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Tel: +1 (302) 313-9984
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Wireless Monitoring Systems for Vital Signs in Neonates and Infants: a Systematic Review

Ellen Wu, Ashvita Ramesh, Molly Beestrum, Guilherme Sant'Anna, Kian Jalaleddini, Ehsan Sobhani Tehrani, Wissam Shalish, Robert Kearney, Jessica Walter, and Shuai Xu

"The interest in wearable wireless monitoring systems has accelerated secondary to the ongoing COVID-19 pandemic. Moreover, the alarmingly high number of infections in the pediatric population underscores a gap in monitoring these vulnerable populations, particularly in the home setting."

Abstract:

The interest in wearable wireless monitoring systems has accelerated secondary to the ongoing COVID-19 pandemic. Moreover, the alarmingly high number of infections in the pediatric population underscores a gap in monitoring these vulnerable populations, particularly in the home setting. This systematic review aims to identify and assess currently available wearables used to monitor cardiopulmonary function in infants and neonates. The study, prospectively registered on PROSPERO (CRD42020200642), completed a search of PubMed 1946-, Embase 1947-, Cochrane Library, Scopus 1823-, and IEEE Explore 1872- in June 2020. A total of 2324 unique citations were identified, with 16 studies describing 17 unique devices meeting inclusion criteria. Types of devices included smart clothing, belts, and mechanical adhesives, each with unique battery designs, data collection, and transmission hardware. Only four of the 17 devices underwent rigorous comparative testing, and three demonstrated correlation with the standard of care monitoring systems. Low sensitivity and specificity were reported in two commercially available consumer devices compared to the standard of care monitoring systems. The risk of bias in the entire cohort was highly based on a modified ROBINS-I scale. Further development and rigorous wearable device testing are necessary for neonatal and infant deployment.

Keywords

Wearable, sensor, technology, pediatrics, neonates, critical care, cardiopulmonary disease

Introduction:

Wearable technologies, electronic devices worn directly on the body or attached to clothing that capture high-quality physiological information,(1) are an area of rapid development in healthcare. Recent challenges posed by COVID-19 to maintain high-quality, often distanced healthcare have only increased the relevance of wearable biosensors to monitor and quantify patients' physiological status of patients(2). Wearable monitoring devices have been used during the pandemic to facilitate remote care of infected patients, monitor clinical deterioration, and identify infections before symptom development.(3, 4) While there are several studies demonstrating the utility of wearables in adults, less is known in regards to wearables in the neonatal and infant population.(5-7) Given that SARS-CoV-2 infections in neonates and infants can present with a wide spectrum of clinical signs or symptoms and the lack of vaccine availability for this cohort, the use of wearables within the context of the current pandemic, has remained understudied in these younger patients.(8-13)

"Given the inherent vulnerability and distinct physiology of pediatric patients compared to adults, the potential utility of wearable devices for monitoring physiological parameters in this population extends beyond the pandemic. Wearable devices must overcome unique challenges related to skin fragility, anatomical differences, and differences in physiological ranges for heart rate and respiratory rate.(14-16)"

Given the inherent vulnerability and distinct physiology of pediatric patients compared to adults, the potential utility of wearable devices for monitoring physiological parameters in this population extends beyond the pandemic. Wearable devices must overcome unique challenges related to skin fragility, anatomical differences, and differences in physiological ranges for heart rate and respiratory rate.(14-16) Current monitoring methods require invasive and bulky devices that not only risk injury to neonatal skin (17, 18) but also preclude therapeutic parent-child skin-to-skin contact (19) and are not conducive for home use. Appropriately designed wearable biosensors have the potential to ameliorate these limitations and enable continuous, convenient physiological monitoring of neonates and infants. This systematic review assesses wearable devices that monitor cardiopulmonary function in neonates and infants by summarizing accuracy, performance, and usability.

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Methods:

Search strategy and selection criteria

This systematic review assessed the accuracy and reliability of wearable devices for cardiopulmonary monitoring in neonates and infants available in the scientific literature. The protocol was prospectively registered on Prospero (CRD42020200642),(20) and reported according to PRISMA standards.(21) A medical librarian (M.B.) created search strategies for the themes of cardiovascular disease, infants, and wearable electronic devices. The search strategies were performed in PubMed (MEDLINE) 1946-, Embase (Elsevier) 1947-, the Cochrane Library (Wiley), Scopus (Elsevier) 1823-, and IEEE Explore (IEEE) 1872-. The search strategies for the Embase, Cochrane, Scopus, and IEEE databases were adapted from the MEDLINE search strategy. All databases were searched from inception with no date or language limits. Searches were completed by June 1, 2020. The full strategies are available in Appendix 3. All results were exported to Rayyan, and the automatic duplicate finder was applied.(22) The references of relevant studies were also reviewed to identify additional manuscripts.

"Inclusion criteria were the use and assessment of wearable technology in the neonatal or infant population. This includes subjects under two years of age, with neonates defined as birth to age less than one month and infants defined as age one month to less than two years per Food and Drug Administration guidelines. (23) "

Inclusion criteria were the use and assessment of wearable technology in the neonatal or infant population. This includes subjects under two years of age, with neonates defined as birth to age less than one month and infants defined as age one month to less than two years per Food and Drug Administration guidelines.(23) We also included programmable simulators for this age group for cardiopulmonary monitoring with the presentation of original data and publication in English. Animal studies, non-original studies, secondary research, abstracts, studies with only patient-reported outcomes, and studies using technology without investigation of its properties were excluded. Two reviewers (E.W., A.R.) screened all articles independently on the online Rayyan platform. First, a title and abstract screening were performed, followed by the full manuscript review of the selected abstracts. Disagreements were resolved by discussion between all reviewers.

Data analysis:

A standardized template for data extraction was developed and piloted with three articles in which two authors (E.W., A.R.) extracted relevant data. Both individual patient-level data and summary estimates were used. The template was modified according to the pilot assessment, and each author subsequently independently extracted data from the remaining articles. Each reviewer assessed all manuscripts for risk of bias using a modified ROBINS-I scale (available in Appendix 4), constructed with the assistance of the medical librarian (M.B.), which included grading of selection, performance, attrition, detection, and reporting bias.(24) The outcome measures reported by the studies were heterogeneous. Extracted variables included sensitivity, specificity, intraclass correlation coefficients, and mean difference. Discrepancies in the extraction results were discussed and resolved by both reviewers.

Results:

The search identified a total of 2323 unique citations. Four additional studies were identified through hand searching and review of references of included studies. After title and abstract review, 28 full-text articles were assessed for eligibility, and 16 studies describing 17 neonatal wearable devices were included in the final analysis (Figure 1). Three of the devices assessed were commercially available (Baby Vida, Owlet Smart Sock 2, and ANNE One), while the remaining 14 were in development as of 2020. Overall, 14 studies were engineering papers, and two were non-randomized studies of interventions. Additional information regarding the included studies is detailed in Table 1.

Device Designs

Body Placement

Given the intended utility of wearables as convenient, non-invasive devices for continuous monitoring, location, and placement of the device on the body are critical considerations in their design. This is a particular challenge in neonates and infants with smaller total body surface areas and often more fragile and irritable skin.(25) Most wearables in the cohort were designed for placement on the neonate's foot (three studies) or chest (three studies), or both (two studies) (Figure 2). Foot devices were wrapped around the foot and ankle, characterized as "socks," "booties," or skin-like wireless foot modules. Chest units varied from adhesive biosensors to chest belts. Six studies developed devices embedded in an article of clothing. Two devices were secured to the forehead, which the authors asserted would limit manipulation during clothing removal.(26) Generally, devices with both chest and limb components report more accurate device outputs.

"Inclusion criteria were the use and assessment of wearable technology in the neonatal or infant population. This includes subjects under two years of age, with neonates defined as birth to age less than one month and infants defined as age one month to less than two years per Food and Drug Administration guidelines. (23) "

Battery

Power management is an important component of wearable device development given their intended use as long-term continuous monitoring tools,(27) and a significant portion of energy consumption occurs during raw data transmission from the device to external sites or the cloud.(28) Eight studies reported the use of a Bluetooth Low Energy (15) system to transmit collected data. Other technologies include near-field communication,(15) Teflon-associated microwires,(15) Zigbee technology,(29) and microcontroller transceivers.(30) To satisfy power requirements, most used commercially available batteries. However, innovation in battery technology and battery-free power sources are exciting and necessary for the evolution of future wearables(27). Chung et al. described several alternate power sources, including a modular bat-

Figure 1: Study selection (Prisma flowsheet)

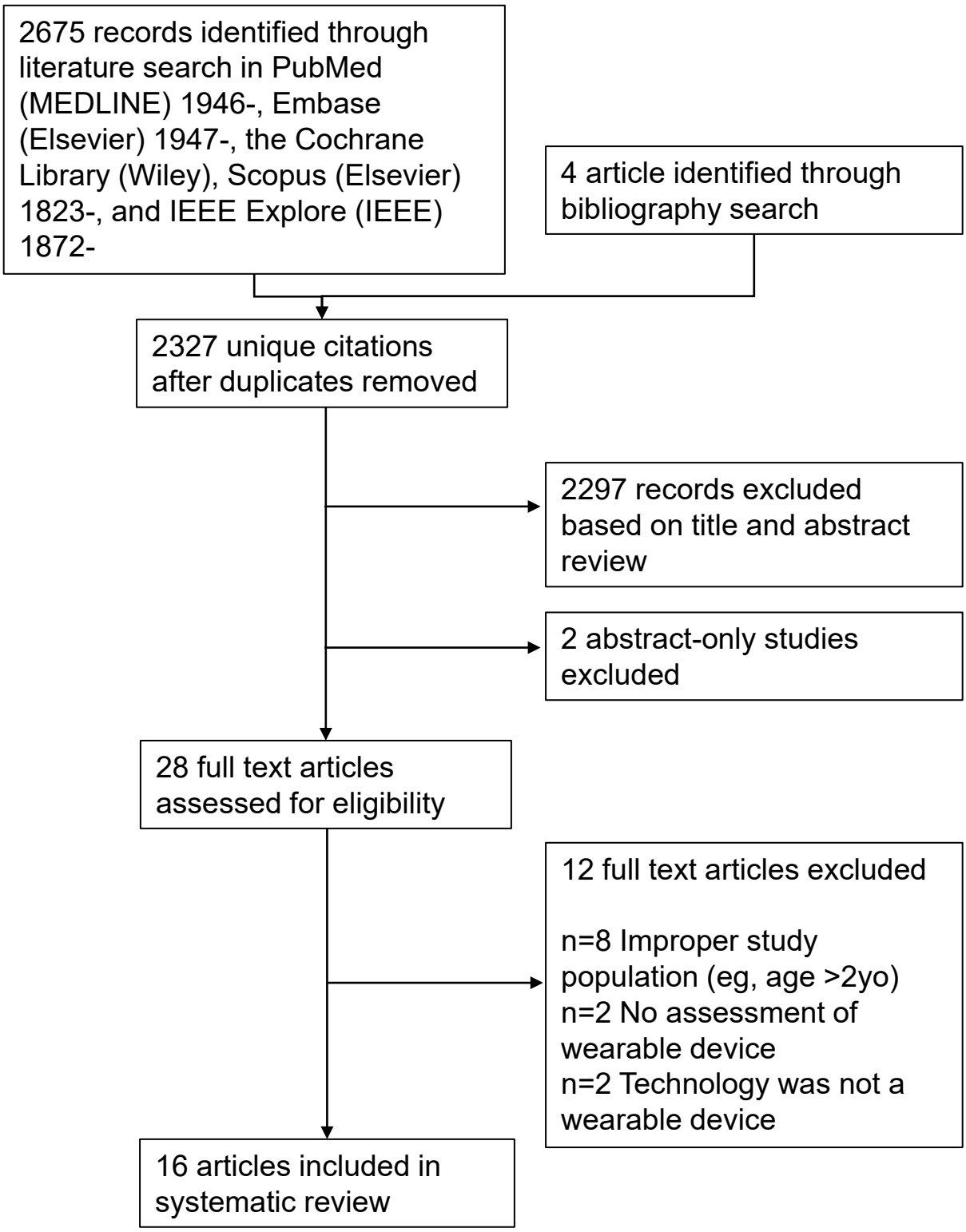

Table 1: Summary of Included Studies and Devices

Study	Study Type; Design	Wearable Device	Vital Signs Collected	Device Location	Device Design Technologies
Agezo et al, 2016	Conference Proceeding; Engineering Paper	Fabric onesie with Techniktex P180+B electrodes	Raw Data: ECG; Calculated Data: HR	Full body	Data Collection: TechnikTex P180+B[1] Data Transmission: RFID[2], Bluetooth Battery: no battery required
Bonafide et al, 2018	Letter; Non-randomized study of the effects of interventionS	Owlet Smart Sock 2 Baby Vida	Raw Data: pulse oximetry; Calculated Data: SpO_2, pulse rate	Foot & Ankle	Data Collection: Baby Vida device, Owlet Smart Sock Device Data Transmission: Bluetooth
Chen et al, 2010	Full Report; Engineering Paper	Smart jacket	Raw Data: ECG, SpO_2, body temperature	Full body	Data Collection: Medtex 130+B[3] textile electrodes by Shieldex and gold printed textile electrodes by TNO Science and Indusrtry; NTC Mon-A-Therm 90045 temperature sensor[4] Data Transmission: unspecified conductive textile wires
Chen et al, 2020	Full Report; Engineering Paper	Smart vest	Raw Data: ECG, motion, respiratory signals Calculated Data: HR, RR	Full body	Data Collection: Silver textile electrodes (Technik-tex P130 + B[5] and Berline RS of Shieldex Company[6]), PDMS-Graphene compound-based sensor[7], inertial measurement unit (IMU) sensors (MPU9250)[8] Data Transmission: Bluetooth Battery: 3.7V Li-battery and charging circuit
Chung et al, 2019	Full Report; Engineering Paper	Chest ECG device, foot PPG device	Raw Data: ECG, PPG, temperature; Calculated Data: HR, HR variability, RR, blood oxygenation, PAT	Chest; Foot	Data Collection: 2 wireless epidermal electronic system (EES) with chip-scale circuit components, metal mesh microstructures, small scale LEDs, temperature sensor; Data Transmission: near field communication
Chung et al, 2020	Letter; Engineering Paper	Chest unit, limb unit	Raw Data: acoustic signatures, PPG, movement/ changes in body orientation; Calculated Data: HR, RR, SpsO2, temperature, PAT, PTT	Chest; Limb on various peripheral locations	Data Collection: Wide-bandwidth 3-axial accelerometer (BMI160[9], Bosch Sensortec), clinical-grade temperature sensor (MAX30205[10], Maxim Integrated), ECG system consisting of two gold-plated electrodes, integrated pulse oximetry module (MAX30101[11], Maxim Integrated), temperature sensor (MAX30205[10], Maxim Integrated) Data Transmission: Bluetooth Low Energy System Battery: Several Configurations including modular battery unit coupled to device through pairs of magnets, battery-free that relies on wireless power transfer, wirelessly rechargeable lithium polymer battery
De et al, 2017	Full Report; Engineering Paper	Forehead belt	Raw Data: acceleration, HR, body temperature	Forehead	Data Collection: Silver textile electrodes (Technik-tex P130 + B[5] and Berline RS of Shieldex Company[6]), PDMS-Graphene compound-based sensor, inertial measurement unit (IMU) sensors (MPU9250[8]) Data Transmission: Data cable Battery: 3.7V Li-battery and charging circuit

Ferreira et al, 2016	Conference Proceeding; Engineering Paper	Chest belt	Raw Data: Accelerometry, Body temperature, ECG; Calculated Data: HR, RR, body position	Chest	Data Collection: iOT device with infrared thermopile sensor (TMP007[12]), LSM330DLC[13] inertial sensor, CC2530[14] microcontroller, AD8232[15] signal conditioning block Data Transmission: Zigbee technology to H Medical Interface, wireless USB adapter TL-WN725N[16]; Storage: cloud storage center Battery: TPS63060[17] battery
Inamori et al, 2020	Conference Proceeding; Engineering Paper	Forehead device	Raw Data: Reflected light intensity from LEDs; Calculated Data: HR, bilirubin concentration, SpO2	Forehead	Data Collection: 4 photodiodes with 4 wavelengths of LEDs, microcontroller unit for controlled timing of emissions Data Transmission: Bluetooth Low Energy Battery: Cointype cells
Leier et al, 2014	Conference Proceeding; Engineering Paper	Foot monitoring device	Raw Data: accelerometry, body temperature, PPG; Calculated Data: HR, RR, body posture and activity, SpO2	Foot	Data Collection: Three-axes accelerometer (BMA280[18]), optical sensors on flex cable, temperature sensor on flex cable Data Transmission: Bluetooth Low Energy, Micro-USB interface; Storage: On-board ferro-electric RAM memory module Battery: 400 mAH battery with micro-USB charging
Linti et al, 2006	Conference Proceeding; Engineering Paper	Sensory baby vest	Raw Data: ECG, delta resistance between thermistors, Garment moisture; Calculated Data: HR, RR, temperature, humidity/sweating	Full Body	Data Collection: Dry electrodes on garment with silicone rubber printed on textile substrate, silver particles, moisture sensors, miniature NTC thermistors[19] integrated into ribbon cable Data Transmission: AWG36[20]
Maitha et al, 2020	Full Report; Engineering Paper	Wireless vest	Raw Data: ECG, Respiratory signal, accelerometry; Calculated Data: HR, RR, body position	Full Body	Data Collection: 3 removable + replaceable patch electrodes, 3 axis accelerometer, force sensitive resistor; Data Transmission: Bluetooth Storage: SD card Battery: 2500 mAH battery + 3.3 V
Petrus et al, 2015	Full Report; Non-randomized study of the effects of interventions	Vest-based Floright ® system	Raw Data: Magnetic field signal; Calculated Data: HR	Full body	Data Collection: Magnetic dipole moment generated by vest + detected by antenna
Raj et al, 2018	Conference Proceeding; Engineering Paper	Wearable respiratory rate device	Raw Data: 3-axis accelerometer; Calculated Data: RR	Abdomen and chest	Data Collection: 3 axis accelerometer LIS2HH12[21] with 16-bit resolution Data Transmission: Bluetooth; Storage: None, streams raw data in analysis mode + transmits locally computed RR to gateway device which communicates with Cloud Battery: 3.7 V, 200 mAH Li-ion battery
Rimet et al, 2007	Conference Proceedings; Engineering Paper	BBA Bootee	Raw Data: pulse oximetry; Calculated Data: HR, position, SpO2	Foot	Data Collection: OEM III oximetry module[22], 3-axes accelerometer Data Transmission: Nordic ref. nRF9E5[23] Battery: 3.6 V battery + recharging circuity

Vora et al, 2017	Conference Proceeding; Engineering Paper	RFID Infant Monitor (Bellyband)	Raw Data: ECG, fabric strain gauge; Calculated Data: HR, RR	Abdomen and chest	Data Collection: electrodes for ECG, fabric strain gauge, RFID antenna Data Transmission: RFID tags Battery: no battery required

