICU is well-established. Previous studies have associations between cycled lighting exposure and:

1. Improved weight gain, shorter length of stay, improved oxygen saturation, and more developed melatonin rhythm (Vásquez-Ruiz et al, 2014).
2. Trends toward lower incidence of ROP and improved growth (Morag et al, 2013).
3. Reduced crying and fussing (Guyer et al, 2012).

However, these studies did not evaluate spectral exposure and used arbitrary light/dark programs. Our system offers the opportunity to evaluate and optimize appropriate light exposure in the NICU.

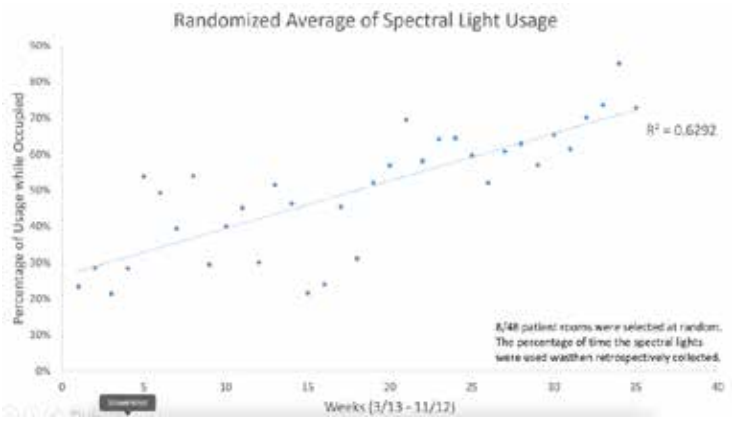
Impact and Results: Two challenges facing the implementation and usage of the CCHMC spectral lighting system are (1) lack of familiarity among patient families and (2) established NICU practices among the care staff. To explore the issue of low acceptance, we evaluated the following interventions:

1. Establishment of a clinical education team to share operational advice and explain the supporting science.
2. Surveys to gain feedback regarding nursing knowledge and opportunities for system improvement.

This supported subsequent modification of user interface design and interaction to optimize appropriate use.

We collected real time usage data to evaluate these approaches as shown in the Figure.

Figure



Conclusion: Full spectrum cycled lighting represents a significant advance for the NICU environment of care. Its channel-specific tuning capability provides a unique platform to improve key outcomes for the NICU patient population. The use of unit-based education and modification of the use interface to incorporate an opt-out design led to significant improvement in provider and parent usage and acceptance.
Problem statement:

The CCHMC Critical Care building NICU includes a novel full-spectrum circadian lighting system that emulates the spectral distribution of natural daylight. This system provides the opportunity to consider alternative NICU lighting standards: (1) conventional LED and (2) full spectrum circadian lighting. Despite strong biological plausibility, adoption of full spectrum circadian lighting varies among patient care staff, parents, and patients.

Gravens 2023–35

Abstract title: Perinatal Characteristics and Neurodevelopmental Outcomes in a Medical Home for NICU graduates

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Background: Every year close to 15% of children in the United States are affected by neurodevelopmental and other related disorders (e.g., ADHD, autism spectrum disorder, intellectual disability). Although many individuals with neurodevelopmental disorders do not face significant impairment, those who do can experience challenges with employment and independent living in adulthood. These disorders are more prevalent in vulnerable populations, such as children with complicated and/or prolonged NICU stays. Preterm infants who spent time

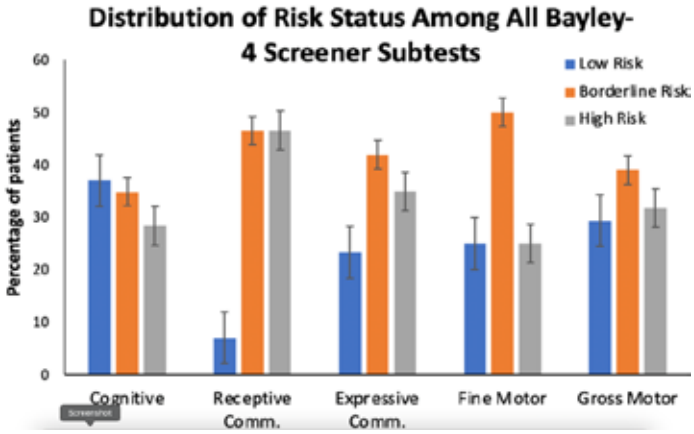
in the NICU are at higher risk for developmental delay, motor and sensory abnormalities, learning, and behavioral problems. There are discrepancies in identification of neurodevelopmental disorders across various cultural and ethnic groups. Black and Latinx children are consistently under-identified, and this is magnified when barriers such as poverty and non-English as the primary language are considered.

Program and Methodology: Patients were recruited from The Center for Children and Youth with Special Health Care Needs (CYSHCN) Next Steps Program at St Christopher's Hospital for Children. Next Steps is a follow-up program for NICU graduates that are deemed high-risk. Located in North Philadelphia, 82% of patients presenting to St. Christopher's Hospital for Children are covered by Medicaid. Many of the families have limited financial and community resources, with one-third of the families having limited English proficiency and primarily speaking Spanish.

Developmental screenings were administered to qualifying children (9 to 36 months) presenting to the CYSHCN for their well visits. Cognitive, communicative, social-emotional, and motor development were assessed using the Bayley Scales of Infant and Toddler Development, 4th Edition Screening Test (Bayley-IV). Screening was administered by trained professionals through clinician observation, caregiver interview, and various structured performance tasks presented to the child. No correction for prematurity was made so that all infants were compared to those at the same level, regardless of gestational age. Data collection is ongoing, but presently developmental screening has been administered to 47 patients. The main outcome measurements included sub-scores on the Bayley-IV in six different categories (Cognitive, Receptive Communication, Expressive Communication, Social-Emotional, Fine Motor, and Gross Motor).

Impact and results: To streamline the developmental assessment screening process, a record review and survey on various demographic and social factors was administered to parents/caregivers at the start of each visit. Data from this survey revealed an average gestational age of 31.7 weeks and average birth weight of 1.73 kg. Many infants also had prolonged NICU stays (Mean[M]=72.3 days) with many medical interventions (59.2% received oxygen, 42.9% had a feeding tube, 55.1% had respiratory distress syndrome, and 55.1% were intubated). 51% of the patient population also identifies as Hispanic and/or Latino. Patients came from a variety of family units—with caregivers such as biological parents, foster parents, aunts, uncles, and grandparents.

Preliminary data suggests greater than 75% of infants were borderline or high-risk for cognitive, expressive, and receptive communication, and fine and gross motor delay in their NICU follow-up assessments. Various analyses were conducted on medical interventions performed on the infants. Increased length of NICU stay is significantly associated with increased risk for cognitive (r = .361*, n = 44), expressive communication (r = .310*, n = 44), fine motor (r = .640**, n = 39), and gross motor delay (r = .590**, n = 40), $p < .01$. Patients who received supplemental oxygen during their NICU stay are also significantly more at risk (M=1.14, SD=.89) for gross motor delay than infants who did not receive supplementary oxygen (M=.769, SD=.43); t(39)=-1.43, *p<.05, **p<.01. No significant relationship between other medical interventions, such as intubation or apnea monitors and developmental delay was found. No racial or ethnic differences were found.



Conclusions: In our patient population, prolonged NICU stay (M = 72.3 days) is associated with increased risk for developmental delay, as evidenced by scoring as borderline or high risk on the Bayley-IV screener. However, no effect on receptive communication was found. We postulate this may be due to the stimulation and exposure to social interaction provided to these infants by the NICU care team. Preliminary analyses in the study reveal that supplemental oxygen is associated with gross motor development. This finding may be attributed to prematurity itself, given that motor delay is well established in preterm infants. Further, supplemental oxygen tends to be associated with more severe disease in preterm infants presenting to the NICU. Data collection is ongoing. Results from this study will enable us to screen for early indicators of neurodevelopmental disorders during and post NICU stay, better understand the relationship between perinatal and sociodemographic factors and developmental outcomes, and more efficiently connect patients and their families to early intervention services and resources.

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Problem statement:

Many children in the United States are affected by neurodevelopmental and other related disorders, with these disorders being significantly more prevalent in vulnerable populations, such as children with prolonged and/or complicated NICU stays. The present study aims to improve identification of neurodevelopmental disorders in infants and young children with prolonged NICU stays and enhance early detection and intervention by implementing consistent developmental screening.

Learner objectives:

The purpose of this study includes:

1. To identify young children developing neurodevelopmental disorders accurately and early, while enhancing their medical home experience.
2. Explore validated developmental screening and assessment tools' role in identifying deficits or delays in high-risk NICU populations and monitoring developmental progress.
3. Describe sociodemographic and perinatal characteristics and assessment data associations with higher risk for neurodevelopmental disorders in young children.

Gravens 2023–36

Abstract title: Serial Brain Imaging and Targeted Neuropromotive Intervention for Very Preterm Infants in the NICU - Study Protocol and Preliminary Outcomes

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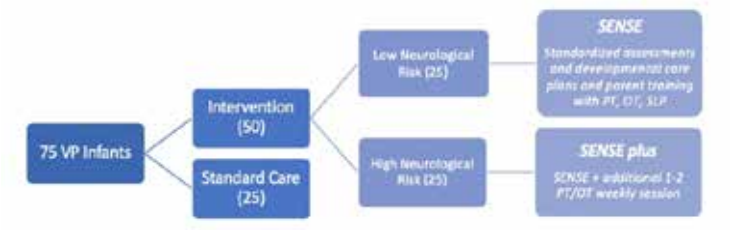
Background and Methodology: Babies born preterm undergo rapid brain growth and development prior to term age while hospitalized in the NICU[1], a critical window for intervention. Early neuropromotive intervention is essential and should be initiated as soon as possible after birth for very preterm (VP) infants in the NICU. This study aims to enhance our understanding of early brain development in VP infants in relationship to intensive neurodevelopmental care. The Supporting and Enhancing NICU Sensory Experiences (SENSE) program is a sensory-based intervention that emphasizes meaningful multisensory exposures[2,3] to improve infant and family outcomes[4]. We plan to enroll 75 VP infants, born before 33 weeks gestation, in a level-III NICU prospectively over two years. The infants will be divided into three groups (see Figure 1). Infants are assigned to a group (low-risk or high-risk) depending on whether significant neurological injury is present on early imaging (high risk defined as IVH with any ventricular dilatation, white matter injury, cerebellar hemorrhage). Implementation of the SENSE program is preferentially done by NICU families with coaching from developmental therapists and NICU staff[4]. Serial MRIs are performed over at least three time points until term equivalent age (TEA). Infants who met inclusion criteria but were either unable to enroll or declined enrollment were offered enrollment in the standard care group. Enrolled babies undergo standard neurodevelopmental assessments during their NICU stay and at outpatient clinical follow-ups until two years of age.

Table 1: OpenNotes survey results 3/16/2022 to 11/16/2022

Question	Number of responses (%)
How often have you read the doctors' daily progress notes during your child's hospitalization?	
Every day	28 (68%)
A few days a week	7 (17%)
Once a week	
Less than once a week	
I didn't know I could or I have never read	6 (15%)
In addition to notes from your child's doctors, there are also notes from nurses and other health team members. Was it clear to you that these notes were from different team members?	
Very clear	23 (82%)
Somewhat clear	4 (14%)
Somewhat unclear	
Very unclear	1 (3.6%)
What are/were your reasons for reading the doctor's daily progress notes from your child's hospitalization? (select all that apply)	
To know about my child's health	28 (28%)
To be sure I understood what the doctor said	18 (18%)
I was curious	16 (16%)
To remember the plan of care	15 (16%)
To know what the doctor was thinking	11 (11%)
I have a right to see my child's record	9 (9.1%)
To check that the notes were right	2 (2%)
No particular reason	
How often were the doctors' daily progress notes accurate?	
Always	26 (93%)
Usually	
Sometimes	1 (3.6%)
Never	
Do not know	1 (3.6%)
How easy was it to understand the doctors' daily progress notes?	
Very easy	17 (61%)
Somewhat easy	8 (29%)
Somewhat difficult	2 (7.1%)
Very difficult	1 (3.6%)
Do not know	
Did reading the notes change the way you felt about your child's doctor(s)?	
I felt much better about the doctor(s)	20 (71%)
I felt somewhat better about the doctor(s)	2 (7.1%)
I did not feel better or worse about the doctor(s)	6 (21%)
I felt somewhat worse about the doctor(s)	
I felt much worse about the doctor(s)	
Did you ever contact the doctor about something you read in the doctors' daily progress notes?	
Yes	15 (54%)
No	12 (43%)
Considered but did not	
Do not know/Do not remember	1 (3.6%)
How old is your NICU baby on the day you are filling out this survey?	
Less than 7 days old	11 (34%)
7-30 days old	17 (53%)
31-60 days old	1 (3.1%)
Greater than 60 days old	3 (9.4%)

Figure 1: Diagram of enrollment set-up for study



Results: To date, 35 infants have been enrolled: 14 intervention (8 low-risk and 6 high-risk) and 21 standard care (15 low-risk and 6 high-risk). 97 MRI scans have been performed with 30 at TEA. 12 babies (86%) in the intervention group received all interventions with delivery of 75% or more of the targeted multisensory experiences. 27 infants (11 intervention and 16 standard care) had a TIMP[5] assessment prior to NICU discharge. To date, a total of 5 (100%) babies in the intervention group and 13 (72%) babies in the standard care group have returned to the developmental follow-up clinic at 4 months corrected age and had a TIMP completed (results in Table 1). Early data show that many infants at TEA in standard care are below average while at 4 months this is less prominent. To date, too few subjects have had outcomes in the intervention group to assess impact, although many still display below average performance despite interventions.

Table 1: Results from the TIMP at TEA and at a 4-month follow-up visit

		Low-risk (*Intervention*)	High-risk (*Intervention*)	Low-risk (*Standard care*)	High-risk (*Standard care*)
TIMP at TEA	Below Avg. n (%)	-	1 (20)	-	-
	Average n (%)	6 (100)	4 (80)	10 (100)	6 (100)
TIMP at 4 mo.	Below Avg. n (%)	-	-	1 (11)	-
	Average n (%)	3 (100)	2 (100)	8 (89)	4 (100)

Conclusion: Serial imaging provides valuable insight into the pattern of brain growth and neurodevelopment in VP infants. The impact of implementing targeted interventions in the NICU setting on improving the outcomes in VP infants with and without neurological injury continues to be investigated.

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Problem statement

In this research, we are looking at whether implementing targeted early neuropromotive interventions in the NICU will improve neurodevelopment of very preterm infants.

Learner objectives:

We aim to further develop our understanding of brain growth in very preterm infants. Additionally, we hope to investigate the outcomes of implementing targeted, age-appropriate interventions in very preterm infants with and without neurological injury.

Gravens 2023–37

Abstract title: Future Intersection of NICU and Fetal Center Professionals and Facilities

Authors: Teri Oelrich, MBA, BSN, Travis Leissner, Mary Beth Martin, Judy Smith, MHA, Smith Hager Bajo, Sue Ann Barton, AIA, EDAC, LEED, AP

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With the huge advances in care for the fetus and the increase in the number of fetal programs around the world, this information aims to educate participants on the needs of the fetal programs, open the dialogue between professionals, and invoke thought as to the impact of these programs on fetal, neonatal, obstetric and children's hospital facilities.

The focus will be to identify the work based on experience and evidence-based design that has taken place to date. The authors and extended committee used a process similar to a different consensus committee's approach to develop and update *Recommended Standards for NICU Design*.

The proposed recommended fetal center guidelines aim to address flexibility for future advances in fetal care that are likely to impact fetal centers and NICU facilities. Involvement

of neonatologists, NICU nurses and therapists, NICU families, healthcare designers and others can substantially inform and vet the first proposed facility guidelines related to this field and its evolving future. Examples of key drivers that are important to consider when planning or expanding a fetal center facility will be presented along with rationales (e.g., future advances on the horizon, increased collaboration, functions/volumes that need to be accommodated, ethics, locations such as adult patients in a children's hospital, funding, governance model). The presenters will include discussion of why neonatal professionals, families and others should be informed and contribute to the ongoing development of fetal center design guidelines.

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Problem statement:

Fetal Centers are on the rise throughout the world. The Fetal Therapy Think Tank (FTTT) is a voluntary group of physicians, nurses, planners, manufacturers, architects, family advocates and others collaborating to advance fetal medicine. A subgroup of the FTTT has taken on the process of developing recommended design guidelines for fetal centers. The intent of this presentation is to introduce the process, the results, and encourage future wider engagement in developing guidelines, especially by neonatal professionals, in support of a comprehensive continuum of care extending from fetal life to the NICU and beyond.

Learner objectives:

1. What are the vision and the status of the Fetal Therapy Think Tank's work?
2. What are the typical structures and compelling issues of fetal programs including how they intersect with the NICU?
3. What are the facility needs for a fetal program and the needs of the NICU and obstetrics facilities to support fetal programs?

Gravens 2023–38

Abstract title: Evolution of the auditory environment by postmenstrual age in infants born very preterm

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Background: Infants born very preterm undergo brain growth and development while hospitalized in the neonatal intensive care unit (NICU) before term equivalent age (TEA).[1] Age- and stage-appropriate positive sensory experiences can decrease stress and optimize positive learning experiences during this important period of brain development.[2] Yet, the NICU auditory environment may consist of loud alarm noises, excessive silence, and insufficient meaningful auditory exposures such as human voice, especially when parental presence is limited.[3] The aim of this study is to examine the current auditory experiences of infants born very preterm in a level-III NICU before they reach TEA, and assess how these exposures relate with room type and parental presence.

Methodology: This is a prospective observational study of infants born < 33 weeks gestational age (GA) in a level-III NICU. In our unit, very preterm infants are initially cared for in single-family rooms while requiring intensive care; once they no longer require positive pressure respiratory support and enter a convalescent stage, very preterm infants transition to an open bay step-down/convalescent care unit (Growth and Development Unit). Generally, this transition occurs around 33-34 weeks. We performed sixteen-hour auditory recordings once a week over a period of up to six weeks using the Language Environment Acquisition (LENA) device.[4] At each measurement, the LENA device was placed in the infant's incubator or crib and recordings of the infant's auditory environment were analyzed using the LENA SP automated software. The program records the total adult word count (AWC) and classifies the auditory environment into six categories: meaningful language, distant speech, electronic, overlap, noise, and silence. Demographic data and setting of recording were ob-

tained from medical charts. We examined room type (single-family or private room vs open bay) and parental presence (quantified as 6 hours or more vs less than 6 hours around the time of recording) at each measurement. We assessed the relationship of AWC and auditory components with PMA, room type and parental presence using linear and multiple regression analyses.

Results: To date, 36 auditory recordings were performed among 7 participants (of 20 projected). Mean GA was 30.9±1.2 weeks and mean birth weight was 1545±342 grams. 13 measurements (36%) were performed in a private room and 21 (58%) were recorded while parents were present 6 hours or more. Infants born very preterm were exposed to a variety of sounds in the NICU before TEA (Table 1). Overall, the majority of the auditory environment was composed of silence (69.6±13.2%), followed by electronic sounds (9.0±8.9%), and noise (7.2±8.1%), while distant speech (6.9±6.6%) and meaningful language (5.5±3.0%) represented the least predominant auditory components. As PMA increased, there was a rise in exposure to meaningful language (p<0.001) and a decrease in noise (p=0.01) (Figure 1). The degree of exposure to meaningful language across PMA appeared lower in private rooms in comparison with open bays (Figure 2). When adjusting for PMA, infants in private rooms were also exposed to significantly lower AWC (p=0.03). Higher parental presence was associated with an increased exposure to distant speech (p= 0.01) and less silence (p=0.05).

Table 1

Table 1 Components of the auditory environment of infants born very preterm by week of post-menstrual age

	33 weeks (n=6)	34 weeks (n=7)	35 weeks (n=7)	36 weeks (n=6)	37 weeks (n=5)	38 weeks (n=5)	All (n=36)
Meaningful language							
Percentage, mean (SD)	3.5 (3.5)	3.7 (2.3)	5.6 (2.3)	7.0 (3.3)	7.3 (3.4)	6.8 (1.3)	5.5 (3.0)
Percentage, median (IQR)	2.4 (4.4)	4.0 (5.1)	5.8 (4.5)	7.0 (5.8)	8.9 (5.4)	6.9 (2.0)	5.9 (4.4)
Minutes, mean (SD)	37.0 (36.1)	37.7 (25.3)	54.9 (23.0)	68.4 (28.7)	71.9 (31.1)	80.7 (16.7)	56.8 (30.1)
Minutes, median (IQR)	27.4 (49.4)	39.2 (36.9)	55.6 (39.0)	67.7 (53.4)	66.5 (48.6)	76.1 (27.2)	61.3 (41.4)
Distant speech							
Percentage, mean (SD)	5.5 (11.7)	4.9 (3.2)	5.2 (3.3)	7.3 (3.8)	5.6 (2.7)	9.4 (11.2)	6.7 (6.6)
Percentage, median (IQR)	3.3 (19.3)	5.0 (6.3)	5.0 (5.0)	6.9 (6.4)	5.2 (4.9)	5.0 (16.2)	5.1 (5.7)
Minutes, mean (SD)	92.5 (113.1)	49.7 (33.2)	52.0 (30.8)	71.9 (36.1)	54.4 (26.0)	91.5 (110.2)	67.4 (64.5)
Minutes, median (IQR)	32.1 (188.1)	54.8 (69.9)	48.6 (43.3)	69.7 (57.8)	50.2 (48.2)	48.4 (158.0)	51.2 (56.2)
Electronic sounds							
Percentage, mean (SD)	10.0 (13.9)	12.6 (7.0)	5.7 (7.2)	6.2 (7.1)	6.6 (7.2)	13.0 (10.5)	9.0 (8.9)
Percentage, median (IQR)	4.8 (13.3)	11.0 (12.1)	4.0 (11.8)	3.0 (8.1)	3.2 (10.3)	7.7 (13.9)	6.0 (8.6)
Minutes, mean (SD)	99.0 (138.8)	124.3 (66.3)	56.5 (68.5)	60.2 (68.5)	63.8 (66.8)	125.5 (99.3)	88.0 (86.4)
Minutes, median (IQR)	49.7 (129.4)	109.6 (106.4)	40.9 (110.1)	29.1 (79.4)	31.1 (100.5)	73.9 (131.6)	62.9 (84.8)
Overlap sounds							
Percentage, mean (SD)	0.9 (0.7)	0.6 (0.4)	1.0 (0.6)	1.5 (1.8)	1.8 (1.9)	0.9 (0.6)	1.1 (1.1)
Percentage, median (IQR)	0.7 (1.3)	0.5 (0.8)	1.0 (0.9)	0.9 (2.6)	0.8 (2.3)	1.0 (1.1)	0.8 (0.8)
Minutes, mean (SD)	10.7 (7.2)	8.5 (5.7)	10.9 (6.3)	16.9 (18.7)	16.9 (20.4)	16.5 (3.5)	12.2 (11.4)
Minutes, median (IQR)	9.7 (14.2)	8.8 (10.8)	12.0 (10.9)	9.0 (23.0)	7.4 (24.6)	9.8 (6.4)	9.3 (9.9)
Noise							
Percentage, mean (SD)	12.5 (9.8)	10.4 (11.9)	8.7 (6.5)	4.5 (5.0)	2.3 (3.2)	3.0 (3.9)	7.2 (8.1)
Percentage, median (IQR)	10.7 (19.0)	9.1 (12.0)	9.6 (13.3)	2.1 (9.3)	1.8 (4.4)	1.1 (5.9)	4.9 (10.5)
Minutes, mean (SD)	117.7 (83.7)	101.7 (113.1)	84.5 (61.5)	45.2 (47.6)	22.6 (30.5)	29.7 (37.5)	70.7 (77.3)
Minutes, median (IQR)	106.0 (182.2)	87.7 (111.2)	92.1 (123.0)	25.2 (87.7)	13.4 (42.2)	11.7 (56.7)	47.0 (102.4)
Silence							
Percentage, mean (SD)	62.7 (21.3)	66.3 (12.5)	72.8 (14.0)	72.5 (7.7)	75.9 (6.9)	66.2 (9.8)	69.6 (13.2)
Percentage, median (IQR)	61.6 (36.2)	70.0 (6.9)	72.3 (26.8)	73.5 (14.3)	75.9 (11.7)	68.9 (18.7)	70.0 (15.1)
Minutes, mean (SD)	602.9 (203.6)	637.8 (119.0)	700.7 (134.6)	697.8 (75.1)	733.5 (66.3)	99.0 (85.8)	667.8 (125.1)
Minutes, median (IQR)	594.3 (345.4)	671.1 (60.5)	694.4 (251.0)	707.3 (141.3)	743.3 (108.4)	661.8 (167.4)	671.6 (148.7)
Adult word count							
Mean (SD)	4776.7 (4639.2)	5454.0 (4232.2)	7917.0 (4180.6)	9169.0 (3804.5)	9473.8 (4036.5)	6998.2 (4732.7)	6898.0 (4250.5)
Median (IQR)	4267.0 (7499.0)	6702.0 (9368.8)	6142.0 (3597.0)	9800.5 (7027.0)	9018.0 (7319.0)	8230.0 (9269.0)	6832.5 (7281.0)

Figure 1

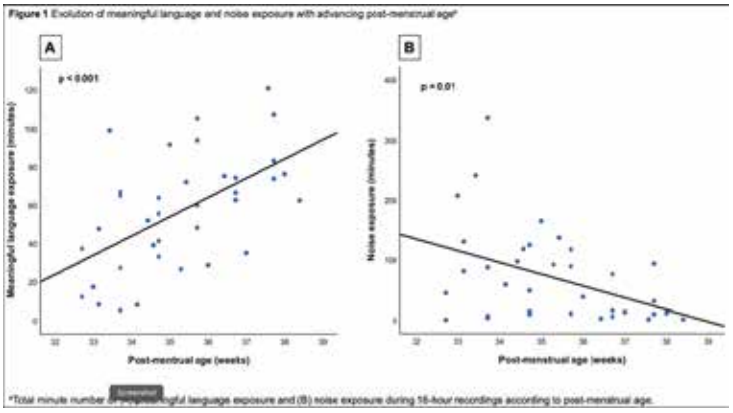
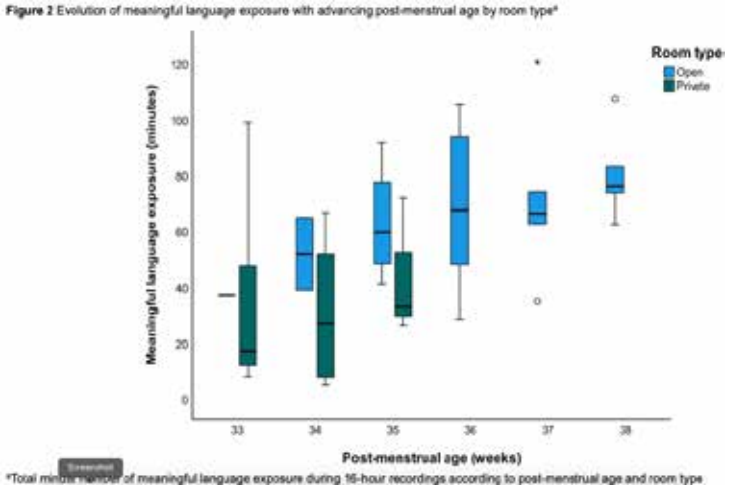


Figure 2



Conclusions: In our study, the auditory environment of infants born very preterm before TEA in the NICU was predominantly composed of silence and undesired exposures such as electronic/alarm sounds or noise, and included a limited amount of meaningful language and distant speech. The earliest weeks of PMA when recordings were obtained were characterized by exposure to the highest levels of noise, and least amount of human voice. These current findings completement previous studies and highlight that the paucity of meaningful auditory exposures in the NICU remains a concern. Exposure to meaningful language appears to increase across PMA; however, we note that in our environment, very preterm infants transition from single-family rooms to an open bay unit after 33-34 weeks PMA, a time that coincides with increasing meaningful language exposures in our data. This suggests that the NICU environment may impact infant auditory experiences, which are known to correlate with neurodevelopmental outcomes.[5] The findings reinforce that parental presence may play an important role to optimize infants' auditory environment before TEA. Further data will be needed to establish the effects of the environment on the preterm infant, with direct implications for interventions in the NICU which have the potential to optimize outcomes.

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Problem statement:

Meaningful neurosensory experiences are critical to supporting optimal neurodevelopment of hospitalized preterm infants. This study seeks to understand the evolution of auditory experiences of infants born very preterm as they advance in postmenstrual age in the neonatal intensive care unit (NICU), and assess how these experiences may be influenced by room type and parental presence.

Learner objectives:

1. To understand the components of the auditory environment experienced by infants born very preterm in the NICU before they reach term-equivalent age.
2. To learn how the auditory environment surrounding infants born very preterm evolves during their NICU stay.
3. To learn how environmental factors such as room type and parental presence may influence the auditory environment of infants born very preterm in the NICU.

Gravens 2023–39

Abstract title: Parent Presence and Engagement in the NICU: Trends and Relationships to Infant Stress

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Methods: Study hypotheses were addressed via a descriptive study, using an existing dataset to conduct a secondary analysis. This quantitative dataset included parent presence, SSC and infant salivary cortisol data for 78 families with an infant that received care in a tertiary level NICU in the Midwestern United States. Of 78 infants, 41 were term and 37 were preterm infants born at ≥ 28 weeks gestation. Infants' level of illness was assessed using Neonatal Medical Index (NMI) scores.

Parent presence was operationally defined as amount of time one or both parents were with their infant in the NICU in hours per week and days per week through NICU discharge (median age at discharge=33 days), or over the first month of life for infants with longer lengths of stay. SSC was operationally defined as amount of time parents participated in SSC with their NICU infant in hours per week and days per week through NICU discharge or during the first month of life for infants discharged later. Parent presence and SSC data, in hours per week and days per week, were collected from infants' electronic medical records.

Infant stress was measured using resting salivary cortisol levels collected in the morning at NICU admission and discharge. For infants not discharged at or before 33 days of life, a resting cortisol was collected at one month of age.