Legend: HR= heart rate, RR= respiratory rate, ECG= electrocardiogram, PPG=photoplethysmography, PAT=pulse arrival time, PTT=pulse transit time, RFID=radio frequency identification, ioT = internet of things, RAM= random access memory, SpO_2 = oxygen saturation

Terms: 1. TechnikTex P180+B: high conductive silver-plated knitted fabric, 2. RFID: radio frequency identification, 3. Medtex 130+B: silver coated textile electrodes by Shieldex, 4. NTC Mon-A-Therm 90045: temperature sensor, 5. TechnikTex P130+B: high conductive silver-plated knitted fabric, 6. Berline RS: high conductive silver-plated knitted fabric, 7. PDMS-Graphene compound-based sensor: polydimethylsiloxane-graphene, 8. MPU9250: a 9 degree-of-freedom (9-DoF) inertial measurement unit (IMU); small profile sensor houses an accelerometer and gyroscope, 9. BMI160: small, low power inertial power unit, 10. MAX30205: accurate temperature sensor with alarm/shutdown/interrupt output; has a high-resolution sigma-delta ADC (Analog-to-Digital Converter) that converts the temperature data to digital form, 11. MAX30101: high-sensitivity pulse oximeter and HR Sensor for fitness & healthcare, 12. TMP007: the latest thermopile sensor from TI, 13. LSM330DLC: a system-in-package featuring a 3D digital accelerometer and a 3D digital gyroscope, 14. CC2530: Zigbee and IEEE 802.15. 4 wireless microcontroller with 256kB Flash and 8kB RAM, 15. AD8232: an integrated signal conditioning block for ECG, 16. TL-WN725N: wireless USB adapter, 17. TPS6306x devices: provide a power supply solution for products powered by either three-cell up to six-cell alkaline, NiCd or NiMH battery, or a one-cell or dual-cell Li-Ion or Li-polymer battery, 18. BMA280 is an advanced, triaxial, low-g acceleration sensor with digital interfaces, aiming for low-power consumer electronics applications, 19. NTC thermistors: non-linear resistors, which alter their resistance characteristics with temperature; resistance of NTC will decrease as the temperature increases, 20. AWG36: flexible, Teflon-isolated microwires, 21. LIS2HH12: ultra-low-power high-performance three-axis linear accelerometer that is capable of measuring accelerations with output data rates from 10 Hz to 800 Hz, 22. OEM III Module provides a simple way to incorporate Nonin pulse oximetry technology, 23. Nordic ref. nRF9E5:microcontroller transceiver

tery unit that magnetically and electrically couples to their chest sensor called ANNE® One.(31) In addition, the study described the potential for a battery-free system that relies on wireless power transfer via a magnetically coupled harvesting unit configured to receive power from a transmission antenna.(16) Newly developed fabric onesie and Bellyband devices were battery-free, utilizing passive Radio Frequency Identification (RFID) technology for continuous energy supply.(32)

"Wearable devices often have four major modalities: (1) a biopotential-specific sensor unit, such as an electrocardiogram (ECG), (2) a motion sensor unit, such as an accelerometer or gyroscope, (3) an optical measurement unit, such as a photoplethysmograph, and (4) an environmental sensor unit, such as a video camera."

Device Outputs:

Wearable devices often have four major modalities: (1) a biopotential-specific sensor unit, such as an electrocardiogram (ECG), (2) a motion sensor unit, such as an accelerometer or gyroscope, (3) an optical measurement unit, such as a photoplethysmograph, and (4) an environmental sensor unit, such as a video camera. The devices included in this review contained variable combinations of these sensor modalities (Table 1). Of the 14 devices, 11 included a biopotential-specific sensor unit: six devices had ECG monitoring capabilities, and three contained pulse oximetry sensors. Seven of the 14 studies incorporated a motion sensor unit as a 3-axis-accelerometer. Three devices utilized photoplethysmography (PPG) sensors. Finally, five incorporated environmental sensors to measure body temperature and respiratory rate (16).

Given the breadth of possible cardiopulmonary function measures, final device outputs were not uniform across the devices. The simplest devices measured only respiratory rate. More advanced sensors reported an array of physiological parameters, including heart rate (H.R.), body temperature, and pulse oxygen saturation (SpO_2). H.R. was calculated through several methods, including the derivation from PPG, ECG, and reflected light intensities of the arterial pulse.(25) While PPG-derived HR is most accurate due to minimal confounding factors such as breathing patterns; all three methodologies are readily utilized and accepted.(33) R.R. was derived by pulse oximetry,(34) 3-axis-accelerometry,(35) fabric strain gauges,(32) magnetic field signal,(36) and ECG.(15, 16) Several devices reported unique capabilities, including sweat monitoring through collecting raw garment moisture volume(29) and ECG-derived pulse arrival time (PAT), which is a surrogate for continuous systolic blood pressure.(16)

Performance Metrics:

The primary outcome of interest was device accuracy and performance. However, there was significant heterogeneity in how results were reported across studies. Some studies reported sensitivity and specificity, while others reported alternate parameters, including mean differences and intraclass correlation coefficients. This variability can be attributed to the variety of device validation methodologies utilized by investigators and the different stages of development in which devices were tested.

Study Conditions:

While most publications recruited neonates and infants for testing, two studies used simulated models: an age-matched infant and a skin model to test a bellyband device and a onesie, respectively.(32, 37) Subgroups of neonates and infants also studied varied, with inclusion criteria as specific as infants with pulmonary disease(36) to as wide a group as all admitted premature neonates in the neonatal intensive care unit (NICU) and pediatric intensive care unit (PICU).(15, 16, 38, 39) Bonafide et al. utilized the broadest study population, which included infants with any cardiopulmonary condition requiring hospitalization at a large U.S. children's hospital.(34) When reported, the duration of device testing ranged widely from 18 minutes(40) to 230 hours.(31) Only two other studies carried out more than two hours of device validation, citing 30 and 2.5 hours of data, respectively.(16, 39) Study sizes were similarly disparate, varying from one subject(29, 30, 32, 37, 38, 41) to the largest cohort of 71 subjects.(31) There were several failures to report device validation methodology–one study did not report sample size,(25) and seven omitted descriptions of testing duration (Table 3). Device validation was overwhelmingly performed in the hospital or laboratory, with only one study conducting validation tests in the home.(15)

"There were several failures to report device validation methodology–one study did not report sample size,(25) and seven omitted descriptions of testing duration (Table 3). Device validation was overwhelmingly performed in the hospital or laboratory, with only one study conducting validation tests in the home. (15)"

Validated Devices:

In order to clinically validate new technologies, existing standard of care consensus systems must be used for product testing.(42, 43) In our cohort of studies, gold standard devices such as the IntelliVue MX800 bedside patient monitor and Masimo SpO_2 sensors were utilized as comparators in four of the 16 studies. Only these four studies can be validly assessed via their reported outcomes. Three of the studied devices demonstrated strong performances and close correlation with standard-of-care system outputs. Chung et al. developed and validated two separate monitoring platforms. In a 2019 Science paper, they introduced a binodal wearable system consisting of two electronic components mounted on the chest and foot, respectively. The system had H.R., R.R., and SpO_2 measuring capabilities validated in three NICU neonates. There was a reported mean difference of –0.17 beats per minute, 0.75 breaths per minute, and 1.02% for H.R., R.R., and SpO_2, respectively, when compared to the IntelliVue MX800. This wearable system also piloted PAT calculations via ECG and PPG raw data, although no correlative results with gold standard blood pressure measurements were reported. In the 2020 Nature Medicine article, the group described a newer iteration of their wearable system (ANNE® One) with more robust validation data. Compared to the IntelliVue MX800, the wireless sensor H.R. and SpO_2 measures showed a mean difference of -0·02 beats per minute and 0·11%, respectively, for a cohort of 20 neonates.(16) The calculated H.R. standard deviation (S.D.)

Study	Selection Bias		Performance Bias		Attrition Bias		Detection Bias	Reporting Bias	Overall Quality
	Consistent application of inclusion and exclusion criteria in selection of participants	Selection of representative group of participants with adequate sample size	Followed methods as outlined	Followed a method that could be used to validate the device	Reporting of all outcome data	Reporting of device validation data.	Consistent and comprehensive outcome measures	Complete, non-selective reporting of data	
Agezo et al, 2016	High	High	Low	Low	Unclear	Unclear	Low	High	Med risk of bias
Bonafide et al, 2018	Low	Low	Low	Low	High	Low	Low	Low	Low risk of bias
Chen et al, 2010	High	High	Low	Low	Low	Low	High	High	Med risk of bias
Chen et al, 2020	Low	Low	Low	Low	Low	Low	Low	Low	Low risk of bias
Chung et al, 2019	Low	Low	Low	Low	Low	Low	Low	Low	Low risk of bias
Chung et al, 2020	Low	High	Low	Low	Low	Low	Low	High	Low risk of bias
De et al, 2017	Low	High	Low	Low	High	Low	High	High	Med risk of bias
Ferreira et al, 2016	High	High	Low	Low	High	High	Low	High	High risk of bias
Inamori et al, 2020	High	High	Low	Low	High	High	Low	High	High risk of bias
Leier et al, 2014	High	High	Low	High	High	High	Unclear	High	High risk of bias
Linti et al, 2006	High	Unclear	Low	High	High	High	High	High	High risk of bias
Maitha et al, 2020	High	High	Low	High	Low	Unclear	Low	Low	Med risk of bias
Petrus et al, 2015	Low	High	Low	Low	Low	Low	Low	Low	Low risk of bias
Raj et al, 2018	Low	Low	Low	Low	Low	Low	Low	Low	Low risk of bias
Rimet et al, 2007	Low	Low	Low	Low	Low	Low	Low	Low	Low risk of bias
Vora et al, 2017	Unclear	Unclear	Low	Low	High	Low	Low	High	Med risk of bias

Table 2: *Quality and Bias Assessment of Included Studies*

Risk of bias was assessed using a modified ROBBINS criteria and 3 categorizations: low, high and unclear risk of bias. Overall quality was reported as med (medium), low, and high risk of bias.

Table 3: Performance and Accuracy of Wearable Devices

Study	Wearable Device	Relevant measures tested	Study Population	Cumulative Duration of Testing	Testing Condition	Comparator (*standard of care)	Main Findings
Agezo et al, 2016	Fabric onesie	Heart rate	1 skin dummy with cardio ECG stimulator	Unspecified	Lab	MediTrace foam electrodes	Output signal quality obtained from fabric onesie had 98.80% correlation with that from standard foam comparator.
Bonafide et al, 2018	Owlet Smart Sock 2	SpO_2	30 infants	60 hours	Hospital	Masimo Radical 7*	Sensitivity for hypoxemia was 88.8%. Specificity for hypoxemia was 85.7%. Sensitivity for bradycardia was 0.0%. Specificity for bradycardia was 100.0%.
	Baby Vida						Sensitivity for hypoxemia was 0.0%. Specificity for hypoxemia was 100.0%. Sensitivity for bradycardia was 0.0%. Specificity for bradycardia was 82.3%.
Chen et al, 2010	Smart jacket	Heart rate, SpO_2, temperature	1 premature infant	Unspecified	NICU	Solar® 8000M patient monitor	Temperature readings were within 0.1°C of Solar® 8000M. "Very good agreement" between smart jacket and Solar® 8000M derived HR and SpO_2.
Chen et al, 2020	Smart vest	ECG, heart rate, respiratory rate	15 neonates	150 minutes	NICU	Polysomnography (PSG)	ECG has "comparable signal quality and amplitude compared to PSG". HR Pearson correlation of r=0.967. RR Pearson correlation monitoring was r=0.969.
Chung et al, 2019	Dual sensor system including a chest and limb sensor.	Heart rate, respiratory rate, SpO_2	3 neonates	Unspecified	NICU	Intellevue MX800, Philips*	HR mean difference of –0.17 beats per minute. RR mean difference of 0.76 breaths per minute SpO_2 mean difference of 1.02%.
Chung et al, 2020	ANNE® One monitoring platform with two sensors including a chest and limb sensor.	Heart rate, SpO_2, temperature	20 neonates	25 hours	NICU, PICU	Intellevue MX800, Philips*; Giraffe Omnibed Incubator, GE (temp	HR mean difference of –0.02 beats per minute, SD of 2.08 bpm. SpO_2 mean difference of 0.11%, accuracy root mean square of 2.99% Temperature mean difference of 0.21°C, SD of 0.26°C.
		Respiratory rate	6 neonates	Unspecified (41 data points)	NICU, PICU	Direct physician observation	RR mean difference of 0.11, SD of 1.95 bpm.
		PAT/PTT	2 infants	4 hours	PICU	Arterial line*	PAT-derived SBP mean difference of 1.60 mmHg, SD of 7.99 mmHg. PTT-derived SBP mean difference of –0.04 mmHg, SD of 7.86 mmHg. (These results are within the ANSI/AA<MI SP10 standard for blood-pressure cuffs, which requires a mean different and SD of <5 mmHg and <8 mmHg.)

De et al, 2017	Forehead belt	Body temperature, ambient temperature, acceleration, heart rate	3 neonates	1.5 hours	Hospital	Unspecified	Temperatures, body acceleration and heart rates correlated exactly with existing wired system.
Ferreira et al, 2016	Chest belt	Heart rate, respiratory rate	1 infant	"Minutes"	Unspecified	Polar model T-34 heart rate chest strap	Chest belt and standard reference system "behave similarly in terms of heart rate measurement". Device able to detect all breaths when infant is on their back.
Inamori et al, 2020	Forehead device	Heart rate, SpO_2	Neonates	Unspecified	Unspecified	Unspecified	HR and SpO_2 results were "close to commercial monitor".
Leier et al, 2014	Foot monitoring device	Heart rate, respiratory rate, SpO_2	1 neonate	"Several hours"	Unspecified	None	No analysis of device accuracy.
Linti et al, 2006	Sensory baby vest	Heart rate, respiratory rate, temperature	1 simulation infant	Unspecified	Lab, hospital	None	No analysis of device accuracy.
Maitha et al, 2020	Wireless vest	Heart rate, respiratory rate, body position	2 infants	1121.2 seconds	Lab	None	Accelerometry data was qualitatively consistent with observed movement.
Petrus et al, 2015	Vest-based Floright ® system	Respiratory rate	19 healthy infants, 18 infants with lung disease	380 minutes	Hospital	Ultrasonic flowmeter (USFM)	RR mean difference of 0.71/min, with a 95% CI 0.24 – 1.17, p= 0.031.
Raj et al, 2018	Wearable respiratory rate device	Respiratory rate	30 neonates	Unspecified	Hospital	Clinician tabulated RR + video camera for backup/ cross certification	Device had a correlation coefficient (r) of 0.974 with physician tabulated values.
Rimet et al, 2007	BBA Bootee	Heart rate, SpO_2	71 neonates	230 hours	Hospital	Hewlett Packard Merlin with a Nellcor SpO_2 module*; Datascope Passport II with a Masimo SpO_2 module*	SpO_2 mean difference of -2.7%, SD of 2.1% and HR mean difference of -1bpm, SD of 9bpm when compared to the HP/ Nellcor unit. SpO_2 mean difference of 0.4%, SD of 1.6% and HR mean difference of -3bpm, SD 6bpm when compared to the Masimo unit.
Vora et al, 2017	RFID Infant Monitor (Bellyband)	Heart rate, respiratory rate	Simulation infant	Unspecified	Lab	NI myDAQ (data acquisition module)	Heart rate correlation was r=0.9976. Respiration monitor detected apnea within 10s of its onset.

Legend: SpO_2 = oxygen saturation, SD = standard deviation

Definitions: neonate = under 28 days old, infant = at or under 1 year old

of 2·08 beats per minute and SpO_2 accuracy root mean square of 2·99% fell within the regulatory guidelines of the Food and Drug Administration (FDA).(44) PAT- and pulse transit time (PTT)-derived systolic blood pressure were validated against arterial line monitoring and reported mean difference. S.D. similarly fell within American National Standards Institute and Association for the Advancement of Medical Instrumentation SP10 standards .(45) (15) The third validated device is the BBA Bootee described by Rimet et al. (31) This soft sandal-like device primarily reports H.R. and SpO_2 but also features an accelerometer which outputs infant motion data. In their study of 71 infants, they reported H.R. mean difference ± S.D. of -2·7% ± 2·1% (-1 bpm±9 bpm) compared with an FDA-approved Nellcor™ system and SpO_2 mean difference +/- SD of 0·4%±1·6% (-3bpm±6bpm) compared with the Masimo SET® pulse oximeter.

"The Owlet Smart Sock demonstrated a sensitivity and specificity for detection of hypoxemia of 88·8% and 85·7%, respectively. However, sensitivity and specificity for bradycardia detection were 0·0% and 100·0%."

Unvalidated Devices:

Although Bonafide et al. used standardized comparators in their investigation of two marketed devices, their results demonstrated the inaccuracy of technology. Thirty hours of the pulse oximeter and pulse measurements by the Owlet Smart Sock and Baby Vida were compared with the Masimo Radical 7 device, which features the Masimo rainbow SET® pulse oximeter.(34) The Owlet Smart Sock demonstrated a sensitivity and specificity for detection of hypoxemia of 88·8% and 85·7%, respectively. However, sensitivity and specificity for bradycardia detection were 0·0% and 100·0%. The Baby Vida sensitivity and specificity for hypoxemia were 0·0% and 100·0%, and for bradycardia, 0·0% and 82·3%, respectively. Unspecified or non-standard of care comparators were used in the remaining twelve studies. These comparators included video camera-captured respiratory and physician-observed respiratory rates, which were used to validate the respiratory rate monitoring device.(35) Validation of the RFID Bellyband reported a H.R. correlation of r=0·998 with a portable data acquisition device called N.I. myDAQ .(32) A commercially available yet clinically unvalidated was used to test a novel chest belt device,(30) and an ultrasonic flowmeter with facemask was compared to a newly developed vest system (36). Strong Pearson correlation coefficients (H.R. correlation of r=0·967 and R.R. correlation of r=0·969) were reported between the smart vest and an unspecified polysomnography unit.(39) In another study of a novel forehead belt, the comparator was described as the hospital's "existing wired system"; however, further detail regarding the make and model of the technology was omitted.(26) Three studies did not use a comparator or report device accuracy.(29, 40, 41) In several instances, studies reported using comparator measures but did not publish the comparison data between the wearable and the standard of care device.(25, 30) For example, the smart jacket described by Chen et al. was validated against a Solar® 8000M patient monitor; however, data points and statistical analysis were not reported.(38)

Quality Assessment:

The quality of each publication was assessed based on selection bias, performance bias, attrition, detection, and reporting bias based on the modified ROBINS-I scale, outlined in Table 2. Overall, six of the 16 studies had a high risk of selection bias due to inconsistent application of inclusion and exclusion criteria in participant selection, inadequate sample sizes, and unrepresentative participant groups. Three studies were at high risk of performance bias, given the failure to follow rigorous methods that could be used to validate the device. Additionally, seven studies had high attrition bias due to incomplete outcome data reporting, while four studies had high attrition bias due to a lack of device validation reporting. Most studies (12 of 16) had low detection bias, defined as bias in the outcome measurement outcome. Eight studies had high reporting bias due to selective data reporting.