Impact and Results: Mean parent presence in hours per week ranged from 34.9 to 42.35 hours in weeks one to four of life. A repeated-measures ANOVA identified a significant trend in hours per week of parent presence over time ($F(2.45, 53)=5.02$, $p=.005$, $n^2=.09$), with parent presence increasing over the first two weeks of life, then decreasing. Post hoc analyses demonstrated a significant mean increase in parent presence from weeks one to two (6.42 hours, $p=.04$) and a significant mean decrease from weeks two to four (10.03 hours, $p=.02$). The range of cumulative parent presence in days per week over the first four weeks of life ranged from 35.7% to 100% of days in the NICU with a mean (SD) of 91.1% (13.8%) days. Trend analyses did not identify a significant trend in cumulative parent presence in days per week.

The range of cumulative SSC hours over the first four weeks of life ranged from zero to 52 total hours with a mean (SD) 5.52 hours (9.93). Mean hours of SSC per week were quite low, ranging from 1.29 to 1.81 hours in weeks one to four of life. The range of cumulative SSC in days per week over the first four weeks of life ranged from zero to 67.9% of days in the NICU with a mean (SD) of 8.63% (13.5%). No significant trends in cumulative hours or days of SSC over time were identified.

Significant negative correlations between cumulative SSC, in hours per week ($r_s=-.25$, $p=.03$) and days per week ($r_s=-.21$, $p=.05$) were observed. Results of hierarchical regression analyses examining timing of SSC in days per week supported a model including infant salivary cortisol at admission, NMI

score and SSC in days per week during week one for explaining infant stress at NICU discharge (R^2=.21, F=3.08, p=.04). Hierarchical regression examining timing of SSC in hours per week did not yield any significant models.

Parent presence in hours per week (r=.11, p=.39, 95% CI -.145, 353) and days per week (r=.06, p=.63, 95% CI -.147, .233) was not significantly associated with infant stress at NICU discharge. Results of hierarchical regression analyses examining the timing of parent presence in hours per week supported a model including admission cortisol, NMI score, and parent presence during weeks one through four of life for explaining infant stress at NICU discharge (R^2=0.44, F=4.11, p=.004); and in this model NMI score (p=.03) and parent presence during weeks two (p<.001) and three of life (p=.03) were significant predictors. Hierarchical regression examining timing of parent presence in days per week did not yield any significant models.

This study was novel in examining trends in naturally occurring parent presence and SSC over an average NICU length of stay. In addition, this study was novel in examining potential relationships between parent presence, parent engagement (measured using SSC), and infant stress at NICU discharge.

Conclusions: The need for early, frequent SSC to mitigate stress in NICU infants was supported. Study results suggest that NICU infants experiencing more parent presence in hours per week during week two had higher salivary cortisol levels at discharge, while infants experiencing more parent presence during week three had lower salivary cortisol levels. During the early weeks of life, parent-infant relationships may require more support due to high levels of infant illness and parent and infant stress. More study is needed to examine potential relationships between the amount, frequency and timing of parent presence, SSC and NICU infant stress.

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Problem statement:

Relationships between parents and NICU infants are essential to mitigating NICU-related stressors and to preventing impacts of toxic stress that may result from cumulative NICU-related stressor exposures, which include psychosocial deprivation. The purpose of this study was to examine trends in NICU parent presence and skin-to-skin care (SSC) and to examine relationships between parent presence, parent engagement and NICU infant stress.

Learner objectives:

1. Discuss trends in parent presence and SSC observed over an average NICU stay.
2. Describe relationships observed in the reported study between parent presence, parent engagement and NICU infant stress.

Gravens 2023–40

Abstract title: Where you start out shouldn't determine where you end up!

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Purpose: Define for staff and families, the importance of reading for early child literacy and the impact of disparities in families facing financial instability. The critical window for brain development is 0-3 years of life. A NICU Reading Program develops a child's love of books and a readiness to learn.

Relevance: NICU nurses support community healthcare outreach needs by engaging in reading or assisting family reading time for infants twice a day. The Leader Reader Program provides new children's books for reading and for taking home. This early beginning point helps children to develop a rich vocabulary, self-expression, and reading comprehension; all tools needed to become successful lifelong learners. Nurses remain cognizant of the need to help prepare a home environment that fosters literacy skills.

Quality Methods (PDCA):

Plan—The unit OKR project to address Child Literacy as many of the NICU babies had financially challenged families and literacy was a documented community deficiency.

Do—An interprofessional group established an action plan to facilitate reading to the NICU babies 2Xs a day. Average Daily census in NICU 22 infants times 10 months of reading equals an estimated sample size of 13,464 episodes of reading.

Check—Two outcome documents for measurement: a reader log of times and qualitative responses, and Press Ganey Courtesy and Respect Outcome measure of Nurse treated my baby as a person. **A**ct—A book drive with the hospital shared governance council, D. Pardon Books, Sororities, and local merchants for new book donations. Leader Reader invites to schedule individual reading time. Read-a-thon March 2–9.

Outcome: The project had great involvement with the staff and became well integrated into practice. Thousands of hours have been spent reading to the NICU babies by administrative leaders, nursing leaders, nurses, parents, grandparents, and siblings. Qualitative comments re: baby's reaction have been positive in the calming effect for a restless baby. The data measurement for Press Ganey Courtesy and Respect question, How the nurses cared about your baby as a person--has outscored the national benchmark three out of three of the last quarters.

The successes of the program have rapidly spread through our hospital system and now has 8 nationwide hospitals who have reached out for assistance in initiating the program for their babies and children patients.

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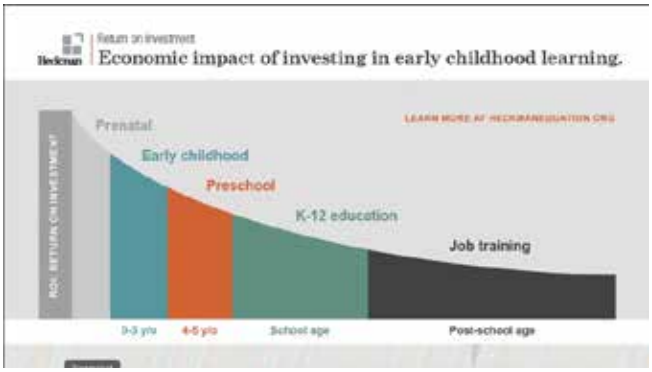
Problem statement:

Nursing care review identified by gap analysis a deficit in nursing knowledge and support of early childhood literacy tools and programs to meet brain development in the Neonatal Intensive Care Unit (NICU) population. Research evidence identifies the critical window for brain development as 0-3 years of life and if the brain is not stimulated during this critical period, learning will be much more difficult for the child.

Learner objectives:

1. Learn how early childhood literacy matters, NICU to community, as parents want their child to be healthy, happy, and successful throughout life.
2. Develop NICU Leader Reader Program that provides the tools and activities that support language development as a lifelong investment in NICU persons who are a person no matter how small.



Gravens 2023–41

Abstract title: Provision of Positive Oral Experiences for Premature Infants by Offering Milk Drops: A Clinical Practice Change Initiative

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Introduction: Premature infants routinely experience invasive oral procedures that may have a negative impact on oral sensory and oral motor function. Approximately 80% of premature infants will have difficulty with oral feeding, making failure to thrive a leading health issue associated with prematurity and a primary reason for readmission to the hospital.

Objective: The objective of this clinical practice change was

to provide positive oral experiences to premature infants by offering droplets of human milk or formula orally during gavage feedings, subsequently referred to as the Milk Drop Intervention.

Method: This pre- and post-implementation quasi-experimental study included a total of 198 premature infants born at 24 to 33+6 weeks' gestation.

Staff Education: Online learning modules were created to explain the rationale, provision, and documentation of the Milk

Drop Intervention: The learning module became mandatory education requirement for the NICU medical team, leadership, and nurses.

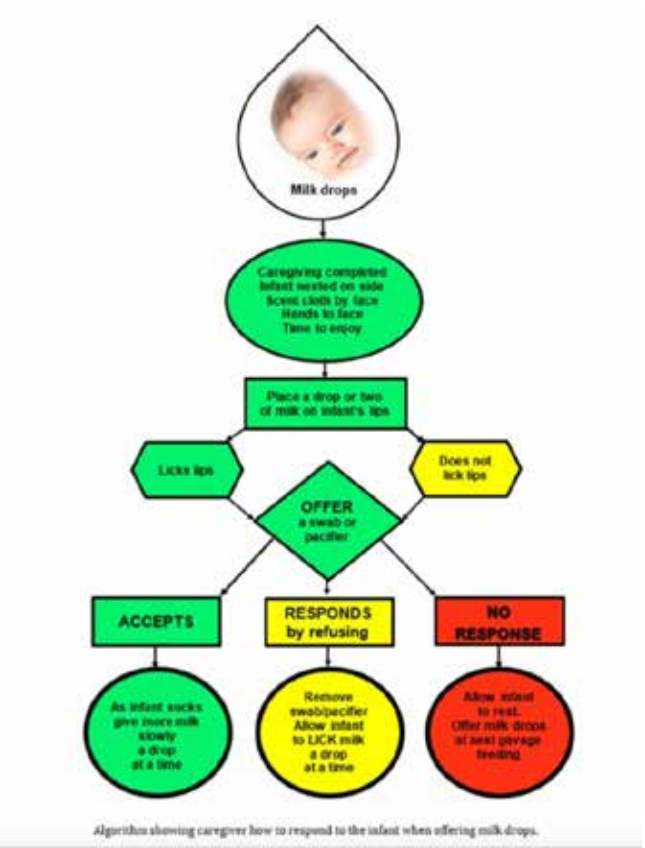
Parent Education: Upon admission, parents were given a brochure explaining the Milk Drop Intervention, the rationale, and descriptions of how their infant may respond when offered milk drops.

Milk Drop Intervention: Once all cares were completed, the infant was nested with hands to face and their parent's scent heart placed near their face. The gavage feeding was started, and the infants in the Milk Drop Intervention group were offered oral milk drops with every full gavage feeding. More milk drops were given based on the infant's response (see algorithm). If parents were present, they were encouraged and supported to observe and learn about their infant's responses and feeding cues.

Data Collection and Analysis: Electronic health records were used to identify gestational age at birth, pre-feeding cues, length of stay, PMA at discharge, and parent experiences. All data was compiled by staff with ethical access to the data for clinical practice evaluation. Descriptive statistics were used to analyze the primary and secondary outcomes. To further understand a preliminary cost analysis of the initiative, the hospital analytic department assessed the hospital bills of the infants pre/post implementation of the Milk Drop Intervention.

Outcomes measured: Average length of stay and adjusted cost differences. Parental perception and comments were also recorded.

Results: Nine of ten intervention groups had a shorter average length of stay, with the intervention group overall having a significantly shorter average length of stay (p=0.004). Adjusted cost savings for the intervention group was over $663,000.



Algorithm showing caregiver how to respond to the infant when offering milk drops.

Conclusion: Offering milk drops during gavage feedings is a simple, low-cost, intervention that may provide positive oral experiences for the smallest and most fragile of premature infants. The intervention also provided an opportunity for parents to observe their infant's response to the milk drops, which formed a foundation to understanding cue-based feeding.

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Problem statement:

To determine if offering oral milk drops for positive oral experiences with gavage feedings would decrease length of stay in premature infants.

Learner objectives:

1. Discuss how NICU procedures such as taping, intubation, suctioning, etc. can negatively impact feeding development.
2. List one major developmental reason why premature infants are at increased risk when they receive negative oral experiences.

Gravens 2023–42

Abstract title: NICU Families Have Positive Perception of Doctors' Daily Progress Notes

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Methods: All NICU patients are assigned Discharge Education on admission in English or Spanish by preferred language, and families complete this education in the patient portal prior to discharge. At the end of the NICU Discharge Education in MyChart, parents were offered the opportunity to take a voluntary, anonymous survey on OpenNotes, with a link at the bottom of the page to a Qualtrics survey in English or Spanish. The survey is an adaptation of the same survey used in numerous OpenNotes studies, including prior studies in outpatient and inpatient pediatrics.

Results: Out of 216 NICU patients from 3/16-11/16/2022, there were 41 respondents to the survey (19%). NICU patients were primarily term infants (51%) with birth weight > 2501 g (57%). Maternal race was primarily Asian (43%) and English was the most common preferred language (93%) [Figure 1]. Families most frequently read the doctors' daily progress notes "every day" (68%). They indicated the doctors' notes were primarily "always accurate" (93%) and "very or somewhat easy to understand" (90%). All of the respondents felt the same or better about the doctor(s) after reading the notes, and 54% contacted the physicians about something in the notes [Table 1]. Four respondents (15%) felt that OpenNotes were more confusing than helpful, and two (7.4%) disagreed that OpenNotes helped them better understand the other information in the patient portal, e.g. lab results or imaging studies [Figure 2]. Free text responses indicated satisfaction with NICU OpenNotes: "Helped reinforce the verbal explanations of progress. Great memory aid when tired." But there were also suggestions for improvement: "It can be very jargon-y."

Conclusion: To the authors' knowledge, this is the first study to document families' perceptions of OpenNotes in the NICU. Though limited by low survey response rate, NICU families overwhelmingly indicated positive interactions with the doctors' daily progress notes. Their responses give important insights into how to improve patient information shared via the patient portal and via OpenNotes.

Figure 1

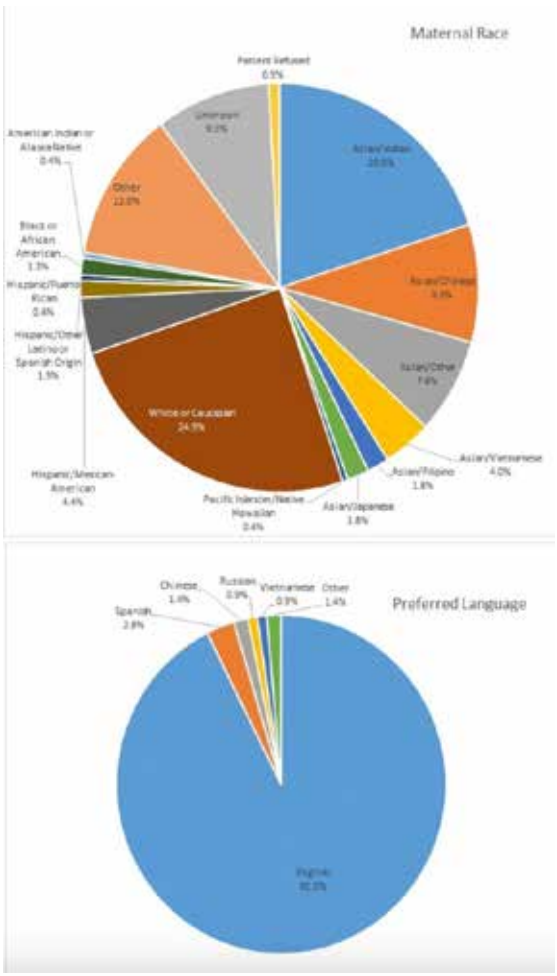
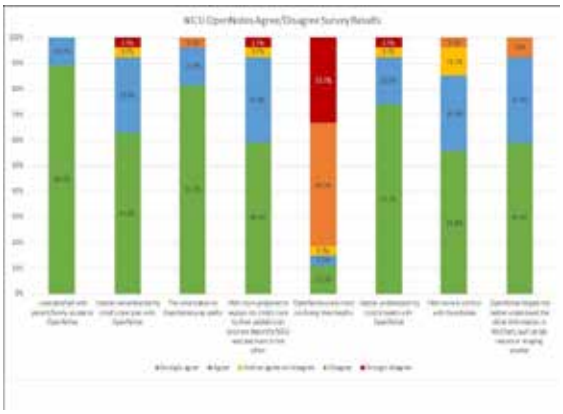


Figure 2



Table

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Problem statement:

The 21st Century Cures Act has mandated sharing of clinical notes electronically to patients. OpenNotes, or sharing of medical notes via a patient portal, has been studied extensively in the adult population, but less in pediatric populations, and not at all in the Neonatal Intensive Care Unit (NICU). This study aims to understand parents' interaction with and perception of the NICU physicians' daily progress notes shared with them via the hospital's patient portal (Epic MyChart) using a survey of NICU parents at a community level 3 NICU.

Learner objectives:

1. Describe how NICU families interact with the physicians' daily progress notes shared electronically via patient portal
2. Recognize families' perception of NICU OpenNotes and how it affects their relationship with physicians
3. Apply family suggestions for improvement of NICU OpenNotes

Gravens 2023–43

Abstract title: Improving Safe Sleep Practices in a Level III Neonatal Intensive Care Unit

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Background: In the Neonatal Intensive Care Unit at a large inner-city hospital, healthcare providers are not appropriately transitioning premature infants to safe sleep positioning (SSP) as recommended by the American Academy of Pediatrics (AAP). Based on a random bedside audit in March 2022, 40% of infants in the NICU met the eligibility criteria, and 0% of those patients were in accordance with the guidelines. No formal safe sleep policy currently exists at the site. The purpose of this quality improvement initiative is to increase the number of neonates in accordance with the AAP's safe sleep guidelines for hospitalized infants. PICO(T): In neonatal patients admitted to a level III NICU, how effective is a standardized safe sleep bundle compared to current practice based on nurse judgement in increasing the percentage of infants who are compliant with the AAP's safe sleep guidelines prior to their discharge home. The goal is that 100% of eligible infants will be in accordance with the AAP's recommendations.

Objective: Objectives for this poster presentation are as follows: Learner will understand the risk of Sudden Infant Death Syndrome (SIDS) in premature infants; Learner will be educated on the safe sleep guidelines recommended by the AAP; Audience will be educated on the evidence supporting a standardized safe sleep bundle in the NICU, Audience will understand how the results from this quality improvement project support the incorporation of a safe sleep policy in level III NICUs.

Methods: A safe sleep bundle has been implemented at the site that includes the development of an evidence-based sleep algorithm (from the AAP recommendations), standardizations of a parent safe sleep education video, as well as a parent safe sleep survey at discharge. Staff education included an introduction to the elements of the safe sleep bundle, the safe sleep algorithm and safe sleep positioning guidelines. Posters of the algorithm, and positioning guidelines have been strategically placed in various high traffic locations throughout the unit. Staff is reinforcing SSP, and at discharge parents are asked to complete a survey that assesses their knowledge of safe sleep and their comfort level with the implementation of SSP at home. There are random bedside audits throughout the implementation period to collect data. Using the safe sleep algorithm and safe sleep guidelines, the surveyor assesses each baby's safe sleep eligibility. For infants who qualify, the surveyor is using the data collection tool to gather information. That data will be used to determine if the implementation of the safe sleep bundle improves safe sleep positioning in NICU patients. Data from the parent discharge survey will also be analyzed to identify parents' SSP comfort level and intent to practice at home.

Results: Following seven weeks of data collection, the results have shown positive improvements throughout the unit. During the most recent audit, the NICU had a total of 35 patients. Of those patients, 51% (18) met the eligibility criteria for SSP. At time of audit, 78% (14) of those patients were appropri-

ately practicing SSP. The implementation phase is currently occurring over a 16-week period from September to December 2022. Data collection will continue through the end of the year.

Conclusion: Preliminary findings suggest incorporating a standardized safe sleep bundle in a level III NICU will increase compliance with safe sleep positioning in eligible NICU patients. Results indicate that this practice change will benefit the premature infants admitted to the NICU by preparing them and their families for a safe sleeping environment at home.

Problem statement:

In neonatal patients admitted to a level III NICU, how effective is a standardized safe sleep bundle compared to current practice based on nurse judgement in increasing the percentage of infants who are compliant with the AAP's safe sleep guidelines prior to their discharge home. The goal is that 100% of eligible infants will be in accordance with the AAP's recommendations.

Learner objectives:

Learner will understand the risk of Sudden Infant Death Syndrome (SIDS) in premature infants; Learner will be educated on the safe sleep guidelines recommended by the AAP; Audience will be educated on the evidence supporting a standardized safe sleep bundle in the NICU, Audience will understand how the results from this quality improvement project support the incorporation of a safe sleep policy in level III NICUs.

Disclosures: *Conflicts of interest are disclosed by the individual authors*

NT

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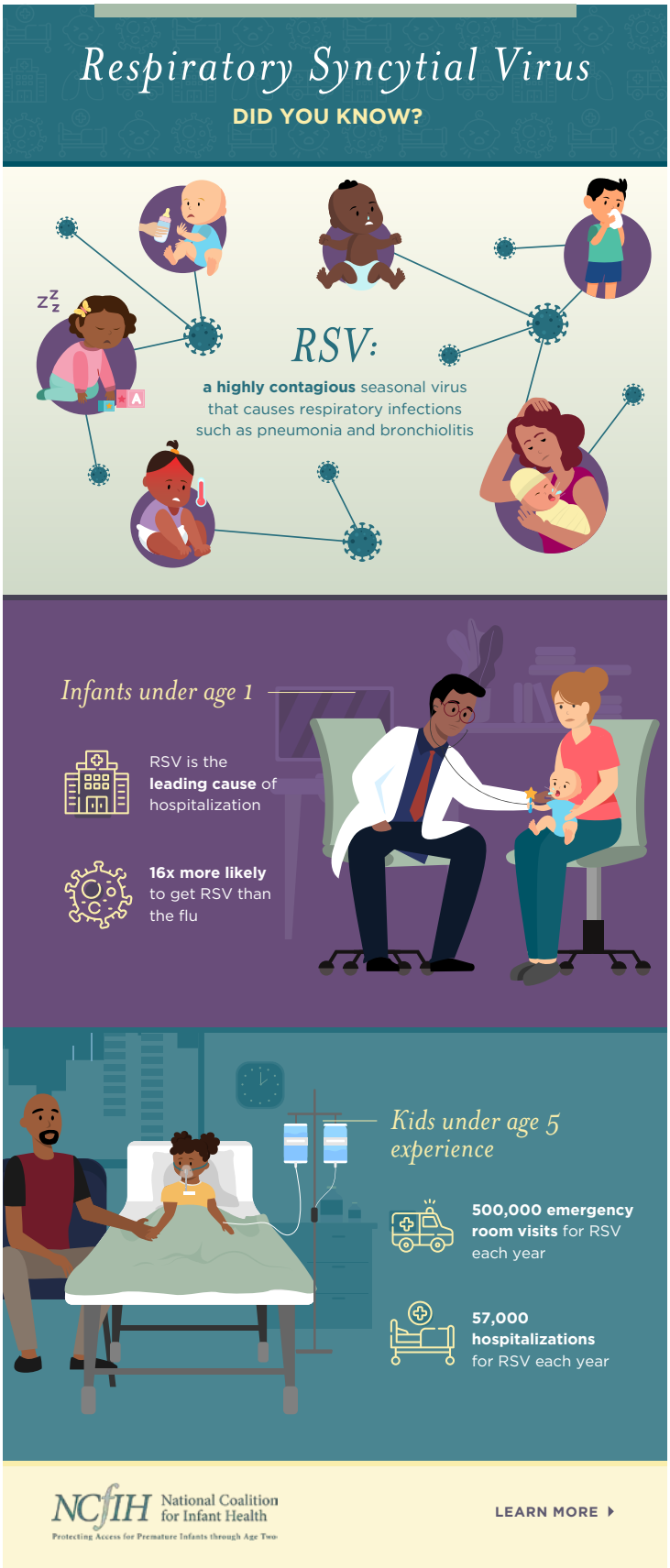
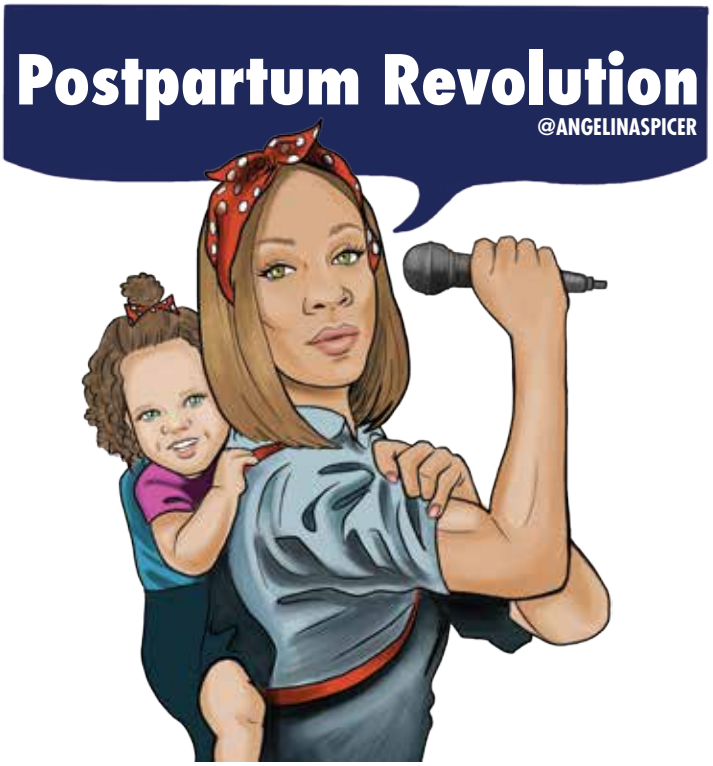


The Gap Baby: An RSV Story



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Gary D. Miner, Linda A. Miner, Scott Burk, Mitchell Goldstein, Robert Nisbet, Nephi Walton, Thomas Hill

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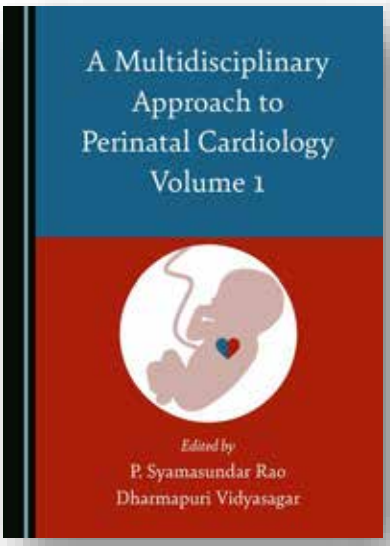
A Multidisciplinary Approach to Perinatal Cardiology *Volume 1*

Edited by P. Syamasundar Rao and Dharmapuri Vidyasagar



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Book Description

Recent developments in diagnostic and therapeutic aspects of cardiac and neonatal issues have advanced the care of the newborn. To achieve excellence in cardiac care, however, close interaction and collaboration of the pediatric cardiologists with neonatologists, pediatricians, general/family practitioners (who care for children), anesthesiologists, cardiac surgeons, pediatric cardiac intensivists, and other subspecialty pediatricians is mandatory. This book provides the reader with up-to-date evidence-based information in three major areas of neonatology and prenatal and neonatal cardiology. First, it provides an overview of advances in the disciplines of neonatology, prenatal and neonatal cardiology, and neonatal cardiac surgery in making early diagnosis and offering treatment options. Secondly, it presents a multidisciplinary approach to managing infants with congenital heart defects. Finally, it provides evidence-based therapeutic approaches to successfully treat the fetus and the newborn with important neonatal issues and congenital cardiac lesions. This first volume specifically explores issues related to perinatal circulation, the fetus, ethics, changes in oxygen saturations at birth, and pulse oximetry screening, diagnosis, and management.

About the Editors

Dr P. Syamasundar Rao, MD, DCH, FAAP, FACC, FSCAI, is Professor of Pediatrics and Medicine and Emeritus Chief of Pediatric Cardiology at the University of Texas-Houston Medical School. He received his medical degree from Andhra Medical College, India, and subsequently received post-graduate training both in India and the USA before joining the faculty at the Medical College of Georgia, USA, in 1972. He has also served as Chairman of Pediatrics at King Faisal Specialist Hospital and Research Center, Saudi Arabia, and Professor and Director of the Division of Pediatric Cardiology at the University of Wisconsin and St. Louis University, USA. He has authored 400 papers, 16 books and 150 book chapters, and is a recipient of numerous honors and awards.

Dr Dharmapuri Vidyasagar, MD, MSc, FAAP, FCCM, PhD (Hon), is currently Professor Emeritus in Pediatrics at the University of Illinois, Chicago, where he served as Professor of Pediatrics for four decades. He is a graduate of Osmania Medical College, India. He has published over 250 papers and authored several books with a focus on prematurity, neonatal pulmonary diseases and neonatal ventilation. His goal is to reduce neonatal mortality in the USA and around the world, and he has received multiple awards and honors including the Ellis Island Award.

A Multidisciplinary Approach to Perinatal Cardiology Volume 1 is available now in Hardback from the Cambridge Scholars website, where you can also access a free 30-page sample.

My NICU Network
My Perinatal Network

National Perinatal Association + NICU Parent Network

Online L&D Staff Education Program

Caring for Pregnant Patients & Their Families:

Providing Psychosocial Support During Pregnancy, Labor and Delivery

WWW.MYPERINATALNETWORK.ORG

Continuing education credits provided by

pac-lac

About the Program

- **WHO SHOULD TAKE THE PROGRAM?** This program is designed for both office and hospital staff in all disciplines that interact with pregnant patients and their families. A key focus is recognizing risk factors for perinatal mood and anxiety disorders, and mitigating their impact through provision of trauma-informed care.

- **WHY TAKE THE PROGRAM?** Families will benefit when staff have improved skills, through enhanced parental resilience and better mental health, and improved parent-baby bonding leading to better developmental outcomes for babies. Benefits to staff include improved skills in communicating with patients; improved teamwork, engagement and staff morale; reduced burnout, and reduced staff turnover.

- **HOW DOES THE PROGRAM ACHIEVE ITS GOALS?** Program content is representative of best practices, engaging and story-driven, resource-rich, and developed by a unique interprofessional collaboration of obstetric and neonatal professionals and patients. The program presents practical tips and an abundance of clinical information that together provide solutions to the emotional needs of expectant and new parents.

- **HOW WAS THE PROGRAM DEVELOPED?** This program was developed through collaboration among three organizations: a multidisciplinary group of professionals from the National Perinatal Association and Patient + Family Care, and parents from the NICU Parent Network. The six courses represent the different stages of pregnancy (antepartum, intrapartum, postpartum), as well as perinatal mood and anxiety disorders, communication techniques, and staff support.

Program Objectives

- Describe principles of trauma-informed care as standards underlying all communication during provision of maternity care in both inpatient and outpatient settings.
- Identify risk factors, signs, and symptoms of perinatal mood and anxiety disorders; describe treatment options.
- Define ways to support pregnant patients with high-risk conditions during the antepartum period.
- Describe obstetric violence, including ways that providers may contribute to a patient's experience of maternity care as being traumatic; equally describe ways providers can mitigate obstetric trauma.
- Describe the importance of providing psychosocial support to women and their families in times of pregnancy loss and fetal and infant death.
- Define the Fourth Trimester, and identify the key areas for providing psychosocial support to women during the postpartum period.
- Identify signs and symptoms of burnout as well as their ill effects, and describe both individual and systemic methods for reducing burnout in maternity care staff.