"This review, including 16 studies, summarizes the evidence around the accuracy and performance of wearables for cardiopulmonary monitoring in neonates and infants. This is the first systematic review to explore the validity and reliability of wearable technologies for continuous monitoring in this population."

Discussion:

This review, including 16 studies, summarizes the evidence around the accuracy and performance of wearables for cardiopulmonary monitoring in neonates and infants. This is the first systematic review to explore the validity and reliability of wearable technologies for continuous monitoring in this population. Three novel technologies (the mechanical adhesive sensors of Chung et al.,(15, 16) and the BBA Bootee(31)) provided robust evidence of reliable performance with data outputs characterized by low mean differences against standard-of-care systems. Newer systems, published more recently than this review, suggest opportunities to assess both traditional vital signs such as heart rate and blood oxygenation as well as advanced measures such as cerebral hemodynamic monitoring.(46)

While the remaining 13 studies described the device designs with technical detail, clinical evaluation was limited; small sample sizes, poor comparators, and multiple instances of missing data compromised results. Short device testing durations were particularly notable, as the intention of wearables is long-term, continuous monitoring to capture rare catastrophic events rather than surveil intermittent point measurements of vital signs. This highlights the limitations of the current body of research on wearables in the infant and neonate population, with a need for larger, more rigorous investigations.

Furthermore, while wearable devices are most promising and often marketed for home monitoring neonates and infants (e.g., Owlet), only one was tested in a non-hospital or laboratory setting. While most studies described wearables newly developed by the authors, there is a need for external validation testing. For instance, Bonafide et al. investigated two marketed but non-FDA cleared devices: the Baby Vida and Owlet Smart Sock 2.(34) They showed that the Owlet Smart Sock inconsistently detected hypoxemia and the Baby Vida device failed to both detect hypoxemia and display accurate low pulse rates. Home-based monitoring for neonates and infants remains a major unmet clinical need, where wearable wireless devices have tremendous potential. A recent analysis of NICU Medicaid patients demonstrated a 37% one-

A

B

C

D

E

year readmission rate, (47) suggesting inadequacies of discharge planning and home transition programs, which could be aided by implementing wearable home monitoring devices.

Notably, the current evidence for wearables use in neonates and infants has a low-GRADE rating.(48) In our overall quality assessment, 25% and 31% of included studies were systematically characterized by high and medium risk of bias, respectively. Data logging and processing and device sensitivity and specificity validation must be improved to assure the broad applicability of high-quality, evidence-based technologies in continuous cardiopulmonary monitoring. Fortunately, some of these efforts are ongoing, with some systems even achieving FDA clearance. For instance, the ANNE One system (Sibel Inc., Niles, IL), included in this review,(16, 49) and the Lifetouch biosensor (Isansys Lifecare Ltd, Oxfordshire, U.K.) (50) are FDA-cleared but currently limited to only adults. A recent 2022 publication showed that the ANNE One system compared favorably for heart rate, respiratory rate, SpO_2, and temperature against gold standard wired systems in n=84 neonates.(51) Notably, another medical device startup focused on global health, Neopenda, is also developing a wearable forehead device for neonatal monitoring in low-income settings.(52) Future work should focus on rigorous, well-conducted comparative trials of these new systems with gold standard wired monitoring systems followed by confirmatory studies in the home.

"Our review here suggests a tremendous unmet clinical need and a gap in evidence for novel wearable monitoring platforms for neonates and infants—too often, vulnerable populations such as these are overlooked when it comes to medical technology innovation."

Conclusion:

Our review here suggests a tremendous unmet clinical need and a gap in evidence for novel wearable monitoring platforms for neonates and infants—too often, vulnerable populations such as these are overlooked when it comes to medical technology innovation. In 2016, Congress enacted the 21st Century Cures Act with explicit incentives to drive forward pediatric device innovation. (53) Since then, the FDA has acted in conjunction with industry and other stakeholders to support pediatric device development through targeted meetings(54) and new initiatives (e.g., System of Hospitals for Innovation in Pediatrics(55)). The needs of neonates and infants for new monitoring solutions can only be met through coordinated collaboration between academics, entrepreneurs, industry, and regulators.

Figure 2: Wearable devices for cardiopulmonary monitoring in neonates and infants

Top: Textile-based devices

A. Foot monitor composed of a three-axis accelerometer, optical sensors, and temperature sensor(41)

B. Fabric onesie with two sewn-in ECG electrodes and RFID integrated connectors; ECG pulse signal obtained from onesie showing high correlation with a foam electrode(37)

Bottom: Patch-based devices

C. Skin interfaced biosensors designed for the limb and chest; Bland-Altman plots showing insignificant mean difference standards for H.R. and SpO_2(16)

D. Ultrathin, wireless ECG patch mounted on the chest with representation ECG and PPG waveform outputs from a healthy neonate(15)

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S.X. has royalty and equity interests in companies commercializing technologies in this space. JRW reports a spouse with royalty and equity interests in companies commercializing technologies in this space.

NT

Ellen Wu, MD
Department of Dermatology,
The Feinberg School of Medicine
Northwestern University
Chicago, IL 60611, USA

Guilherme Sant'Anna, MD, PhD
Neonatologist
Associate Professor of Pediatrics
Faculty of Medicine
McGill University
Montréal, QC H3A 2B4, Canada

Ashvita Ramesh
Department of Surgery
Division of Cardiac Surgery
Feinberg School of Medicine
Bluhm Cardiovascular Institute, Northwestern University,
Chicago, IL, USA

Kian Jalaleddini, PhD
Principal Data Scientist
Nile
Los Angeles, California, USA

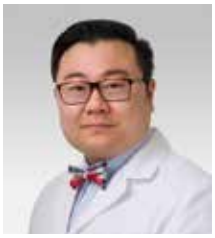
Molly Beestrum
Education and Curriculum Coordinator
Northwestern University School of Medicine,
Chicago, IL 60611, USA

Corresponding Author

Ehsan Sobhani Tehrani, PhD
Chief Executive Officer
iKinesia Inc
Research AssistantResearch Assistant
Department of Biomedical Engineering
McGill University
Montréal, QC H3A 2B4, Canada

Wissam Shalish, MD, PhD, FRCP
Candidate in Experimental Medicine
Neonatologist
Clinician-Scientist,
Department of Pediatrics,
The Research Institute of the McGill University Health Center
Montréal, QC H3A 2B4, Canada

Corresponding Author



Shuai Xu, MD
Department of Dermatology,
Northwestern University School of Medicine,
Chicago, IL 60611, USA
Email: stevexu@northwestern.edu

Robert E Kearney
Professor
Department of Biomedical Engineering
McGill University
Duff Medical Building
3775 University Street, Room 309
Montréal, QC H3A 2B4, Canada

Jessica R Walter, MD, MSCE
Assistant Professor of Obstetrics and Gynecology
(Reproductive Endo and Infertility)
Northwestern University School of Medicine,
Chicago, IL 60611, USA

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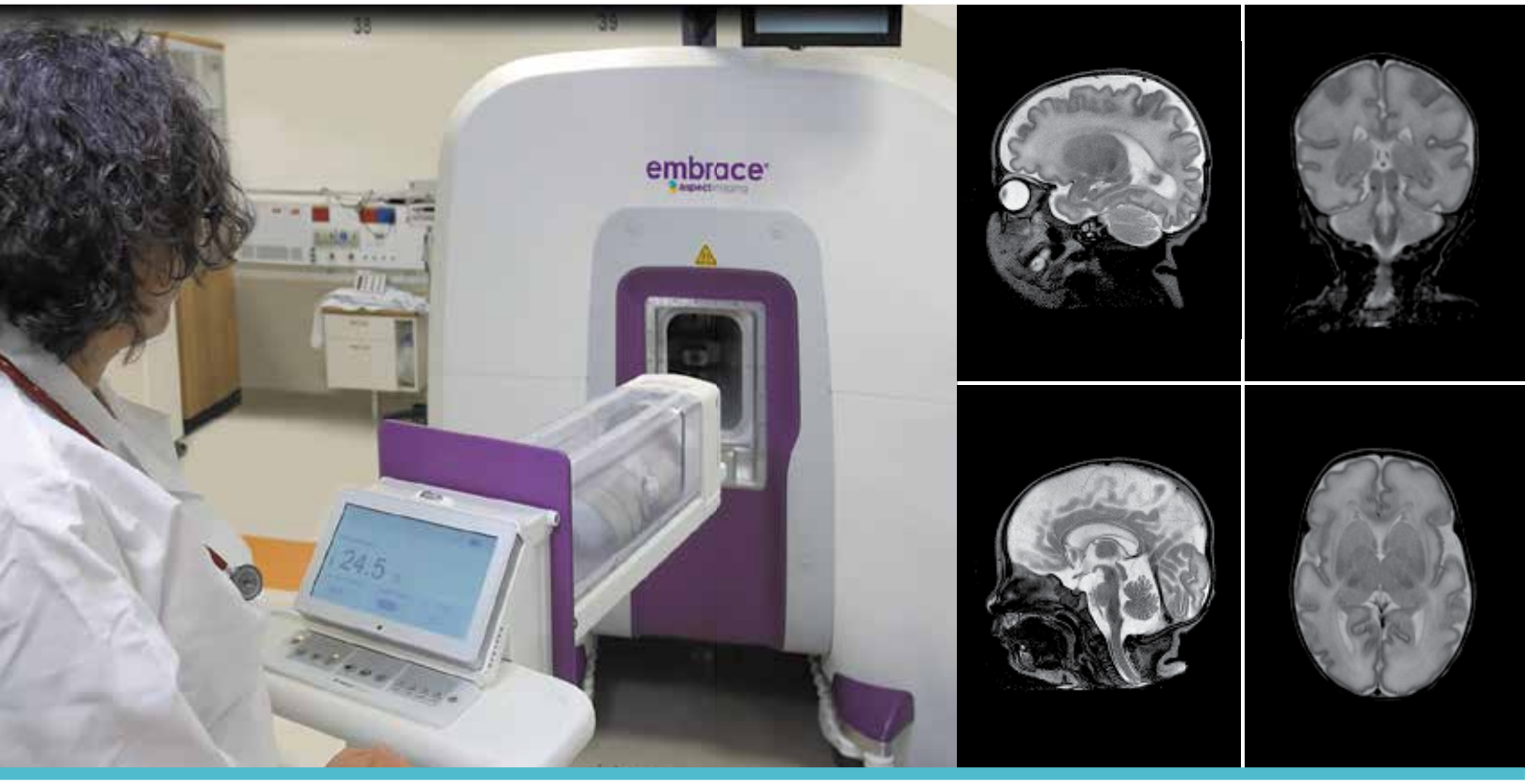

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Letters to the Editor

Response to Physicians Against Drug Shortages (PADS): End Chronic Shortages & Skyrocketing Prices of Generic Drugs, Devices & Supplies, Repeal the 1987 Medicare Anti-Kickback "Safe Harbor" for Hospital Group Purchasing Organizations (GPOs)

Dear Editor:

By sharing the letter to Senators Patty Murphy and Richard Burr, Goldstein and Zweig highlight the efforts of Physicians Against Drug Shortages (PADS) and the skyrocketing charge of generic drugs, durable medical equipment, and supplies for both infants, children, and adults through Group Purchasing Organizations (GPOs). I commend their analysis and hope that the Senators will heed their concerns.

"By sharing the letter to Senators Patty Murphy and Richard Burr, Goldstein and Zweig highlight the efforts of Physicians Against Drug Shortages (PADS) and the skyrocketing charge of generic drugs, durable medical equipment, and supplies for both infants, children, and adults through Group Purchasing Organizations (GPOs). I commend their analysis and hope that the Senators will heed their concerns"

Oregon and three other states are making bold efforts to control the high cost of health care, especially for Medicaid populations, tribal members, immigrant populations, and others served by the Oregon Health Plan. Through a public process for transparency, Oregon has established health care growth targets and set the stage to hold both the public and private markets accountable for containing these costs, although it does not confront the issues of drug shortages (especially generic drugs). A recent report presents a detailed look at Oregon's health care costs and cost growth between 2013 and 2019 (the latest reported data). This effort resulted from the Oregon Legislature establishing a Sustainable Health Care Cost Growth Target Program, which set a statewide target for the annual per person growth rate of total health care spending. (https://go.usa.over/xzFpX).

"Through a public process for transparency, Oregon has established health care growth targets and set the stage to hold both the public and private markets accountable for containing these costs, although it does not confront the issues of drug shortages (especially generic drugs). "

Key findings are that between 2013 and 2019, health care costs grew faster than the national average and faster than income and inflation. However, in terms of dollar amounts, health care in Oregon in any given year is less expensive than the national average. Per person, health care costs in Oregon grew by 49% from 2013 to 2019 (or 6.9% annually). Medicare costs per person grew 58%, commercial costs per person grew 45%, and Medicaid costs grew at least 32%. Overall, Inpatient services were the highest cost category, followed by professional services. Pharmacy costs per person from 2013 to 2019 rose by 20% per year among Medicare-covered Oregonians.

Medicaid costs were generally the lowest, and Medicare costs were the highest, considering each market. In the commercial market, per person costs in the professional service category were the highest at $1657 and contributed the most to overall cost growth between 2013 and 2019. In the Medicare market, inpatient per person costs were the highest cost category at $3489 in 2019, and pharmacy per person costs in Medicare grew the most at 185% over the six years. In the Medicaid market (Oregon Health Plan patients), inpatient per person costs were the highest cost category at $1250 in 2019, and professionals and pharmacies contributed the most to overall cost growth between 2013 and 2019. In 2020 the OHP covered 43% of all children, including Medicaid, SCHIP, Cover All Kids, and Reproductive Health Equity Act. (Allen, Patrick, and Coyer, Lori, Oregon Health Authority Health Systems Divospm, Oregon Health Plan 2019). However, 4.1% of children do not have health insurance. Oregon ranks 19th of 51 in the number of children without medical/dental or behavioral health benefits or an estimated 38,000 children in Oregon.

Pharmacy drug costs following Oregon Revised Statute 646A.689, the Oregon Department of Consumer and Business Services establishes a transparency program to accept reports and disclose certain information from prescription drug manufacturers, health insurance carriers, and consumers on drug prices. This transparency aims to provide accountability for prescription drug pricing through the notice and disclosure of specific drug costs and price information from pharmaceutical manufacturers, health insurers, and consumers. Manufacturers are required to report 60 days in advance of specific price increases as required by Oregon House Bill 2658 (heeps://ohs.oregonlegislature.gov/liz/2019R1Measures/Pverview/HB2658). Further, the public is encouraged to submit their experiences on how rising prescription drug prices have affected their lives or if they have experienced a price increase to the program. The Oregon legislature approved by the Governor (HB 2623) a maximum of $75 co-pay for insulin per month owing to consumer gouging for the increasing price of insulin. However, this co-pay may be burdensome even for OHP and fixed-income patients. Although these efforts are laudable

in "controlling" cost escalation and transparency, the significant impact of GPOs in Oregon is through intensive lobbying of the legislature (much of which is non-transparent).

Fortunately, Oregon has one of the highest breastfeeding rates in the country, with an estimated 64% of mothers breastfeeding through 6 months or longer and surpassed only by Alaska, Washington, and Montana. (Breastfeeding Report Care United States 2020, cdc.gov/breastfeeding/data/reportcard.htm). Nonetheless, formula shortages (even through the Women Infants and Children program) hampered the availability of artificial milk for infants and special nutritional supplements for infants with metabolic disorders. In 2018, Oregon's Health Evidence Review Commission, among a few other states, added donor/banked human milk as a benefit for infants whose mothers could not provide sufficient human milk for their infants to the prioritized list of covered health services when donor milk came from a licensed breastmilk bank. Through the OHP and State Health Insurance Program, over 90% of Oregon's infants, children, and adolescents receive these benefits, although access to some services (including specialty care) may not be equitable, especially in rural areas and among tribal members.

"Through the OHP and State Health Insurance Program, over 90% of Oregon's infants, children, and adolescents receive these benefits, although access to some services (including specialty care) may not be equitable, especially in rural areas and among tribal members. "

As documented in their editorial, Goldstein and Zweig document the evidence of deadly consequences of Group Purchasing Organizations contracting, increasing prices far out-pacing wages and inflation. I likewise encourage Senators Murphy and Burr to remove the 1987 Medicare anti-kickback "safe harbor" provisions which exempted CPOs from criminal prosecution for taking kickbacks from suppliers. For Neonatologists, joining efforts with the voice of Physicians Against Drug Shortages and deter the pernicious effects of GPO and pharmacy benefit managers on unwarranted drug unavailability and pricing patterns both in hospital and at home that face all Neonatologists advocating for their patients and families.

"I likewise encourage Senators Murphy and Burr to remove the 1987 Medicare anti-kickback "safe harbor" provisions which exempted CPOs from criminal prosecution for taking kickbacks from suppliers. "

T. Allen Merritt, M.D., MHA

Dear Dr. Merritt:

Many thanks for writing in support of our letter to the Senate HELP Committee and for your trenchant analysis of Oregon's health care costs.

Exhaustive documentation gathered over more than two decades shows that the misbegotten 1987 Medicare anti-kickback "safe harbor" for GPOs (and pharmacy benefit managers, aka PBMs) is at the root of much of what is wrong with American health care: Chronic shortages and grossly inflated prices of generic injectable drugs, masks, and other personal protection equipment (PPE) and other hospital goods; outrageous prices for drugs sold through PBMs to individuals; lack of competition and medical device innovation, even physician burnout. Doctors resent being told by materials managers that they cannot use the best available pacemaker or hip implant for their patients because those devices are not on their hospitals' GPO contracts. Within Neonatology, GPO "decision-making" drives the choice of the ventilator, pulse oximeter, and even EHR. The pharmacy and therapeutics committee evaluates the available choices, those permitted by GPO contracting, and not those that produce the best possible results or outcomes.

"Exhaustive documentation gathered over more than two decades shows that the misbegotten 1987 Medicare anti-kickback "safe harbor" for GPOs (and pharmacy benefit managers, aka PBMs) is at the root of much of what is wrong with American health care: Chronic shortages and grossly inflated prices of generic injectable drugs, masks, and other personal protection equipment (PPE) and other hospital goods; outrageous prices for drugs sold through PBMs to individuals; lack of competition and medical device innovation, even physician burnout. "

The notion of a system in which dominant suppliers are permitted by statute to pay kickbacks (aka bribes) to for-profit buying cartels for exclusive access to thousands of health care facilities is preposterous. It is a "legalized" fraud, to put it bluntly. Unfortunately, a vast well-financed lobbying and PR operation has grown, like a malignant tumor, to protect the unsafe safe harbor and the gravy train it has created for GPO insiders, CEOs of shareholder hospitals, and other predators. Worse still, there is no conclusive evidence that any saving results from these organizations and their interference in evidence-based best practices.