Continuing education credits will be provided for physicians, clinic and bedside nurses, social workers, psychologists, and licensed marriage and family therapists. CEUs will be provided by Perinatal Advisory Council: Leadership, Advocacy, and Consultation.

PROGRAM CONTENT

COMMUNICATION SKILLS CEUs offered: 1

Learn principles of trauma-informed care, use of universal precautions, how to support LGBTQ patients, obtaining informed consent, engaging in joint decision-making, delivering bad news, dealing with challenging patients.

Faculty: Amina White, MD, MA, Clinical Associate Professor, Department of OB/Gyn, University of North Carolina, Chapel Hill, NC; Sue Hall, MD, MSW, FAAP, St. John's Regional Medical Center, Oxnard, CA; Karen Saxer, CNM, MSN, University of North Carolina Maternal-Fetal Medicine, UNC Women's Hospital, Chapel Hill, NC; Tracy Pella, Co-Founder & President, Connected Forever, Tecumseh, NE.

PERINATAL MOOD AND ANXIETY DISORDERS CEUs offered: 1

Identify risk factors for and differential diagnosis of PMADs (perinatal mood and anxiety disorders), particularly perinatal depression and/or anxiety and posttraumatic stress syndrome. Learn the adverse effects of maternal depression on infant and child development, and the importance of screening for and treating PMADs.

Faculty: Linda Baker, PsyD, psychologist at Unstuck Therapy, LLC, Denver, CO; Sue Hall, MD, MSW, FAAP, neonatologist at St. John's Regional Medical Center, Oxnard, CA; Angela Davids, Founder of Keep 'Em Cookin', Baltimore, MD; Brittany Boet, Founder of Bryce's NICU Project, San Antonio, TX.

PROVIDING ANTEPARTUM SUPPORT CEUs offered: 1

Identify psychosocial challenges facing high risk OB patients, and define how to provide support for them, whether they are inpatient or outpatient. Recognize when palliative care is a reasonable option to present to pregnant patients and their families.

Faculty: Amina White, MD, MA, Clinical Associate Professor, Department of OB/Gyn, University of North Carolina, Chapel Hill, NC; Sue Hall, MD, MSW, FAAP, neonatologist at St. John's Regional Medical Center, Oxnard, CA; Angela Davids, Founder of Keep 'Em Cookin', Baltimore, MD; Erin Thatcher, BA, Founder and Executive Director of The PPROM Foundation, Denver, CO.

PROVIDING INTRAPARTUM SUPPORT CEUs offered: 1

Describe how to manage patient expectations for labor and delivery including pain management; identify examples of obstetric violence, including identification of provider factors that may increase patients' experience of trauma; learn how to mitigate patients' trauma, and how to provide support during the process of labor and delivery.

Faculty: Sara Detlefs, MD, Fellow in Maternal-Fetal Medicine, Baylor College of Medicine, Houston, TX; Jerry Ballas, MD, MPH, Associate Clinical Professor, UCSD Health System, Maternal-Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of California at San Diego, San Diego, CA; MaryLou Martin, MSN, RNC-NIC, CKC, Women's and Children's Services Nurse Educator, McLeod Regional Medical Center, McLeod, SC; Claire Hartman, RN, IBCLC, Labor & Delivery, University of North Carolina Hospital, Chapel Hill, NC; Crystal Duffy, Author of Twin To Twin (from High Risk Pregnancy to Happy Family), and NICU Parent Advisor, Houston, TX; Erin Thatcher, Founder and Executive Director of The PPROM Foundation, Denver, CO.

PROVIDING POSTPARTUM SUPPORT CEUs offered: 1

Define the 4th Trimester and the importance of follow-up especially for high risk and minority patients, learn to recognize risk factors for traumatic birth experience and how to discuss patients' experiences postpartum; describe the application of trauma-informed care during this period, including support for patients who are breastfeeding and those whose babies don't get to go home with them.

Faculty: Amanda Brown, CNM, University of North Carolina Hospital, Chapel Hill, NC; ; Sue Hall, MD, MSW, FAAP, neonatologist at St. John's Regional Medical Center, Oxnard, CA; Crystal Duffy, Author of Twin To Twin (from High Risk Pregnancy to Happy Family), and NICU Parent Advisor, Houston, TX.

SUPPORTING STAFF AS THEY SUPPORT FAMILIES CEUs offered: 1

Define burnout and compassion fatigue; identify the risks of secondary traumatic stress syndrome to obstetric staff; describe adverse impacts of bullying among staff; identify the importance of both work-life balance and staff support.

Faculty: Cheryl Milford, EdS, Consulting NICU and Developmental Psychologist, Director of Development, National Perinatal Association, Huntington Beach, CA; Sue Hall, MD, MSW, FAAP, neonatologist at St. John's Regional Medical Center, Oxnard, CA; Erin Thatcher, BA, Founder and Executive Director, The PPROM Foundation, Denver, CO

Cost

- RNs: $10/CEU; $60 for the full program
- Physicians, licensed clinical social workers (LCSWs), licensed marriage and family therapists (LMFTs): $35/CEU; $210 for the full program
- Although PACLAC cannot award CEs for certified nurse midwives, they can submit certificates to their own professional organization to request credit. $35/CEU; $210 for the full program

Contact help@myperinatalnetwork.org to learn more.

Faculty

Linda Baker, PsyD
Psychologist at Unstuck Therapy, LLC, Denver, CO.

Jerasimos (Jerry) Ballas, MD, MPH
Associate Clinical Professor, UCSD Health System, Maternal-Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of California at San Diego, San Diego, CA.

Amanda Brown, CNM, MSN, MPH
University of North Carolina-Chapel Hill Hospitals, Chapel Hill, NC.

Sara Detlefs, MD
Fellow in Maternal-Fetal Medicine, Baylor College of Medicine, Houston, TX.

Sue L. Hall, MD, MSW, FAAP
Neonatologist, Ventura, CA.

Claire Hartman, RN, IBCLC
Labor & Delivery, University of North Carolina Hospital, Chapel Hill, NC.

MaryLou Martin, MSN, RNC-NIC, CKC
Women's and Children's Services Nurse Educator, McLeod Regional Medical Center, McLeod, SC.

Cheryl Milford, EdS.
Former NICU and Developmental psychologist, in memoriam.

Karen Saxer, CNM, MSN
University of North Carolina Maternal-Fetal Medicine, UNC Women's Hospital, Chapel Hill, NC.

Amina White, MD, MA
Clinical Associate Professor, Department of Obstetrics and Gynecology, University of North Carolina, Chapel Hill, NC.

Parent/Patient Contributers:

Brittany Boet
Founder, Bryce's NICU Project, San Antonio, TX.

Angela Davids
Founder, Keep 'Em Cookin', Baltimore, MD.

Crystal Duffy
Author of Twin To Twin (from High Risk Pregnancy to Happy Family), and NICU Parent Advisor, Houston, TX.

Tracy Pella, MA
Co-Founder and President, Connected Forever, Tecumseh, NE.

Erin Thatcher, BA
Founder and Executive Director, The PPROM Foundation, Denver, CO.

CANCELLATIONS AND REFUNDS

- For Individual Subscribers:
  - If you elect to take only one course, there will be no cancellations or refunds after you have started the course.
  - If you elect to take more than one course and pay in advance, there will be no cancellations or refunds after payment has been made unless a written request is sent to help@myperinatalnetwork.com and individually approved.
- For Institutional Subscribers:
  - After we are in possession of a signed contract by an authorized agent of the hospital and the program fees have been paid, a 50% refund of the amount paid will be given if we are in receipt of a written request to cancel at least 14 (fourteen) days prior to the scheduled start date for your hospital's online program.
  - Refunds will not be given for staff members who neglect to start the program. Also, no refunds for those who start the program, but do not complete all 6 courses within the time frame allotted.

For Physicians: This activity has been planned and implemented in accordance with the Institute for Medical Quality and the California Medical Association's CME Accreditation Standards (IMQ/CMA) through the Joint Providership of the Perinatal Advisory Council: Leadership, Advocacy and Consultation (PAC/LAC) and the National Perinatal Association. PAC/LAC is accredited by the Institute for Medical Quality/California Medical Association (IMQ/CMA) to provide continuing education for physicians. PAC/LAC takes responsibility for the content, quality and scientific integrity of this CME activity. PAC/LAC designates this activity for a maximum of 6 *AMA PRA Category 1 Credit(s)TM*. Physicians should only claim credit commensurate with the extent of their participation in the activity. This credit may also be applied to the *CMA Certification in Continuing Medical Education*.

For Nurses: The Perinatal Advisory Council: Leadership, Advocacy and Consultation (PAC/LAC) is an approved provider by the California Board of Registered Nursing Provider CEP 5862. When taken as a whole, this program is approved for 7 contact hours of continuing education credit.

For CAMFT: Perinatal Advisory Council: Leadership, Advocacy, and Consultation (PAC/LAC) is approved by the California Association of Marriage and Family Therapists to sponsor continuing education for LMFTs and LCSWs. CE Provider #128542. PAC/LAC maintains responsibility for the program and its content. Program meets the qualifications for 6 hours of continuing education credit for LMFTs and LCSWs as required by the California Board of Behavioral Sciences. You can reach us at help@myperinatalnetwork.org.

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** SSESS 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.

Partnering for patient-centered care when it matters most.

nann.org nationalperinatal.org

National Association of Neonatal Nurses

National Perinatal Association

FREE ONLINE EDUCATION

Coping with COVID-19

A viral pandemic

A racial pandemic within a viral pandemic

Will mental illness be the next inevitable pandemic?

WWW.MYNICUNETWORK.ORG

and

National Perinatal Association
NICU Parent Network

CDC, FDA Issue New RSV Immunization Recommendations

Josie Cooper

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.

AfPA | Alliance for Patient Access

IfPA | Institute for Patient Access

"RSV, or respiratory syncytial virus, is a virus that affects the lungs and respiratory tract. It usually causes mild cold-like symptoms but can cause severe infections in premature babies, infants, children, and older adults. "

RSV, or respiratory syncytial virus, is a virus that affects the lungs and respiratory tract. It usually causes mild cold-like symptoms but can cause severe infections in premature babies, infants, children, and older adults.

The United States experienced a severe RSV surge in fall 2022. Between October and November 2022, the CDC recorded 126,000 cases of RSV.

Going forward, pregnant women and parents of young children now have more tools to ward off RSV.

Better Protection for Infants and Young Children:

Safe and effective vaccines and immunizations to combat RSV infections have long been a clinical research focus. Now, for the first time, immunizations are available to all infants and pregnant women in their third trimester.

The FDA recently approved the first RSV vaccine, Abrysvo, for pregnant women in their third trimester. The vaccine allows the mother to develop antibodies that protect her and her baby. This protection extends for the first six months of the baby's life.

"The FDA recently approved the first RSV vaccine, Abrysvo, for pregnant women in their third trimester. The vaccine allows the mother to develop antibodies that protect her and her baby. This protection extends for the first six months of the baby's life."

The approval comes on the tail of another critical step toward protecting infants and children from RSV. After the FDA approved nirsevimab in July, the CDC's Advisory Committee on Immunization Practices added it to the Vaccines for Children program – ensuring that all infants have access to this new immunization. The program employs federal funding to provide vaccines to children whose families may be unable to afford them.

The introduction of successful RSV immunizations reduces the incidence of severe RSV disease and related hospitalizations and limits the strain RSV season imposes on healthcare systems.

Infants and Children are Especially Susceptible to RSV:

Infants and children have more significant risks if infected with RSV. Their small airways sometimes cannot accommodate the intense bouts of wheezing, coughing, and labored breathing accompanying RSV. This situation can lead to more severe complications, like bronchitis and pneumonia. The CDC estimates that RSV-related infections lead to more than 300 deaths yearly among children under age five.

"Infants and children have more significant risks if infected with RSV. Their small airways sometimes cannot accommodate the intense bouts of wheezing, coughing, and labored breathing accompanying RSV."

Regular hand washing and avoiding sick people, as well as other Preventive measures, can reduce children's risk of RSV and its potentially serious consequences. Nevertheless, broad immunization efforts for pregnant women and infants must also be part of the public health solution.

Suggested Reading:

1. https://www.cdc.gov/vaccines/vpd/rsv/index.html
2. https://www.cdc.gov/media/releases/2023/p0922-RSV-maternal-vaccine.html#:~:text=CDC%20now%20recommends%20RSV%20vaccine,for%20them%20at%20this%20time

Josie Cooper is the executive director of the Alliance for Patient Access.

Disclosure: The authors have no disclosures.

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Immunizing Yourself Against **COVID-19**

COVID-19 vaccines have been shown to:

- Lessen the severity of symptoms[1]
- Reduce disease transmission[3]
- Reduce risk of mortality[2]
- Make communities healthier and safer[4]

Understanding the Options

COVID-19 vaccines are available for children, adolescents and adults. There are 3 types to choose from.

mRNA VACCINES

New to market, but research has been ongoing since the 1990s.

HOW THEY WORK: **Instruct cells to make COVID-like proteins that trigger the immune system to fight the virus.**

PROTEIN SUBUNIT VACCINES

Used for three decades against the flu, whooping cough and hepatitis B.

Deliver harmless versions of the COVID protein that train the immune system to fight the virus.

VECTOR VACCINES

Used for decades against chickenpox, malaria and tuberculosis.

Use a modified virus, such as a common cold, to teach the body to fight off COVID.

COVID vaccines are recommended for everyone ages 6 months and older, and boosters for everyone ages 5 years and older, if eligible.[5]

Safe and Sound

COVID vaccines have been:

- **Thoroughly tested** through multi-phase trials with tens of thousands of participants[6]
- **Proven safe and effective** for adults as well as children[7]
- **Vetted and approved** by the US FDA and EMA and endorsed by the WHO[8-10]

Get Your Jab

Vaccines are available at your:

- **Doctor's office**
- **Neighborhood pharmacy**
- **Community health center**

Talk to your **health care provider** or **pharmacist** about which vaccine is right for you.

1. https://www.mayoclinic.org/diseases-conditions/coronavirus/symptoms-causes/syc-20479963
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8782520/
3. https://www.nejm.org/doi/full/10.1056/nejmc2107717
4. https://royalsocietypublishing.org/doi/full/10.1098/rsif.2020.0683
5. https://www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html
6. https://doh.wa.gov/emergencies/covid-19/vaccine-information/safety-and-effectiveness
7. https://doh.wa.gov/emergencies/covid-19/vaccine-information/safety-and-effectiveness
8. https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines
9. https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/vaccines-covid-19/covid-19-vaccines-authorised
10. http://www.bccdc.ca/Health-Info-Site/Documents/COVID-19_vaccine/WHO-EUA-qualified-covid-vaccines.pdf

GAfPA Global Alliance for Patient Access

NCPA NATIONAL COMMUNITY PHARMACISTS ASSOCIATION

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

National Perinatal Association

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

www.infanthealth.org

Empowering Tomorrow's Medical Pioneers: Sponsoring Children with Chronic Illnesses in Pediatric Research, Innovation, Medicine, and Advocacy

Sabina Schmidt Goldstein-Becerra

iCAN
International Children's Advisory Network

Get involved today and Join the iCAN Parent Council!

"iCAN, or the International Children's Advisory Network, is committed to providing numerous opportunities for the pediatric community to come together and hear from the most crucial stakeholders in healthcare: the patients. Our organization empowers all pediatric patients worldwide by facilitating their active participation in innovation, research, and medicine. "

iCAN, or the International Children's Advisory Network, is committed to providing numerous opportunities for the pediatric community to come together and hear from the most crucial stakeholders in healthcare: the patients. Our organization empowers all pediatric patients worldwide by facilitating their active participation in innovation, research, and medicine. Whether you are a patient, family member, healthcare professional, or supporter of the cause, we welcome you to visit our website at www.iCAN.health to learn more about our mission, various programs, and initiatives. Join us to ensure that every child's voice is heard and that their unique experiences are taken into account to improve healthcare outcomes for all pediatric patients.

Exciting News: Join Our Monthly "Ask the Experts" Series to Explore Cutting-Edge Healthcare Technology on September 23, 2023

We are thrilled to share the next installment of our highly anticipated "Ask the Experts" (ATE) series, a monthly event scheduled every Saturday at our new time of 11 AM EST via Zoom. This month, our focus turns to the dynamic world of new technology in healthcare. In an era where technology plays a pivotal role in shaping the future of healthcare, it is crucial to engage in this conversation actively.

Our virtual seminar is open to all, and the best part is that it is entirely free! We invite everyone to seize this unique opportunity to delve into the exciting advancements in healthcare technology and share their thoughts and insights. This monthly series is designed to bring together luminaries from diverse fields, including healthcare, technology, innovation, and even patients. We wholeheartedly encourage you to secure your spot for the upcoming ATE session in September by registering on our website, icanresearch.org, or https://www.icanresearch.org/events-1/ask-the-experts-september-2023/form.

"We urge you to promptly reserve your spot for the upcoming ATE session, as we eagerly anticipate your active engagement and participation. Your journey toward enlightenment and empowerment commences here."

This presents a rare and invaluable opportunity to deeply immerse yourself in the knowledge and insights of top-tier healthcare experts. We urge you to promptly reserve your spot for the upcoming ATE session, as we eagerly anticipate your active engagement and participation. Your journey toward enlightenment and empowerment commences here. Do not miss out on this chance to be part of the conversation shaping the future of healthcare through

technology. To stay updated on upcoming ATE topics and session dates, please follow our Instagram account, @icanresearch.

At the heart of iCAN's mission lies an unwavering dedication to providing a platform for experts to share their wisdom and perspectives. If you possess expertise in pediatric healthcare, whether in innovation, medicine, or technology, we wholeheartedly invite you to contribute as a speaker for our ATE sessions. For additional information and to express your interest, please contact us at abbyclark@icanresearch.org.

"At the heart of iCAN's mission lies an unwavering dedication to providing a platform for experts to share their wisdom and perspectives. If you possess expertise in pediatric healthcare, whether in innovation, medicine, or technology, we wholeheartedly invite you to contribute as a speaker for our ATE sessions."

Prominent Industry Leaders Share Insights on Career Exploration for Kids and Young Adult Professionals at iCAN's Annual Summit in San Diego.

The recent annual summit hosted by iCAN in San Diego saw an impressive lineup of speakers, including representatives from the FDA and Jumohealth, as well as other vital industries. The event was a remarkable platform for professionals to share their career journeys and offer invaluable insights for young minds eager to explore these career paths in the future.

Leanne West, the esteemed President of iCAN, took the moderator role, guiding a stimulating discussion by posing pertinent questions to the panelists. The focus of the conversation revolved around the panelists' journeys into their respective roles and the avenues available for young individuals to follow in their footsteps.

The engagement level was remarkable, as the iCAN kids were highly involved in the session. They seized the unique opportunity to ask the panelists about their career trajectories and delved into personal inquiries about their experiences in the healthcare industry.

This event exemplified iCAN's commitment to nurturing and inspiring the next generation of healthcare professionals. By providing a platform where accomplished industry leaders share their stories and knowledge, iCAN continues to empower young minds and foster a spirit of curiosity and ambition.

"The annual summit in San Diego served as a beacon of hope for kids interested in healthcare careers, offering them firsthand access to the wisdom and experiences of individuals who have made significant contributions to their respective fields. It was an event where dreams met reality, and the insights of accomplished professionals nurtured young aspirations."

The annual summit in San Diego served as a beacon of hope for kids interested in healthcare careers, offering them firsthand access to the wisdom and experiences of individuals who have made significant contributions to their respective fields. It was an event where dreams met reality, and the insights of accomplished professionals nurtured young aspirations. iCAN looks forward to continuing to ignite the spark of curiosity and ambition in the hearts of future healthcare leaders through events like these.

Exciting News: 2024 Summit Set to Inspire in Bari, Italy!

We are thrilled to unveil our much-anticipated event for 2024, and this time, we're taking our annual summit to the enchanting city of Bari, Italy! The excitement among our young members is palpable as they eagerly anticipate this extraordinary gathering. However, we recognize that to make this event truly unforgettable, we need your support and involvement.

Our annual summit has a rich history of providing invaluable opportunities for our youth akin to those previously offered by Empath Labs and Pfizer. It is a transformative platform nurturing inno-

vation, compassion, and collaboration within pediatric healthcare.

If you share our belief in the transformative power of education and inspiration, we invite you to be an integral part of this life-changing event. There are two distinct ways you can contribute to the success of the 2024 Summit:

1. Sponsorship Opportunities:

By becoming a sponsor, you assume a pivotal role in supporting the logistical and organizational aspects of the summit. Your generous contribution will enable us to craft an impactful and seamless experience for all participants. To explore sponsorship opportunities and get involved, please contact Sabina Schmidt Goldstein at sabinaschmidtgoldstein@icanresearch.org.

2. Sponsor a Child's Attendance:

Your sponsorship can directly impact a child's life, affording them a once-in-a-lifetime chance to participate in the Bari Summit. Your support will cover their travel, accommodation, and participation fees, allowing them to immerse themselves in a world of learning, inspiration, and empowerment. To sponsor a child's attendance, please visit our donation page at https://www.icanresearch.org/donate.

Together, we can shape a brighter future for pediatric healthcare by nurturing the boundless potential of our young members. Regardless of its size, your contribution will play a significant role in paving the way for innovative advancements in the field.

"We extend our heartfelt gratitude for considering this opportunity to support the next generation of healthcare leaders. Let us come together in Bari, Italy, and create an unforgettable summit experience that will continue to inspire and empower young minds for years to come! Join us on this incredible journey toward a brighter future in pediatric healthcare."

We extend our heartfelt gratitude for considering this opportunity to support the next generation of healthcare leaders. Let us come together in Bari, Italy, and create an unforgettable summit experience that will continue to inspire and empower young minds for years to come! Join us on this incredible journey toward a brighter future in pediatric healthcare.

Disclosures: *There are no reported disclosures*

NT

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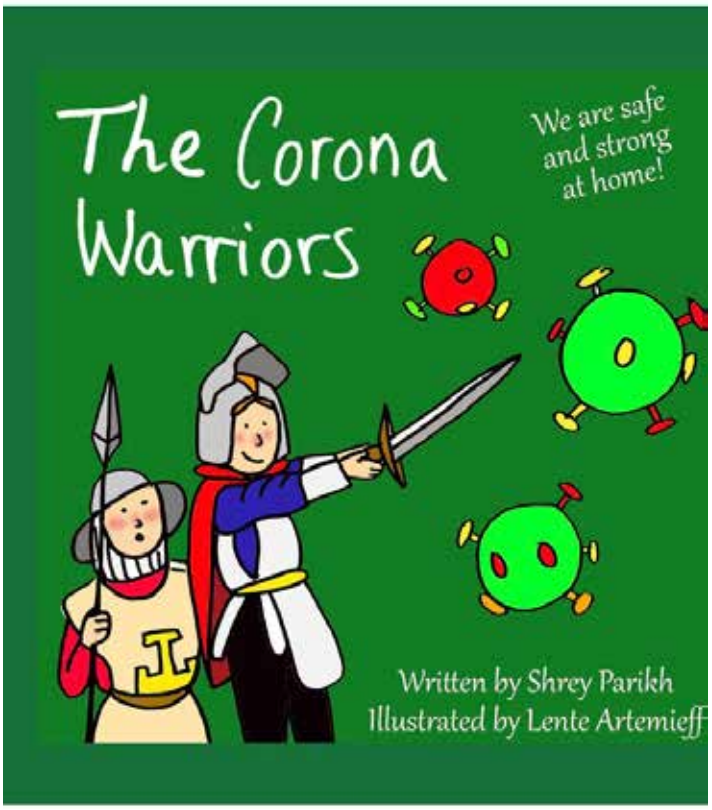
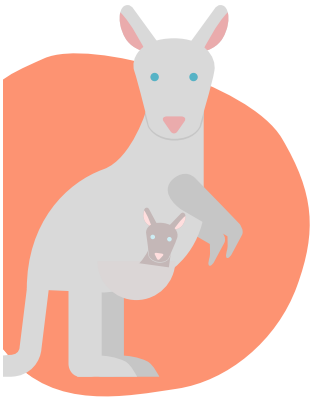


SUPPORTING KANGAROO CARE

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

National Perinatal Association

nicuparentnetwork.org

nationalperinatal.org/skin-to-skin

Your Pregnancy and Substance Use

4 Things you can do to improve your health and lower your risk for complications

Get Prenatal Care

Start early. Go to all your visits. Empower yourself with information so you can make smart decisions. Build relationships with providers who understand Substance Use Disorders (SUDs) and know how to help. Partner with them to reach your goals. But remember, you do not need to be abstinent from substance use to get care. Go now.

Reduce Your Use

There are simple things you can do to limit the harm substances might do.

- Use fewer substances
- Use smaller amounts
- Use less often
- Learn how to use safer

Reducing or quitting smoking is a good place to start. Set your goals, then ask for help.
One of the best things you can do is to stop using alcohol. We know that even small amounts are risky. And when combined with benzos and opioids, alcohol can kill.

Use Medications for Opioid Use Disorder (MOUD) if you are opioid dependent

Methadone and Buprenorphine (Subutex® or Suboxone®) are the "Standard of Care" during pregnancy because they:

- Eliminate the risks of illicit use
- Reduce your risk for relapse
- Can be a positive step towards recovery

Take Good Care of Yourself

You deserve a healthy pregnancy & childbirth.

- Eat healthy and take your prenatal vitamins
- Find the right balance of rest and exercise
- Surround yourself with people who care

Your Health Matters

Academy of Perinatal Harm Reduction

www.perinatalharmreduction.org | www.nationalperinatal.org

Education. Anytime, Anywhere.

Academy of Neonatal Care

The Academy of Neonatal Care serves to educate Respiratory Therapists, Nurses, and Doctors in current and best practices in Neonatal ICU care. We prepare RT's new to NICU to fully function as a bedside NICU RT. Our goal is to enrich NICU care at all levels. Beginner to Advanced Practice, there is something for you at:

www.AcademyofNeonatalCare.org.

Keeping Your Baby Safe
from respiratory infections

RSV
COVID-19
colds
flu

How to protect your little ones from germs and viruses

This year is an especially dangerous cold and flu season - especially for vulnerable infants and children. Fortunately, 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 your 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.
- Drink more water and eat healthy foods.
- Seek mental health support.
- Sleep when you can.

Get Immunized

Vaccinations save lives. Protecting your baby from COVID-19, flu and pertussis lowers their risks for complications from respiratory infections.

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 feel sick or 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.
www.nationalperinatal.org/rsv

National Perinatal Association

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.

COVER COUGHS AND SNEEZES.
Sneeze and cough into your elbow.

USE AN ALCOHOL-BASED HAND SANITIZER.

STAY AWAY FROM SICK PEOPLE
Avoid crowds. Protect vulnerable babies and children.

National Perinatal Association

www.nationalperinatal.org

FREE RESOURCES FOR YOUR NICU

Coping During COVID-19

Targeted interventions to improve the mental health of parents, infants, families, and providers

BONDING WITH YOUR BABY

HELPING CHILDREN AND FAMILIES COPE

CAREGIVERS NEED CARE TOO

National Network of NICU Psychologists

nationalperinatal.org/psychologists

Respiratory Syncytial Virus:

How you can advocate for babies this RSV season

Track national data and trends at the CDC's website www.cdc.gov/rsv

Identify babies at greatest risk

including those with CLD, BPD, CF, and heart conditions

Teach families how to protect

their babies from respiratory infections

Advocate for insurance coverage for palivizumab prophylaxis so more babies can be protected *

Use your best clinical judgement

when prescribing RSV prophylaxis

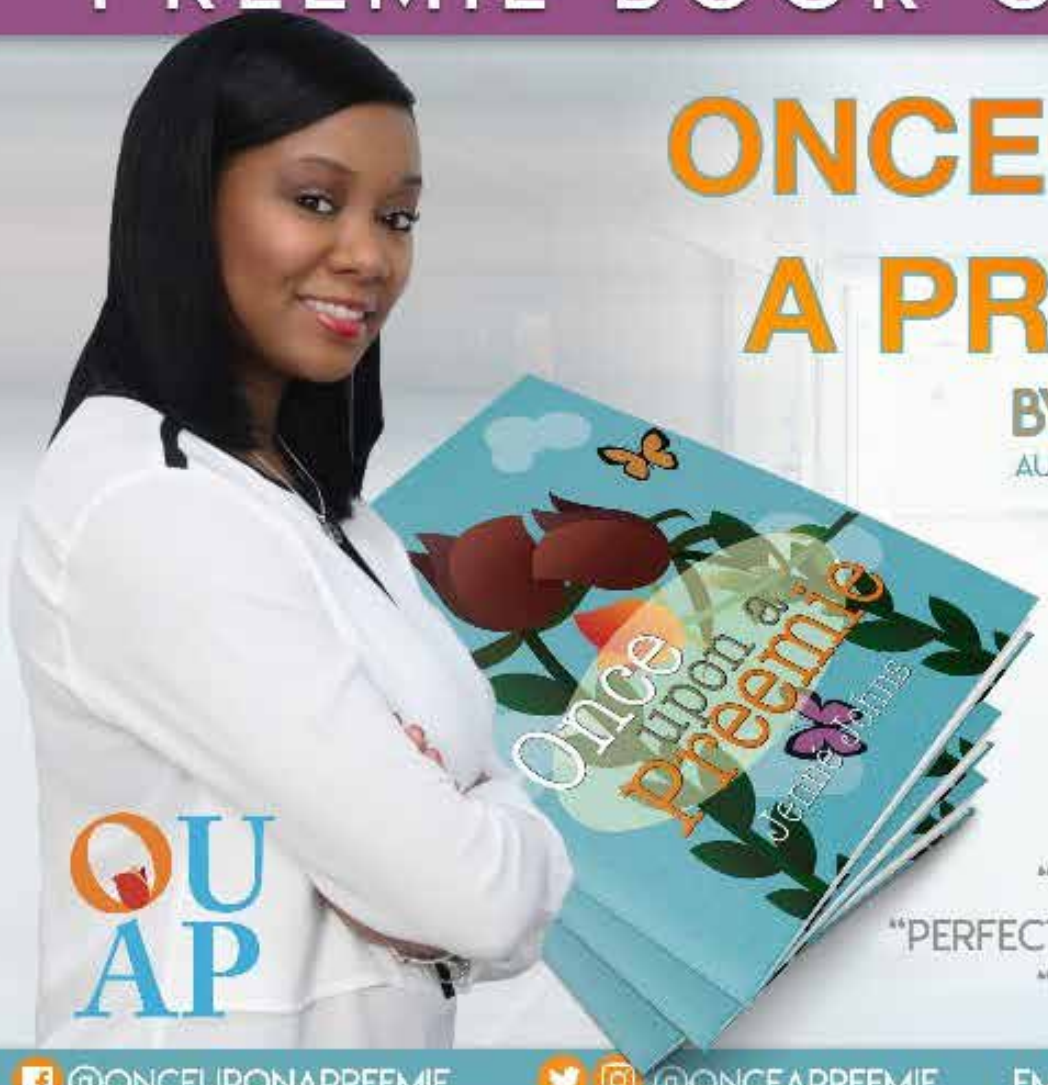
Tell insurers what families need

and provide the supporting evidence

National Perinatal Association

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

PREEMIE BOOK ON SALE



ONCE UPON A PREEMIE

BY JENNÉ JOHNS

AUTHOR | SPEAKER | ADVOCATE

QUAP

"ONE OF A KIND"
"PERFECT FOR PREEMIE FAMILIES"
"ENCOURAGING"

@ONCEUPONAPREEMIE @ONCEAPREEMIE EMAIL: HI@ONCEUPONAPREEMIE

ONCE UPON A PREEMIE IS A BEAUTIFUL NEW WAY TO LOOK AT THE LIFE OF A PREEMIE BABY. IT EXPLORES THE PARENT AND CHILD NEONATAL INTENSIVE CARE UNIT (NICU) JOURNEY IN A UNIQUE AND UPLIFTING WAY.

SPEAKING ENGAGEMENTS

PREEMIE PARENT ALLIANCE SUMMIT
NATIONAL ASSOCIATION OF PERINATAL SOCIAL WORKERS
CONGRESSIONAL BLACK CAUCUS ANNUAL LEGISLATIVE CONFERENCE
NATIONAL MEDICAL ASSOCIATION ANNUAL CONFERENCE
HUDSON VALLEY PERINATAL PUBLIC HEALTH CONFERENCE
MATERNITY CARE COALITION ADVOCACY DAY

MEDIA APPEARANCES

Preemie Family

The Joyner Report

PEBBLES of Hope

WDAS 105.3 FM

CBS RADIO

wgts 91.9 Washington, D.C.

MAJIC 102.3 92.7 The Real Sound of the DMV

AVAILABLE FOR $12.99 ON AMAZON OR ONCEUPONAPREEMIE.COM

Still a **Preemie?**

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 PREEMIE

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 PREEMIE

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

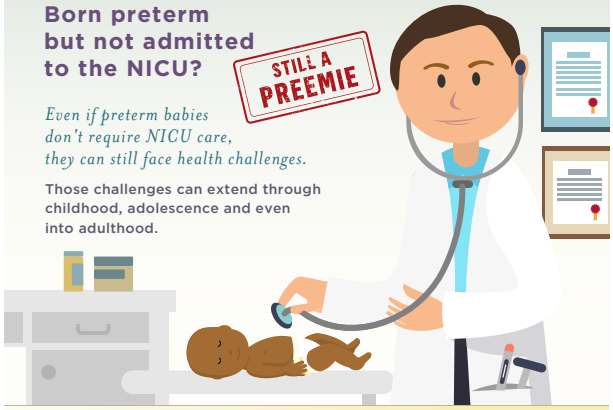
But because some health plans determine coverage based on a preemie's weight, **families of babies that weigh more may face access barriers and unmanageable medical bills.**

Born preterm but not admitted to the NICU?

STILL A PREEMIE

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 Preemies

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

All Preemies

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

NCfIH National Coalition for Infant Health

Protecting Access for Premature Infants through Age Two

www.infanthealth.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

National Perinatal Association

FREE Online CE Activity

Nurses: parents trust you.

You can help reduce the risk of Sudden Infant Death Syndrome (SIDS), the leading cause of death among infants between 1 month and 1 year of age. Take our **free continuing education (CE) activity** to stay up to date on the latest safe infant sleep recommendations. Approved for 1.5 contact hours.

Learn more about the free online activity at **https://nichd.nih.gov/SafeSleepCE.**

The CE activity explains safe infant sleep recommendations from the American Academy of Pediatrics and is approved by the Maryland Nurses Association, an accredited approver of the American Nurses Credentialing Center's Commission on Accreditation.

NIH *Eunice Kennedy Shriver* National Institute of Child Health and Human Development

SAFE TO SLEEP®

Compiled and Reviewed by Sandeep Lankireddy, BA, OMS IV

When the Unknown Is Unknowable: Confronting Diagnostic Uncertainty

NEWS PROVIDED BY

American Academy of Pediatrics

by Giulia Faison, MD, MA; Fu-Sheng Chou, MD, PhD; Chris Feudtner, MD, PhD, MPH; Annie Janvier, MD, PhD

September 14, 2023

The neonatology literature often refers to medical uncertainty and specifically the challenges of predicting morbidity for extremely premature infants, who can have widely varying outcomes. Less has been written about situations in which diagnoses are simply unknown or unattainable. This case highlights the importance of communication amidst uncertainty from a lack of knowledge about aspects of a patient's condition. Using epidemiologic and clinical reasoning, the authors challenge the assumption that diagnostic uncertainty must necessarily portend prognostic uncertainty. When physicians' quest for a diagnosis becomes burdensome and detrimental to the infant's quality of life, this should be abandoned and replaced by focusing on prognosis. The authors focus on the shift of the physician's role toward one of support, assisting the family in ascribing meaning to the dying experience. By focusing on prognosis and support, communication can proceed with more clarity, understanding, and empathy.

NT

Neonatal Hypothermia: Not an Issue to Simply Blanket Over

NEWS PROVIDED BY

American Academy of Pediatrics

August 17, 2023

Editor's Note: Eli Cahan is a resident physician in pediatrics at The Boston Combined Residency Program at Boston Children's Hospital and Boston Medical Center, and an investigative journalist whose work focuses on the intersection of health equity and social justice. -Rachel Y. Moon, MD, Associate Editor, Digital Media, Pediatrics

As a pediatrics resident learning the neonatal resuscitation program (NRP) for the first time, there's lots to remember: PIPs (peak inspiratory pressures) and PEEPs (positive end-expiratory pressures), bulb suctions and deep suctions, CPAPs (continuous positive airway pressures) and C-MACs (video laryngoscopes).

However, every NRP session starts the same, by turning on the infant warmer. Babies don't like the cold, instructors say, citing surface area-to-volume ratios.

Neonatal hypothermia, however, continues to be an issue. Historical studies in the US have found increases in mortality of up to 30% per degree below the low end of normal body temperature. Other studies have found maintenance of normothermia can reduce mortality by 19% per degree above hypothermia. Still others have found specific interventions—like thermal mattresses and heated wraps—can together reduce mortality by nearly 50%.

Despite the importance of neonatal hypothermia, large-scale studies—both domestically, and abroad, including in low- and middle-income countries—aiming to quantify its prevalence and illness course are scarce.

In an article being early released this week in Pediatrics, Frade Garcia and colleagues set out to answer these questions by extracting data on over 200,000 premature and/or small for gestational age newborns from 34 hospitals between 2018-2021 (10.1542/peds.2023-061607).

They found that almost two-thirds of newborns in middle-income countries (MICs) experienced hypothermia within an hour of birth; in high-income countries (HICs), almost 30% of newborns did so. Furthermore, the in-hospital mortality rates of hypothermic neonates in MICs were 21% above those of euthermic neonates. In HICs, the differences were even more pronounced; infants who were hypothermic had mortality rates 26% higher than their euthermic peers. All told, each additional degree reduced mortality rates by around 10% in both MICs and HICs.

The authors were careful to caution that hypothermia may be a product, rather than a cause, of underlying illness that can increase mortality risk. Nonetheless, they highlight the importance of attentiveness to hypothermia as a key method in newborn management.

"Hypothermia remains a common problem in both MICs and HICs," the authors wrote, "urging the medical community caring for newborns around the globe to renew their focus on this often-neglected vital sign is a key strategy to improve outcomes."

Clinicians across the practice spectrum interested in advancing the short- and long-term wellbeing of neonates can read more in the September issue of Pediatrics.

NT

Heterogeneity and Gaps in Reporting Primary Outcomes From Neonatal Trials

NEWS PROVIDED BY

American Academy of Pediatrics

by Ami Baba, MRes; James Webbe, MB BChir, PhD; Nancy J. Butcher, PhD, et al.

August 29, 2023

Objectives

Clear outcome reporting in clinical trials facilitates accurate interpretation and application of findings and improves evidence-informed decision-making. Standardized core outcomes for reporting neonatal trials have been developed, but little is known about how primary outcomes are reported in neonatal trials. Our aim was to identify strengths and weaknesses of primary outcome reporting in recent neonatal trials.

Methods

Neonatal trials including ≥100 participants/arm published between 2015 and 2020 with at least 1 primary outcome from a neonatal core outcome set were eligible. Raters recruited from Cochrane Neonatal were trained to evaluate the trials' primary outcome reporting completeness using relevant items from Consolidated Standards of Reporting Trials 2010 and Consolidated Standards of Reporting Trials-Outcomes 2022 pertaining to the reporting of the definition, selection, measurement, analysis, and interpretation of primary trial outcomes. All trial reports were assessed by 3 raters. Assessments and discrepancies between raters were analyzed.

Results

Outcome-reporting evaluations were completed for 36 included neonatal trials by 39 raters. Levels of outcome reporting completeness were highly variable. All trials fully reported the primary outcome measurement domain, statistical methods used to compare treatment groups, and participant flow. Yet, only 28% of trials fully reported on minimal important difference, 24% on outcome data missingness, 66% on blinding of the outcome assessor, and 42% on handling of outcome multiplicity.

Conclusions

Primary outcome reporting in neonatal trials often lacks key information needed for interpretability of results, knowledge synthesis, and evidence-informed decision-making in neonatology. Use of existing outcome-reporting guidelines by trialists, journals, and peer reviewers will enhance transparent reporting of neonatal trials.

NT

Patterns of antibiotic use, pathogens, and prediction of mortality in hospitalized neonates and young infants with sepsis: A global neonatal sepsis observational cohort study (NeoOBS)

NEWS PROVIDED BY

PLOS Medicine

by Neal J. Russell ,Wolfgang Stöhr ,Nishad Plakkal, et al.

June 8, 2023

Abstract

Background

There is limited data on antibiotic treatment in hospitalized neonates in low- and middle-income countries (LMICs). We aimed to describe patterns of antibiotic use, pathogens, and clinical outcomes, and to develop a severity score predicting mortality in neonatal sepsis to inform future clinical trial design.

Methods and Findings

Hospitalized infants <60 days with clinical sepsis were enrolled during 2018 to 2020 by 19 sites in 11 countries (mainly Asia and Africa). Prospective daily observational data was collected on clinical signs, supportive care, antibiotic treatment, microbiology, and 28-day mortality. Two prediction models were developed for (1) 28-day mortality from baseline variables (baseline NeoSep Severity Score); and (2) daily risk of death on IV antibiotics from daily updated assessments (NeoSep Recovery Score). Multivariable Cox regression models included a randomly selected 85% of infants, with 15% for validation.

A total of 3,204 infants were enrolled, with median birth weight of 2,500 g (IQR 1,400 to 3,000) and postnatal age of 5 days (IQR 1 to 15). 206 different empiric antibiotic combinations were started in 3,141 infants, which were structured into 5 groups based on the World Health Organization (WHO) AWaRe classification. Approximately 25.9% (n = 814) of infants started WHO first line regimens (Group 1—Access) and 13.8% (n = 432) started WHO second-line cephalosporins (cefotaxime/ceftriaxone) (Group 2—"Low" Watch). The largest group (34.0%, n = 1,068) started a regimen providing partial extended-spectrum beta-lactamase (ESBL)/pseudomonal coverage (piperacillin-tazobactam, ceftazidime, or fluoroquinolone-based) (Group 3—"Medium" Watch), 18.0% (n = 566) started a carbapenem (Group 4—"High" Watch), and 1.8% (n = 57) a Reserve antibiotic (Group 5, largely colistin-based), and 728/2,880 (25.3%) of initial regimens in Groups 1 to 4 were escalated, mainly to carbapenems, usually for clinical deterioration (n = 480; 65.9%).

A total of 564/3,195 infants (17.7%) were blood culture pathogen positive, of whom 62.9% (n = 355) had a gram-negative organism, predominantly Klebsiella pneumoniae (n = 132) or Acinetobacter spp. (n = 72). Both were commonly resistant to WHO-recommended regimens and to carbapenems in 43 (32.6%) and 50 (71.4%) of cases, respectively. MRSA accounted for 33 (61.1%) of 54 Staphylococcus aureus isolates.

Overall, 350/3,204 infants died (11.3%; 95% CI 10.2% to 12.5%), 17.7% if blood cultures were positive for pathogens (95% CI 14.7% to 21.1%, n = 99/564). A baseline NeoSep Severity Score had a C-index of 0.76 (0.69 to 0.82) in the validation sample, with mortality of 1.6% (3/189; 95% CI: 0.5% to 4.6%), 11.0% (27/245; 7.7% to 15.6%), and 27.3% (12/44; 16.3% to 41.8%) in low (score 0 to 4), medium (5 to 8), and high (9 to 16) risk groups, respectively, with similar performance across subgroups. A related NeoSep Recovery Score had an area under the receiver operating curve for predicting death the next day between 0.8 and 0.9 over the first week. There was significant variation in outcomes between sites and external validation would strengthen score applicability.

Conclusion

Antibiotic regimens used in neonatal sepsis commonly diverge from WHO guidelines, and trials of novel empiric regimens are urgently needed in the context of increasing antimicrobial resistance (AMR). The baseline NeoSep Severity Score identifies high mortality risk criteria for trial entry, while the NeoSep Recovery Score can help guide decisions on regimen change. NeoOBS data informed the NeoSep1 antibiotic trial (ISRCTN48721236), which aims to identify novel first- and second-line empiric antibiotic regimens for neonatal sepsis.

Trial Registration

ClinicalTrials.gov, (NCT03721302).

Author Summary

Why was this study done?

1. Increasing trends in antimicrobial resistance (AMR) disproportionately affect neonates and young infants with sepsis in LMIC settings and undermine the effectiveness of WHO-recommended antibiotics.
2. Despite this, longitudinal data on antibiotic management strategies and outcomes of hospitalized neonates and young infants with sepsis in low- and middle-income country (LMIC) settings are extremely limited, impeding the design of robust antibiotic trials.
3. There is limited data to define risk stratification, inclusion, and escalation criteria in trials of sepsis in hospitalized neonates and young infants.

Why did the researchers do and find?

1. In this large global, prospective, hospital-based observational study across 4 continents, including LMIC settings, there was a high mortality among infants with culture positive sepsis (almost 1 in 5), and a significant burden of antibiotic resistance.
2. This study highlights wide variations in standard of care (SOC) for sepsis in neonates and young infants, with more than 200 different antibiotic combinations, significant divergence from WHO-recommended regimens, and frequent switching of antibiotics.
3. A NeoSep Severity Score that defined patterns of mortality risk at baseline was developed from 4 non-modifiable and 6 modifiable factors that are feasible to measure across a range of LMIC hospital contexts.
4. A NeoSep Recovery Score including the same modifiable factors (with the addition of cyanosis) predicted mortality on the following day during treatment.

What do these findings mean?

1. These data demonstrate that patterns of routine antibiotic use are now markedly divergent from global guidance.
2. There is an urgent need for large pragmatic randomized controlled trials to address optimal empiric first- and second-line antibiotic treatment strategies in LMIC hospital settings with a significant AMR burden.
3. The wide range of multiple antibiotic regimens routinely used as SOC suggests the need for novel trial designs.
4. The NeoSep Severity Score and NeoSep Recovery Score informed inclusion and escalation criteria in the NeoSep1 antibiotic trial (ISRCTN48721236) that aims to identify novel first- and second-line empiric

antibiotic regimens for neonatal sepsis.

NT

Viral Infections and Neonatal Necrotizing Enterocolitis: A Meta-analysis

NEWS PROVIDED BY

American Academy of Pediatrics

by Ryan M. McAdams

July 8, 2023

Context

Necrotizing enterocolitis (NEC) is a devastating intestinal disease affecting preterm infants. Studies implicate viral infections in etiopathogenesis.

Objective

To summarize the association of viral infections with NEC by systematic review and meta-analysis.

Data Sources

We searched Ovid-Medline, Embase, Web of Science, and Cochrane databases in November 2022.

Study Selection

We included observational studies that examined the association between viral infections and NEC in newborn infants.

Data Extraction

We extracted data regarding the methodology, participant characteristics, and outcome measures.

Results

We included 29 and 24 studies in the qualitative review and meta-analysis, respectively. The meta-analysis demonstrated a significant association between viral infections and NEC (odds ratio [OR], 3.81, 95% confidence interval: 1.99–7.30, 24 studies). The association remained significant after excluding the outliers (OR, 2.89 [1.56–5.36], 22 studies) and studies with poor methodology (OR, 3.33 [1.73–6.43], 22 studies). In subgroup analysis based on participants' birth weight, studies including very low birth weight infants only (OR, 3.62 [1.63–8.03], 8 studies) and non-very low birth weight infants only (OR, 5.28 [1.69–16.54], 6 studies) showed a significant association. In subgroup analysis based on specific viruses, infection with rotavirus (OR, 3.96 [1.12–13.95], 10 studies), cytomegalovirus (OR, 3.50 [1.60–7.65], 5 studies), norovirus (OR, 11.95 [2.05–69.84], 2 studies), and astrovirus (OR, 6.32 [2.49–16.02], 2 studies) was significantly associated with NEC.

Limitations

Heterogeneity of the included studies.

Conclusions

Viral infection is associated with an increased risk of NEC in newborn infants. We need methodologically sound prospective studies to assess the effect of preventing or treating viral infections on NEC incidence.

NT

A minimal neonatal dataset (mND) for low- and middle-income countries as a tool to record, analyse, prevent and follow-up neonatal morbidity and mortality

NEWS PROVIDED BY

Journal of Global Health Reports

by Persis Zokara Zala, Solange Ouedraogo, Sofia Schumacher, Paul Ouedraogo, Flavia Rosa-Mangeret, Riccardo E. Pfister

June 9, 2023

Background

Neonatal mortality accounts for the most significant and today increasing proportion of under-5 mortality, especially in sub-Saharan Africa. The neonatal population is a sharp target for intervention for these 2.5 million annual deaths. The limited availability of quality data on morbidities leading up to this mortality hampers the development and follow-up of effective interventions. For leverage, undoubtedly more detailed and standardized data adapted to low and middle-income countries (LMICs) is urgently needed.

Methods

Drawing on existing databases such as the Swiss Neonatal Network and Vermont Oxford Network, 267 clinical, administrative, and structural variables of neonatal health and healthcare services were selected and submitted for ranking to 42 experts through two Delphi rounds. An empirically limited number of variables with the highest ranking for availability and relevance in low and middle-income countries were field-tested in three centres in Burkina Faso during one year for improvement and practicality.

Results

We report the database development process according to the Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) recommendations. The final dataset is composed of 73 clinical and 6 administrative patient variables, and 21 structural healthcare center variables. Two-thirds of clinical variables maintain matching definitions with high-income countries.

Conclusions

The developed minimal neonatal dataset is standardized and field-tested for relevance and availability in LMICs allowing south-south and some south-north cross-comparison.

NT

Hearing Assessment in Infants, Children, and Adolescents: Recommendations Beyond Neonatal Screening

NEWS PROVIDED BY

American Academy of Pediatrics

August 28, 2023

Children who are deaf or hard of hearing (D/HH) are at high risk for permanent deficits in language acquisition and downstream effects such as poor

pac-lac

Perinatal Advisory Council:
Leadership, Advocacy and Consultation

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academic performance, personal–social maladjustments, and emotional difficulties. Identification of children born D/HH through newborn hearing screening and subsequent timely early intervention can prevent or reduce many of these adverse consequences. Ongoing surveillance for changes in hearing thresholds after infancy is also important and should be accomplished by subjective assessment for signs of atypical hearing and with objective screening tests. Scheduled hearing screening may take place in the primary care setting, or via referral to an audiologist according to the Bright Futures/American Academy of Pediatrics "Recommendations for Preventive Pediatric Health Care" (also known as the periodicity schedule). This report covers hearing assessment beyond the newborn period, reviews risk factors for hearing level change, and provides guidance for providers of pediatric primary care on the assessment and care of children who are D/HH.

NT

Neonatal Admission Temperature in Middle- and High-Income Countries

NEWS PROVIDED BY

American Academy of Pediatrics

by Alejandro Frade Garcia, MD; Erika M. Edwards, PhD, MPH; José Maria de Andrade Lopes, MD; Lloyd Tooke, MBChB, MMed (Paeds), Cert. Neonatology; Evelyne Assenga, MD, MPH; Danielle E. Y. Ehret, MD, MPH; Anne Hansen, MD, MPHMay 22, 2023

Background and Objectives

Despite being preventable, neonatal hypothermia remains common. We hypothesized that the proportion of newborns with hypothermia on admission would be high in all settings, higher in hospitals in middle-income countries (MIC) compared with high-income countries (HIC), and associated with morbidity and mortality.

Methods

Using the Vermont Oxford Network database of newborns with birth weights 401 to 1500 g or 22 to 29 weeks' gestational age from 2018 to 2021, we analyzed maternal and infant characteristics, delivery room management, and outcomes by temperature within 1 hour of admission to the NICU in 12 MICs and 22 HICs.

Results

Among 201 046 newborns, hypothermia was more common in MIC hospitals (64.0%) compared with HIC hospitals (28.6%). Lower birth weight, small for gestational age status, and prolonged resuscitation were perinatal risk factors for hypothermia. The mortality was doubled for hypothermic compared with euthermic newborns in MICs (24.7% and 15.4%) and HICs (12.7% and 7.6%) hospitals. After adjusting for confounders, the relative risk of death among hypothermic newborns compared with euthermic newborns was 1.21 (95% confidence interval 1.09–1.33) in MICs and 1.26 (95% confidence interval 1.21–1.31) in HICs. Every 1°C increase in admission temperature was associated with a 9% and 10% decrease in mortality risk in MICs and HICs, respectively.

Conclusions

In this large sample of newborns across MICs and HICs, hypothermia remains common and is strongly associated with mortality. The profound burden of hypothermia presents an opportunity for strategies to improve outcomes and achieve the neonatal 2030 Sustainable Development Goal.

NT

Effects of severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) Delta variant (B.1.617.2) on maternal and neonatal outcomes

NEWS PROVIDED BY

Journal of Global Health Reports

by Dolma K, John S, Gulati R.

June 27, 2023

Background

Coronavirus 2019 (COVID-19) infection during pregnancy has been reported to increase the risk of adverse maternal and perinatal outcomes. Data from the general population suggests that the Delta variant infection is associated with more severe disease than the Alpha variant. However, there is limited data available on the impact of delta variant infection during pregnancy on perinatal outcomes. This study aimed to evaluate the effects of SARS-CoV-2 delta variant infection during pregnancy on maternal and neonatal outcomes.

Methods

In this retrospective, single-center study, we included all infants who were born from May 2020 through October 2021 to mothers with COVID-19 infection during

pregnancy. At our institution, we started inpatient testing of all obstetric patients on admission on May 29, 2020. In our region, the Delta variant accounted for more than 80% of all COVID-19 infections from July 2021. Maternal and neonatal outcomes were compared between the pre-Delta (May 2020–June2021, n = 20) and Delta groups (July 2021–October 2021, n = 52).

Results

In comparing the Pre-Delta to Delta groups, there were no significant differences in the rates of maternal chorioamnionitis, gestational hypertension, diabetes, antepartum bleeding, c-section, maternal ICU admission, maternal COVID-19 symptoms, and maternal survival. All neonates born to these mothers tested negative for COVID-19. The rates of premature birth, Apgar score of less than 5 at 5 minutes, small for gestational age, microcephaly, need for noninvasive or invasive ventilator support, hypoxic ischemic encephalopathy, culture positive sepsis, and neonatal survival were not different between the two groups. There was no difference in placental findings between the two groups. However, infants born to symptomatic mothers in the Delta group had a higher rate of preterm delivery.

Conclusions

Based on our study, the Delta variant of COVID-19 can increase preterm birth rates among symptomatic mothers. Further meta-analysis of available studies is needed to evaluate its effect on neonatal outcomes.

NT

Reducing Severe Intraventricular Hemorrhage in Preterm Infants With Improved Care Bundle Adherence

NEWS PROVIDED BY

American Academy of Pediatrics

by Sarah E. Kolnik, MD, MBA; Kirtikumar Upadhyay, MD; Thomas R. Wood, BM, BCh, PhD; Sandra E. Juul, MD, PhD; Gregory C. Valentine, MD, MED

August 23, 2023

Background and Objectives

Intraventricular hemorrhage prevention bundles (IVHPBs) can decrease the incidence of intraventricular hemorrhage (IVH) in premature infants. Our center had a high rate of severe (grade III/IV) IVH (9.8%), and poor adherence (24%) to an IVHPB in neonates born ≤1250 g or ≤30 gestational weeks. Improvement initiatives were planned to decrease the incidence of severe IVH by 30% over 2 years.

Methods

A multidisciplinary team undertook interventions including in-service training, prompt initiation of IVHPB, revision of guidelines, and process standardization. Baseline data were collected from May 2016 to June 2018, with interventions occurring from July 2018 to May 2020. Adherence to the IVHPB was the primary process measure, and incidence of severe IVH the primary outcome measure. Control charts were used to analyze the effect of interventions on outcome. Balancing measures included use of breast milk at discharge, use of mechanical ventilation after initial resuscitation, and bronchopulmonary dysplasia.

Results

A total of 240 infants were assessed pre-intervention, and 185 during interventions. Adherence to the IVHPB improved from 24% to 88%. During this period, the incidence of severe IVH decreased from 9.8% to 2.4%, a 76% reduction from baseline. A higher adherence score was associated with reduced odds of IVH (odds ratio 0.30; 95% confidence interval 0.10–0.90, P = .03).

Conclusion

Interventions focused on enhancing adherence to an IVHPB were associated with a reduced rate of severe IVH in high-risk neonates, highlighting the importance of assessing adherence to clinical guidelines.

NT

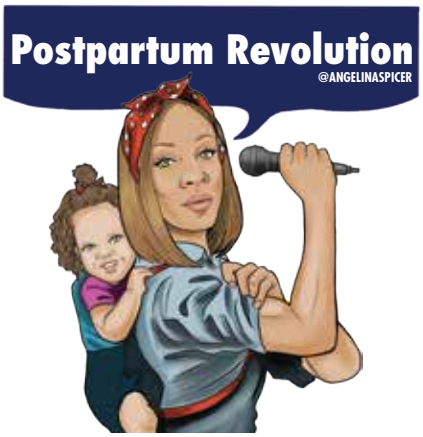
Vaginal and neonatal microbiota in pregnant women with preterm premature rupture of membranes and consecutive early onset neonatal sepsis

NEWS PROVIDED BY

BMC Medicine

by Luiz Gustavo dos Anjos Borges, Jana Pastuschek, Yvonne Heimann, Kristin Dawczynski, PEONS study group, Ekkehard Schleußner, Dietmar H. Pieper & Janine Zöllkau

March 13, 2023



Background

Preterm premature rupture of membranes (PPROM), which is associated with vaginal dysbiosis, is responsible for up to one-third of all preterm births. Consecutive ascending colonization, infection, and inflammation may lead to relevant neonatal morbidity including early-onset neonatal sepsis (EONS). The present study aims to assess the vaginal microbial composition of PPROM patients and its development under standard antibiotic therapy and to evaluate the usefulness of the vaginal microbiota for the prediction of EONS. It moreover aims to decipher neonatal microbiota at birth as possible mirror of the in utero microbiota.

Methods

As part of the PEONS prospective multicenter cohort study, 78 women with PPROM and their 89 neonates were recruited. Maternal vaginal and neonatal pharyngeal, rectal, umbilical cord blood, and meconium microbiota were analyzed by 16S rRNA gene sequencing. Significant differences between the sample groups were evaluated using permutational multivariate analysis of variance and differently distributed taxa by the Mann–Whitney test. Potential biomarkers for the prediction of EONS were analyzed using the MetaboAnalyst platform.

Results

Vaginal microbiota at admission after PPROM were dominated by Lactobacillus spp. Standard antibiotic treatment triggers significant changes in microbial community (relative depletion of Lactobacillus spp. and relative enrichment of Ureaplasma parvum) accompanied by an increase in bacterial diversity, evenness and richness. The neonatal microbiota showed a heterogeneous microbial composition where meconium samples were characterized by specific taxa enriched in this niche. The vaginal microbiota at birth was shown to have the potential to predict EONS with Escherichia/Shigella and Facklamia as risk taxa and Anaerococcus obesiensis and Campylobacter ureolyticus as protective taxa. EONS cases could also be predicted at a reasonable rate from neonatal meconium communities with the protective taxa Bifidobacterium longum, Agathobacter rectale, and S. epidermidis as features.

Conclusion

Vaginal and neonatal microbiota analysis by 16S rRNA gene sequencing after PPROM may form the basis of individualized risk assessment for consecutive EONS. Further studies on extended cohorts are necessary to evaluate how far this technique may in future close a diagnostic gap to optimize and personalize the clinical management of PPROM patients.

NT

Data-driven longitudinal characterization of neonatal health and morbidity

NEWS PROVIDED BY

Science

by Davide E Francesco, Jonathan D Reiss, Jacquelyn Roger, et al.