Their tactics include "donations," "grants," and outright payments to medical societies, non-profit patient "advocacy" groups, academics, and health care policy "experts." We know at least one instance in which a medical society executive, a physician, was threatened with losing his job if he lobbied for repeal. One doctor

characterized this as a war between "the suits and the scrubs." At the same time, medical students and residents are discouraged from communicating with the industry about any newer innovative products. Often, they are unaware of alternatives outside of the GPO-sponsored options. The need for physicians to avoid conflict or commercial bias facilitates the continuation of the "safe" harbor since medical decision-making is no longer in their purvey but instead controlled by Group Purchasing Organizations and their stranglehold on hospital purchasing.

"The need for physicians to avoid conflict or commercial bias facilitates the continuation of the "safe" harbor since medical decision-making is no longer in their purvey but instead controlled by Group Purchasing Organizations and their stranglehold on hospital purchasing."

We can restore competition and integrity to the supply chain and end this travesty if rank-and-file physicians, pharmacists, nurses, and other health care workers and concerned citizens demand that Congress repeal this pernicious statute. Indeed, Oregon is potentially fertile ground for reform. As chair of the Senate Finance Committee, Senator Ron Wyden could help fix this if he chose to. Representatives Kurt Schrader and Earl Blumenauer serve on the powerful House Energy and Commerce and Ways and Means Committees, respectively, which have jurisdiction in the lower chamber. Round up a few of your colleagues and schedule in-person meetings with them. Furthermore, we would welcome you as a co-chair of PADS, which has led the charge on GPO/PBM reform for a decade.

"We can restore competition and integrity to the supply chain and end this travesty if rank-and-file physicians, pharmacists, nurses, and other health care workers and concerned citizens demand that Congress repeal this pernicious statute."

Respectfully,

Mitchell Goldstein, M.D., M.B.A.

Chair, PADS
Professor of Pediatrics

Loma Linda University School of Medicine
Loma Linda, CA

Contact info: mgoldstein@llu.edu Cell: (909) 257-8573

Phillip L. Zweig, M.B.A.

Executive Director/Co-founder

Contact info: plzweig@aol.com (508) 627-3285

Mitchell Goldstein, MD, MBA, CML

Editor in Chief

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Loma Linda, CA 92354

Tel: +1 (302) 313-9984

LomaLindaPublishingCompany@gmail.com

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Erratum (Neonatology Today July, 2022

Neonatology Today is aware of the following erratum affecting the July, 2022 edition.

In their letter to the editor, Zweig and Goldstein refer to the " American College of Emergency Medicine" They intended to refer to the "American College of Emergency Physicians." NT regrets this oversight.

Corrections can be sent directly to LomaLindaPublishingCompany@gmail.com. The most recent edition of Neonatology Today including any previously identified erratum may be downloaded from www.neonatologytoday.net.

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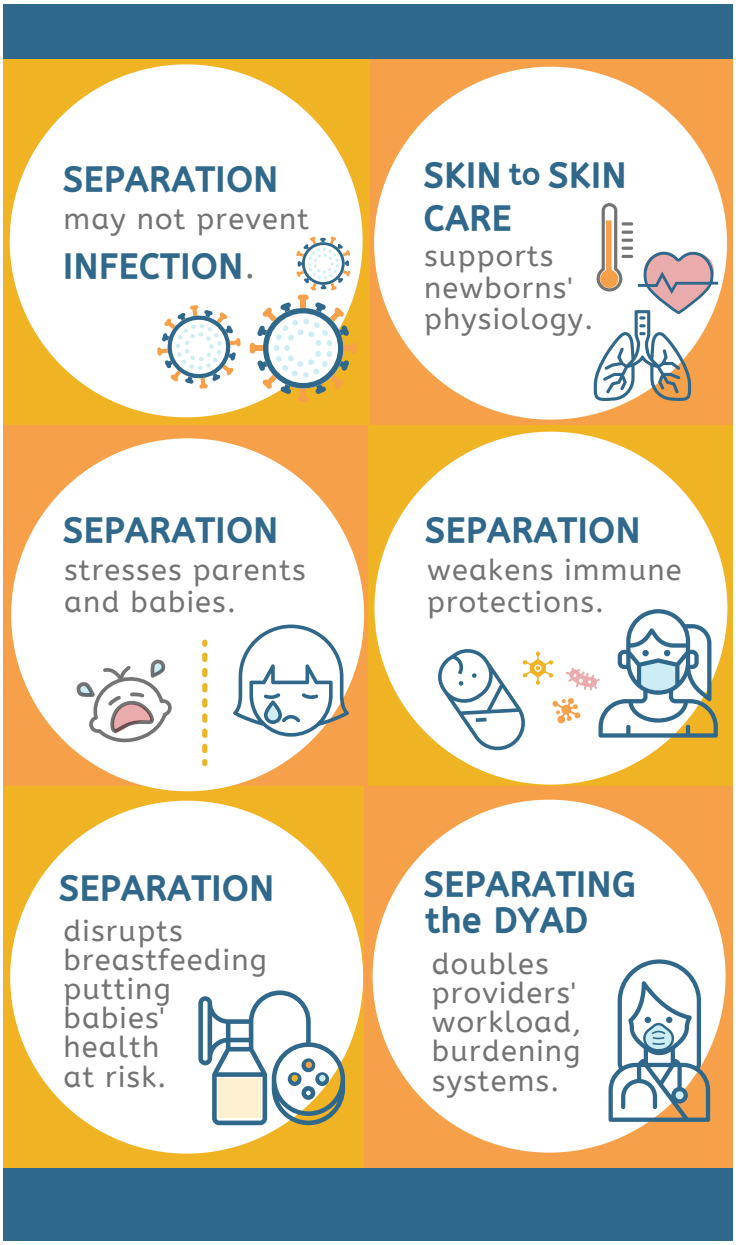
Neonatology Today welcomes your editorial commentary on previously published manuscripts, news items, and other academic material relevant to the fields of Neonatology and Perinatology.

Please address your response in the form of a letter. For further formatting questions and submissions, please contact Mitchell Goldstein, MD at LomaLindaPublishingCompany@gmail.com.

NT

Should Infants Be Separated from Mothers with COVID-19?

FIRST DO NO HARM



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Identifying Gaps – Entering the Path to High-Reliability Organizing (HRO)

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

Abstract

The human brain evolved to act against consequences, yet decision-making models rely on information processing. Crises occur in volatile environments, yet organizations rely on plans and planning. The gap between fluctuating events and static concepts and models creates inconsistencies that are solved under pressure at the local level. We identify the more consequential gaps, describing their origins and structure. Some gaps are readily bridged, but some present existential danger, such as between identity or beliefs and the environment.

"We identify the more consequential gaps, describing their origins and structure. Some gaps are readily bridged, but some present existential danger, such as between identity or beliefs and the environment."

Introduction

Computer programmers and digital engineers appreciate 10 kinds of people: those who understand binary and those who do not. For this article, we draw three insights from this joke: 1) people tend to divide and classify, 2) some people do not see the divide, and 3) people often do not understand the other side. We create gaps when we do not bridge divides. Rather than criticize the gaps that endanger people or the organization, we suggest the use of engagement to bridge such gaps. This article describes the gap between cognition and behavior, the types of gaps between the stable and unstable environment, and consequential gaps identified in the academic literature. In subsequent articles, we will discuss the priority of consequences and the function of engagement followed by the human performance in these situations.

Does a gap exist between the brain's ability to process perceptions and information (cognition) and the brain's ability to develop adaptive and survival actions (behavior)? *Time* enhances processing but impairs survival. Perhaps the gap is fictitious or synthesized, a product of how we understand the brain's adaptive functions.

The brain perceives the world, forming its perceptions into a mental model or representation of the world, then subsequently processes new information to find the truth. This firmly held belief of the brain as an analytical computer follows the development of computers for analysis and decision-making, initially proposed by Allen Newell and Herbert Simon (1). Cognition became a mechanical behavior, and computers became models of human thought (2, 3).

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"The human brain did not evolve a new brain region for abstract thought or information processing. Instead, evolution builds on existing characteristics that are inheritable. Evolution also conserves inheritable characteristics."

The human brain did not evolve a new brain region for abstract thought or information processing. Instead, evolution builds on existing characteristics that are inheritable. Evolution also conserves inheritable characteristics. All cognitive activity has been built on pre-existing brain structures.

Environmental responsiveness is such an inheritable characteristic. Our cognitive processes can influence what we respond to and how we respond. However, alertness and vigilance circuits are shared by fish and mammals (4), while the correlated *behaviors* of environmental responsiveness (boldness and aggressiveness) are widespread in the animal kingdom, structuring the animal personality kingdom (5, 6) The animal personality characteristics of alertness, vigilance circuits, and environmental responsiveness are inheritable.

The brain has developed to respond to the environment with heritable behavioral traits for alertness, vigilance, and responsiveness to the environment. The brain learns how to "approach or avoid an object, to navigate to feeding sites, and to move among obstacles (some of which might themselves be in motion) (7). The brain "goes into the world," interpreting and understanding the world by taking actions to learn about objects rather than the mind becoming constructed from a blank slate (3).

"The brain learns how to "approach or avoid an object, to navigate to feeding sites, and to move among obstacles (some of which might themselves be in motion) (7). The brain "goes into the world," interpreting and understanding the world by taking actions to learn about objects rather than the mind becoming constructed from a blank slate (3)."

The function of the brain is to understand the environment by acting on the environment that fits our experience (8, 9). This also describes the neural basis of sensemaking developed by Karl Weick (10) and correlates with Bertrand Russell's "knowledge by acquaintance" (11). It also supports abstract thought's limited influence or should have during life-threatening situations. Stress and fear drive effective action but can be accompanied by the inherent vice of failing to respond or inordinately focusing on personal survival.

"Engagement is acting upon the environment because we observe a discrepancy or experience a disruption. Such action creates more gaps regarding philosophy, strategy, tactics for choosing actions, and interpretation of responses. Do we first identify the situation, apply an algorithm, or figure out the situation by acting?"

Engagement is acting upon the environment because we observe a discrepancy or experience a disruption. Such action creates more gaps regarding philosophy, strategy, tactics for choosing actions, and interpretation of responses. Do we first identify the situation, apply an algorithm, or figure out the situation by acting?

Gaps exist that impede our ability to prevent or respond to **consequences**. **Engagement** to prevent these consequences generates feedback while bridging these gaps. We define engagement as actions in response to and modified by **feedback**. Systemic and routine engagement of gaps supports effective, early engagement of the situation by individuals. Consequences, though present, become mitigated, and a more desirable end-state will be reached.

Effective operations in a dangerous context focus on the consequences of the situation. The operator considers the consequences of acting and not acting. This is not a singular decision. Marianne Paget (12) described this well, "from the point of view of an actor; an act often becomes mistaken only late in its development. As it is unfolding, it is not becoming a mistake at all. It is moving and evolving in time." Success and failure are ephemeral. Actions and events fold into each other as the actor responds to feedback.

Gaps form at various levels of analysis – prevention and response, planning, training, organizing, logistics, prevention, recovery, et cetera. Engagement bridges these gaps. Unrecognized information is lost with increased risk exposure.

The first article (13) in the *Neonatology Today* series about High-Reliability Organizing (HRO) addressed the gap between the normative and pragmatic frames, describing engagement as a bridge. Throughout the HRO series, we have described other gaps having various methods for engagement. These presentations developed from our efforts to articulate the experience of HRO to those who have not effectively experienced operations in dangerous contexts. The elaboration of these various gaps and methods of engagement continued from the feedback of readers, conversations with operators having various levels of understanding and experience, and the continuing extension of our discussions with Karl Weick.

Gaps are not visible without a challenge to the system and, more vital, without acceptance of negative feedback about the system, leaders, executives, and administrators. Long periods without serious incidents reinforce beliefs that a program is effective. The vigilance that identifies errors, mistakes, and near misses can support beliefs about the effectiveness of enforcement measures. Research relying on data that fits a statistically normal distribution and standard deviations creates the science supporting these beliefs. Concepts from models of psychological stress and theories from complexity and chaos emphasize the importance of accepted models and how leadership is used.

These descriptions and beliefs strongly derive from management science, generally with management models borrowing from methods of organizing developed for extreme hazards. This borrowing has been restricted, mostly from the normative frame for preventing system failure. The more salient and relevant principles then become less visible and often unnoticed. The occasion for academic observers to participate in live-or-die operations and become familiar with the more pragmatic frame is severely limited. Identifying characteristics necessary in dangerous and routine operations is absent, and their necessity in routine operations is unnoticed (13).

Not directly addressing these gaps between the normative and pragmatic frames has consequences. Management science focuses on theory and methods to bring theory to the field. Operators rely on the experience that may not sufficiently be informed by science. Leaders in both realms find evidence to reinforce their beliefs, further deepening the divide between the theoretician and the operator. Experience may go "underground" amongst operators more ubiquitously, while managers and leaders support their beliefs with science, alienating operators.

It is June in the hospital, and a new intern stands next to an infant with a decreasing heart and respiratory rate. The capillary refill is prolonged. Staff exposed the infant for examination. What action do we expect from the intern, nurse, or respiratory care practitioner? The discussion would reveal the gaps endemic in healthcare or any domain of operations.

"The capillary refill is prolonged. Staff exposed the infant for examination. What action do we expect from the intern, nurse, or respiratory care practitioner? The discussion would reveal the gaps endemic in healthcare or any domain of operations."

Aristotle (14) described the five virtues of thought in his book *Nicomachean Ethics*: *technê*, *epistêmê*, *phronêsis*, *sophia*, and *nous*. The more salient gap is between *episteme* and *techne*. *Episteme* in modern English is "knowledge" (epistemology is the study of the nature of knowledge), and *techne* is translated as "craft," "craftsmanship art," or "skill," this represents practical, context-dependent knowledge, or what we would call the practice. This is also the divide between science and the practice of medicine.

We may not see this gap as clinically relevant until we listen to arguments reliant on evidence-based medicine, protocols, and lab values that reject anecdotes. An extension of this gap is the "common sense" idea that makes it hard to believe something ex-

ists if the person does not know about it. One Author (DvS) had observed clinical deterioration in patients because a healthcare professional was unaware that a certain condition could occur and refused to believe in the possibility when told it could develop. Karl Weick (personal communication) observed and warned, "This is between rationalism and empiricism, but take care to avoid empirical research and the term empirical being hijacked to justify rationalism." Empiricism shifts from sensory experience to prospective, randomized, controlled studies. This gap is formed when knowledge from a white noise environment is applied to red noise forcing functions (15), the gap between formal and emergent structures (13).

"Empiricism shifts from sensory experience to prospective, randomized, controlled studies. This gap is formed when knowledge from a white noise environment is applied to red noise forcing functions (15), the gap between formal and emergent structures (13)."

The 'color' of environmental noise describes the effect of periods on the environment. Without feedback, time segments and elements are independent of each other and typically assumed to be independent, hence the Gaussian distribution and calculated statistics and probabilities. The presence of feedback in a system causes autocorrelation and frequency changes. Low-frequency events bring a more significant force into the system [Table 1].

Table 1. Patterns and Characteristics of Noise (15)

Color	Structure	Variance	Distribution
White	No frequencies dominate Flattened spectrum	Data *decreases* variance	Gaussian distribution - Elements fully independent - No autocorrelation
Red	Low frequencies dominate Long-period cycles	Data *increases* variance	Power law distribution - Elements *not* independent - Mutual/ reciprocal relations
Pink	The midpoint of red noise Slope lies *exactly* midway between white noise and brown (random) noise	Data *continuously increases* variance Distinguishes pink noise from reddened spectra	Power law distribution - No well-defined long-term mean - No well-defined value at a single point

The intern above is in that gap. The intern is losing context in a space meant for passage, yet they cannot move. The intern must act. Not think – act. Thinking doesn't cause a sick stomach. Acting doesn't cause a sick stomach. Thinking to act causes a sick stomach, impairing thought, and impending action. This is tonic immobility – the bane of the liminal space and the reason programs reduce risk by bringing structure for the intern while other programs engage risk by increasing the capabilities of the intern (16, 17). This is the fundamental gap in reliability. "People need to know how to go on. HRO is a guide for doing so," Karl Weick (personal communication).

Gaps in Theory and Practice

The Particular

Aristotle (18) distinguished between knowledge and wisdom and between the theoretical and the practical. *Epistêmê* (theoretical knowledge) and *technê* (practical knowledge) are familiar to us as science and technology, respectively (19). *Phronêsis* (practical wisdom) describes the capability for rational thinking that accounts for context and contingent facts, thus taking in "the particular." The HRO places value on information that may change with events. Aristotle considered *phronêsis* the first of the four cardinal virtues because ethics guides the individual to place the community's good ahead of the individual's good. Phronesis is acquired through practice and observation: practice creates the experience, while observation of elders who model this virtue leads one to phronesis (20).

"We see Aristotle's focus on the particular with Patricia Benner's description of the development of the moral agency. The individual develops an enhanced ability to read the situation as the limits of planning and prediction become apparent."

We see Aristotle's focus on the particular with Patricia Benner's description of the development of the moral agency. The individual develops an enhanced ability to read the situation as the limits of planning and prediction become apparent. The individual begins to make a difference – improvement is from the individual's judgment and actions rather than algorithms. With that knowledge comes responsibility for the care provided (21).

Classifications and Standardization

Classifications are influential with a relatively invisible influence on thinking and acting. Consider how the organization's error classification influences whether disruption is engaged as an error, novel, or emergent situation. How one classifies the incident influences actions, communications, and documentation (22).

Concepts are how we access reality, produce mental representations, make sense of the world, and make predictions. We then classify and categorize our concepts as part of knowledge production. Classification as 'categorical work' creates the rules for communication, meanings, conforming actions, and compliance (23) which then become the standards for the rules to classify and produce textual or material objects (24). Keeping our classifications in the abstract makes them more amenable to classification and more tractable to our sense of order (25).

This perspective, however, is outside the flux of events. Within

the flux of events, the operator is personally at risk, and changing contexts necessitates updating less reliable information. For the operator, this is 'articulation work,' the way things are worked out in practice. Articulation work is classification in real-time, managing and anticipating contingencies in the face of the unexpected, and directing efforts to keep the program running (23). In classifying, we lose details due to irrelevance, but what is irrelevant now may become relevant later. Context and meaning, critical for engagement, are lost.

"Leaders, administrators, and regulators may mistranslate the nature of an HRO and try to control or reduce the fluidity necessary for engagement (23). This is usually accomplished with increased standardization and reduced diversity and variability."

Leaders, administrators, and regulators may mistranslate the nature of an HRO and try to control or reduce the fluidity necessary for engagement (23). This is usually accomplished with increased standardization and reduced diversity and variability. The dominant group sets the discourse, defines categories and classifications, sets limits of what can be spoken about and what cannot, and who can speak with legitimacy. The dominant account is the privilege of being listened to (26).