Feb 15, 2023

Perinatal Risk Assessment

Reduction of neonatal mortality and morbidity requires timely risk assessment so that care can be appropriately managed. Using multiple cohorts of mother and newborn dyads, De Francesco et al. trained and externally validated a deep learning model to predict different adverse neonatal outcomes by mining the paired electronic health records (EHRs). Their method largely outperformed currently used EHR-based clinical risk scores and can be applied to EHR data at time points ranging

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from early gestation to at or after birth, positioning their risk assessment model to be of potential clinical utility. —CAC

Abstract

Although prematurity is the single largest cause of death in children under 5 years of age, the current definition of prematurity, based on gestational age, lacks the precision needed for guiding care decisions. Here, we propose a longitudinal risk assessment for adverse neonatal outcomes in newborns based on a deep learning model that uses electronic health records (EHRs) to predict a wide range of outcomes over a period starting shortly before conception and ending months after birth. By linking the EHRs of the Lucile Packard Children's Hospital and the Stanford Healthcare Adult Hospital, we developed a cohort of 22,104 mother-newborn dyads delivered between 2014 and 2018. Maternal and newborn EHRs were extracted and used to train a multi-input multitask deep learning model, featuring a long short-term memory neural network, to predict 24 different neonatal outcomes. An additional cohort of 10,250 mother-newborn dyads delivered at the same Stanford Hospitals from 2019 to September 2020 was used to validate the model. Areas under the receiver operating characteristic curve at delivery exceeded 0.9 for 10 of the 24 neonatal outcomes considered and were between 0.8 and 0.9 for 7 additional outcomes. Moreover, comprehensive association analysis identified

multiple known associations between various maternal and neonatal features and specific neonatal outcomes. This study used linked EHRs from more than 30,000 mother-newborn dyads and would serve as a resource for the investigation and prediction of neonatal outcomes. An interactive website is available for independent investigators to leverage this unique dataset: https://maternal-child-health-associations.shinyapps.io/shiny_app/.

NT

Percutaneous Closure of the Patent Ductus Arteriosus in Infants ≤2 kg: IMPACT Registry Insights

NEWS PROVIDED BY

American Academy of Pediatrics

by Adrianne Rahde Bischoff, MD; Kevin F. Kennedy, MS; Carl H. Backes, MD; Shyam Sathanandam, MD; Patrick J. McNamara, MD

August 2, 2023

Objectives

Percutaneous patent ductus arteriosus (PDA) closure is becoming the standard of care for definitive closure in progressively smaller and younger neonates. The objective of this study was to assess safety and feasibility of percutaneous PDA closure in patients ≤2 kg.

Methods

This was a cohort study using the IMPACT Registry (Improving Pediatric and Adult Congenital Treatments) from the American College of Cardiology Foundation's National Cardiovascular Data Registry. Patients who were ≤2 kg at the time of percutaneous PDA closure were included. The primary outcome was the composite of technical failure and/or major adverse event.

Results

A total of 1587 attempted PDA closures were included, with a 3% incidence of technical failure and 5.5% incidence of the composite outcome. Major adverse events were observed in 3.8% of the patients; the most common events were device embolization requiring retrieval and unplanned cardiac or vascular surgery in 1.3% and 1.3% of cases, respectively. The incidence of the composite outcome was associated with the need for arterial access (P < .001) as well as annual hospital volume of percutaneous PDA closures in infants ≤2 kg (P = .001). The incidence of the composite outcome has decreased overtime, whereas median weight at the time of procedure has also diminished.

Conclusions

Percutaneous PDA closure appears to be safe and feasible procedures in infants ≤2 kg. The incidence of major adverse events has continued to decline over the years and seems to have a strong correlation with individual center case volumes and expertise.

NT

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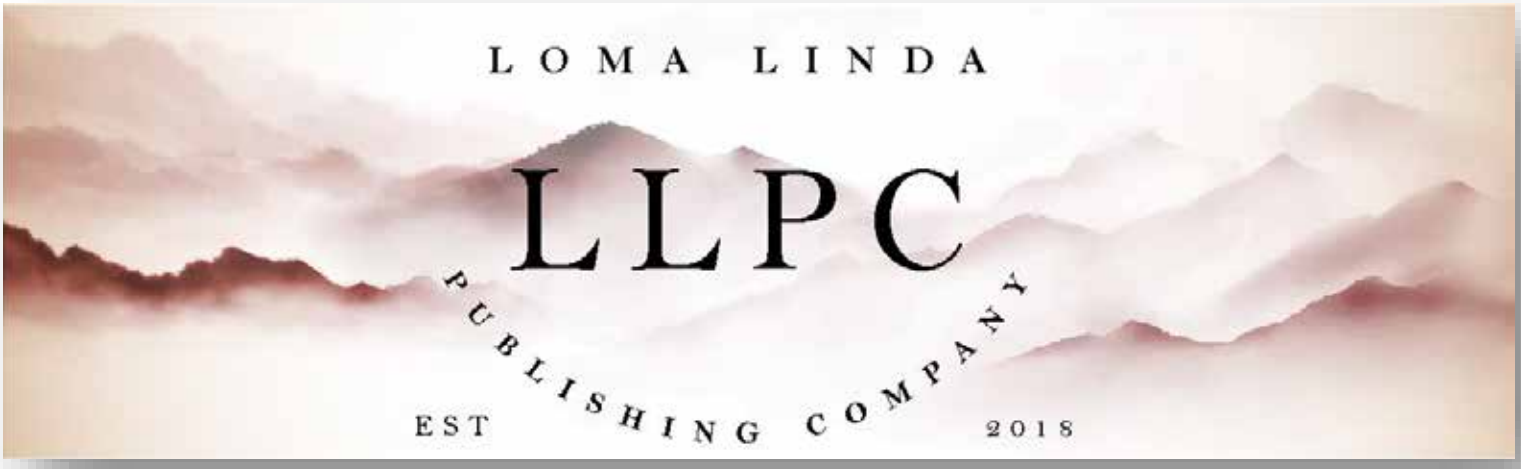

A Newborn with Cloverleaf Skull and Sacrococcygeal Eversion due to a Rare FGFR2-Related Craniosynostosis Disorder: Beare-Stevenson Syndrome

Jennifer Shin, MS, Skyler Muchmore MSII, Robin D. Clark, MD

Case Summary:

A Genetics consultation was requested for a term female infant with a cloverleaf skull and multiple congenital anomalies. She was born by Cesarian section at 38 weeks 5 days gestation to a 29-year-old G2P1 mother. Father was 30 years old. Pregnancy was complicated by maternal obesity, polyhydramnios, prenatal diagnosis of fetal ventriculomegaly, and Chiari 1 malformation.

The physical exam was noteworthy for major and minor anomalies:

- Cloverleaf skull with turricephaly (Figure 1a); moderately tense anteriorly displaced fontanelle; flat midface; maxillary hypoplasia, class III malocclusion with excess tissue on the lower alveolar ridge (Figure 1b), with a prominence at the midline; intact, high arched palate, shallow and widely spaced orbits, posterior auricular pits and indentations, bilateral preauricular and lobular pits and excess nuchal skin
- Broad adducted thumbs and great toes (Figure 1c) without syndactyly and with a range of motion of all joints.
- The caudal appendage at the base of the spine has a blind central pit with a hard, bony consistency (Figure 1d)
- Thick umbilical stump with excess epithelialization extending 2-3 cm up the cord (Figure 1e)
- Anteriorly placed anus at the base of the introitus; edematous and widely separated labia; unable to visualize clitoris.
- Hyperkeratotic palms and soles (Figure 1f); deep palmar and plantar creases with many accessory creases and rugae on the face

"During her 3-month hospitalization, she required a ventriculoperitoneal shunt, tracheostomy, and gastrostomy tube. The first step in the surgical correction of her craniosynostosis, a posterior distraction, is planned at about four months of age."

Brain imaging with CT and MRI showed multisuture craniosynostosis (coronal and lambdoid) with cloverleaf skull, dysmorphic bilateral cerebral hemispheres with scalloping along the posterior parieto-occipital lobes, thinning of the corpus callosum, hypoplastic posterior fossa with low-lying cerebellar tonsils, midfacial hypoplasia, and shallow orbits with associated proptosis and hypertelorism and lateral ventriculomegaly. A patent foramen ovale was visualized at 8 days by echocardiogram. She was treated with positive pressure ventilation for upper airway obstruction. During her 3-month hospitalization, she required a ventriculoperitoneal shunt, tracheostomy, and gastrostomy tube. The first step in the surgical correction of her craniosynostosis, a posterior distraction, is planned at about four months of age.

Family history was not significant. The parents are both of Mexican ancestry, and consanguinity was denied.

A craniosynostosis gene panel testing revealed a recurrent *de novo* pathogenic variant in *FGFR2*: c.1124A>G, p.Tyr375Cys. Chromosome microarray was negative.

"A craniosynostosis gene panel testing revealed a recurrent de novo pathogenic variant in FGFR2: c.1124A>G, p.Tyr375Cys."

Discussion:

Craniosynostosis is a relatively common congenital anomaly that affects about 1 in 2000 children. (1) Although most cases of craniosynostosis involve a single suture and are not associated with other anomalies, approximately 5% involve multiple sutures, which are more often syndromic with a genetic etiology (Figure 2). (2) This infant has the most severe manifestation of craniosynostosis with premature fusion of both coronal and lambdoidal sutures, causing a cloverleaf-shaped skull. The genetic cause in her case is a heterozygous *de novo* pathogenic variant (p.Tyr375Cys or Y375C) in the *FGFR2* gene, which encodes the fibroblast growth factor receptor type 2. Activating variants in this family of genes (*FGFR1, FGFR2,* and *FGFR3)* are responsible for many craniosynostosis and chondrodysplasia syndromes.

"The pathogenic FGFR2 variants responsible for craniosynostosis cause a gain of function in either a ligand-dependent or ligand-independent manner."

Like the other members of this class, FGFR2 is a transmembrane tyrosine kinase signaling factor that usually forms a dimer and activates a growth-stimulating signal when ligands bind to its extracellular domains (Figure 3). (3) The pathogenic *FGFR2* variants responsible for craniosynostosis cause a gain of function in either a ligand-dependent or ligand-independent manner. Two tissue-specific isoforms of FGFR2 have different ligand binding domains (IIIb, KGFR, IIIc, and BEK) and selectively target epithelial and mesenchymal tissues. The Y375C variant adds a cysteine residue, which is thought to increase ligand-independent dimerization in both the mesenchymal and epithelial isoforms, constitutively activating the growth-stimulating pathway in both tissue types.

The Y375C variant in *FGFR2* is the most common variant responsible for Beare-Stevenson syndrome (BSS; OMIM #123790). (4) The incidence of BSS is unknown, and only about 25 cases have been reported worldwide. In this rare condition, cloverleaf skull occurs in the context of cutis gyrata on the scalp or elsewhere, skin tags, creases on the ears, skin furrows on the palms and soles, enlarged and elongated umbilical stump, anal and genital anomalies. (5) A caudal appendage or pseudotail, described more accurately as a sacrococcygeal eversion, has been reported in many affected individuals with BSS and the Y375C variant. (6-8)

Figure 1a: Cloverleaf skull with turricephaly. Note the rugae on the forehead. Photo taken about 11 weeks.

Figure 1b: Exuberant gingival tissue growth on the lower alveolar ridge.

Figure 1c: The great toe is wide and there is excess soft tissue around the toenail and rugae of the foot. The thumbs are broad but not deviated

Figure 1d (left): Caudal appendage at the base of the spine has a blind central pit.

Figure 1e (right): The umbilical stump is large with excess epithelialization and soft tissue.

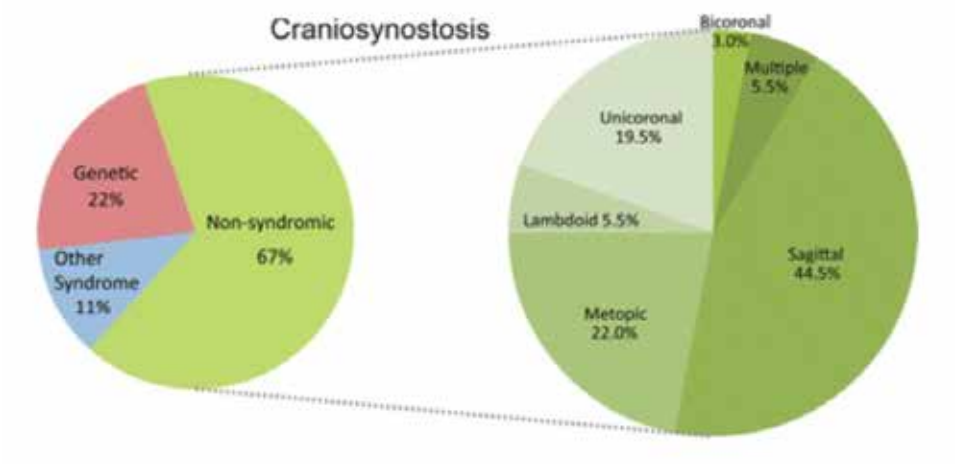

Figure 2: The prevalence of different forms of craniosynostosis was derived from a cohort of 215 patients. (2)

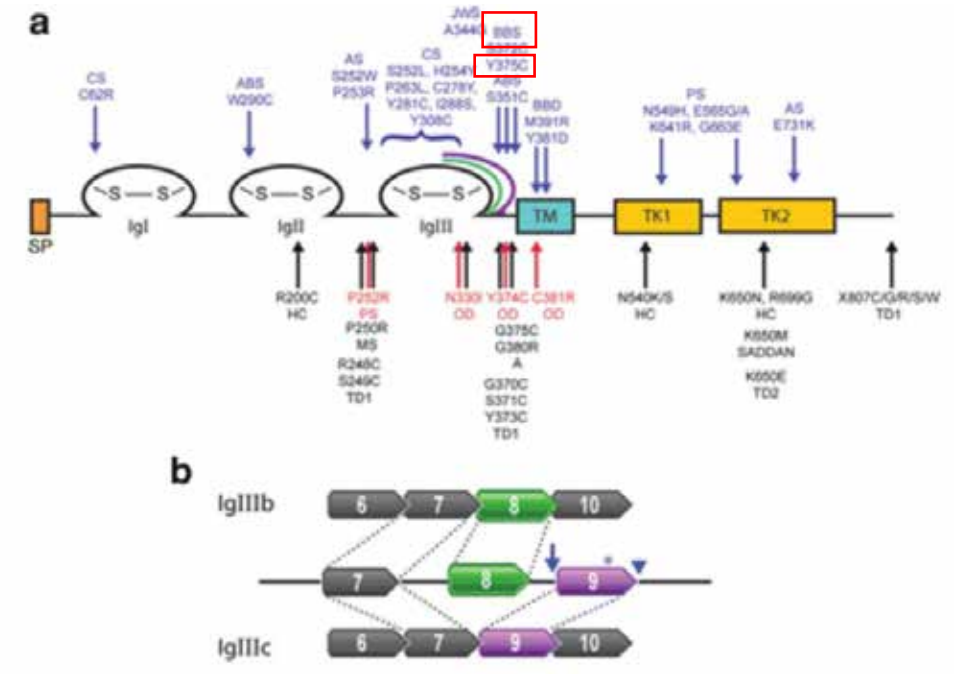

Figure 1f: Hyperkeratotic soles and deep plantar creases.

Figure 3a: This schematic of the FGFR protein structure illustrates the functional domains: three immunoglobulin-like loops in the extracellular space (IgI, IgII, and IgIII), responsible for ligand binding, the transmembrane domain (TM) and the intracellular tyrosine kinase domains (TK1, TK2). Mutations in different functional domains cause Crouzon syndrome (CS), Antley-Bixler syndrome (ABS), Apert syndrome (AS), Pfeiffer syndrome (PS), and other craniofacial disorders. Note that the *FGFR2* variant identified in this patient (red box), abbreviated Y375C is in the juxtramembrane domain, listed under BSS, Beare-Stevenson syndrome. (3)

Figure 3b: This illustrates the alternate splicing of exons 8 and 9 that determines ligand binding in the third immunoglobulin loop in the two isoforms of FGFR2: IgIIIb, which contains exon 8 (green) and IgIIIc, which contains exon 9 (purple). The juxtamembrane region, where this patient's variant is found, is shared by both isoforms, which is why this Y375C variant is expected to enhance FGFR2 signaling and cause excess growth in both mesenchymal and epithelial tissues. (3)

Pfieffer syndrome (PS; OMIM# 101600) was initially considered because of the baby's broad great toes and thumbs, but her features are more compatible with BSS even in the absence of cutis gyrate of the scalp. (9) There is considerable phenotypic overlap between BSS and other craniosynostosis syndromes like PS, such as a cloverleaf skill, airway obstruction, hydrocephalus, and Chiari malformation. (10) Compared to other craniosynostosis syndromes, the prognosis for BSS is worse. To our knowledge, there have been no survivors beyond the age of 13. Fifty percent of individuals with the Y375C variant have not survived past two years of age. (11).

Practical applications:

1. Pay attention to minor anomalies. They can be the keys to a correct diagnosis. The presence of facial rugae, a long epithelialized umbilical stump, multiple ear creases, and deep furrows on the palms and soles established the diagnosis of Beare-Stevenson syndrome in this child.
2. Seek a unifying diagnosis. Beare-Stevenson syndrome is caused by enhanced signaling of mesenchymal (bone) and epithelial (skin) isoforms of FGFR2, explaining its varied effects on different tissue types.
3. Order genetic testing when craniosynostosis is severe (cloverleaf skull), involves multiple sutures or is associated with extraskeletal anomalies.

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NT

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Therapeutic Hypothermia: A Hot Legal Topic

Jonathan Muraskas MD, Jay P. Goldsmith, MD

"The neurological exam at 1 hour of life revealed jitteriness, intermittent decreased spontaneous activity, mild hypotonia, poor suck, incomplete Moro reflex, and stable vital signs. The infant appeared stable; however, at 12 hours of life, the parents noted cyanosis and periods of apnea. A neonatologist is consulted, and the diagnosis of clinical seizures is made."

A term AGA newborn male was delivered by emergency cesarean section in a community level 2 hospital for persistent Category 2 tracings. The infant was born depressed, requiring positive pressure ventilation for 4 minutes. By 10 minutes of age, the infant had decreased tone but good respiratory effort on room air. Apgar scores were 2, 5, and 7 at 1, 5, and 10 minutes, respectively. A cord arterial blood gas revealed a pH of 7.14, pO_2 12, pCO_2 65, and a base excess of -10. The neurological exam at 1 hour of life revealed jitteriness, intermittent decreased spontaneous activity, mild hypotonia, poor suck, incomplete Moro reflex, and stable vital signs. The infant appeared stable; however, at 12 hours of life, the parents noted cyanosis and periods of apnea. A neonatologist is consulted, and the diagnosis of clinical seizures is made. The newborn is transferred to the regional center for more extensive neurological evaluation. The workup with MRI reveals extensive partial prolonged hypoxic ischemia with a possible acute grey matter injury. At two years of age, the child has spastic quadriplegia and is neurologically devastated. Approximately three years after the delivery, you receive a summons. The allegation is that if the standard of care (SOC) were followed, this infant would have been transferred within 6 hours of life for Therapeutic Hypothermia (TH). The plaintiffs also allege that a normal neurologic outcome would have resulted if cooling had been initiated.

"Neonatal encephalopathy is a clinical syndrome of disordered neonatal brain functioning occurring in the first days after birth in infants born at 35 weeks gestation or greater."

Neonatal encephalopathy is a clinical syndrome of disordered neonatal brain functioning occurring in the first days after birth in infants born at 35 weeks gestation or greater. It is a clinically defined syndrome with multiple etiologies characterized by abnormal levels of consciousness and/or seizures. It is often accompanied by difficulty in initiating respirations at birth and depression of tone and reflexes. Hypoxic ischemic encephalopathy (HIE) affects 2 million infants annually worldwide. The incidence of HIE in developed countries is approximately 1.5/1000 live births. The pathophysiology of HIE is characterized at the cellular level by a biphasic process of primary and secondary energy failure. The initial phase consists of the triggering hypoxic-ischemic insult that leads to primary energy failure and can be severe enough to cause permanent brain damage. Approximately 6 to 24 hours later, secondary energy failure occurs, characterized by the activation of the neurotoxic cascade, leading to apoptosis and neuronal necrosis. Recognition and early initiation of TH for all eligible infants is important to attempt to ameliorate the secondary energy failure accompanying acute HIE and improve outcomes. However, only one of every 7-8 infants treated with TH will avoid death or moderate to severe disability compared to those who do not receive TH. This modest level of the number needed to treat (NNT) to benefit is because treatment was probably started too late (i.e., the injury did not occur intrapartum), the injury was too severe (i.e., Sarnat 3), or the etiology of the encephalopathy was not HIE (1, 2, 3).

"Any infant with perinatal depression or an acute perinatal event history should receive a prompt evaluation for TH. This evaluation begins in the delivery room with the assignment of Apgar scores. Evaluation should include a detailed birth history, cord or early newborn blood gas sampling within 1 hour of birth and physical examination with particular attention paid to elements of a modified Sarnat examination."

Any infant with perinatal depression or an acute perinatal event history should receive a prompt evaluation for TH. This evaluation begins in the delivery room with the assignment of Apgar scores. Evaluation should include a detailed birth history, cord or early newborn blood gas sampling within 1 hour of birth and physical examination with particular attention paid to elements of a modified Sarnat examination. History should be examined for clues of an acute perinatal event capable of causing hypoxic ischemia or a history of potential pregnancy complications that might cause neonatal encephalopathy. Critical features of the physical exam include alteration in the degree of consciousness, activity, tone, posture, reflexes, and cardiorespiratory hemodynamics. The Sarnat stages include stage I encephalopathy, described as mild and often associated with sympathetic overdrive and hyper-alertness, resulting in an excellent neurologic prognosis. Moderate

encephalopathy, or stage 2, is marked by lethargy and hypotonia, and stage 3 encephalopathy essentially describes an obtunded, flaccid, comatose infant. The presence of seizures is always considered moderate or severe encephalopathy (i.e., Sarnat stage 2 or 3) (4).

The optimal timing to initiate TH is within 6 hours of birth. Studies on the use of TH after 6 hours have not shown statistical improvement in outcomes. The optimal timing of the neurologic examination is around 1 hour of age after initial resuscitation is completed, but it should be repeated in the first 6 hours of life to determine if the baby meets encephalopathic criteria. The consensus is that an infant with moderate to severe encephalopathy who meets historical, neurologic, and biochemical criteria should receive TH. Initial management would also focus on avoiding hypocapnia, hyperoxia, hyperthermia, or hypothermia with passive cooling (5, 6). If TH is going to be initiated, the failure to start passive cooling at the birth hospital can be viewed as a deviation from the standard of care. However, there are no studies that indicate that passive TH is effective in improving the outcome of transported babies. Several hospitals now initiate TH on transport. The clinician should be vigilant for seizures; however, most seizures secondary to hypoxic-ischemic insult occur beyond 6 hours of life and are often subtle and can go undetected. Transferring to a higher level of care with continuous EEG monitoring is recommended.

"The clinician should be vigilant for seizures; however, most seizures secondary to hypoxic-ischemic insult occur beyond 6 hours of life and are often subtle and can go undetected. Transferring to a higher level of care with continuous EEG monitoring is recommended."

Threshold blood gas criteria reported in trials to institute TH include the following:

1. pH less than or equal to 7.0 or a base deficit of 16 mmol/L or more in umbilical cord blood or any blood sample within the first hour of life.
2. pH between 7.01 and 7.15, base deficit 10 to 15.9 mmol/L within the first hour with any of the following:
   - An acute perinatal event AND
   - 10-minute Apgar score of 5 or less OR
   - Assisted ventilation was initiated at birth and continued for at least 10 minutes
   - Neurologic exam findings, including seizures or evidence of moderate-severe neonatal encephalopathy or other signs of central nervous system dysfunction, such as jitteriness, clonus, apnea, abnormal posturing and movement

The majority of clinical trials have focused on moderately and severely affected infants. In a meta-analysis, TH has been shown to decrease death and disability at two years from 45% to 29%. Both from a clinical and medico-legal perspective, there is an ambiguity to either support or refute TH with mild hypoxic-ischemic encephalopathy. The PRIME study (Prospective Research in Mild HIE) provided the first empirically validated definition of mild hypoxic-ischemic encephalopathy within 6 hours of birth using two steps as in prior cooling trials. The first step is screening for fetal acidosis and acute perinatal events per established criteria. The second step is performing the modified Sarnat scoring by a competent examiner. The study expanded the criteria for TH to include mild in addition to moderate and severe abnormalities. Results showed that most infants with this definition of mild hypoxic-ischemic encephalopathy had abnormal outcomes when not treated with hypothermia (7). However, more robust data on the effectiveness of TH in this population are lacking. Analogous to resuscitation of 22-week gestational age preterm newborns, neonatologists have significant variation in managing newborns with mild hypoxic-ischemic encephalopathy. In both instances, the standard of care essentially has become blurred.

"However, more robust data on the effectiveness of TH in this population are lacking. Analogous to resuscitation of 22-week gestational age preterm newborns, neonatologists have significant variation in managing newborns with mild hypoxic-ischemic encephalopathy. In both instances, the standard of care essentially has become blurred."

Some points to consider to decrease professional liability:

1. Plaintiff experts often minimize the side effects of TH. TH is not benign and can adversely affect almost every infant organ system. The more common side effects include thrombocytopenia, coagulopathy, increased risk of bleeding, and persistent pulmonary hypertension in the newborn (8).
2. A newborn who is born depressed should prompt the resuscitation team to request cord blood gases, usually drawn by the obstetrical team.
3. After the birth of a depressed newborn with a potential adverse outcome, it is recommended that the placenta be sent for analysis. The placenta can make a great witness.
4. Sometimes arterial or venous access is impossible in the first hour of life. In that case, one can obtain a capillary blood gas when the first glucose is drawn. However, it should be recognized that a capillary blood gas may give a falsely low pH and/or falsely elevated base deficit if drawn from a poorly perfused foot or hand. An early lactate level may also help decide whether the baby should receive TH.
5. Therapeutic hypothermia criteria should be posted in labor and delivery, neonatal intensive care unit, special care, and newborn nursery.
6. Yearly training for all newborn caregivers to assess eligibility for TH should be implemented.
7. If you do not cool a depressed newborn, document your thought process; if you are not in a center capable of cooling, document your conversation with the perinatal center.
8. A very small percentage of cerebral palsy is directly related to the last 2 hours of a normal 7000-hour pregnancy. More

often than not, the etiology of cerebral palsy is remote or post-delivery, in which TH would not significantly affect the outcome. Other etiologies, such as perinatal infection, genetic abnormalities, placental abnormalities, metabolic disorders, maternal risk factors, and neonatal vascular stroke, need to be ruled out.

9. Any off-protocol use of TH should be documented.
10. Most Sarnat stage 3 encephalopathy infants will not benefit from TH.

"The American Academy of Pediatrics Committee of The Fetus and Newborn promulgated the current guidelines on TH in 2014 (9). These guidelines are currently being reviewed to establish new criteria to address TH in infants with mild encephalopathy and reevaluate the existing strict criteria for initiating TH. From a clinical and medico-legal perspective, one should err on the side of treatment and initiate TH in equivocal scenarios where no major contradiction exists. "

The American Academy of Pediatrics Committee of The Fetus and Newborn promulgated the current guidelines on TH in 2014 (9). These guidelines are currently being reviewed to establish new criteria to address TH in infants with mild encephalopathy and reevaluate the existing strict criteria for initiating TH. From a clinical and medico-legal perspective, one should err on the side of treatment and initiate TH in equivocal scenarios where no major contradiction exists. There is not enough evidence-based data to initiate TH routinely in mild encephalopathy as the standard of care.

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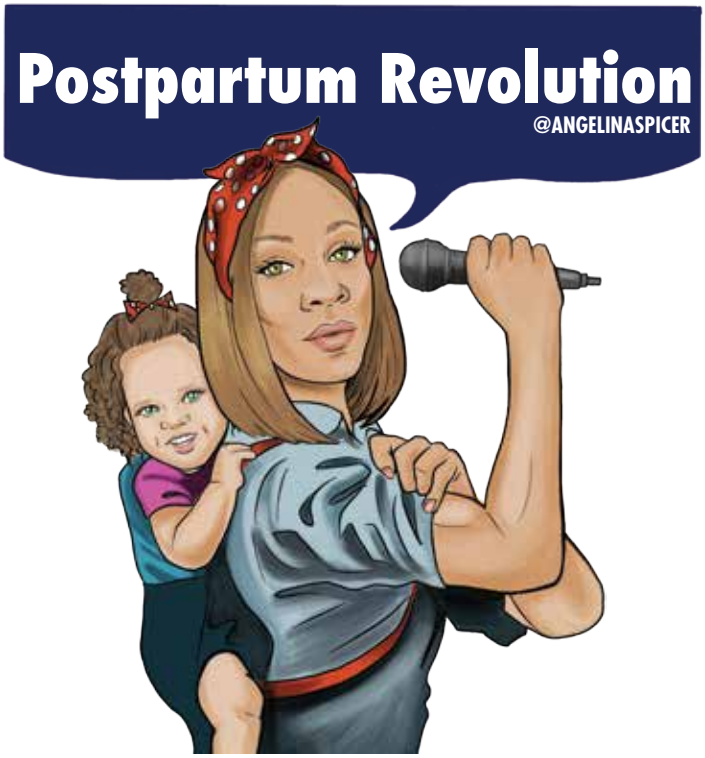
Disclaimer:

This column does not give specific legal advice, but rather is intended to provide general information on medicolegal issues. As always, it is important to recognize that laws vary state-to-state and legal decisions are dependent on the particular facts at hand. It is important to consult a qualified attorney for legal issues affecting your practice.