Abstractions and Context

Concepts are reality images, but we must not mistake concepts *for* reality. Alfred North Whitehead (27) warns against this "fallacy of misplaced concreteness," mistaking the abstract for the concrete, accepting abstractions as the most concrete rendering of fact. Discrete, abstract concepts, in a reality of continuous perceptions, create gaps subject to misspecification, misidentification, and misunderstanding (28), gaps the pragmatic leadership stance works to close.

Gaps generated by theory (abstractions) and practice (context) impair the organization's operations and processes. HRO emerges when our perceptual order is contextual, and we engage the flux of contingencies to make them more orderly. We cannot treat these environments as isolated systems with demarcated boundaries. Instead, the environment is comprised of open, contextual systems always in flux. Contextual systems are those systems where the environment interacts with and changes the problem (29).

> "The misplacing and fixing of abstractions are a big issue. Misplaced concreteness is the problem. Your emphasis [DvS] on moving, flow, trajectory, reduces 'severe concreteness.' I'm studying a disaster that sank the container ship, El Faro. As they are entering the eyewall of hurricane Joaquin, without knowledge of winds and at 4 AM in darkness, the captain says, 'This is a typical winter day in Alaska.' and sticks to his route straight toward the eye. The ship (790 feet long) capsizes 3 1/2 hours later, drowning all 33 crew.
>
> "Typical day" is a severe abstraction."
>
> Karl Weick (personal communication)

The Gap Between Theory and Practice

High-Reliability Theory relies partially on an outside view in its reliance on codifying a framework of guiding principles. However, when those principles are seen as the core to producing reliability, that is where the emphasis gets misplaced. Scientific theory and rationality assume discrete a priori themes and concepts outside the human mind (30, 31). The goal is to represent an "outside" view of the world, a dispassionate, objective representation that is disinterested in personal experience and practical concerns.

"Scientific theory and rationality assume discrete a priori themes and concepts outside the human mind (30, 31). The goal is to represent an "outside" view of the world, a dispassionate, objective representation that is disinterested in personal experience and practical concerns."

Operators in the field develop their logic of practice built upon contextual relations entwined with people and work (30). For Mike Zundel and Panagiotis Kokkalis (31), the absence of practice within the theory is how theoreticians see theory making as themes in terms of a priori scientific assumptions, the *scientific subject domain*. The theory would move into the practical world by including engagement of practice, closing the gap between theory and practice to create the *practical engagement domain*. The significance of practice engagement derives from attitudes taught to rookies in the military and public safety – always engage, in some way, even if to evacuate the area.

The Skill Acquisition Gap: Competent to Proficient

Patricia Benner (32) described the discontinuity between the competent level of performance obtained in preparatory education and the proficiency necessary for more independent professional functioning. The student moves from what can be taught by precept and what can only be learned through experience. When described as "OJT" (On Job Training) in dangerous contexts, skill acquisition occurs as semi-autonomous engagement under the watchful supervision of veterans, all of whom share the duty to ensure that the novice learns appropriately (16).

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Unfortunately, time and resource limitations lead to standardization and routinization of processes. While this was initially developed in nursing and EMS to prepare novices in a high turnover workforce, it has become perceived as the ideal method for training and maintenance toward a competent level of performance.

The result is the prevention of individualized care (32).

Gaps from Leadership

"Leadership" has become an *ex officio* label for executives, administrators, managers, and supervisors. Such labeling risks washing out the leadership characteristics necessary for liminal events and dangerous contexts. It also distracts from the leadership that expands an organization's frame of reference. The nature of engaging an evolving embedded problem in shared threat does not lend itself to most leadership models.

Leadership models risk creating operational gaps or authority gradients between leader-follower. Models developed in and for stable environments do not fully translate to dynamic, uncertain situations where the leader and followers personally face threats, the type of environment from which the HRO emerged. Leadership from a distance will shift thinking toward decontextualized abstractions, focusing on principles, and relying on discrete concepts.

The pragmatic leadership stance of HRO engages the embedded problem with subordinates, accepting the influence of the environment, monitoring the performance of individuals and the team, and supporting "leader-leader" actions (33). All members of an HRO must immediately engage in any disruption and investigate any discrepancy. People lead in engaging the problem until they are relieved.

HRO leadership has a more pragmatic frame that iteratively supports engagement. Team members and the leader engage in sensemaking/sense-giving as interactive, iterative, recursive, intertwined, and overlapping parts of a single process. Each action, rapid shifts in contingencies, and unexpected disruptions change some of the rules. More than group interaction, it is through shared cognition and visual communication that the team generates a frame that, while dynamically changing, becomes an increasingly accurate representation of events (33, 34). Collaboration makes the team and the HRO stronger (35).

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For example, the fire service is quickly reduced to firefighting. William J. Corr, Captain, LAFD, and WWII US Navy veteran, South Pacific, viewed the fire service uniquely as a way of thinking and acting. By modeling motor cognition (thinking *by* acting) and expanding the frame of reference for firefighters from specialists to specialist-generalists, he made the fire service larger than firefighting. Corr often counseled, "We don't fight fires; we solve problems the public cannot or will not solve themselves." These were not simple but ill-structured problems that might be embedded in dangerous situations.

Pediatrics can also expand its frame of reference to become larger than pediatrics. John Mace, MD, former Chairman of the Department of Pediatrics, Loma Linda University, supported the expansion of the Pediatric Critical Care Division as the two Pediatric Intensivists (one of the authors, DvS, and Ronald M. Perkin) began the PICU. Within its first year, the division became influential in adult and pediatric EMS. It expanded into Home Mechanical Ventilation and trauma care, later participating in the national aviation safety program. In the hospital, new procedures were introduced, such as using helium, hand ventilating breathing patients, and intubating for epiglottitis in referring Emergency Departments (EDs). Out of the hospital, new procedures included paramedics intubating infants and children, initiating and managing mechanical ventilation in a free-standing subacute facility without blood gas monitoring, and managing mechanically ventilated children using *smile* as the management goal. Mace provided protective support to the intensivists for this expansion of pediatric critical care and the introduction of methods that were and still are, met with strong disapproval by influential physicians. These respiratory techniques continue in one pediatric subacute facility and a special group in SOCOM – the military's Special Operations Command.

What is more notable than the successes were the failures: development of a pediatric subacute unit within the medical center, full integration of the department into pediatric and adult EMS and trauma systems, pediatric outreach to EDs, creation of a center for pediatric prehospital care, and pediatric intubation by paramedics. (The first two children intubated had apnea with rapidly decreasing heart rates despite mask ventilation. Both were intubated in the field and discharged neurologically intact from the PICU after 24 hours. One of the last infants intubated was an infant in breech birth with only the head visible and cyanotic. The paramedic intubated the infant, who was then delivered to the hospital.) The failures demonstrate that Mace supported programs to serve the community rather than the limited selection of programs within the domain of pediatrics that had a guarantee of success. His was a unique method of HRO leadership.

The pragmatic leadership stance takes place *within* the situation, taking advantage of natural internal processes that self-organize people and situations. Self-organization with intention creates adaptive improvisation and immediate responsiveness, driving engagement and action. Individuals sense and respond to weak signals, subtle and nuanced feedback, and misinterpreted noise to bring order and generate structure (36).

Military veterans describe the importance of mutual influence on performance *in extremis*, the mutual influence acting as a multidirectional pattern of reciprocal leadership enabling team members to lead each other to achieve common objectives (37). For polar explorers, this reciprocal influence makes the team highly effective while the leader maintains a strong influence (38). The leader seeks perspectives, encourages information sharing, and models how to engage in ambiguous situations (39). Through reciprocal influence, the leader gains a sense of how members think and their motivation (38).

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Values

Values are more strongly held and are more permanent beliefs compared to attitudes. Two of the authors (DvS and TAM) identified five values of HROs (33):

- *Duty.* Acknowledge the value of everybody's contribution. We will not let others down; we have a duty to our larger community.
- *Empathy.* We can all make mistakes at any time; HROs work in tough situations where people will fail.
- *Dignity.* Acknowledge the value of everybody's contribution; every job, every task, is important
- *Honesty* What someone says represents the circumstances. Our descriptions represent what we see without effort to persuade. Freely accept disconfirming evidence..
- *Humility.* The unexpected can happen to any of us; we can all fail.

Some values oppose each other such as obedience versus initiative and conformity versus creativity (40). We do not expect to find opposing values in the same culture except that HROs work in structured environments preventing system failure and the unstructured environments of an emergency response. The structured environment favors conformity to standards and obedience to authority, while the initiative to engage and improvise in the unstructured environment is necessary (33). This creates a gap between values and the necessity to, at times, act from opposing values.

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This ability to rapidly develop initiative and creativity in an unstructured situation creates the "leader-leader" construct. A "leader-follower" construct too quickly creates a docile member who awaits instructions. We rely on the leader-leader approach for members to keep their sense of duty toward the community (phronesis) and the organization.

Technical Design versus Self-Organization

The security of *structure* too readily drives people to create or conjure structure through technical design. This is the gap between designed order and emergent order. By organizing structure from outside the flow of events, designed order from human intentions creates structure without context (41), disregarding local forcing functions of the red noise environment (15).

Before events of a forcing function become visible, local nonlinear interactions and self-organizing have occurred. "Natural systems become structured by their internal processes: these are self-organizing systems, and the emergence of order within them is a complex phenomenon" Eugene F. Yates (42). Improvisation is self-organizing with human intention but from *within* the flow of events (43, 44).

Spectating leaders and administrators unable to engage the gap may fear improvisation as a weakness. The weakness is not from non-compliant staff. The weakness emerges from the experience of individual staff facing a confusing situation. Staff always act in a way that makes sense to them…locally. This may not make sense to a spectator (13).

Socio-Technical System (STS)

Introducing "longwall" mining technology into British mining created a gap between technology and social structure. Technology has disrupted the social balance of two men working face-to-face in the "room-and-pillar" technique. Mechanization decreased adaptability and responsible autonomy. Some mines showed increased productivity, while others did not (45).

Technology in the latter group of miners had created a socially ineffective structure. Management disregarded the dangers and human shortcomings that followed the introduction of the technology. Individuals isolated by the longwall technology felt socially isolated and vulnerable, and local disturbances became magnified. The resentment and hostility led the miners to self-organize for group defense.

Technical management gave miners the security necessary for undertaking new developments in productive mines. Technology was treated as an engineering system that interacted with the longwall, which was regarded as a social structure with occupational roles. By treating new technology as two technological and social systems, management developed close interaction with the staff and gained far better results.

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Gaps from Experience

The Flow of Events

We readily understand the different experiences of an event between an observer and participant. However, a gap will develop when we do not acknowledge the different functions of the measures.

We can describe the temporal flow of events in two equivalent ways:

- Observation and measurement at a fixed point as events flow by, observing the rate of change and measuring the velocity and gradients of events
- Experience the effects on a single element of the organization within the flux of events, comparing it to its neighboring elements and evaluating the element's rate of change in the flux of events.

These methods are equivalent to the eulerian and lagrangian specifications from hydrodynamics (46) [Table 2]. The different specifications for events will influence practical descriptions of what to expect, such as the nature of the increase in demand,

the appearance of novel demands, and the decrease in resource availability (47).

The eulerian specification describes the organization's motion without reference to the forces which cause the motion. This generates state variables and demands on the system and organization independent of causation. The lagrangian specification describes the velocity and gradients of events, enabling descriptions of demands on individual elements at specific points.

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Table 2: Eulerian and Lagrangian Specifications (46)

Eulerian, quantitative	Langrangian, qualitative
Decontextualized	Contextual
External, fixed point Focus on a specific location	Within flow Focus on the individual moving parcel
Flow	Trajectory
Multiple, fixed positions	Continuous measure with position and pressure
Rate of change of system	Individual parcels

VUCA-2T and Liminality

"We modified the US Army concept VUCA (48, 49) for the civilian environment because the military assumes operations under threat. Hence, VUCA-2T describes the HRO environment (Volatility, Uncertainty, Complexity, Ambiguity-Threat, and Time Compression, Table 3) (16)."

VUCA-2T. We modified the US Army concept VUCA (48, 49) for the civilian environment because the military assumes operations under threat. Hence, VUCA-2T describes the HRO environment (Volatility, Uncertainty, Complexity, Ambiguity-Threat, and Time Compression, Table 3) (16). Such situations do not often readily translate into straightforward problems with definitive constituents, rules, and outcomes (13, 50, 51). Inquiry is active and operational, supporting authority migration and information flow, enlarging small cues and evaluating context (10, 35, 51).

Table 3. VUCA-2T (16)

Volatility	The rapid, abrupt change in events
Uncertainty	Lack of precise knowledge, need for more information, unavailability of the necessary information
Complexity	A large number of interconnected, changing parts
Ambiguity	Multiple interpretations, causes, or outcomes
Threat	Impaired cognition and decision-making
Time Compression	Limitations acquiring information, deciding or acting before consequential changes

Liminality. It is a bit discomfiting when we find ourselves in a space we do not belong or are meant for passage. The discomfort arises from the loss of context but also when the discomfort triggers the sympathetic nervous system. The liminal zone described in anthropology is that space between a world we know and a world we do not, where our old rules do not apply and we have not learned the new rules (52). In this area of experience, we must engage the situation to leave, yet we do not know what works; we cannot rely on learned concepts, policies, or rules (8).

Liminal zones are not continuous with routine operations or with each other. Abrupt changes disrupt operations. Our treatments may abruptly disrupt the disease process and the neonate's physiology. Such a sequence of experiences creates the more common "punctuated experience" of resuscitation that necessitates constant evaluation and re-evaluation. "HRO is a trajectory of engagement that fuses the *now* with the experience of *then* into simultaneous inquiry and redescription," Karl Weick (personal communication), rather than sensemaking guiding us from the immediate past to the immediate future. Karl Weick describes the repeated presentation of abrupt changes as "punctuated sensemaking" (personal communication). Every action is a failure, and every action creates an unrelated or disconnected experience.

"Common experiences do not describe how VUCA-2T or the liminal zone places demands on the brain's survival system. Nor how those demands affect our thinking and behavior. The liminal experience shapes the HRO by shaping the individual. Experience describes the changes within an individual due to the environment (8)."

Common experiences do not describe how VUCA-2T or the liminal zone places demands on the brain's survival system. Nor how those demands affect our thinking and behavior. The liminal experience shapes the HRO by shaping the individual. Experience describes the changes within an individual due to the environment (8). The more severe environment of the liminal zone has a profound effect on the individual, sometimes as a larger number of small liminal experiences or fewer but more severe incidents. What makes High-Reliability Organizing is not the number or se-

verity of liminal experiences but learning how to perform in the liminal zone.

"WWII American bomber crews arriving in the theater of operations were insecure and defensive. In action, they were overly self-assured though some were particularly diffident (53). About the time of their tenth raid, the airmen had entered and remained in liminality"

WWII American bomber crews arriving in the theater of operations were insecure and defensive. In action, they were overly self-assured though some were particularly diffident (53). About the time of their tenth raid, the airmen had entered and remained in liminality:

> "The man had experienced fear and by now knew that he could deal with it; he found that care and skill and coolness in the pilot and crew had a real bearing upon the question of his return; he saw that his crew and his airplane could withstand catastrophe; he developed an "esprit de corps" in regard to his squadron, and was now really part of it. He developed for the first time a sense of his responsibility to his mates and to formation. At this stage…the men were effective, careful, fighting men, quiet and cool on the ground and in the air. They attained a sort of tranquility in spite of their anxiety. *They had very little need for defensive mechanisms of any sort to deceive themselves or anyone else.* [Author's emphasis.] They talked easily and quietly" (53).

Gaps from Belief

"How do you identify when you are wrong?" "Would you please describe an actual error in leadership, administration, or management?" One of the authors (DvS) has asked these two questions privately and in discussion groups for over 20 years. No one has answered; most people ignore the question.

The most difficult gaps to engage are the gaps between identity or belief and the environment – made less than visible when the conversation hinges on a person's depth of knowledge, extensive experience, and good judgment, the triad that must not be questioned. It is of little use to describe the somewhat shared character of those who suffered a severe failure or have had extensive experience in dangerous contexts – described above in the vignette of WWII bomber crews. It does seem true that the stronger the belief, the weaker the experience. Knowledge by description can be mastered, while knowledge by acquaintance seems to increase doubt. Crossing the gap described by Benner (32) between competence and expertise does not protect one from equating mastery with knowledge and identity.

Identity

"Sustained conversations about failure are difficult because they are mined with threats to identity," Eric M. Eisenberg (54) writes about Karl Weick's concept of sensemaking and the individual's struggles over meaning. Meaning, like classification, favors some images and actions at the expense of others. People identify with the meanings they give. Weick lists identity first in his properties of sensemaking.

Our experiences are processes of doing or making. At the moment, our experiences contain story arcs that connect us to our past to others and form extensions into our future. For John Dewey (55), our experience becomes our identity and is the source of our pride. Experiences are the assets people bring to a program, their identity, and pride in their accomplishments rather than the team or organization. Experience and identity carry a quality of self-sufficiency, as experience gives meaning to one's life (55).

A difficulty working with common sense knowledge is associating "common sense" with one's identity and self-image. When questioned about a source, the person answers, "I just know it" (56), ending further inquiry. Others become offended when suggestions are not acted upon and can become less than cooperative when the team is engaged with a situation.

Identity is sensemaking emerging from social feedback – the individual deduces their identity from the behaviors and attitudes directed toward them as they also attempt to influence those behaviors and attitudes (57).

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This is also dynamic for the development of moral agency described by Benner as the individual moves toward proficiency and expertise. The awareness of shifting values from conformity to obedience, initiative, and creativity becomes visible. The five HRO values described above become internalized. It is the shared duty of workers in dangerous contexts to precept the novice for safety and performance (16). How we treat subordinates can create the expert we will later defer to for expertise.

This is the locus where identity can be damaged, and transition to expertise stalled or irreparably damaged. Negative behaviors and attitudes toward colleagues and subordinates or the ecology of fear (58) impede the actions necessary to gain experience and a sense of agency with long-acting consequences. An organization may better be identified as HRO through the more subtle and nuanced interactions that reflect moral agency and reveal the five HRO values.

Thinking and acting are contextual. Who the person is, in that context, is their identity. Identity and context influence engagement, interpretation of the situation, and enactment (59). HRO leaders contribute to the creation of a positive identity.

As a fire rescue medic, one of the authors (DvS) was detailed in 1976 to a firehouse where some of the first paramedics in California were assigned. They had been trained in 1971. Physicians at the time did not know how to train paramedics, resulting in less than professional medical knowledge and terminology. In the intervening few years, physicians had developed better training, and paramedics became more adept with the language and principles of medicine. Nearly all the firefighters assigned to that firehouse had about 30 years of experience, and with longevity and veteran credits (many were WWII veterans), they could easily promote to a higher rank for a higher salary, then retire at higher pay. The Author asked his captain why these paramedics did not improve their performance or retire.

Bill Corr, the fire captain, described earlier, responded, "Davey, those men went through the Depression. They fought in the war. They are able to provide shelter for their family. Food for their family. They have a car. They *are* successful. They are the most successful person in their family."

When the Author works with a medical assistant, nursing attendant, or any line staff or student, the Author, and his co-authors, see the most successful person in their family. Moreover, they receive respect.

Logics about Belief

Beliefs about logic, particularly the sole reliance on classical logic, make the belief-environment gap one of the hardest to bridge (60).

Doxastic logic (Greek *doxa*, "belief"), a form of epistemic logic, concerns the logic of the belief of participants. Doxastic logic provides reasons about belief rather than knowledge; the difference is that a belief is probably, though not necessarily, true. When we are not careful, we may collapse knowledge and belief into the same system as conviction in epistemic logic. Our beliefs become refractory to disconfirming evidence, contributing to the development of *motivated reasoning.* Doxastic operators capture belief change as "belief revisions" or "belief updates" when they receive conflicting information or encounter a discrepancy or disruption.

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Belief Revision. People have inconsistent beliefs. We revise when we accept old information as less reliable; we then favor new information we consider reliable. The most significant sources of inconsistencies are motivated reasoning and cognitive dissonance. Paraconsistent logic drives inquiry to correlate and revise belief to context, as opposed to motivated reasoning and cognitive dissonance. We cannot eliminate all inconsistencies (61).

A *belief update* refers to accounting for a change in the situation and acquiring new, more reliable information; this requires us to change our inaccurate old beliefs to a more accurate, new belief. One of the authors (DvS) encourages staff to offer "updated information" when presenting information that disagrees with the physician's understanding of the situation.

Paraconsistent and *paracomplete logics* permit contradictions and overlapping values (the law of the excluded middle does not apply) (62, 63). These logics also allow changing a deduction after it is reached, an operation that is not permitted in classical logic.

Cognitive Dissonance

The dissonance between opposing cognitions is nearly impenetrable, but, fortunately, the outward appearance is reliable and has become well known. However, the dissonance will interfere when information changes and events are in flux.

One of the authors (DvS) had an extended discussion with Karl Weick regarding cognitive dissonance as a risk for uncorrected errors and failures. Weick concluded with this reply [his comments in italics]:

> "Knowledge in the threatening, unstructured state acts as a degree of belief that must be updated from information generated during the event. Mistaken beliefs must be identified and corrected, no matter how dearly held. A mistaken belief, compared to an updated belief, is stronger depending on its presence at the beginning of the incident or the length of time the individual has held the belief. Events in flux create the need for dynamic reasoning processes and more easily acceptance of new, disconfirming evidence. Long-held entrusted beliefs must be freely questioned, not an easy thing to do for most people, regardless of level of skill or logic used" (64).
>
> *The clash between a mistaken old belief and an updated belief would seem to be a form of dissonance. An interesting possibility is that the more you engage in dynamic reasoning, the less chance there is for dissonance between old belief and updated belief to develop, and the fewer errors you make.*
>
> Karl Weick, personal communication

Motivated reasoning

Motivated beliefs are unconsciously directed toward a goal (65). Protecting a self-serving conclusion comes from their prior beliefs making their conclusions seem more plausible. Motivation appears to affect cognitive processes rather than emotion (66). The individual will attempt to be rational, constructing an "objective" justification persuasive to a dispassionate observer. This can involve creatively combining knowledge to construct new, logical beliefs supporting their desired conclusion. People are unaware of their use of motivated reasoning, which comes from motives to achieve an accurate conclusion or maintain a specific conclusion (66).

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A person firmly holds their desired conclusion, supported by overscrutinizing or rejecting disconfirming evidence (66-68). The individual reasons for a preferred conclusion affect forming impressions, determining beliefs and attitudes, evaluating evidence, and making decisions (66, 69). Analytical sophistication and education do not reduce the presence of motivated reasoning (65).

The individual will attempt to be rational, constructing an "objective" justification persuasive to a dispassionate observer. This can involve creatively combining knowledge to construct new, logical beliefs supporting their desired conclusion. They do not realize their reasoning processes have biased their thinking (66).

A direct challenge can evoke strong emotions, even physical anger, and outrage (65, 66). This clearly shows you have encroached on a protected, cherished belief.

Motivated reasoning enhances self-efficacy against a problem of self-control or gives utility to beliefs to counter a perceived weakness in a desired trait. Motivated reasoning also protects personal and social identity. Selective updating by information avoidance

and asymmetric processing of good and bad information protects these beliefs (65).

Accuracy requires greater cognitive effort for reasoning, attending to relevant information, deeper processing, and the use of more complex rules (66). This is similar to the approach described by Simon for the ill-structured problem (70). The concern to avoid a wrong judgment and drawing the wrong conclusion while more careful cognitive processing parallels HRO reasoning. A consequence is a reduction of cognitive biases (66).

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The Gap of No Complaints

A dominant account of systems or events reflects the beliefs of those in authority, the most distant from events. This is common in Lessons Learned and After Action Reports. An organization's culture can be described by its beliefs, behaviors, tools, or artifacts. The dominant account influences culture through beliefs, just as the organization's tools will. (The 'tools' of an organization include its rules, protocols, and algorithms, hence Weick's dictum "drop your tools" in a crisis (71) would encompass the necessity to drop rules and protocols.)

The dominant account comes from those in authority, excluding contextual elements from the environment and within the human-environment interface. For this reason, certain voices are or are not heard within and outside the organization. In an organization, there are three main types of authority: line authority, staff authority, and functional authority.

- *Line authority* directly follows the chain of command from the most senior executive to the line worker.
- *Staff authority* is the authority to advise and support line executives and managers; members with staff authority include legal counsel, finance, and human relations.
- *Functional authority* is based on expertise and authority over a particular function for staff personnel or a particular situation for line personnel.

Anyone with authority in an organization can enact an environment where non-HRO behaviors make sense. The person in authority can also enact an ecology of fear, such as fear of malpractice, litigation, short-term financial insecurity, or intractable social and leadership interactions. The failure of Enron can be traced to one CEO enacting beliefs that made sense of illegal and unethical practices; alternative definitions were discouraged if not tolerated (54, 59). On a smaller scale, we encounter the effect of the dominant voice with routine criticism of other services, specialties, and regulatory agencies. Once a dominant account develops, voices become hidden, and knowledge is lost.

The dominant account becomes a mistranslation of the environment – reduced and simplified to fit a normative view framed from the fixed point of a spectator. Context and meaning, critical for engagement, are lost. The dominant group sets the discourse, defines categories and classifications, sets limits of what can be spoken about and what cannot, and who can speak with legitimacy. The dominant account is the privilege of being listened to (26).

Why No One Complains

Belief that one's experience is shared by or subordinate to another person's experience risks negating that person's experience. Using technical terms more fluently or speaking more forcefully does not make the person's experience more important than other people's experience. This absolutist view happens in healthcare when a physician or surgeon negates the experience of others, removing their experience from consideration. It then becomes the dominant account, driving other views to become hidden voices with a loss of the expertise the leader could have deferred to (9).

It is not uncommon to hear from an authority figure, "Why didn't I hear about this?" "Why wasn't I told?" Some of this is the climate created by the dominant group that impedes information flow or generates the ecology of fear.

Only the executive can say "no." One of the authors (TAM) kept this as a rule of command for a US Navy ship – only the captain can say "no." The subordinate would learn how to solve a problem or provide assistance through direct action or with support from a superior. This increased the person's capabilities and contributed to a sense of agency. Benner described how providing such assistance engenders *moral agency* and *identity* within the profession (32). Before saying "no" to the captain, midlevel managers would consult each other, resulting in a body of *distributed knowledge*. In *epistemic logic*, distributed knowledge is a modal operator for pooled knowledge in a specific frame of reference (13, 72). The most difficult decisions would more quickly reach and alert the captain. Whatever decisions were made at the appropriate level, positive or negative, they were passed up the chain of command to inform the executive.

"It is difficult to go against the dominant account. Individuals who identify substantive issues make sense from their identity, an identity shared with the organization. If the issue involves integrity, the individual's evolving identity of integrity and autonomy is made more unstable when superiors and colleagues treat the person as dishonest or marginally qualified."

It is difficult to go against the dominant account. Individuals who identify substantive issues make sense from their identity, an identity shared with the organization. If the issue involves integrity, the individual's evolving identity of integrity and autonomy is made more unstable when superiors and colleagues treat the person as dishonest or marginally qualified. Social interactions become restricted and redundant. The individual misjudges cues interpreted to confirm the person's developing bias, ongoing events impair efforts to cope, and everything or nothing seems plausible. Enactment begins to violate important norms that diminish the person's influence (73). The emerging cognitive dissonance creates isolation and stops information flow that could have moved important information to leaders and those in authority.

Hidden voices containing valuable information and insights remain hidden. The dominant account guides the culture and operations. The gap never closes.

Conclusion

Myriad approaches and models describe the difference between the situation and an outcome or consequence. Perhaps the fundamental difference or influence is the certainty of the past, a form of stability, and the uncertainty of the outcome, a form of instability. The difference lies in our environmental responsiveness.

The human brain, rather than being analytical, evolved to respond to consequences within the environment. Several inheritable traits support mental and behavioral responsiveness, such as alertness, vigilance, and environmental responsiveness (boldness and aggression). These traits also influence the engagement of situations of consequence.

Gaps in interpretation and between models develop because of two disparate types of environments – stable and unstable. The elements we discussed do not operate over a spectrum; rarely do they lie on a continuum. They more likely form discrete systems separated by a gap. The orthogonal relations of various systems and their gaps do not preclude us from engagement. What strengthens engagement along one axis can influence favorable developments along other axes.

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Engagement is not a mental exercise nor a purely cognitive activity. Again, the brain evolved to act. The executive functions coordinate cognition with action, stress responses and fear circuits limit distractions, and motor cognition changes behaviors in the flux of events.

We typically engage in these situations to gain a favorable outcome. Unrecognized gaps impede our ability to respond effectively to consequences. Engagement can also bridge the gaps in our various systems to understand, prepare for, and respond to consequential situations.

It is the recognition of these gaps that helps identify when to change models. In effect, we drop our tools when the tool is wrong. Rules, protocols, ideas, and frames of reference are tools we may need to drop. Identity and firmly held beliefs are the tools we hold most dear, the tools we believe will save us. They are the tools we are least likely to drop, yet the most likely to bring us harm.

Knowing how and when to drop our mental and behavioral tools is our entry on the path to High-Reliability Organizing.

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NT

Corresponding Author

Daved van Stralen, MD, FAAP
Associate Professor, Pediatrics
Department of Pediatrics
Loma Linda University School of Medicine
11175 Campus Street
CP-A1121
Loma Linda, CA 92350
Email: DVanStra@llu.edu

Sean McKay
Executive Partner / Director, Disruptive Rescue & Austere Medicine
Element Rescue - Response Solutions within Nonlinear Complex Environments
Greenville, South Carolina, United States

Thomas A. Mercer
Rear Admiral
United States Navy (Retired)

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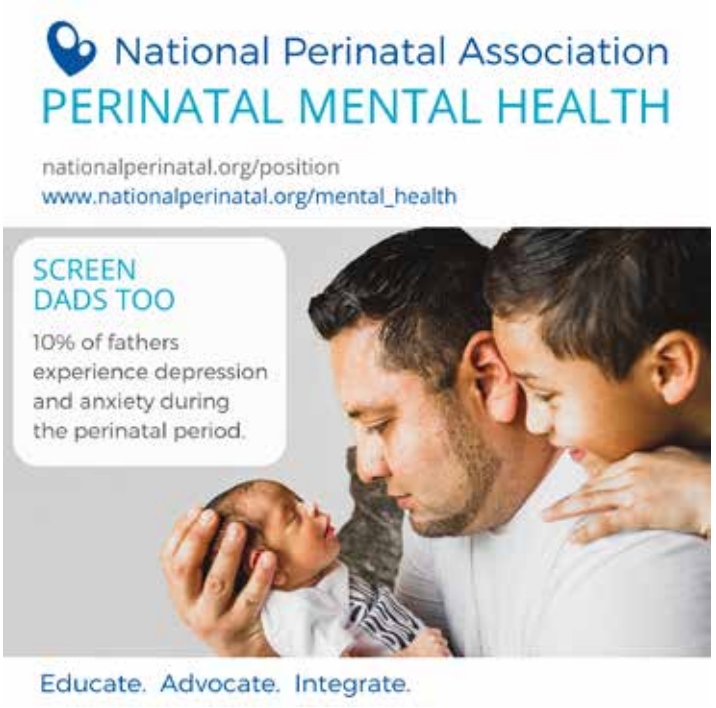

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Fellow's Column: A Neonate with Recurrent Apnea

Daniel Farishta, MD, Briana Hernandez, MD, Shabih Manzar, MD

"We describe a case of a newborn infant who developed significant apnea, bradycardia, and desaturation (ABDs) at 35 weeks postmenstrual age (PMA)."

Summary:

We describe a case of a newborn infant who developed significant apnea, bradycardia, and desaturation (ABDs) at 35 weeks postmenstrual age (PMA). On the day of life 37 (39 2/7 PMA), an otolaryngology evaluation showed edematous floppy arytenoids prolapsing into the airway. The infant underwent a carbon dioxide (CO_2) laser supraglottoplasty. After surgery, the infant continued to nipple well with no further episodes of ABD and was discharged home in stable condition. At the follow-up visit on the day of life 59, she was asymptomatic and growing well. CO_2 laser supraglottoplasty successfully cured the infant's life-threatening events and resulted in her discharge, decreasing the length of her hospital stay and alleviating parental anxiety.

Case:

The infant was born at a gestational age of 34 weeks. Soon after birth, she had signs of respiratory distress syndrome, for which she was intubated orally with a 3.5 mm endotracheal tube without difficulty, was given one dose of surfactant, and was placed on a ventilator. At 19 hours of life, she was extubated successfully to a high-flow nasal cannula. By day 3 of life, she was stable in room air and tolerating oral feedings. Parents were counseled, and discharge planning started.

"On the night before the planned discharge day, the infant developed significant apnea, bradycardia, and desaturation (ABD). A complete workup showed normal hemoglobin, head ultrasound, echocardiogram, and video electroencephalogram. As per unit protocol, a 5-day observation was started."

On the night before the planned discharge day, the infant developed significant apnea, bradycardia, and desaturation (ABD). A complete workup showed normal hemoglobin, head ultrasound, echocardiogram, and video electroencephalogram. As per unit protocol, a 5-day observation was started. Once again, on the night before discharge, the infant had significant ABD requiring stimulation. The pattern of ABD and 36-week postmenstrual age (PMA) was not suggestive of central apnea, so treatment with caffeine was not considered. As the infant had no respiratory distress except for 1-2 episodic ABD at night, we did not try nasal continuous positive airway pressure (CPAP) or nasal cannula and continued with a 5-day observation before discharging home. Multiple plans to discharge home failed due to significant ABDs at night. On the day of life 37 (39 2/7 weeks GA), an otolaryngology evaluation showed edematous floppy arytenoids prolapsing into the airway on a flexible nasolaryngoscopy. Figure 1 shows the anatomical landmark with a thickened aryepiglottic fold. On the day of life 39, the infant underwent a carbon dioxide (CO_2) laser supraglottoplasty in the operating room. Figure 2 shows the aryepiglottic folds being clipped with microsurgical scissors. Figure 3 shows the lateral arytenoid complex after CO_2 laser ablation. After the surgery, the infant was observed for ABDs for 48 hours. She continued to nipple well with no further episodes of ABD and was discharged home in stable condition on the day of life 42. At the follow-up visit on the day of life 59, she was asymptomatic and growing well.

"On the day of life 37 (39 2/7 weeks GA), an otolaryngology evaluation showed edematous floppy arytenoids prolapsing into the airway on a flexible nasolaryngoscopy."

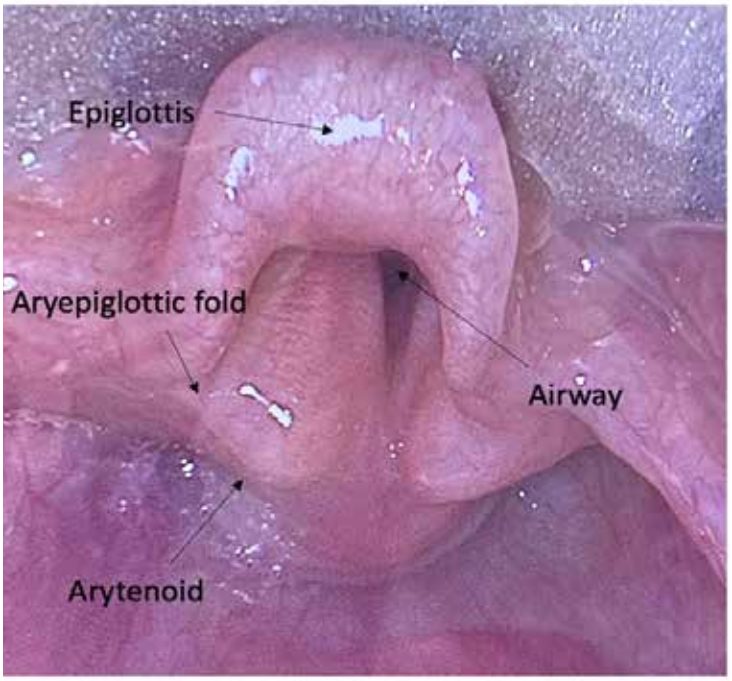

Figure 1: The picture shows the anatomical landmark with thickened aryepiglottic fold

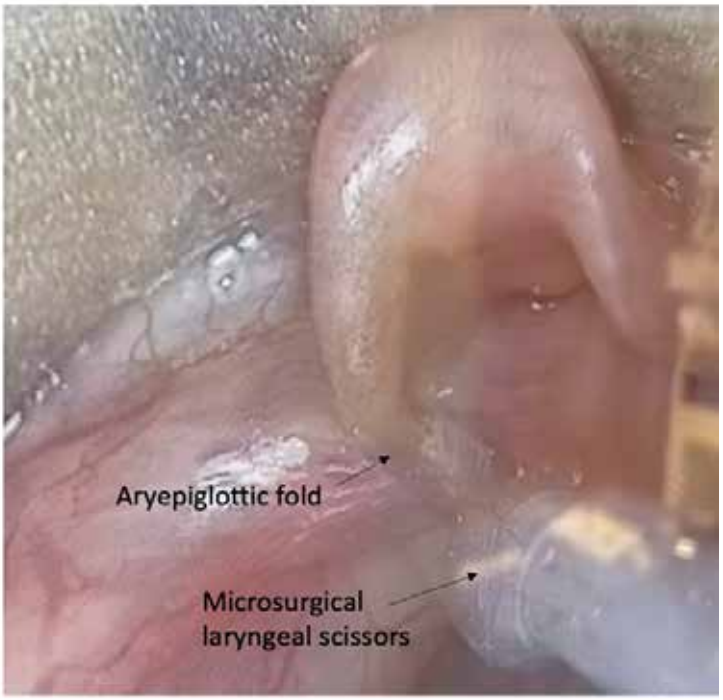

Figure 2: The aryepiglottic fold is identified and clipped with the microsurgical scissors

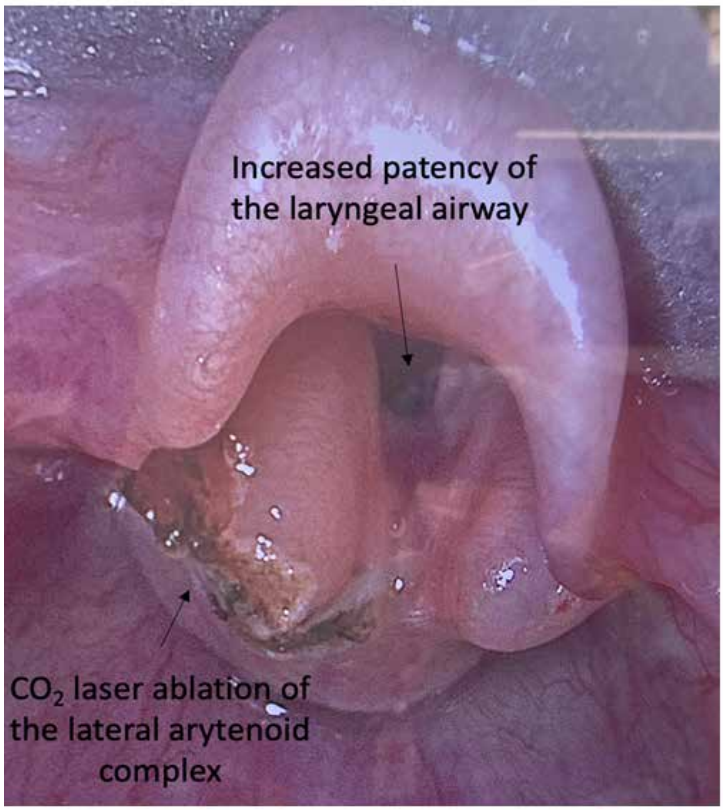

Figure 3: Status post-CO_2 laser ablation of lateral arytenoid complex

Discussion:

In the case described, the infant did not have any stridor but significant ABD due to the floppy arytenoids. In a previous report by Lis et al. (1), floppy arytenoid cartilages were noted as a common cause of stridor in infants. Temper et al. (2) described a similar case, but the infant had significant stridor.