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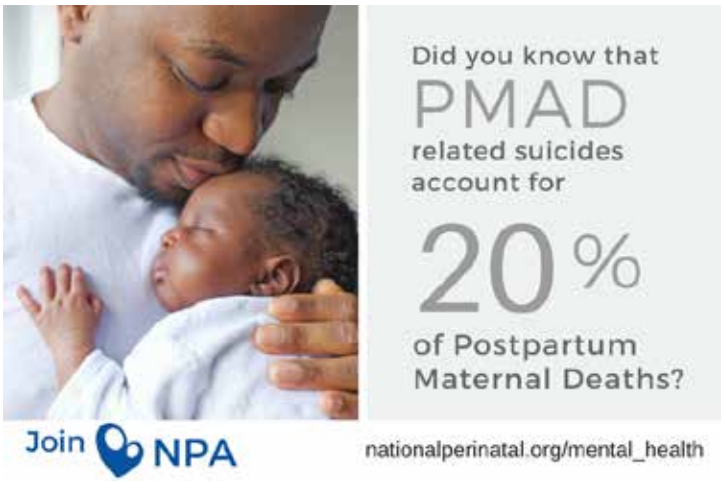
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related suicides
account for
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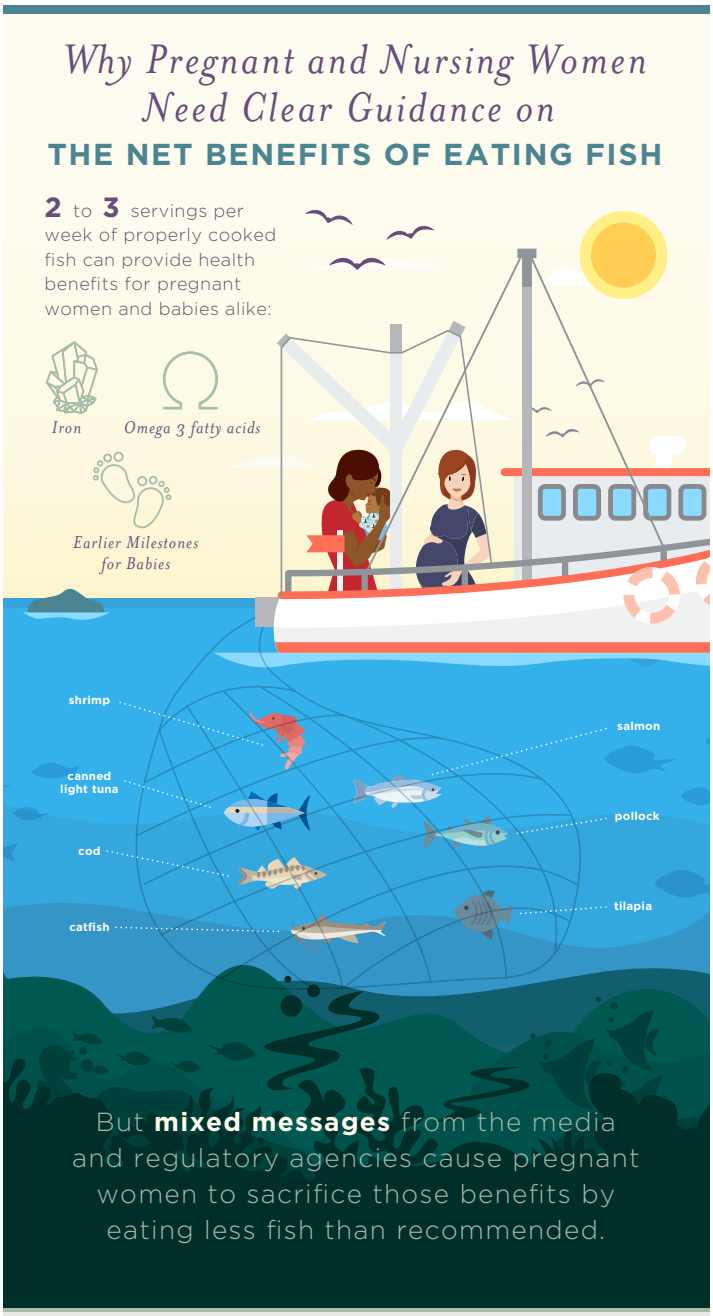
Why Pregnant and Nursing Women
Need Clear Guidance on
THE NET BENEFITS OF EATING FISH
2 to 3 servings per
week of properly cooked
fish can provide health
benefits for pregnant
women and babies alike:
Iron
Omega 3 fatty acids
Earlier Milestones
for Babies
shrimp
salmon
canned
light tuna
pollock
cod
tilapia
catfish
But mixed messages from the media
and regulatory agencies cause pregnant
women to sacrifice those benefits by
eating less fish than recommended.


GET THE FACTS
ON FISH CONSUMPTION
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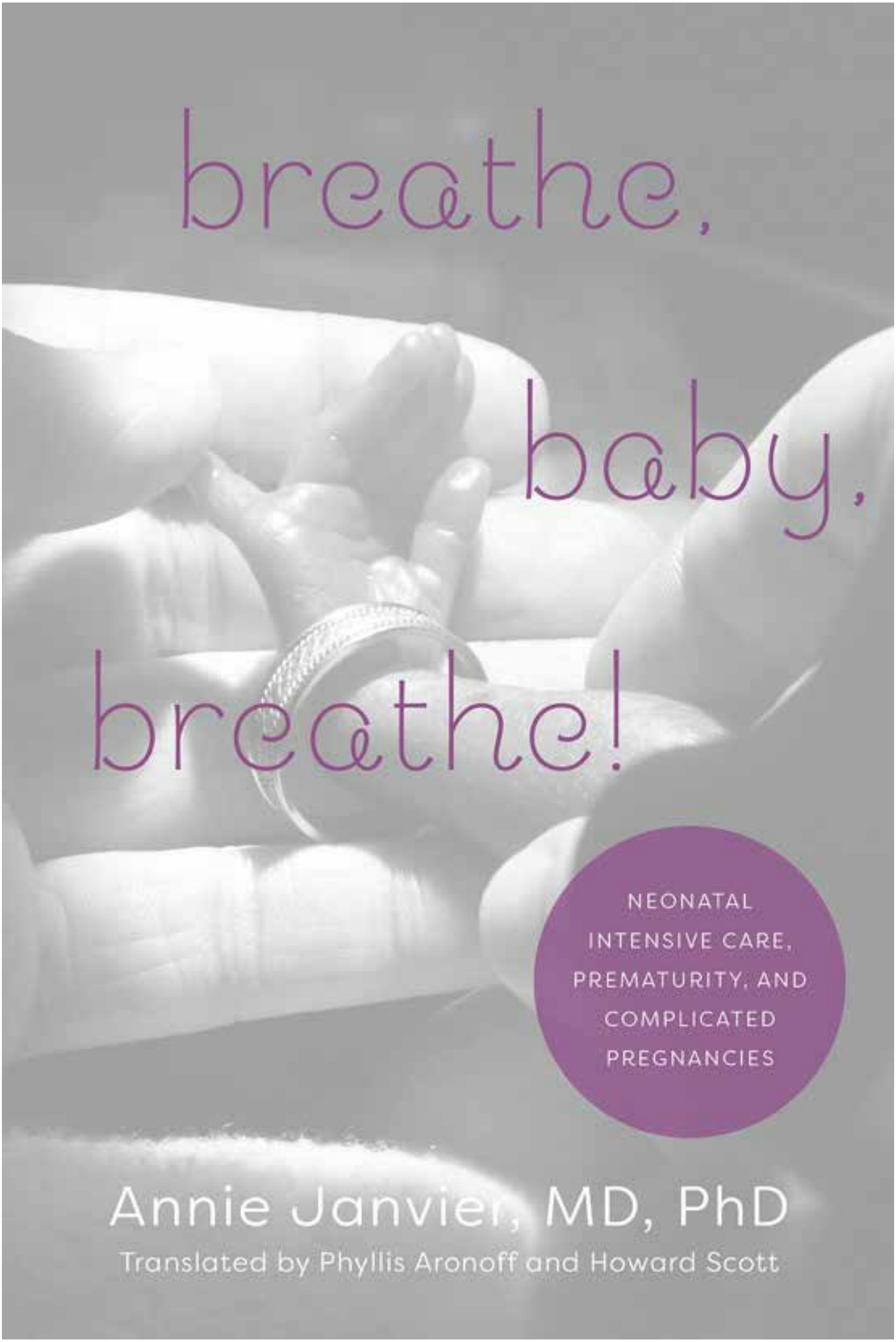
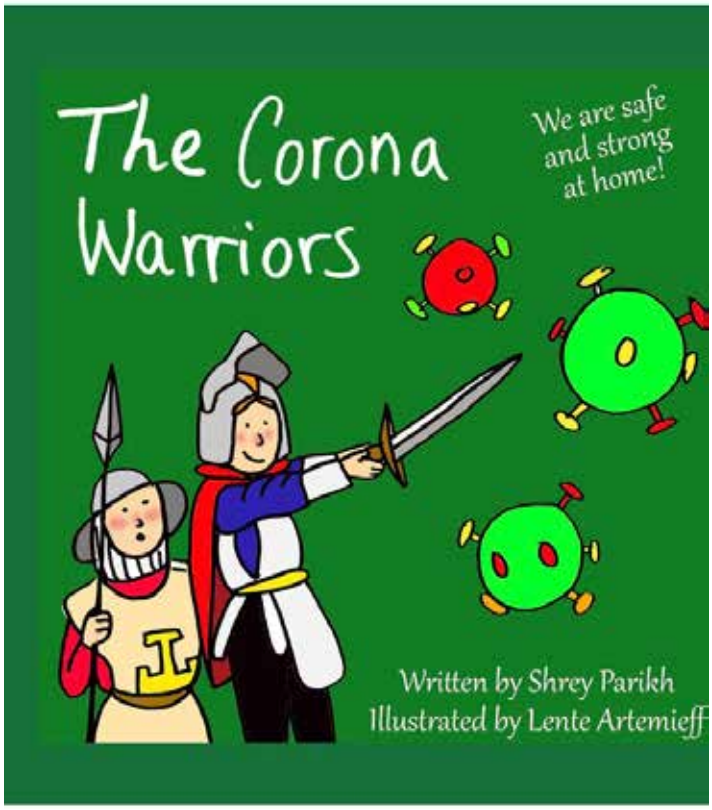

breathe,
baby,
breathe!
NEONATAL INTENSIVE CARE, PREMATURITY, AND COMPLICATED PREGNANCIES
Annie Janvier, MD, PhD
Translated by Phyllis Aronoff and Howard Scott



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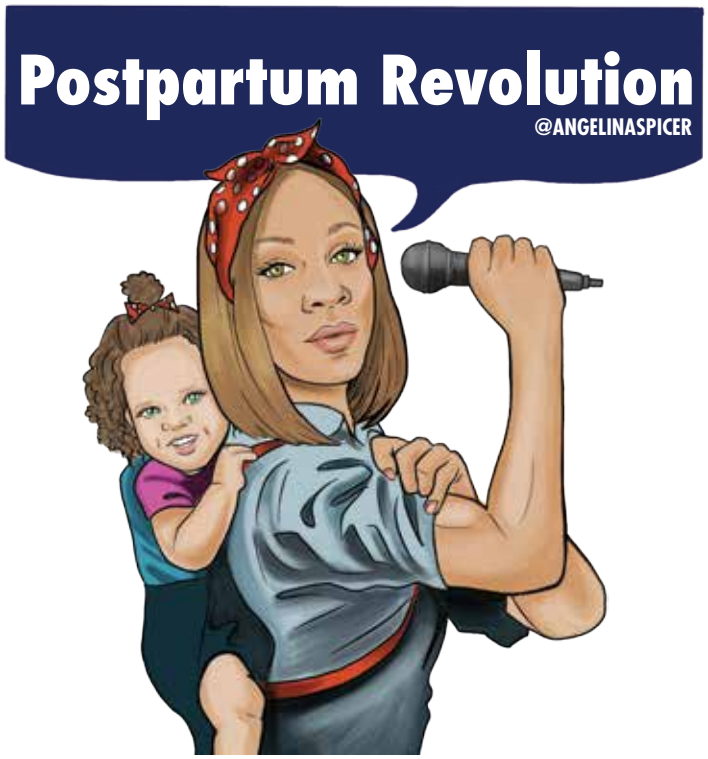

Vaccines and Preventive Monoclonal Antibodies

WHAT'S THE DIFFERENCE?

The Importance of Immunization

Vaccines and preventive monoclonal antibodies are two different types of immunization. While they function differently, they both serve the same purpose: protecting people from serious illnesses and diseases.

Different Technology, Same Protective Value

AfPA

https://www.who.int/news-room/feature-stories/detail/how-do-vaccines-work#:~:text=Vaccines%20contain%20weakened%20or%20inactive,rather%20than%20the%20antigen%20itself.

https://static1.squarespace.com/static/5523fcf7e4b0fef011e668e6/t/62445afd0134140ff954f3f6/1648646910485/NCIIH_Monoclonal+Antibodies+Inclusion+in+the+VFC+Program_Position+Paper_Mar+2022.pdf

VACCINES		PREVENTIVE MONOCLONAL ANTIBODIES
Teach the body to create antibodies that fight off a specific disease.		Introduce antibodies that are ready to ward off disease in the body.
By introducing an inactive piece of a disease or proteins that look like the disease, they trigger an immune response, training the body to create antibodies that defeat the disease.	**How does it work?**	Instead of teaching the body to create antibodies and defenses, they provide antibodies that are readily available.
Both support the immune system's defenses.		
Many vaccines are readily and easily available. The technology behind vaccines has been around for decades.	**What are the benefits?**	Preventive monoclonal antibodies can provide protection for diseases where there isn't an existing vaccine or there isn't an existing vaccine for certain patient groups.
Both protect against disease and provide a public health benefit by decreasing the burden of disease.		
Polio Measles COVID-19 And more	**What can this immunization protect against?**	RSV COVID-19
Both can provide tailored protection from a variety of diseases.		
Yes	**Is it safe?**	Yes

Both vaccines and preventive monoclonal antibodies undergo extensive testing for safety and efficacy.

READ NPA's statement: BLACK LIVES MATTER

The Indirect Impact of **RSV**

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

Susan Hepworth, Suzanne Staebler, DNP, APRN, NNP-BC, FAANP, FAAN, Mitchell Goldstein, MD, MBA, CML

OVERVIEW

RSV impacts not only infants and young children, but also entire families.

The National Coalition for Infant Health and the Alliance for Patient Access sought to examine the multifaceted burden that RSV places on families and to identify potential policy solutions.

Two surveys were conducted, one of parents who had at least one child contract RSV and one of health care providers who treat infants and children with RSV.

Both surveys were conducted with YouGov, a global public opinion and data company. Parents and providers were recruited from a pool of pre-selected respondents to ensure they met the survey's requirements. Participants received an honorarium.

RSV PARENT SURVEY

340 parents who had at least 1 child sick with RSV

67% of parents said their child was hospitalized for RSV

RSV HEALTH CARE PROVIDER SURVEY

175 health care providers across various pediatric and neonatal subspecialties

67% worked in an outpatient facility

33% worked in a hospital

RESULTS

FINANCIAL BURDEN

More than ⅔ of parents said the costs of RSV posed a financial burden or financial crisis.

7% of parents said they were fired as a result of caring for their child with RSV.

32% of parents reported losing potential income while their child had RSV.

EMOTIONAL BURDEN

68% of parents said watching their child suffer affected their mental health.

69% of parents felt guilty that they could not do more to prevent their child's RSV.

When parents found out there was no treatment for RSV, only supportive care:

- **48%** felt angry
- **46%** felt helpless

SOCIAL BURDEN

43% of parents had never heard of RSV before finding out their child was sick.

54% of parents had to rely on family and friends for sibling care, transportation and other responsibilities.

42% of parents said they struggled to care for their other children when one faced RSV.

RESULTS

PARENT EDUCATION & AWARENESS

86% of providers said they include RSV education as part of routine care.

99% of providers agreed that parents need more information about RSV.

TREATMENT CHALLENGES

Nearly ⅓ of providers have been reluctant to test for RSV because no treatment exists.

48% of providers said it was difficult to decide whether to send an infant or child with RSV to the emergency room.

92% agreed that if an immunization were available, it should be added to the Vaccines for Children program's list of pediatric vaccines.

MISCONCEPTIONS

A majority of providers (60%) explained that around 50% or more of the babies they see hospitalized for RSV were born healthy, despite many people thinking severe RSV only impacts premature infants or those with preexisting conditions.

CONCLUSION

Both surveys highlighted that the burden of RSV extends well beyond its physical symptoms.

The virus may lead to:

- **Long-lasting health challenges** for babies and young children
- **Financial, social and emotional burdens** for families
- **Frustration for providers,** who lack a cure or viable preventive interventions

This burden is not experienced by the few. Most infants and children contract RSV by the time they are two, and challenges that accompany RSV may impact anyone who has been affected.

Moving forward, the many burdens of RSV demonstrate the need for:

- **More RSV education**
- **Research and innovation** for preventive interventions
- **Access to prevention and treatment** for all babies and children

The challenges caused by RSV can reach far and wide, and its indirect impacts often leave families struggling.

Immunization Umbrella Options to Reduce the Burden of RSV

Susan Hepworth, L.J. Tan, MS, PhD, Chelsea Woosley

NCfIH National Coalition for Infant Health

Protecting Access for Premature Infants through Age Two

The National Coalition for Infant Health is a collaborative of more than 200 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.

Susan Hepworth:

Thank you, everybody, for joining today's webinar under the Immunization Umbrella Options to Reduce the Burden of RSV. This is hosted by the National Coalition for Infant Health and co-hosted by the Alliance for Patient Access. My name is Susan Hepworth, and I serve as executive director of the National Coalition for Infant Health. Joined today by our speakers, Dr. L.J. Tan of Immunize.Org and Dr. Chelsea Woosley of the National Association of Pediatric Nurse Practitioners. I want to thank our co-host, the Alliance for Patient Access, for helping to make today's webinar possible. I want to review a few objectives before we get into the meat of our discussion today to level set.

There are four things I want to bring to your attention. The first is a better understanding of the impact of the burden of RSV. Then, we will learn about current vaccines, immunizations, and development to prevent RSV in infants and young children. The last two items identify some policy barriers that may impact equitable access to new immunizations coming to market. And then, lastly, a call to action for those interested, related to a CDC advisory committee on Immunization Practices meeting scheduled for August 3rd to discuss a new immunization for RSV.

Before discussing this with L.J. and Chelsea, I want to share this short video from our co-hosts, the Alliance for Patient Access. This video is helping to educate on the different types of immunization and why the policy will be essential to ensure timely and equitable access and ensure that the procedures we have in our current vaccine pathway and vaccine infrastructure system can adapt to new technology and innovations.

Video

All infants, children, and adults need protection from infectious diseases. That's why immunizations are so necessary. There are two types of immunizations. The first is active immunization, which trains the body to create antibodies to fight diseases. These immunizations are commonly called vaccines. They protect against diseases like polio, whooping cough, and the flu. The second type of immunization is passive immunization, which provides the body with antibodies to fight infections. This type of immunization can help protect against diseases that traditional vaccines cannot address, whether a vaccine or a long-acting preventive monoclonal antibody. Immunizations are critical for public health. That's why they must be accessible promptly and equitably to boost public health and maximize disease prevention. All immunizations should be treated the same. Ensuring coverage and access for vaccines and long-acting preventive monoclonal antibodies with good policy. Families can have more opportunities to stay safe, healthy, and protected against infectious diseases.

"There are two types of immunizations. The first is active immunization, which trains the body to create antibodies to fight diseases. These immunizations are commonly called vaccines. They protect against diseases like polio, whooping cough, and the flu. The second type of immunization is passive immunization, which provides the body with antibodies to fight infections. This type of immunization can help protect against diseases that traditional vaccines cannot address, whether a vaccine or a long-acting preventive monoclonal antibody."

Susan Hepworth:

I want to start with you. L.J. to help set the stage. I want you to talk about RSV; many people here are probably familiar with it. Firstly, why is it something that healthcare providers and parents need to be aware of?

L.J. Tan:

To set the stage here, like the flu, RSV has a U-shaped impact on epidemiology. In other words, it dramatically impacts the young infants on one side of the curve, and then it dramatically affects those who are 60 and older on the other side of the curve. When we want to target protection, those are the populations we start with—but recognize that we still want to protect many people in the middle. It is the leading cause of hospitalizations in U.S. infants. About 2 to 3% of all infants will be hospitalized for RSV, and the hospitalization rate in infants five months of age and younger is almost 16 for 1,000 persons. This is a significant hospitalization rate for these younger infants who catch RSV, hence the need to protect them. It is also an important cause of hospitalizations in 60 adults 60 years and older. The 60 to 79 age group is 2.3 for every thousand. If you are over 80, it increases to 2.6 per 1000 persons in terms of hospitalization rates. Because there are so many more

adults, even though those rates are lower than we see in infants, the number of hospitalizations is more significant. Adults tend to be at about the same rate as we saw with infants five months of age and younger—finally, the population in between that. There are high-risk adult populations, including those with immunocompromised people, with diabetes, cardiovascular disease, and asthma, that we also want to protect. I hope this gives an idea of the impact of this disease. And again, Susan, Charles's comments will also be significant.

"RSV has a U-shaped impact on epidemiology. In other words, it dramatically impacts the young infants on one side of the curve, and then it dramatically affects those who are 60 and older on the other side of the curve. When we want to target protection, those are the populations we start with—but recognize that we still want to protect many people in the middle. It is the leading cause of hospitalizations in U.S. infants. About 2 to 3% of all infants will be hospitalized for RSV."

Susan Hepworth:

Chelsea, what real-world impact do you see, mainly from a clinical perspective? What are you seeing these infants and young children experiencing when they come to the hospital with RSV?

Chelsea Woosley:

It can range, be severe or minor, but hospitalization is unsuitable for anybody. I work in a pediatric intensive care unit and care for kids from 0 to 17. My PICU is a level-one trauma center, and we see a lot of trauma patients. We also see medical-type patients such as those with seizures, asthma, or respiratory viral illnesses, and babies, kids, and toddlers can get very sick when they have a respiratory virus or an infection.

We see just a tiny percentage in the ICU. These patients may be with us for a day or several weeks to months. Unfortunately, if we see a patient in the ICU overnight, even if just one overnight stay in the ICU, they may still end up in the hospital. Because of that lingering oxygen requirement, they may still need hospitalization outside our ICU for several days or two weeks. But it varies from patient to patient. We also see many patients with chronic illnesses, an increasing population. We know a lot of those kids in our hospital. Once we see one chronic child in our ICU, the others come because the viruses impact many of these patients. It's not just the babies and the smaller kids for us. It's also a significant stressor for families with a chronically ill child because they must deal with this chronic illness. And then, on top of this, it's not easy getting to the hospital. It means putting them in their wheelchair and the van, etc., and getting them to the hospital.

It's also a significant stressor for families of previously healthy children because they've never dealt with hospital systems or hospitalizations. It is challenging for chronically ill children and their families because a respiratory illness can put them over the top and end up hospitalized. It is a heavy burden for patients and their parents, whether it's a first-time hospitalization or a chronically ill child with a respiratory illness exacerbating their chronic illness.

Susan Hepworth:

We've just talked about the impact on the patients and their families. But I wanted your perspective on the impact on the health care system and providers. Last year, we experienced the "tripledemic;" COVID-19, flu, and RSV; talk about the burden of having an additional illness like RSV on the healthcare system and our most precious resource, our actual healthcare providers.

"Last year, we experienced the "tripledemic;" COVID-19, flu, and RSV; talk about the burden of having an additional illness like RSV on the healthcare system and our most precious resource, our actual healthcare providers."

Chelsea Woosley:

RSV before COVID was primarily seasonal; we saw it in the winter and early spring, and we were generally swamped at times when we wouldn't be able to accept patients anymore. All this in a city where there are three children's hospitals. And even then, if our beds were full, the other hospitals were also full. We'd often have to transfer patients to other cities, including Texas, a big state, and many hospitals. Additionally, we'd have to transfer to other states, which is a massive burden for families. There's a family that comes with it and a parent who may or may not have other children or who may or may not have support to help with a family they leave behind.

COVID-19 was impactful in the hospital, but we saw fewer other viruses during COVID-19. The pediatric units were not stressed to the adults' level. However, since COVID-19, hospitalizations due to respiratory illnesses have become less seasonal. This led to this RSV illness going differently and being year-round. Include RSV, COVID-19, and flu, it wasn't just an RSV season in the winter months. Once the quarantine was lifted, we noticed an unbelievable burden of respiratory illnesses and hospitalizations in the summertime. Summer has become overwhelming in the last couple of years. The first summer, we saw more medical patients, resulting in a big bed availability problem. It overwhelmed healthcare providers and hospital staff. Caring for these patients and coordinating with other facilities to get beds for these kids was stressful.

Susan Hepworth:

I will cite some statistics before I ask you my next question. Last year, the National Coalition Group on Health and the Alliance for Patient Access, who is co-hosting today's webinar, conducted a

national survey of parents who had had at least one child become ill with RSV. We wanted to understand the indirect impact better. There were a few jaw-dropping statistics we got from that survey. More than two-thirds said RSV was a financial burden or crisis for their family. More than one-third said their experience with RSV put a strain on their marriage or relationship. And this, to me, was the most shocking of all. 10% left their job, and 7% reported being fired because they had to take so much time off work to care for their children with RSV. That's almost 20% who lost their job due to this. My question is this: do these statistics align with what you see in the hospital setting?

"10% left their job, and 7% reported being fired because they had to take so much time off work to care for their children with RSV. That's almost 20% who lost their job due to this."

Chelsea Woosley:

Absolutely. I have yet to mention the social workers we've had to rely on to help these families. The impact of RSV goes beyond just the clinical implications for the patient and their family. I've cared for many babies and children in the ICU who sometimes have required intubation, which is a super stressful event for our family. I've had to talk to the parent and say, this is the next step, what we will do. They won't say no because they know that's the right thing, but I can see the stress on their face. Many have required a long time in the ICU to recover from their illness. The emotional impact on the family is enormous.

It's a burden for the families who may or may not have the risk. I live in an area where many indigenous people may not have the support or the resources they need because they might not have extended family here. Also, many parents cannot go to work because they have to be here. We might have a parent who may have one or five children, and they may or may not have somebody helping care for them. It is a burden to the family to figure out where they will put their other children. Leaving your child in the ICU is an emotional struggle, impacting the infant or child to be there without a parent. I cannot imagine leaving my child, but some parents have to because they have no choice. It's a substantial financial burden. Some parents lose their jobs because they have to miss a day or more here, and some positions are not forgiving. Communication is vital. Talking to the parents and families every day and trying to explain to them the course of an illness or the severity of the illness are things that we could do differently for them because it pains me if we're unable to help them.

Susan Hepworth:

We had a neonatal nurse practitioner review the survey results and provide her expert analysis as part of the survey report. She brought up a good point: we didn't screen for socioeconomic status; we didn't look at household income, whether rural, urban, or suburban. She deduced that even these jaw-dropping statistics might be painting a rosy picture, in fact, of what's going on in our economy.

We've discussed the burden and how scary this can be. And there's nothing other than supportive care you can offer, oxygen, etc. There's no actual medication to treat this. However, good news came out at the FDA last week with the approval of a new immunization to prevent RSV in infants. L.J., can you discuss what's currently available for prevention, what's just been approved, and what could be approved soon?

"There's no actual medication to treat this. However, good news came out at the FDA last week with the approval of a new immunization to prevent RSV in infants."

L.J. Tan:

Absolutely. It supports infants, except those most vulnerable, those born prematurely, younger than six months, or under six months. We had Palivizumab for them; the brand name was Synagis. Unfortunately, that is a passive immunization. You give an antibody, but it's a very short-lived antibody; it only lasts a short time in the body. For these highly vulnerable children and infants, you must give it once a month. Generally, you start right before the RSV season and continue to provide it once a month until the risk has passed. Research and development in RSV immunization techniques have been ongoing for over 60 years.

In the last 20 years, we have significantly increased our understanding of RSV's biology. Specifically, the F protein has been essential in how the RSV and the virus reproduce. We have multiple active and passive RSV immunizations by coupling that knowledge with new technology to provide vaccine immunizations.

"In the last 20 years, we have significantly increased our understanding of RSV's biology. Specifically, the F protein has been essential in how the RSV and the virus reproduce."

As of July 17th, we have a new product, a long-acting preventive monoclonal antibody called the Nirsevimab. The Nirsevimab acts long-acting and persists in the body throughout the season for about six months. Therefore, you give it once, and it protects through the RSV season. From the clinical trial data, it's about 70% effective at cutting the risk that a baby would need to visit an RSV physician. It was about 78% effective at preventing hospitalizations due to RSV. Now, I think I would be remiss not to mention that there is another way to protect infants, and the FDA is currently looking at another vaccine, in this case for pregnant women, that would also protect babies. In this situation, we give the vaccine to the mom. The mom makes the antibodies, which cross the placenta to protect the fetus and continue to last through the infant's first few months when they're most vulnerable to RSV complications. The FDA is currently looking at this vaccine for approval. The vaccine will protect babies from the moment they're

born. This is a benefit if you have an infection that shows up out of season, and the vaccination will also prompt the mother to make a broader response against RSV.

"As of July 17th, we have a new product, a long-acting preventive monoclonal antibody called the Nirsevimab. The Nirsevimab acts long-acting and persists in the body throughout the season for about six months. Therefore, you give it once, and it protects through the RSV season. From the clinical trial data, it's about 70% effective at cutting the risk that a baby would need to visit an RSV physician. It was about 78% effective at preventing hospitalizations due to RSV."

Susan Hepworth:

It's a unique time because this is the first immunization of its kind, presenting some policy challenges that many organizations like Immunize.org face. The National Coalition for Women's Health and the Alliance for Patient Access have been paying attention to this for the last couple of years because we know that it has significant implications related to equity and policies that could exacerbate existing disparities or ensure that all infants have equitable access. Can you talk more in-depth about some of those policy challenges we've been looking at?

L.J. Tan:

Yeah, definitely. Whenever we have something new, we want to ensure we're thinking it through and implementing the policy changes to ensure access is not an issue. Let me start by speaking first about a program called Vaccines for Children. The program provides underinsured and uninsured children with free vaccines that the provider administers. The provider then receives a payment for giving the vaccines out of the state's Medicaid program, which the state determines. The Nirsevimab is not technically a vaccine but a long-acting preventive monoclonal antibody that behaves like a vaccine. It acts similar to a seasonal vaccine, such as the flu vaccine, where you give it to your infants at the beginning of RSV season and lasts throughout the seasons. Since it is not technically a vaccine, the Vaccines for Children's Program must consider whether it can administer it. And if it can, how will it provide coverage for the Nirsevimab to these under-insured and uninsured children? It's essential to recognize that we have so few disparities in our pediatric population for vaccines because of the Vaccines for Children program. The Vaccines for Children program has done a fantastic job of creating an infrastructure where people who are uninsured and underinsured children can get vaccinated. As a result, our coverage rates are very high among our disparate populations. If we don't get Nirsevimab protection coverage under the VFC, you can immediately see that there might be some disparities in equity challenges regarding access. We want to ensure that providers are adequately paid for an essential service when they give this long-acting monoclonal antibody. We need to make sure that we have a policy in place that also allows our providers to be adequately paid for providing this new product. This is brand new, and we must work through some policy changes.