"Preterm infants are prone to laryngomalacia (LM) that does not necessarily present soon after birth, and symptoms can take a few days or weeks. (3) Prematurity may predispose infants to unusual presentations of LM, including apneic events with no observed stridor."

Preterm infants are prone to laryngomalacia (LM) that does not necessarily present soon after birth, and symptoms can take a few days or weeks. (3) Prematurity may predispose infants to unusual presentations of LM, including apneic events with no observed stridor. In most cases, it resolves with time, but 20% of infants with LM present with severe disease requiring surgery to eliminate or bypass the obstruction, as seen in the case presented. A success rate of 94% with minimal risk of recurrent symptoms or complications has been reported.(4) Katin and Tucker (5) described a case series of laryngomalacia in young children treated with CO_2 laser to vaporize excess floppy supra-arytenoid tissue.

"We did not perform polysomnography, as evidence showed it to be a low-value investigation and did not correlate with the clinical severity and need for surgery. (6)As noted in the case description, we did institute a trial of caffeine or CPAP due to the episodic nature and gestational maturity."

We did not perform polysomnography, as evidence showed it to be a low-value investigation and did not correlate with the clinical severity and need for surgery. (6) As noted in the case description, we did not institute a trial of caffeine or CPAP due to the episodic nature and gestational maturity. Surgical intervention was performed, as further delaying surgery would have increased the hospital stay.

In conclusion, CO_2 laser supraglottoplasty successfully cured the infant's life-threatening events and resulted in her discharge, decreasing the length of her hospital stay and alleviating parental anxiety.

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Discolosure: The authors have no competing interests to declare.

NT

Daniel Farishta, MD
Resident PGY-3
Department of Otolaryngology Head & Neck Surgery
LSU Health Sciences Center
1501 Kings Highway
Shreveport, LA 71103

Briana Hernandez, MD
Resident PGY-3
Department of Pediatrics
LSU Health Sciences Center
1501 Kings Highway
Shreveport, LA 71103

Corresponding Author

Shabih Manzar, MD
Clinical Associate Professor
LSU Health Sciences Center
1501 Kings Highway
Shreveport, LA 71103
Telephone: 318-626-1623
Fax: 318-675-6059
Email: shabih.manzar@lsuhs.edu

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READ NPA's statement: BLACK LIVES MATTER

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/

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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

Brilliant! Dr. Bell bridges the journey from grief to growth. This is classic wisdom on healing from our heartbreaks and ultimately enjoying a fulfilling life.

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Post-Traumatic Thriving

The Art, Science, & Stories of Resilience

Randall Bell, Ph.D.

Briefly Legal: Loss of Leg Secondary to an Umbilical Arterial Catheter

Maureen E. Sims, MD, Barry Schifrin, MD

A 27-year-old primigravida patient presented at 34 weeks gestation for routine prenatal check complaining of a decreased fetal movement. Her prenatal course had been unremarkable until 34 weeks, at which point ultrasound evaluation revealed mild fetal hydrops and an obvious atrial flutter with a ventricular rate above 200 bpm. The patient was sent immediately to the hospital, where a cesarean section was performed. At birth, the 3360-gram female infant presented with a regular heart rate of 80 bpm, decreased tone, and minimal breathing effort. The Apgar scores were 2 and 5 at 1 and 5 minutes, respectively. The baby was immediately intubated and given positive pressure ventilation. A venous cord gas showed a pH of 7.0, a pCO_2 of 82 mm Hg, pO_2 of 17 mm Hg, and a base deficit (BD) of 12.9. An arterial cord gas was not obtained.

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The baby was brought to the Newborn Intensive Care Unit (NICU). Her heart rate at this point was 120 bpm and regular, and the rest of the physical examination was unremarkable except for mild retractions. She required moderate ventilatory settings with inspired oxygen of 40%. By 30 minutes, umbilical lines were attempted. An umbilical venous line was successfully placed, but a right umbilical arterial catheter (UAC) could not be advanced beyond 7 cm. The calculation for a high-positioned UAC (see below) was 18 cm. Blood could be withdrawn only intermittently from this line, and it was left in place.

The first arterial blood gas showed a pH of 7.14, a PCO_2 of 61mmHg, a pO_2 of 51 mmHg, and a BD of 9. The inspired oxygen and ventilator settings were increased. About an hour after birth, the BP, taken indirectly, was found to be 34/20 with a mean of 28 mm Hg. In response, she was given 40 ml of normal saline over 1 hour. The chest radiograph showed bilateral pleural effusions. Bilateral thoracenteses were performed, producing several ml of clear yellow fluid, followed by the insertion of chest tubes. The ECG revealed normal sinus rhythm. Two and a half hours after birth, the initial (right) UAC was discontinued, and a left UAC was inserted without difficulty. There was no apparent evaluation of pulses and temperature over the lower extremities and gluteal areas.

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On X-ray, the second UAC was initially found coiled in the mid-aorta. After several manipulations, it was uncoiled, and the tip was at T9 on the follow-up scan. After the procedure was completed and the sterile field was removed, the groin was edematous, femoral pulses could not be palpated, and the right leg was pale.

Despite the absent femoral pulses and the pale leg, the second UAC remained in place for several more hours. The leg gradually became mottled, dark, and edematous. Sixteen hours after birth, the neonatologist and the ***risk manager*** met with the mother to discuss the situation. After this discussion, perhaps stimulated by it, a decision was made to contact a higher-level NICU. The neonatologist at the referral center advised the application of topical nitroglycerin ointment, elevation of the right leg, and immediate transfer. ***Upon transfer to the referral hospital, evaluation of the infant's condition, and attempts to save the leg were undertaken. The leg was amputated. The postoperative course was unremarkable.***

The neonatologist and hospital were sued.

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Allegations

Plaintiff's experts were critical of failing to obtain an arterial cord gas at birth. This allegation seemed superfluous considering the severity of the venous pH

They were also critical that the second UAC was left in place since it could not be advanced. The treating physician and nurses countered that the baby was very sick and needed to have central arterial access. In response, Plaintiff's experts pointed out that a venous line was available and that the UAC

was not properly situated in the vessel's lumen and should have been immediately discontinued.

"The plaintiff experts pointed out that an evaluation of the lower extremities and gluteal area should have been performed after the insertion of the catheter, especially since the initial catheter could not be advanced."

The plaintiff experts pointed out that an evaluation of the lower extremities and gluteal area should have been performed after the insertion of the catheter, especially since the initial catheter could not be advanced. Further, the UAC should not have been manipulated and uncoiled but should have been discontinued. Arguably, the second catheter should not have been inserted, considering the disruption in the aorta from the first UAC. Again, the treating neonatologist renewed the assessment that the baby needed the UAC since she was critically ill. The plaintiff neonatologist said, at minimum, that the second UAC should not have been manipulated since the endothelium of the aorta is vulnerable.

The plaintiff neonatologist was appalled that a higher-level medical center was not immediately contacted when the perfusion of the leg was compromised and, further, that an individual from risk management was consulted before a specialized center was consulted.

The case was settled without going to court.

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Discussion.

In this case, the fetus was discovered at 34+ weeks' gestation to be in cardiac failure secondary to cardiac arrhythmia (atrial flutter) and presumably a persistently rapid heart rate. There was no structural cardiac abnormality in the fetus, and the rhythm became sinus immediately after birth.

UACs are commonly used in critically ill neonates, can be placed relatively quickly and easily at the bedside, and be used for many critical functions, including infusion of intravenous fluid and medications, obtaining arterial blood samples, monitoring BP, doing exchange transfusions, and cardiac catheterization. UACs should be placed only by experienced individuals using strict aseptic techniques and only when required. A 5Fr catheter is used for babies >1500 grams, a 3.5 Fr catheter is for infants ≤1500 grams, and a 2.5 Fr catheter is for extremely low birth weight infants if a 3.5 Fr catheter is not possible.

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Once the umbilical arteries have been identified by their anatomic characteristics, one vessel is dilated with an iris forceps. Once inserted, lines cannot be advanced unless the field remains sterile. The artery is dilated, and the catheter is then **gently** advanced to a predetermined length that will place its tip at a high (T 6-9) or at a low (L3-L5) position to avoid false tracking (e.g., the catheter is advanced in the vessel wall outside the lumen),. The umbilical arterial line first travels inferiorly and posteriorly to its junction with the internal iliac artery. Following the artery's course, the catheter must turn superiorly to course through the common iliac artery and aorta. A high-positioned UAC (T6-T9) places the tip above the origin of the celiac axis and below the ductus arteriosus. A low positioned UAC (L3-L5places the tip just above the aortic bifurcation but below the major aortic branches. High-placed UACs have a lower incidence of vascular complications than those in low positions. UACs that are located in an intermediate position between the "high" and "low" positions should be pulled immediately to a "low" position or removed.

" Immediately after placement and suturing of the catheter, it is critical to inspect the infant's buttocks, back, and legs, looking for signs of decreased perfusion that would suggest that the catheter has been inadvertently placed in a gluteal or spinal artery or has created lower extremity ischemia. If these areas appear dusky or pale, immediate catheter removal is required."

A shorthand formula can be used to estimate the catheter length to be inserted. The umbilical arterial catheter length in centimeters

can be calculated from Shukla's formula: 3 x birth weight in kg + 9 for a UAC with the tip in the high position. Immediately after placement and suturing of the catheter, it is critical to inspect the infant's buttocks, back, and legs, looking for signs of decreased perfusion that would suggest that the catheter has been inadvertently placed in a gluteal or spinal artery or has created lower extremity ischemia. If these areas appear dusky or pale, immediate catheter removal is required.

"But for these negligent actions that fell below a reasonable standard of care, given appropriate care, the newborn would have survived had he not been dropped."

These evaluations must be performed even before obtaining radiographic evidence of line placement and tip location,

Radiologic confirmation of the UAC position is imperative. After the UAC is inserted and the proper tip location is confirmed, cm markings on the catheter should be noted and recorded. By documenting the length of a catheter inserted, any movement of the catheter inward or outward can be closely monitored with appropriate intervention. The insertion site must be kept clean and dry. Immediate attention must be placed to remedy a situation if sutures become loose to ensure proper maintenance of tip position. Vascular spasms may occur after catheter insertion or may be triggered by arterial sampling, usually secondary to temporary and reversible arterial constriction. Vascular spasm is characterized by transient cyanosis of the toes, but peripheral pulses are still palpable. A trial of reflex vasodilatation by warming the contralateral extremity generally resolves the spasm.

"Low doses of heparin (0.25-1.0u/ml) should be added to the fluid infused through the UAC to reduce the risk of thromboembolism (TE). Only catheters with end holes should be used since the risks of TE and infection are higher with catheters with side holes."

Low doses of heparin (0.25-1.0u/ml) should be added to the fluid infused through the UAC to reduce the risk of thromboembolism (TE). Only catheters with end holes should be used since the risks of TE and infection are higher with catheters with side holes. UACs should not be replaced if signs of infection or vascular insufficiency in the lower extremities are found. Reinsertion of UACs is generally discouraged because of potential damage to the intimal lining of the arterial vessels with the potential for thrombotic complications. While any fluid, medication, or blood product may be infused through an umbilical venous catheter (UVC), inotropes, calcium boluses, and indomethacin should not be infused via the UAC. Blood and prostaglandin E1 may be infused through a UAC if there is no alternate venous access.

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Complications of UAC include:

1) ischemic and thromboembolic events were causing necrosis to the lower extremities and gluteal area. Arterial thromboembolism (TE) symptoms include pallor or coldness of the lower extremities and/or gluteal area and diminished or absent pulses.
2) vascular compromise to kidneys causing renal failure and hypertension and to the intestine causing necrotizing enterocolitis
3) hemorrhage from a dislodged catheter and extravasation from perforation of a vessel
4) hypoglycemia - if UAC tip streams glucose near celiac artery (located at T12 level)
5) air embolism
6) infection
7) direct peritoneal perforation or urachal/bladder injury
8) aneurysmal dilation with dissection of the abdominal aorta
9) spinal cord infarction
10) discrepancy in leg growth
11) acquired aortic coarctation,
12) mycotic aneurysms of the aorta, particularly in association with Staphylococcus aureus infection.
13) Miscellaneous - Unexplained thrombocytopenia, catheter-obstructed fluid delivery or increased in-line pressure, and concerns regarding lower body or extremity perfusion must be investigated for possible thromboembolism.

Mechanism and incidence for thromboembolism with UACs

Insertion of arterial catheters may mechanically damage the vascular endothelium exposing subendothelial tissue and collagen to the circulating blood, causing adherence and aggregation of platelets, thereby releasing adenosine diphosphate and thromboxane A2 (a platelet stimulator and a very potent vasoconstrictor). These events can lead to vasospasm around the catheter, with complete vessel occlusion and tissue ischemia. A UAC should be placed only in babies who need to have them,

monitored diligently, and when no longer required, should be removed as soon as possible to minimize potential complications. Optimally, umbilical artery catheters should not be left in place for >5 days.

"Although 50% of UAC-related thrombi disappear before discharge from the hospital, the long-term consequences of persistent thrombosis have not been studied systematically. UAC-associated TE has been linked to hypertension, renal function abnormalities, and leg length discrepancy in long-term follow-up studies"

The longer the catheter is in place, the risk of bloodstream infection and catheter-associated TE increase significantly. The reported incidence of arterial thrombosis in neonates with UACs ranges from 8 to 20 percent. Most UAC-associated thromboses are asymptomatic. In one study, two-dimensional abdominal sonography found that 1/3 of infants had abdominal aortic thrombi upon removal of the UACs. The authors found that the probability of developing aortic thrombosis in an infant with a UAC in situ for one day was approximately 16%, increasing progressively to 32% at seven days, 57% at 14 days, and 78% at 21 days. Although 50% of UAC-related thrombi disappear before discharge from the hospital, the long-term consequences of persistent thrombosis have not been studied systematically. UAC-associated TE has been linked to hypertension, renal function abnormalities, and leg length discrepancy in long-term follow-up studies.

Treatment for an ischemic and/or thromboembolic event – Principles and specifics:

- A blanched extremity is an indication for immediate removal of the catheter.
- Patients with TE should be cared for in a highly specialized NICU where radiographic studies, pediatric hematologists, and pediatric vascular surgeons are available should their services be necessary.
- Two-dimensional ultrasound and radionucleotide scanning are usually sufficient to confirm the diagnosis of TE. In some cases, the presentation of TE can mimic severe aortic coarctation.
- Treatment of TE is highly individualized and includes supportive care, generous intravenous fluids, the elevation of the involved extremity, topical application of 2% nitroglycerin ointment at a dose of 4 mm/kg body weight, applied as a thin film over the affected areas, and repeated after 8 hours. Anticoagulation, 4ibrinolytic therapy or surgical intervention may be necessary for specific instances.

Fetal arrhythmias

The cause of the baby's heart failure and compromise at the time of birth was tachyarrhythmia (atrial flutter). Whereas brief accelerations in fetal heart rate (FHR) near term greater than 15 bpm for up to 2 minutes are associated with fetal well-being, sustained elevations of fetal heart rate (tachycardia), irrespective of the underlying rhythm, may be associated with fetal cardiac failure in the form of hydrops fetalis or death. The first clinical clue to the presence of hydrops may be the complaint by the mother of decreased fetal movement, but more often, a rapid rate is detected by routine auscultation. Electronic fetal monitoring has contributed to the awareness of the possibilities of various heart rate and rhythm disturbances. While transabdominal recordings are increasingly available, they are sufficiently reliable to show fetal atrial P-wave morphology. Prenatally, delineating the rhythm disturbance requires evaluation by echocardiographic techniques to determine the function and rule out major structural defects of congenital heart disease and any signs of fetal heart failure. More recently, fetal magnetocardiography (fMCG) has become clinically available. Intrapartum, direct electrodes not only permits observation of the ECG waveform but also provide tachometric clues to arrhythmia that cannot be appreciated by analysis of ECG morphology. Except for complete heart block, arrhythmias associated with structural defects are rare.

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The conduction system of the fetal heart is functionally mature by 16 weeks of gestation, and the average heart rate between 18 and 22 weeks of gestation is 140 bpm. The automaticity of the sinus node is more rapid than the other potential pacemaker sites along the conduction system. An impulse will originate from the next fastest location of pacemaker cells, which may be in the atria, the AV node, or the Purkinje fibers resulting in the sinus rhythm as the fastest normal atrioventricular sequential stimulus. AV nodal or junctional rhythm at 70 to 100 bpm; and a ventricular rhythm at a rate of 45 to 70 bpm are often seen at the base of significant variable decelerations when the intense vagal stimulus has significantly suppressed the sinus node.