"Since it is not technically a vaccine, the Vaccines for Children's Program must consider whether it can administer it. And if it can, how will it provide coverage for the Nirsevimab to these under-insured and uninsured children? It's essential to recognize that we have so few disparities in our pediatric population for vaccines because of the Vaccines for Children program."

Susan Hepworth:

We're increasing exponentially with innovation and technology. And how important it is for our vaccine infrastructure system and other parts of our health care system, even unrelated to vaccines, to adapt to innovation to continue fostering innovation. Do you have anything to add to that?

L.J. Tan:

Oh, absolutely. That's an important concept, too. It shows us that we must show that we are nimble and can address precedents. We can set up new precedents for new technology and innovations that come down the pipeline. This is important to our manufacturing colleagues, as it'd be challenging for them to continue to innovate and develop new technologies if we cannot adapt our public health policies to use these innovations in the best way possible for our patients. We want to ensure that whenever something new comes along, we can assess its worth of safety and its effectiveness in the populations we're looking at. Then, most importantly, we can ensure that it gets recommended and used in a way that allows the broadest access and best equity. Suppose we can make those policy changes rapidly, nimbly, and collaboratively. In that case, we'll continue to create an environment in the United States for innovation and development.

Susan Hepworth:

I'll talk about the meeting that's been called by the CDC on August 3rd. But I will flag that this year, September, is the 30th anniversary of the Vaccines for Children program, a fantastic milestone. However, it will be crucial to see if they can adjust policy to account for innovation.

L.J. Tan:

When we talk about VFC, this innovation since it sounds like a duck, walks like a duck, quacks like a duck. It isn't a duck, but this is what we have here. We have a long-acting preventive monoclo-

nal antibody that behaves like a seasonal vaccine. So, we must treat it like a seasonal vaccine, which means we must get it in season to address the burden of RSV disease in infants. If we do not do this, if we reduce access and, as a consequence, equity, we're not doing our country a service; we're not doing our public health vaccine infrastructure service. We need to create a policy that allows that access and equity. The Vaccines for Children program is a significant part, and they will vote on including this in the Vaccines for Children program.

Susan Hepworth:

Chelsea, from the families you care about, how do you feel they will receive news of a new immunization to prevent RSV, and do you think there might be any challenges?

Chelsea Woosley:

There is always going to be challenges. There's not ever going to be 100% agreement on something. But, the great thing is, in the past, the preventative vaccine was limited to just the high-risk patients, and now it's not. We can give these vaccines that will decrease hospitalizations dramatically. There may be some hesitancy, and it could be because of vaccine fatigue. Educating and recognizing that having a preventative vaccine is the key to lowering the severity of illness is imperative.

"The great thing is, in the past, the preventative vaccine was limited to just the high-risk patients, and now it's not. We can give these vaccines that will decrease hospitalizations dramatically."

It can mean having just a clinic visit versus then having to be hospitalized if they had been given this preventative. It might keep them away from the ICU, which is enormous. At the same time, I do not think that 100% of everybody is going to say, "Yay," another vaccine; I think it's going to be up to us, the educators and the health care providers, to let people know that this can be the difference in a child's life.

Susan Hepworth:

L.J., I'll give you the last question. Given your work and passion for public health, what will the challenges be to ensure we have a good uptake of something that many people may not understand because it's not technically a vaccine, as you mentioned?

L.J. Tan:

I will reiterate some of what I said earlier, Susan, but those are significant policy barriers. A long-acting monoclonal antibody that works like a seasonal vaccine but is not a vaccine can be included in VFC. Wow. How cool is that? If we do that, we will reduce many access issues that result in inequity. The other one is that we want to ensure that our providers will get adequately reimbursed. They must be fairly paid for that critical work if they give the immunizations. And so, we need to ensure that the providers' payments will be fair. Then there is some of the nitty-gritty work we're doing that will come into play because this vaccine, this immunization, because it's not technically a vaccine, will not be coded like a vaccine for billing. It means that providers will be billed for their insurers, the payers, in the traditional vaccine-type manner. They're going to have to learn a new way of doing this. New codes will have to be used. We want to make sure that we educate our providers on that so that they know how to bill for this further intervention and make sure that they get paid right away without any rejected claims. I can think of a lot of little other ones. For example, monitoring the safety of the server, rest assured that's happening with a new product; we need to ensure that we've got all our eggs in place as it goes forward and that this immunization will be monitored for safety. It is also approved for those high-risk infants' second year of life when their hospitalizations are not just overnight but for a more extended period when they will be in the hospital as they get over illnesses. It will significantly impact the burden on our safety and our infants, and we need to make sure that we remove any policy that makes that impact less.

Susan Hepworth:

I talked about a call to action, and we've mentioned it several times. The CDC, the Advisory Committee on Immunization Practices, is the committee that, after the FDA has approved an immunization or vaccine, reviews it and recommends it. They study whether it should be included in the vaccine regimen. Are there any guidelines around who should be eligible for it? After the approval from the FDA came out on the Nirsevimab, the Advisory Committee on Immunization Practices announced an ad hoc meeting to go ahead and, among other things, have a vote on whether to include that in the vaccine. And for those organizations and advocates like Chelsea, L.J., and I, we look forward to the outcome. It's something that we have been working on advocacy-wise for several years now. We will be submitting comments and it will be to thank the committee, which has been extremely busy since 2020, since COVID. We will thank the committee for taking this up and urging them to include it in the VFC because we want broad equity, and equitable access is so important. Those are the two major themes that the National Coalition for Health will include in their comments.

"After the approval from the FDA came out on the Nirsevimab, the Advisory Committee on Immunization Practices announced an ad hoc meeting to go ahead and, among other things, have a vote on whether to include that in the vaccine."

We have a couple of questions that have come in. The first is about cost.

L.J. Tan:

The cost will not be revealed until after the ACP votes on the product, which will be out on August 3rd. If you look at the cost-benefit analysis they've run, as part of the ACP process, they have to run cost-effectiveness studies on whether the interventions can be worth the recommendation. Then, they looked at price ranges from 150 to $300. Which was based on the modeling; however,

we'll have to wait till the manufacturers announce that cost.

Susan Hepworth:

Next question. Can a newborn baby receive the immunization, or must it be a few months old? Or would it be better for me to receive the antibodies they recommend?

L.J. Tan:

Nirsevimab is indicated for newborns through 24 months of age. It is going to be recommended to be used in newborns. Then, in the second year of life, it will be recommended for those high-risk patients. They also suggest that she get a vaccine to help her generate antibodies that she'll pass to her infant, but the FDA has not yet approved it.

"Nirsevimab is indicated for newborns through 24 months of age. It is going to be recommended to be used in newborns. Then, in the second year of life, it will be recommended for those high-risk patients."

Chelsea Woosley:

I'll reiterate that we used to think of RSV season as November, October through April, but now it's year-round. So, a preventative vaccine is crucial and imperative.

Susan Hepworth:

That's great. Well, L.J. and Chelsea, thank you for this informative conversation and your expertise and insights into what happens at the bedside when somebody is hospitalized with RSV. Thank you, and have a great afternoon.

Disclosure: The authors have no disclosures.

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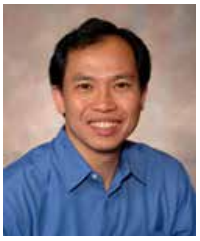

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National Coalition for Infant Health Values (SANE)

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.

The Signs & Symptoms of RSV

RESPIRATORY SYNCYTIAL VIRUS

Know the Signs & Symptoms of RSV

- Cough
- Runny Nose
- Struggling to Breathe *(breastbone sinks inward when breathing)*
- Difficulty Eating
- Lethargy
- Wheezing

RESPIRATORY SYNCYTIAL VIRUS
is a highly contagious seasonal virus that can lead to hospitalization for some babies and young children.

Know the Signs.

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

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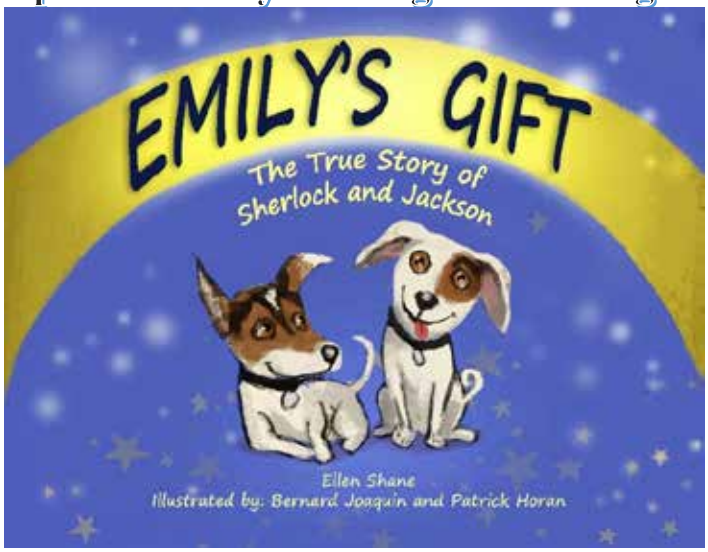

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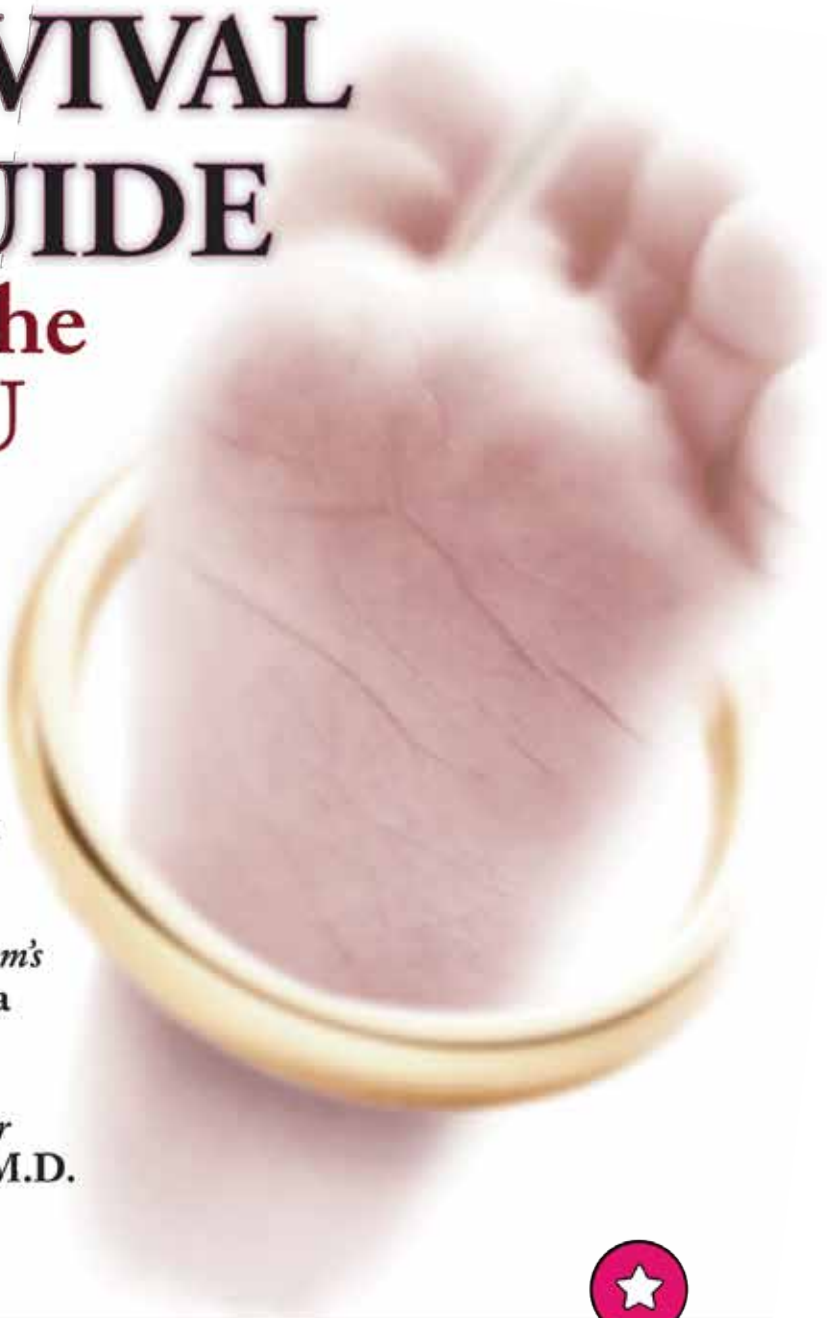
The Preemie Parent's SURVIVAL GUIDE to the NICU



By

little man's
Nicole Conn

&

PreemieWorld.com's
Deb Discenza

with

Medical Editor
Alan R. Spitzer, M.D.

HOW TO MAINTAIN YOUR SANITY & CREATE A NEW NORMAL

second edition

Peer Reviewed

Family-Centered Care Taskforce Advocacy Work: Resolution to the AAP Annual Leadership Conference "Parents and Family Caregivers are Integral Members of the Patient Care Team" (Resolution #36)

Malathi Balsaundaram, MD; Nicole NyBerg, MSN, APRN, NNP-BC; Morgan Kowalski; Keira Sorrells; Colby Day, MD; Kerri Machut, MD.

The American Academy of Pediatric Section on Neonatal-Perinatal Medicine's Family-Centered Care (FCC) Taskforce aims to encourage education, create guidelines, and facilitate unit-based interventions related to FCC in Neonatal Intensive Care Units (NICUs). A key strength of the FCC Taskforce lies in its ability to break down the silos that often hinder progress in healthcare. Through its global network of institutions, this Taskforce connects healthcare professionals, researchers, and family partners, fostering collaboration, knowledge sharing, and disseminating best practices regarding FCC. The Taskforce employs a mentored small group model and large group webinars (nine so far and many more scheduled), enabling effective communication and facilitating change across various healthcare settings. By sharing evidence-based practices and critical family perspectives during webinars and facilitating accountability through small groups, we are creating a forward movement to close this healthcare gap. For more information about the FCC Taskforce and free educational webinars, please visit our website at www.fcctaskforce.org. The FCC Taskforce's Executive Council comprises three co-chairs, a program manager, 18 family partners, 18 healthcare partners, and three committees that oversee marketing and communications, newsletters, and advocacy work.

"By sharing evidence-based practices and critical family perspectives during webinars and facilitating accountability through small groups, we are creating a forward movement to close this healthcare gap. For more information about the FCC Taskforce and free educational webinars, please visit our website at www.fcctaskforce.org."

In March of 2023, Nicole Nyberg, MSN APRN and NICU parent, Colby Day, MD, and Kerri Machut, MD (the FCC Taskforce's Advocacy Committee chair) submitted a resolution to the AAP Leadership and Advocacy Conference titled "Parents and Family Caregivers are Integral Members of the Patient Care Team" (Resolution #36).

The resolution is as follows:

Resolution #: 2023 Annual Leadership Forum

Title: Parents and Family Caregivers are Not Visitors

Sponsored By: Section on Neonatal-Perinatal Medicine

Date: March 31, 2023

Disposition:

Whereas, consistent presence and engagement of parents and primary guardians, herein referred to as family caregivers, in neonatal and pediatric clinical settings positively impact the child's overall health and long-term outcomes.

Whereas, family caregivers who are actively involved in their child's care and shared decision-making have increased confidence, decreased stress, and improvement in the transition of clinical caretaking to the home environment.

Whereas, during the COVID-19 pandemic, children and family caregivers were unnaturally separated due to visitation restrictions since family caregivers were considered "visitors" rather than essential care team members.

RESOLVED, that the American Academy of Pediatrics (AAP) recognize family caregivers as valued contributors to their child's health, declare family caregivers as parents, not visitors, and ensure children and family caregivers are not separated in clinical settings (while following appropriate infection control guidelines).

RESOLVED, the AAP commits to this in the form of policy statements, recommended guidelines for care, and advocates for legislation for family caregiver rights in the healthcare system.

The Taskforce provided a forum to collect supportive comments. Forty parent and clinician members made statements that were shared at the AAP Leadership and Advocacy Conference. As these were so compelling, we memorialize them here:

"The Taskforce provided a forum to collect supportive comments. Forty parent and clinician members made statements that were shared at the AAP Leadership and Advocacy Conference."

Supportive comments are as follows:

- **As the Director of a large Level 4 NICU during the pandemic, it was my responsibility to enforce the hospital's visitor restrictions. The moral distress this created for me and the NICU healthcare team was significant, and I feel [it] has been greatly under-appreciated. As a mother of a NICU graduate who had a 3-month NICU hospitaliza-**

tion, I cannot fathom undergoing that experience alone and [being cut off from my support system. Yet that is the scenario I was required to create for so many families. The emotional and psychological toll on NICU families was immense. I witnessed it daily, and the impact that it had on my own mental wellbeing was significant. I also have great concern over the long-term impact the social isolation had on parent/infant bonding. How has that impacted long-term outcomes for NICU graduates? I also wonder how much of an impact the moral distress and resulting work-related stress has played a role in the nursing turnover so many NICUs have been experiencing. My greatest hope is that we learn from this recent pandemic that NICU parents are part of the care team and should NOT be treated like visitors. With the ongoing nursing shortage, it's more important than ever that parents be fully integrated into their child's NICU care and be made to feel that they are part of the care team.

"We believe that nothing is more important than promoting a bond between the baby and the parent because that relationship will last a lifetime."

- **It is not unusual for a parent of a baby in the NICU to forget that they are, in fact, a parent, especially when their baby is on the edge of life and death.** We at Graham's Foundation exist to help empower parents, so they recognize their importance while their baby is in the NICU. **We believe that nothing is more important than promoting a bond between the baby and the parent because that relationship will last a lifetime.**
- Parents and babies need each other!
- Every parent looks forward to the day their baby is born, and their family grows. **Few of us anticipate that our babies' birth will be a medical emergency - or that we will require intensive care. But this is the reality for more than one in ten of us.**
- **Please appreciate that a NICU admission is an abrupt break in the birthing and bonding process.**
- **When this happens, families need love and support.**
- **If we have to be separated to provide emergency care, please reunite us as soon as possible. Help us reconnect and bond. Care for us together. And help us become the family we need to be.**
- If our baby and we are experiencing the signs and symptoms associated with perinatal substance exposure, please show us extra love and care. Reject stigmatizing attitudes and language, treat us with dignity and respect, and help us by employing evidence-based care models like Eat Sleep Console. **When you deliver this kind of respectful, trauma-informed care, you not only interrupt the systems that oppress us, you help build stronger, more resilient dyads.**

"We will only achieve the best outcomes for each individual infant and family by recognizing the unique and important expertise and value of the family to the care team."

- Parents, as well as extended family and community members, are critical to optimizing neurodevelopment within the NICU and for creating a supportive framework and structure that promotes long-term neurodevelopment. In addition, their presence and participation mitigate the trauma associated with a NICU admission. **We will only achieve the best outcomes for each individual infant and family by recognizing the unique and important expertise and value of the family to the care team.**
- I fully support that the NICU families should not have a limit on visitation rights for their child. My son spent seven months in NICU [from] March 2016 to October 2016. I spent most of my days at his bedside and gave him the care he needed. I helped clean his ostomy bag. I was able to do kangaroo care. This was all part of bonding. This was important to me and for my child's development. He was confined to tubing while in the hospital. He is now seven years old. He is still mainly fed through a g-tube and is working on his oral feeding skills with an SLP feeding specialist. There is a special bond as his mother cares for him.
- I saw information about how important the mother's role is but nothing about the father. Fathers also play an important role and feel they are often neglected and overlooked. Research shows that when fathers are involved, mothers and babies both have better outcomes. This statement needs to include the important role fathers play.
- Parenting in the NICU is the most unnatural place to be a parent. Nowhere else do parents have to ask to hold their baby and have physical barriers to comforting their child when they are in pain or scared? Nowhere else are parents as terrified and traumatized as we are in the NICU. Too often, the clinical care of the medically complex and fragile infant seems to neglect or forget that the powerful and necessary bond of the parent and infant is healing. As a mother of triplets born at 25 weeks 5 days gestation and a full-term baby, I have firsthand knowledge to truly understand and appreciate how vastly different these experiences are. With my triplets, I was separated immediately upon their delivery, did not see them for 48 hours, did not hold them for two months, and did not truly begin to bond with them for several months later. The toll on my mental health was significant as I suffered from PTSD, major depression, and generalized anxiety disorder, issues I still deal with to this day. As my surviving triplets, now 16 years old, struggle with their own mental health conditions (anorexia nervosa, depression, and

anxiety), I can only wonder how that separation and delayed bonding may have played a role in what we are facing now. With my full-term daughter, I held her skin-to-skin immediately after birth while still in the OR. She remained on my chest for the first several months of her life unless she was being dressed, changed, or bathed. Our nurturing connection is unlike anything I had with my triplets. The healing I have experienced through her birth and development is unmistakable. I urge the AAP to consider the long-term impact those days, weeks, and months in the NICU have - not just on the baby but also on the entire family unit. YOU have the power to ensure families are kept together as early and as long as possible.

- **Incredible work is being accomplished by numerous NICU Parent Leaders globally to improve the outcomes of NICU patients and their precious families. Recently, global events demonstrated how easily family caregivers were removed from the NICU in one sweep while being viewed simply as visitors of the NICU, rather than essential care providers. I support the resolution titled "Parents and Family Caregivers are Integral Members of the Patient Care Team" wholeheartedly. I also believe that not acknowledging the parents and family caregivers today has the potential for a long-lasting negative impact on the babies and their families. We must unify our voices that medicine/science/technology alone will not bring the best outcomes to the families, but properly recognizing every stakeholder and valuable role for each, which includes parents and family caregivers' role, is critically necessary today. Our parent and family colleagues are truly valuable in today's NICUs. Pandemic-led historic wrongs against parents and family caregivers must never be repeated.**

"Parents/caregivers are not visitors - they are an integral part of the care team and need to be treated as such. This benefits everyone, especially the baby (ies)."

- As Parent Support Coordinator, I hear over and over again how grateful parents/family caregivers are to be able to room in with their baby (ies) due to having couplet care and private rooms and how being close to their baby benefits their coping with the stress of being in the NICU. I also hear how difficult it is when mom and baby are separated after birth when mom needs a higher level of care and how hard it is for the other parent/caregiver to go back and forth. We see the benefits of parents/caregivers being able to hold, talk to, and care for their babies. They share how relieved they are when they are able to finally all be together. **Parents/caregivers are not visitors - they are an integral part of the care team and need to be treated as such. This benefits everyone, especially the baby (ies). My babies were born in the hospital I now work at, and even though the NICU was an open bay back then, we were still encouraged to participate in care, and we were told how important we were to our babies' development. We need to make sure that parents/family caregivers are able to be present for their babies, even during a pandemic. It is what is best for everyone involved!**

- **I am the other of twin girls born at 26 weeks in the year 2000.** My experience led me to be a founding board member and develop the psychosocial support programs of The Tiny Miracles Foundation in 2004. **I cannot express how important and essential it was for me as a mother and my husband as a father to be in the neonatal unit, advocating for and sharing in the care of our twins in the NICU. I know for a fact that their recovery to typical children today and our emotional recovery as parents had a lot to do with our specific involvement as parents. I've been a Preemie Parent mentor and advocate in five hospitals in CT for 20 years, mentored thousands of parents through the NICU, and followed their kids' progress into adulthood. I know firsthand the difference in the outcome for the kids that didn't have their parents as involved, and also the difference in how those parents have recovered emotionally from the trauma of premature birth. It's staggering, and the studies are clear the parents are "essential "caregivers in the NICU and in all healthcare of their child. COVID restrictions created catastrophic long-term emotional trauma for parents and their children, who have suffered physically and emotionally from the restrictions. This cannot happen ever again.**

"We know outcomes of neonates are largely impacted by family care - nursing, skin-to-skin, parental advocacy, etc. Further, forming attachments to their parents (which will impact them and their relationships throughout their lives) is crucial during this time."

- We know outcomes of neonates are largely impacted by family care - nursing, skin-to-skin, parental advocacy, etc. Further, forming attachments to their parents (which will impact them and their relationships throughout their lives) is crucial during this time. This is just on the neonates' end - parental trauma and mental health are an entirely different ball game! **Parents and family caregivers are most definitely not visitors but part of their baby's treatment and care. They MUST be included every single step of the way.**

- Parents and Caregivers are an essential part of a baby's development and growth. The separation of parents from their newborn is detrimental to the newborn. Newborns and their parents/caregivers both benefit from being together, as study after study has shown. Just a mother's scent alone has been shown to stabilize the heart rate and breathing of a distressed newborn. The separation of a mother from her baby can increase postpartum depression and add to the anxiety and stress of a NICU experience, as well as increase PTSD. Caregivers/Parents should not be separated from

their children in the hospital.

- **I am in complete support of ensuring that parents are at the center of patient care when it comes to their child(ren) in the Neonatal Intensive Care Unit. As a NICU mother myself, I can not imagine being told that I was unable to be with my daughter during care, or unable to do kangaroo care to help regulate her temperature and encourage breastfeeding. It is also unfathomable to think of doing it alone without my husband by my side had one of us only been allowed in the room. These are stories that I have heard time and time again from parents who found themselves in the NICU during the COVID-19 pandemic. Birthing and non-birthing parents are essential to the wellbeing of not only their child(ren), but to their mental health as well. Parents should be at the center and involved in as much as possible while in the NICU with their child(ren).**

- **Considering that parents and caregivers bear the responsibility of caring for NICU babies for a much longer duration than any other hospital provider, it seems most logical that the medical team would, as a whole, work to foster and support parents and caregivers in any way possible. When hospital teams help in this way, it might make the transition to home much more seamless, as caregivers have already begun to see themselves in an essential light and might provide further encouragement and confidence for them where it once was lacking, thereby enabling them to be both more prepared and more knowledgeable caregivers.**

"The physical bond between parent and infant is biological. It is also paramount for their physical and mental health and can have long-term negative consequences when denied."

- We were well informed of our children's progress and felt at ease when we were educated on their conditions. This is never easy for families, but there was a lot of emotional support and resources made available to us to help get us through the challenges. The teams that cared for our children were amazing and sensitive to our needs.

- **The physical bond between parent and infant is biological. It is also paramount for their physical and mental health and can have long-term negative consequences when denied. As a NICU parent, I understand firsthand the anguish of this physical separation and the long-term impact on my mental health and that of my son.**

- **In the NICU setting, the infant-parent bond becomes even more important because of the proven medical benefits to the medically fragile infant and the improved mental health outcomes for parents.** As the Founder of Hand to Hold, a national nonprofit that provides direct mental health support services to more than 40,000 NICU and bereaved parents each year, I can confirm **the significant impact the restrictive visitation policies enacted in response to COVID-19 unmistakably had on the mental health of NICU parents across the country.**

- **I urge the AAP to acknowledge, affirm, and protect parents' rights to be with their children to not only serve as their advocate but to provide the loving, healing power of their presence. It is imperative that parents not be seen as visitors but as essential care team members - because they are!**

"Babies respond to their parents' touch and voice, and the parents learn to care for their medically fragile child by being involved in the baby's care during the NICU stay. Breastmilk is lifesaving for NICU babies, but breastmilk supply is often low in breastfeeding parents whose baby is premature ... there is far more benefit than risk in allowing them both to be present as often as possible while their baby is admitted to the ICU."

- The involvement of parents/guardians of a NICU baby makes a huge difference in the baby's health and life. Kangaroo care, or "skin-to-skin," from both parents/guardians helps with bonding, temperature regulation, and improvement in attention, response, reflexes, and other markers for the baby. Babies respond to their parents' touch and voice, and the parents learn to care for their medically fragile child by being involved in the baby's care during the NICU stay. Breastmilk is lifesaving for NICU babies, but breastmilk supply is often low in breastfeeding parents whose baby is premature or NICU-bound. A parent who is able to pump breastmilk in the NICU near their baby or while touching their baby is able to produce more milk. So long as both parents/guardians are in excellent health, there is far more benefit than risk in allowing them both to be present as often as possible

while their baby is admitted to the ICU.

- **Parents and family caregivers are essential to their infants' health and development in the NICU. Positive and repetitive bonding experiences and care interactions support infant neurodevelopment, attachment, and parental competence and confidence. Parents and family caregivers are an integral part of the healthcare team. Ensuring 24/7 access, inclusion in medical rounds on their infant, and supportive integration into bedside care (diapering, skin-to-skin holding, feeding, human touch, graded sensory input, reading, non-pharmacological pain strategies, etc.) are examples of the many ways parents and family caregivers can bond, learn early parenting skills, advocate, and come to know their infants' unique cues. This critical period of survival and development demands a full spectrum of support for optimal experiences and outcomes. Parents and family caregivers play an elemental role in providing the highest level of care and fundamentally humane care.**

" I had seen a parent's love and healing touch help their baby survive and thrive when medical care was at its maximum, and there was nothing else to offer."

- Parents are also patient. **When children cannot speak for themselves, parents should be allowed and encouraged to be at their bedside as much as possible so that they can be a large part of the caregiving team. Parents will be the long-term caregivers after discharge and should be present as much as possible to learn and bond. There should never be a time when a parent is considered a visitor. They are not visiting their child. They are parenting their child and should have full access at all times unless surgery is required. Parents are the patients.**

- **Parents are not considered visitors in our NICU and shouldn't be considered as such in any NICU or SCN. They are an integral part of the baby's care team. I had seen a parent's love and healing touch help their baby survive and thrive when medical care was at its maximum, and there was nothing else to offer. They provide insight and perspective about their baby that no one else can, and they understand the interpersonal dynamics of the family that the baby will go home to. This is a no-brainer. Parents are NOT visitors. They are the whole world to the baby.**

- **As both a NICU Mom and a NICU Parent Advocate employed by a hospital, I could not agree more that parents are not and are never visitors. The love and experience parents and family caregivers bring [in] is unique and an essential part of the growth and development of the baby and critical to the growth and development of the family, as well. We know that the integration of a baby's family into all aspects of their care improves outcomes, shortens stays, and helps build connections at a time of crisis.** Parents are actively involved in their baby's care in the NICU. They may participate in activities such as skin-to-skin contact (kangaroo care), feeding, and even assisting with medical procedures under the guidance of healthcare professionals. **By being present, parents learn how to care for their baby's unique needs and are better prepared for their transition home. Parents are advocates for their babies in the NICU. They have the right to be involved in discussions about treatment plans, interventions, and decisions affecting their child's care. By being present and engaged, parents can actively participate in these discussions and contribute their insights and preferences. To use the language visitor with respect to NICU parents/caregivers is to frame families as outsiders, which denies the importance of the parent-child relationship at its most vulnerable and delicate stage.** And we know just how vulnerable NICU parents are, how traumatic the separation of parent and child is, how much more at risk they are for things like PTSD and other perinatal mood disorders – coupled with the anxiety of the unknown outcomes for their fragile baby, and the guilt, trauma, and emotions they may be feeling about their pregnancy or delivery only add to the heightened state of distress NICU family caregivers find themselves in. NICU parents have no choice but to leave our hearts in the hospital every day – to trust these excellent providers with our babies. The trust has to work both ways- where families are seen as valued and necessary as the clinical providers.

"By being present, parents learn how to care for their baby's unique needs and are better prepared for their transition home."

- **If parents can be seen and FEEL that they are valued as caregivers in the hospital, and staff recognize and treat them as such, I can't see how it would do anything other than empower parents to be the best caregivers they can be for their child both in the hospital and after discharge home—which is what everyone wants in the long term. It feels like a win/win for all involved**. And perhaps most importantly, for some parents, the time in the NICU with their child may be the only time they will ever have with their child, and that is certainly not visiting. **Language matters, particularly during a time of crisis, and we have an opportunity to make a simple change that will validate NICU parents, make them feel more included, and demonstrate the critical role they play in their infants' lives, starting at the bedside in the NICU and hopefully beyond the doors of the unit with time. I cannot see any downside to empowering parents and welcoming them as an integral part of the care team. "One doesn't have to operate with great malice to do great harm. The absence of empathy and understanding are sufficient." – Charles Blow (and quoted frequently at the Graven's Conference mid-pandemic while talking about the impact of COVID restrictions on NICU Parents) I know that no NICU provider would ever intend to cause harm to a**

parent/family and here we have the chance to make a change that would impact the next generation of NICU parents and show they are truly vital, involved, necessary collaborators.

- **NICU patients are not individual patients. Rather, they come with parents and family members who are critical components of their care and wellbeing. Parents learn to support and tend to their baby's medical needs as important members of the care team, and they provide an emotional connection for the baby. It is important to remember that no parent is a "visitor" when their child is in the hospital; they are thrust into a world of caregiving that many are not prepared for. My son was a 23-weeker, and my husband and I became experts on mundane things like temperature-taking and weighing, but also in complex medical conditions such as ostomies, stomas, and g-tubes. Supporting families and reminding them of the important role they play as part of their baby's care team sets up families for success.**
- The Tiny Miracles Foundation was established to provide the emotional, practical, and financial needs of the families of premature babies. The Tiny Miracles Foundation strongly believes that parents and family caregivers need access to every moment in the NICU and strongly supports the proposed resolution as we know the critical role that parents and family caregivers play in patient care in the NICU.
- **Parents and family members are not visitors in the NICU - they are a fundamental part of the NICU ecosystem.** Parents need to be an integral extension in the health care decision-making and hands-on involvement in the care of NICU babies.

"We support resolution #36, "Parents and Family Caregivers are Integral Members of the Patient Care Team." As a national nonprofit working with a serious high-risk pregnancy complication, the leading identifiable cause of preterm birth, The PPROM Foundation acknowledges the critical importance of family caregivers in the perinatal and neonatal space."

- In what service industry does the person paying for the service get treated like a visitor or a non-human? None. So parents and caregivers are essential members of the NICU team, and without them, facilities do not get access to the best medicine possible in the form of a Mother's breastmilk. To date, it truly is the best medicine for the baby. No other treatment can do what it does. Add to this, the baby knows the parents first and foremost unless there is a situation surrounding adoption. And because of this, the parents know that the baby [comes] first and can provide comfort to the infant. That affects the infant's ability to function, fight infection, and so much more. **As someone who advocates on behalf of Adult Preemies, I can tell you the ramifications of separating families from the baby for whatever time has a truly brutal outcome for that infant and that family.**
- We support resolution #36, "Parents and Family Caregivers are Integral Members of the Patient Care Team." As a national nonprofit working with a serious high-risk pregnancy complication, the leading identifiable cause of preterm birth, The PPROM Foundation acknowledges the critical importance of family caregivers in the perinatal and neonatal space. In addition, this inclusion and involvement should continue post-discharge. **Ensuring that parents and families are active participants in the interdisciplinary care team results in better outcomes for all involved.**

"Shared decision-making is critical in the NICU, where parents and providers must work together to optimize decisions that can have lifelong health implications for the infant."

- **My daughter was born three months premature in 2019. We spent 112 days in the NICU. Having your baby in the NICU is traumatic…walking into the NICU for the first time to see your baby is intimidating. I learned very quickly that I was my daughter's voice. I have about ten years in the medical field, so I was not shy [about] voicing what she needed… didn't need…who[m] I felt comfortable caring for her and certain staff that I did not want to care for her. I feel like the majority of families that are in the NICU are too intimidated and/or scared to speak for their babies. These families should be welcomed with open arms and encouraged to advocate for their babies. Communication between families and staff must be constant and consistent.**
- Shared decision-making is critical in the NICU, where parents and providers must work together to optimize decisions that can have lifelong health implications for the infant. Because things can change so rapidly in a sick newborn, parents need to be at their child's bedside so they can be informed and participate in these vital health decisions.
- I fully support this resolution. Caregivers need education and support while in the NICU. This will improve health outcomes and integrate caregivers into the care team instead of labeling them as visitors.
- As a former NICU mom, I can attest to the integral role that parents and caregivers play in their children's health care team. At the beginning of a NICU stay, medical professionals are often the first to interact with our children; however, as we (parents) spend more time with our children in the hospital, we begin to pick up their tics and tendencies. We learn their mannerisms, and their cries are recognizable to us. **As we connect with our children, we begin to establish a**

connection, a bond. You know the saying, a mother's love knows no bounds, and it's true. We are their greatest advocate. Their fiercest protector. It may take some time to get to that point in the NICU, but being there day in and day out only helps us gain confidence, self-efficacy, and strength to support our children outside of the NICU.

- **Parents spend countless hours in the NICU at their baby's bedside and are essential members of their baby's care team. They know their babies better than anyone else and are often the first to recognize when something is wrong.**
- **Bonding during this developmentally fragile newborn period is crucial.** Extensive research has shown that for vulnerable newborns, particularly premature and sick newborns, their mother's milk is a lifesaving intervention. Skin-to-skin time promotes infant growth and healthy developmental milestones. **Limiting parents' access disrupts the nurturing interactions that are necessary for an infant's cognitive development and that are also essential to parents' mental health.**
- **We need to ensure that all NICU families receive high-quality care by giving parents access to their medically fragile infants. Parents' basic rights to see and care for their own child are infringed upon when they are inaccurately categorized as visitors. Healthcare providers and parents should work together at local and state levels to ensure safe practices that honor the unique situation and needs of sick newborns. The way families experience care in the NICU remains with them for their lifetimes.**
- As a physical therapist who has provided direct bedside care in the NICU for over 20 years, I cannot emphasize enough the importance of including the parents/caregivers in the NICU as true team members. Parents often feel intimidated in the NICU. They sometimes feel "in the way." But in truth, they are the most important people in the NICU. We must change our culture around this and make parents feel that they are needed and wanted in the NICU. Thank you.

Outcome:

Unfortunately, the resolution was not adopted due to the lack of a specific venue and to broaden the scope to include adolescents seeking care without parents for certain conditions. The Taskforce initially focused on NICU patients but expanded to include all pediatric patients to receive more support, which ultimately worked against their goal. The FCC Taskforce plans to refocus this resolution on NICU patients next year. Nicole Nyberg presented oral testimony at the Leadership Conference. Additionally, we want to thank Munish Gupta, MD, Mitchell Goldstein, MD, and Lily Lou, MD, for their review, sponsorship, and support and for presenting this at the Leadership Conference.

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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

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- Masks pose a risk of strangulation and suffocation.
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If you are positive for COVID-19

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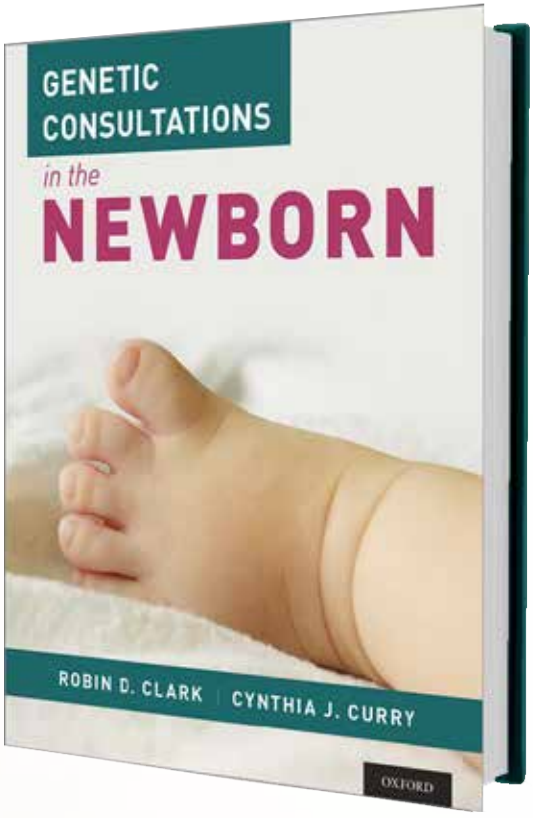

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Clinical Pearl: Do Apgar Scores Reflect Long Term Neurodevelopmental Outcomes in Extremely Preterm Infants at School Age?

Joseph Hageman, MD, Mitchell Goldstein, MD, MBA, CML

"The original Apgar scoring system, a pivotal medical innovation, was conceptualized by Dr. Virginia Apgar in 1953. (1) This system, which has become a cornerstone of neonatal care worldwide, initially had a one-minute Apgar score that served as an immediate indicator of the need for resuscitative measures and a five-minute Apgar score, which offered insights into the effectiveness of the resuscitation efforts. (1, 2)"

The original Apgar scoring system, a pivotal medical innovation, was conceptualized by Dr. Virginia Apgar in 1953. (1) This system, which has become a cornerstone of neonatal care worldwide, initially had a one-minute Apgar score that served as an immediate indicator of the need for resuscitative measures and a five-minute Apgar score, which offered insights into the effectiveness of the resuscitation efforts. (1, 2) In cases where an infant's condition was less than optimal, medical professionals continued to assign Apgar scores at five-minute intervals until a score of at least 8 was achieved. Initially designed for term infants, this scoring system was also applied to preterm infants. (3)

Beyond their immediate clinical utility, the Apgar scores were viewed as predictive tools for both short-term and long-term outcomes, particularly for term infants. Despite extensive research in this domain, questions lingered regarding the accuracy of these scores as predictors, especially in the case of preterm infants, specifically those born at gestational ages of less than 28 weeks.

"A remarkable cohort study by Earnhardt and a team of colleagues expanded our understanding of the Apgar scoring system's predictive power. This study examined the predictability of the five-minute Apgar score concerning neurodevelopmental outcomes. "

A remarkable cohort study by Earnhardt and a team of colleagues expanded our understanding of the Apgar scoring system's predictive power. This study examined the predictability of the five-minute Apgar score concerning neurodevelopmental outcomes. The investigation encompassed a vast geographic scope, spanning 19 regions across 11 European countries. It focused on a cohort of 996 infants born at gestational ages less than 28 weeks who were evaluated at the age of five, or as articulated by Dr. Michael Msall, a Developmental-Behavioral Pediatrician at Comer Children's Hospital at the University of Chicago, at school age. (3)

"These infants, born between 22 and 27 weeks gestation, underwent comprehensive cognitive and motor development assessments. These assessments included the utilization of the Weschler Preschool and Primary Scale of Intelligence test, with IQ scores derived from locally normed versions specific to each country. The Movement Assessment Battery for Children-second Edition"

These infants, born between 22 and 27 weeks gestation, underwent comprehensive cognitive and motor development assessments. These assessments included the utilization of the Weschler Preschool and Primary Scale of Intelligence test, with IQ scores derived from locally normed versions specific to each country. The Movement Assessment Battery for Children-second Edition was also employed to evaluate motor skills. (3) Furthermore, parents contributed valuable information regarding their children's communication and problem-solving abilities, as assessed through the Ages and Stages Questionnaire (ASQ-3). (3)

The study's findings unveiled a significant revelation: low Apgar scores at five minutes of age failed to serve as reliable predictors of neurodevelopmental outcomes at the age of five in extremely preterm infants. (3) This groundbreaking research challenges established assumptions and underscores the need for continued exploration in neonatal care and predictive assessment tools for long-term outcomes in this vulnerable population. (1-3)

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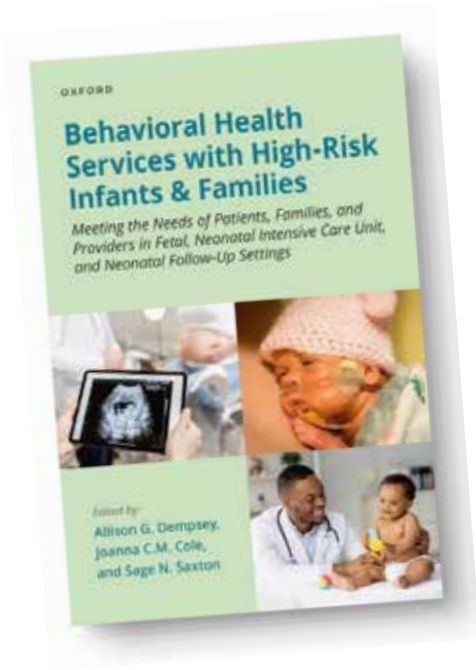

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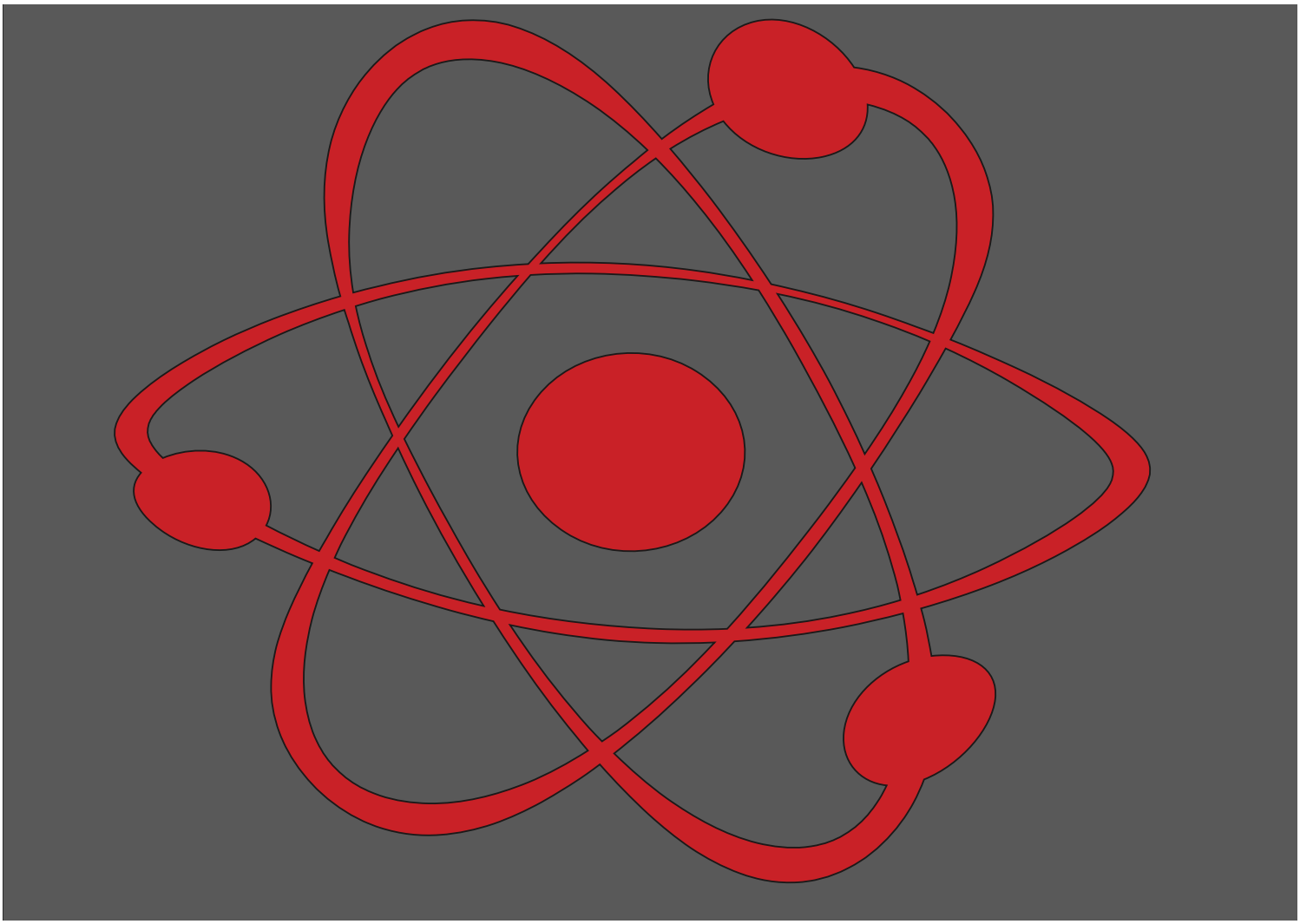

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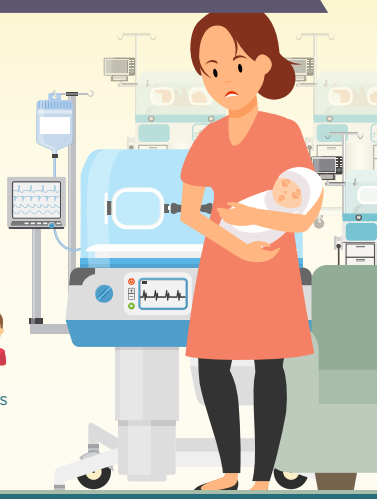
5x more likely to have learning challenges

1 in **3** preterm infants will require support services at school



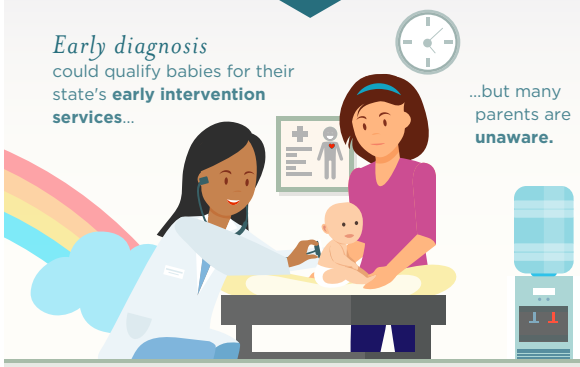
Early intervention can help preterm infants:

- 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 POSPARTO**

1 DE CADA **7** MADRES AFRONTA LA DEPRESIÓN POSPARTO, *experimentando*

- Llanto incontrolable
- Sueño interrumpido
- Ansiedad
- Desplazamientos en los patrones de alimentación
- Ideas de hacerse daño a sí mismas o al bebé
- Distanciamiento de amigos y familiares

Sin embargo, sólo el 15% recibe tratamiento[1]

LA DEPRESIÓN POSTPARTO **NO TRATADA** PUEDE AFECTAR:

- *La salud de la madre*
- *El sueño, la alimentación y el comportamiento del bebé a medida que crece*[2]
- *La capacidad para cuidar de un bebé y sus hermanos*

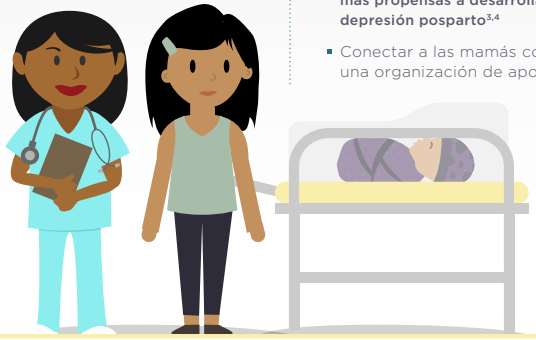
PARA AYUDAR **A LAS MADRES A ENFRENTAR LA DEPRESIÓN POSPARTO**

LOS ENCARGADOS DE FORMULAR POLÍTICAS PUEDEN:

- Financiar los esfuerzos de despistaje y diagnostico
- 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 posparto**[3,4]
- Conectar a las mamás con una organización de apoyo



NCFIH National Coalition for Infant Health

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[1] American Psychological Association. Accesible en: http://www.apa.org/pi/women/resources/reports/postpartum-depression.aspx

[2] National Institute of Mental Health. Accesible en: https://www.nimh.nih.gov/health/publications/postpartum-depression-facts/index.shtml

[3] Journal of Perinatology (2015) 35, 529–536; doi:10.1038/jp.2015.147.

[4] Prevalence and risk factors for postpartum depression among women with preterm and low-birth-weight infants: a systematic review. Vigod SN, Villegas L, Dennis CL, Ross LE BJOG. 2010 Apr; 117(5):540-50.

Upcoming Medical Meetings

2023 AAP National Conference & Exhibition
October 20-24, 2023
Washington, DC.
https://aapexperience.org

40th Advances in Neonatal and Pediatric Cardiorespiratory Care
January 31-February 2, 2024
Hilton Los Angeles North/Glendale
100 West Glenoaks Blvd.
Glendate, CA 91202
https://paclac.org/advances-in-care-conference/

2024 Gravens Conference: The Power of Voice: Using Your Voice for Babies, Family, Staff and Beyond
March 6-9, 2024
Sheraton Sand Key Resort
Clearwater Beach, FL
https://paclac.org/https-paclac-org-gravens-conference/

For up to date Meeting Information, visit NeonatologyToday.net and click on the events tab.

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The Gravens Conference
on the Environment of Care for High Risk Newborns

THE VOICES OF ALL PROFESSIONALS WHO WORK WITHIN THE ENVIRONMENT OF CARE FOR HIGH RISK NEWBORNS AND THEIR FAMILIES NEED TO BE HEARD.

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Attractions Distances are displayed to the nearest 0.1 mile and kilometer.

Glendale Galleria - 1.7 km / 1.1 mi
Americana at Brand - 2 km / 1.2 mi
Griffith Park - 3.3 km / 2.1 mi
Los Angeles Zoo - 5.3 km / 3.3 mi
Walt Disney Studios - 7.9 km / 4.9 mi
Nickelodeon Animation Studio - 7.9 km / 4.9 mi
Warner Brothers Studio - 8.2 km / 5.1 mi
Greek Theatre - 9.9 km / 6.1 mi
Descanso Gardens - 9.9 km / 6.2 mi
Hollywood Boulevard - 10.3 km / 6.4 mi
Universal Studios Hollywood - 10.9 km / 6.8 mi
Rose Bowl Stadium - 11.2 km / 7 mi
Pasadena Convention Center - 11.6 km / 7.2 mi

Other Attractions

Disneyland – 35 mi
Santa Monica Pier -26 mi
Venice Beach - 28 mi

The nearest airports are:

Hollywood Burbank Airport (BUR) - 12.8 km / 8 mi
Los Angeles Intl. (LAX) - 43.5 km / 27 mi
Ontario International Airport- 45 mi
Long Beach Airport- 35 mi

Clinical Trial Center (Full-Time, Day Shift) - Research Coordinator

The Loma Linda University Health's Clinical Trial Center is actively seeking and recruiting top clinical research coordinator talent.

Our mission is to participate in Jesus Christ's ministry, bringing health, healing, and wholeness to humanity by Creating a supportive faculty practice framework that allows Loma Linda University School of Medicine physicians and surgeons to educate, conduct research, and deliver quality health care with optimum efficiency, deploying a motivated and competent workforce trained in customer service and whole-person care principles and providing safe, seamless and satisfying health care encounters for patients while upholding the highest standards of fiscal integrity and clinical ethics. Our core values are compassion, integrity, humility, excellence, justice, teamwork, and wholeness.

Able to read, write and speak with professional quality; use computer and software programs necessary to the position, e.g., Word, Excel, PowerPoint, Access; operate/troubleshoot basic office equipment required for the position. Able to relate and communicate positively, effectively, and professionally with others; provide leadership; be assertive and consistent in enforcing policies; work calmly and respond courteously when under pressure; lead, supervise, teach, and collaborate; accept direction. Able to communicate effectively in English in person, in writing, and on the telephone; think critically; work independently; perform basic math and statistical functions; manage multiple assignments; compose written material; work well under pressure; problem solve; organize and prioritize workload; recall information with accuracy; pay close attention to detail. Must have documented successful research administration experience focused on managing clinical trials function. Able to distinguish colors as necessary; hear sufficiently for general conversation in person and on the telephone; identify and distinguish various sounds associated with the workplace; see adequately to read computer screens and written documents necessary to the position. Active California Registered Nurse (RN) licensure preferred. Valid Driver's License required at time of hire.

The Clinical Trial Center is actively involved in many multi-center global pediatric trials, which span different Phases of research to advance health care in children. Please reach out to Jaclyn Lopez at 909-558-5830 or JANLopez@llu.edu with further interest. We would love to discuss the exciting research coordinator opportunities at our Clinical Trials Center.

Additional Information

- Organization: Loma Linda University Health Care
- Employee Status: Regular
- Schedule: Full-time
- Shift: Day Job
- Days of Week: Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday

LOMA LINDA UNIVERSITY

Loma Linda University Children's Hospital is hiring Neonatal Nurse Practitioners

Children's Hospital, centrally located in Southern California, has earned Magnet Recognition as part of the American Nurses Credentialing Center's (ANCC) Program.

We are looking for experienced or new graduate Neonatal Nurse Practitioners (NNPs) who are excited to join a cohesive team that practices in a collaborative, fast-paced, high-acuity setting.

- Full-time and part-time positions available
- Level IV, 84-bed Neonatal Intensive Care Unit (NICU)
- Regional referral center encompassing Tiny Baby unit, ECMO, Cardiac ICU, Neuro NICU and Surgical services
- Maternity services and delivery center
- 24/7 coverage by NNP team and Fellows
- Competitive employee benefit packages

*Offering a **sign-on bonus** with relocation reimbursement for full-time, direct applicants who meet requirements.

For more information, please contact:

Karin Colunga, MSN, RN, PNP-BC
Director of Advanced Practice Nursing
kecolunga@llu.edu | 909-558-4486

BEST CHILDREN'S HOSPITALS U.S.News & World Report NEONATOLOGY 2022-23

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https://www.nc3rs.org.uk/arrive-guidelines

http://www.icmje.org

https://olaw.nih.gov/policies-laws/phs-policy.htm

NT

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 the next to last page as well as photographs of birds on rear cover.. For this edition, our art was graciously provided by Colleen Kraft, MD. It is a work done by her son Tim. This is "Tornado" .Our Bird is reflected in the water. This beautiful shot is provided by Elba Fayard, MD..

Mita Shah, MD,
Neonatal Intensive Care Medical Director
Queen of the Valley Campus
Emanate Health, West Covina, CA

NT

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, SVG, or pdf) for each figure. Preferred formats are ai, SVG, psd, or pdf. tif and jpg images with 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 is no longer acceptable). 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.

10. Only manuscripts that have not been published previously will be considered for publication except under special circumstances. Prior publication must be disclosed on submission. Published articles become the property of the Neonatology Today and may not be published, copied or reproduced elsewhere without permission from Neonatology Today.

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Please submit your manuscript to: LomaLindaPublishingCompany@gmail.com

NICU Baby's Bill of Rights

1- The Right to Advocacy
My parents know me well. They are my voice and my best advocates. They need to be knowledgeable about my progress, medical records, and prognosis, so they celebrate my achievements and support me when things get challenging.

2- The Right to My Parents' Care
In order to meet my unique needs, my parents need to learn about my developmental needs. Be patient with them and teach them well. Make sure hospital policies and protocols, including visiting hours and rounding, are as inclusive as possible.

3- The Right to Bond with My Family
Bonding is crucial for my sleep and neuroprotection. Encourage my parents to practice skin-to-skin contact as soon as and as often as possible and to read, sing, and talk to me each time they visit.

4- The Right to Neuroprotective Care
Protect me from things that startle, stress, or overwhelm me and my brain. Support things that calm me. Ensure I get as much sleep as possible. My brain is developing for the first time and faster than it ever will again. The way I am cared for today will help my brain when I grow up. Connect me with my parents for the best opportunities to help my brain develop.

5- The Right to be Nourished
Encourage my parents to feed me at the breast or by bottle, whichever way works for us both. Also, let my parents know that donor milk may be an option for me.

6- The Right to Personhood
Address me by my name when possible, communicate with me before touching me, and if I or one of my siblings pass away while in the NICU, continue referring to us as multiples (twin/triplets/quads, and more). It is important to acknowledge our lives.

7- The Right to Confident and Competent Care Giving
The NICU may be a traumatic place for my parents. Ensure that they receive tender loving care, information, education, and as many resources as possible to help educate them about my unique needs, development, diagnoses, and more.

8- The Right to Family-Centered Care
Help me feel that I am a part of my own family. Teach my parents, grandparents, and siblings how to read my cues, how to care for me, and how to meet my needs. Encourage them to participate in or perform my daily care activities, such as bathing and diaper changes.

9- The Right to Healthy and Supported Parents
My parents may be experiencing a range of new and challenging emotions. Be patient, listen to them, and lend your support. Share information with my parents about resources such as peer-to-peer support programs, support groups, and counseling, which can help reduce PMAD, PPD, PTSD, anxiety and depression, and more.

10- The Right to Inclusion and Belonging
Celebrate my family's diversity and mine; including our religion, race, and culture. Ensure that my parents, grandparents, and siblings feel accepted and welcomed in the NICU, and respected and valued in all forms of engagement and communication.

Presented by:

NPN
NICU PARENT NETWORK

NICU Parent Network

Visit nicuparentnetwork.org to identify national, state, and local NICU family support programs.

*** The information provided on the NICU Baby's Bill of Rights does not, and is not intended to, constitute legal or medical advice. Always consult with your NICU care team for all matters concerning the care of your baby.**