A premature beat is defined as a depolarization of the atrium, AV node, or ventricle that occurs earlier than the automatic rate of the sinus node or site of origin of the intrinsic rhythm. Therefore, a premature beat comes earlier than the expected beat-to-beat interval, while an escape beat comes later or at the normal (interpolated) rate for the site of origin. A compensatory pause generally follows conducted atrial premature beats and ventricular extrasystoles before the return of normal atrioventricular rhythms. Premature atrial contractions (PACs) are considered benign and much more common than ventricular premature contractions (PVCs). Approximately 90% of studies in which fetal arrhythmias are detected involve isolated extrasystoles or bigeminal rhythm. Follow-up on extrasystoles involves weekly auscultation to detect tachycardia and monthly routine ultrasound evaluation to develop hydrops. The mother should be assessed for hyperthyroidism and avoid caffeine and other stimulants during the pregnancy.

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Supraventricular tachycardias (SVT) with rates above 200 bpm, SVT occurs in 1—3% of fetuses with isolated atrial ectopic beats. The arrhythmia can be classified as automatic, from an ectopic focus, or reentrant with or without an accessory bypass tract. Reentrant mechanisms are more likely to have sudden paroxysmal onset following a premature depolarization and be transient in duration. Ectopic tachycardias occur due to enhanced or altered automaticity and may occur continuously. Even when brief, SVT causes a significant flow reversal in the ductus venosus, back toward the umbilical vein. Persistent SVT may lead to hydrops fetalis and fetal demise due to decreased cardiac output. Of interest, the abnormal rhythm may occasionally be terminated by the intentional or inadvertent compression of the umbilical cord between the uterine wall and fetus or around the fetal neck. With atrial flutter, the atrial rate is >400 bpm with a 2:1 AV block, with ventricular rates generally between 200—300 bpm. With atrial fibrillation, the atrial rate is over 400 bpm with variable ventricular rates.

Preterm fetuses, even those with hydrops, may be treated by maternal (transplacental) therapy with medications beginning with digoxin, which may be augmented with procainamide, amiodarone, or propranolol. Those with hydrops usually required multiple drugs. In addition, direct, in utero, transabdominal intramuscular injections into the fetus of digoxin may be used to achieve therapeutic levels of digoxin. Most of these fetuses convert under in-utero treatment, while the remainder do so after birth. About one-third will eventually relapse – especially those with WPW.

"In this case, tachyarrhythmia causes fetal heart failure. The heart failure was mild at the time of birth, and the atrial flutter spontaneously resolved. Nevertheless, the child was sufficiently compromised at birth with low Apgar scores, pH, BD, and problems of adaptation that the placement of a UAC was deemed necessary and defensible."

Summary of case

In this case, tachyarrhythmia causes fetal heart failure. The heart failure was mild at the time of birth, and the atrial flutter spontaneously resolved. Nevertheless, the child was sufficiently compromised at birth with low Apgar scores, pH, BD, and problems of adaptation that the placement of a UAC was deemed necessary and defensible. The management of its placement and subsequent events led to allegations of negligence. It seems probable that the insertion of the first UAC was false tracking, as suggested by blood being aspirated intermittently at the tip of the UAC. When the UAC is appropriately placed in the lumen of the aorta, blood should flow freely. As a result of the improper placement, the inner lining of the lower aorta was damaged and became a nidus for thrombus formation. This catheter should have been immediately removed as soon as blood flow was found to be compromised and when attempts to withdraw blood were unsuccessful.

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Evaluation of the legs and gluteal area should have been done. The left UAC at this point was inserted and was found to be coiled in the mid-aortic region. A check for femoral pulses and leg perfusion absolutely should have been performed, and perhaps another catheter should not have been attempted, even if leg perfusion and pulses were normal. A few manipulations that were tried probably resulted in additional intimal damage and the perfect storm for TE. When the sterile field was removed, the leg was noted to be white, the pulses could not be palpated bilaterally, and the groin was edematous. These findings mandated the immediate removal of the UAC. Irrespective, the catheter remained in situ for hours while compromised perfusion and color changes were observed while the health care team entertained hopes of a spontaneous reversal. During this time, the lack of circulation to the baby's leg would lead to its amputation.

The physician and nurses did not reach out to another center, try any intervention or transfer the baby to higher level care until 17 hours after the event. Incomprehensibly, the hospital risk management was called in before medical resources were consulted about intervention and transfer.

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Corresponding Author:

Maureen E. Sims, M.D.
Professor of Pediatrics
Geffen School of Medicine,
University of California, Los Angeles
Los Angeles, California
email: mes@g.ucla.edu

Barry Schifrin, M.D,
Western University of Health Sciences, Pomona, California
Formerly, Professor of Obstetrics & Gynecology
Keck School of Medicine, University of Southern California, Los Angeles

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Gravens By Design: Optimizing Sleep in the NICU, a Neurodevelopmental Imperative

Daphna Yasova Barbeau, MD, Michael D. Weiss, MD

Throughout history, technology and changing workplace needs have shaped how we sleep as we adjust to shifting schedules. (1) The bustling environment of a Neonatal Intensive Care Unit (NICU) is no exception, and the infants in our care are subjected to our rigorous schedule. The preterm neonate is expected to sleep greater than 90% of the day, and the term infant, over 70% of the day. (2, 3) However, this is not always possible in the NICU. We know that neonatal sleep is regularly disrupted by the chaos within the NICU, such as loud alarms, opening and closing of isolettes, workplace chatter, bright lights, painful procedure, and uncomfortable equipment. In addition, studies show that routine care and noises just outside the isolette cause complete arousal from sleep and, if interrupted in certain sleep phases, lead to physiologic instability like bradycardia, apnea, and desaturations. (4) Recurrent disruptions in sleep lead to a sleep deficit in neonates, just like in older children and adults, and chronic sleep deprivation has been linked to learning problems and the development of cardiovascular morbidity like metabolic syndrome. (5)

"Recurrent disruptions in sleep lead to a sleep deficit in neonates, just like in older children and adults, and chronic sleep deprivation has been linked to learning problems and the development of cardiovascular morbidity like metabolic syndrome. (5)"

Living in the NICU is disruptive to sleep, and for the very premature high-risk neonates, exposure to the extrauterine environment disrupts the progression of normal sleep development. Studies have shown that normal sleep develops over time in neonatal life, including lengthening of the sleep interval, increased quiet sleep, and, as the postmenstrual age increases, neonates spend less overall time asleep, with increasing quiet sleep, spending less time in the regenerative REM or rapid eye movement sleep. (2, 3) As the neonate ages, we have fewer opportunities to optimize the most important sleep state for learning, even during typical development. Prematurity interrupts this normal development and leads to disordered sleep structure and sleep-breathing disorders into early childhood and adolescence. (6) While many units adhere to a strict "neurobundle" which includes low stimulation for the first 72 hours to 1 week of age, this vigilance to protect sleep and overstimulation seems to wane over time for older neonates when it might be even more critical. As neonates attempt to undergo typical maturation of sleep-wake cycling, our scrupulous adherence to the NICU schedule continues.

Sleep becomes even more important regardless of gestational age and as acuity increases for neonates. Many pathologies in the NICU are associated with disrupted maturation of sleep-wake cycling. (7, 8) It is unclear whether the disease predicts abnormal sleep patterns or vice versa. However, many studies have shown that decreased maturation of sleep-wake cycling is linked to worse neurodevelopmental outcomes; hence, the protection of neonatal sleep is of utmost importance. (9, 10, 11)

"However, many studies have shown that decreased maturation of sleep-wake cycling is linked to worse neurodevelopmental outcomes; hence, the protection of neonatal sleep is of utmost importance. (9, 10, 11)"

As a result of these findings, minimum guidelines to optimize sleep protection in your unit are proposed. These practices highlight recommendations from the Consensus Committee of the Standards, Competencies, and Best Practices for Infant and Family-Centered Developmental Care in the Intensive Care Unit. (12)

1. **Reduce sleep disrupters:**

   a. *Teach the entire staff about the importance of sleep.* This intervention means recognizing how many people interact daily with an infant's space. A unit-wide curriculum includes everyone, from the environmental services staff to the nursing staff, the administration, and the medical team. Everyone is responsible for safe sleep in the unit. (12)

   b. *Teach families about the importance of sleep.* Encourage sleep protection, educate sleep optimizers, and let baby lead (See below). (12) Including parents in the act of containment brings comfort to neonates and allows parents to interact with their infant regardless of sleep state or clinical illness. They can learn to create the physical boundaries within the bed using equipment and containment holds with their hands, a multimodal experience for infants.

   c. *Monitor the noise level in the neonate's environment.* Infants have awakenings even from brief sound peaks, and prolonged exposure to noise puts infants at risk for hearing deficits. (13, 14) Studies show that the optimal decibel level for units is 45 dB or less. (15)- This is the volume of the humming of a refrigerator, below the 60dB of normal conversation. (16) Many believe that isolettes protect from ambient noise when in reality, the isolette can amplify the sounds in the NICU. (17) It's simple to incorporate the use of decibel meters into daily practice- they are available in application format on phones to combat noise pollution in your unit.

   d. *Decrease bright light.* Studies show that cycled light, as compared to continuous bright light, benefit preterm infants. Cycled light results in a decreased length of stay, a trend towards fewer ventilator days, and a shorter time to full feeds (18). Tools include isolette covers, room/pod dimmers, and timed lighting cycles. (12)

2. Increase sleep optimizers:

a. *Increase Kangaroo Care.* Kangaroo Care accelerates neurobehavioral maturation of sleep. Infants who do Kangaroo Care have more organized sleep states and spend more time in both active and quiet sleep at term corrected age. (19)

b. *Promote individualized body positioning, swaddling, and containment.* Swaddled infants show a longer sleep duration and self-regulation. (12) Positional aids may assist in this individualized care with a focus on permitting supported movement rather than restriction of movement, promoting midline hand positioning, and allowing older infants to self-soothe with their hands.

c. *Practice individualized, parent-driven gentle touch.* Studies of gentle human touch found significant increases in the sleep state and decreases in the awake state during and after the interventions. (12)

3. Let the baby lead:

a. *Teach wakefulness cues to parents and staff.* It is possible to identify neonatal sleep states prior to 28 weeks of gestation. (20) Once an infant's care team recognizes their sleep state, they can be encouraged to let babies sleep if not in the transitional or awake state. (12, 20)

b. *Wake infants gently.* Treat the NICU infant like you would an infant in your own home. Slow, progressive brightening of the lights, greeting the infant with a soft voice when you enter the isolette, and laying hands on them with intention lets them more easily transition into wakefulness.

c. *Engage infants that are awake.* As infants age, they will be awake more often.

For some infants, this means they are awake many hours a day, even before they wean from the isolette. Expecting that older infants will sleep all day restricts valuable developmental opportunities. Engagement in developmentally appropriate activities during wakefulness predicts better sleep, and supporting arousal can optimize interactions like feeding. (12)

d. *Question the "three-hour" rule.* The infant's sleep-wake cycle is approximately 1 hour, so we should protect this cycle when possible. However, not all infants will have a sleep pattern that fits our regimented schedule. We should consider adjusting touch times that are more individualized to each infant.

"For generations, we have allowed the schedule to dictate sleep. However, when it comes to optimizing sleep for neonates in the NICU, perhaps it is time to let infant sleep dictate the schedule instead."

For generations, we have allowed the schedule to dictate sleep. However, when it comes to optimizing sleep for neonates in the NICU, perhaps it is time to let infant sleep dictate the schedule instead.

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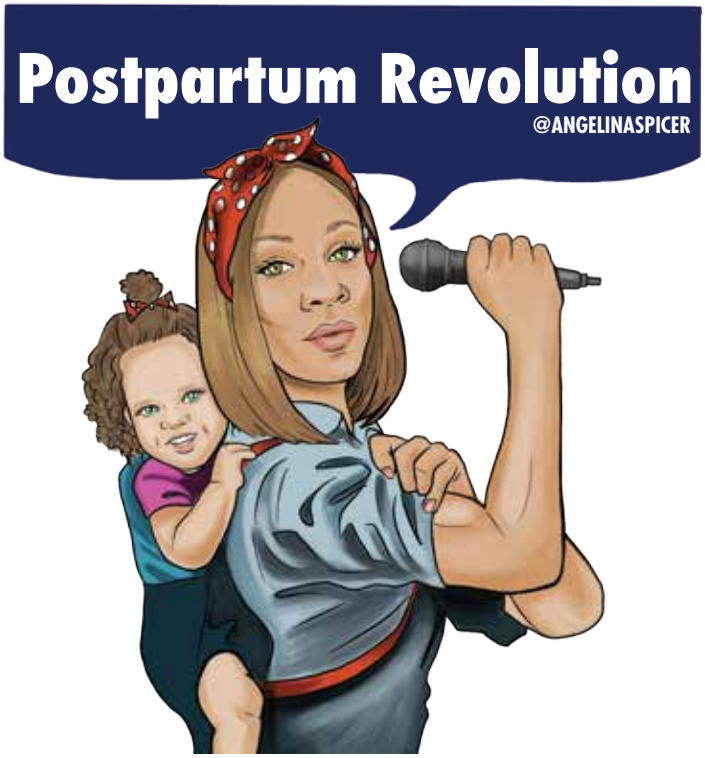
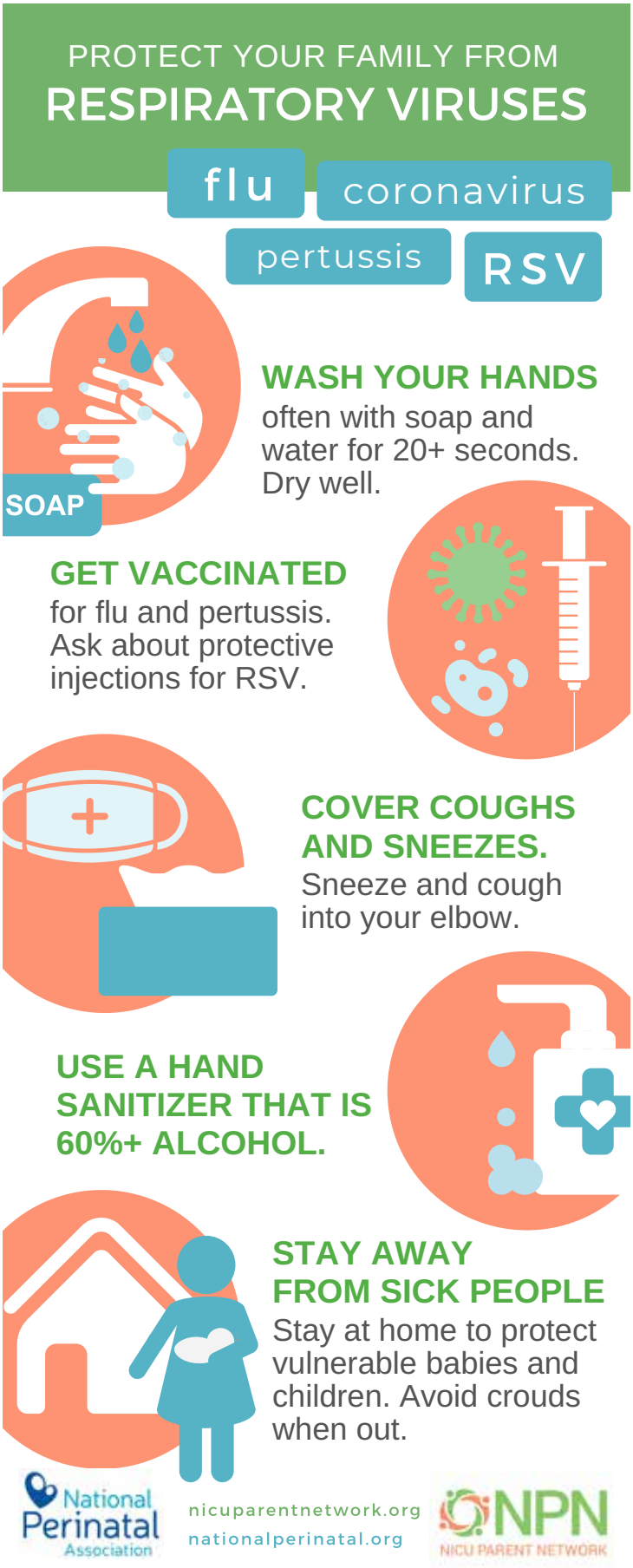
NT

Corresponding Author

Daphna Yasova Barbeau, MD
HCA University Hospital
Davie, Florida
USA
Email: daphnayasovabarbeau@icloud.com

Michael D. Weiss, MD
Assistant Professor i
Department of Pediatrics
Division of Neonatology
University of Florida Health Science Center
Gainesville, Florida, USA





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COVID-19

STOP THE SPREAD AT HOME

What to do when you or a loved one is infected.

HYGIENE TIPS

MOUTH
- Wear a face mask or face shield.
- If in car, wear mask & put windows down.
- NO cloth face masks for children younger than 2yrs.
- Avoid kissing

EYES
Wear protective eye gear (glasses)

HANDS
ALWAYS wash your hands

CLOTHING
- Wear a jacket when dealing with infected.
- DO NOT share clothing, sheets, or pillows.

BATHROOM

- Sanitize EVERYTHING.
- Clean after every use.
- Patient gargle Listerine every morning & night.

PROTECT

- If infected, notify everyone in contact from the past 10 days.
- Ask Dept. of Health for further assistant.
- Call 211 for FREE delivery services.

If you are feeling sicker, DON'T WAIT. Call your doctor immediately.

SELF ISOLATION

- Sick should be separate from household.
- Room with window preferred
- Aerate room 3x day.
- Create a room divider with sheet.
- Keep water and sanitation liquids near
- Keep garbage bag in room.
- Don't cuddle with pets.

6 FT

Practice social distancing

KITCHEN

- Use SEPARATE utensils.
- Clean utensils separately.
- If sick avoid the kitchen.

TRACK COVID-19 NEAR YOU BY VISITING COVIDNEARYOU.ORG

#STOPTHESPREAD

MIORA

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COVID-19

DETENER LA PROPAGACIÓN EN CASA

Qué hacer cuando usted o un ser querido está infectado.

CONSEJOS DE HIGIENE

BOCA
- Use una mascarilla o careta
- Si está en el automóvil, use una máscara y baje las ventanas
- NO mascarillas de tela para niños menores de 2 años.
- Evitar besos

OJOS
Use equipo de protección para los ojos (lentes)

MANOS
SIEMPRE lávate las manos

ROPA
- Use una chaqueta cuando se trata de infectados.
- NO comparta ropa, sábanas o almohadas.

BAÑO

- Desinfecte TODO.
- Limpiar después de cada uso
- El paciente hace gárgaras con Listerine todas las mañanas y noches.

PROTEGER

- Si está infectado, notifique a todos los contactos de los últimos 10 días.
- Pídale al Departamento de Salud por más ayuda.
- Llame al 211 para obtener servicios de entrega GRATUITOS.

Si te sientes más enfermo, NO ESPERES. Llame a su médico de inmediato.

AISLAMIENTO

- Los enfermos deben estar separados del hogar.
- Habitación con ventana preferida
- Airear la habitación 3x al día
- Crea un separador de ambientes con sábana.
- Mantener agua y líquidos de saneamiento cerca
- Mantenga una bolsa de basura en la habitación.

6 FT

Practica el distanciamiento social

COCINA

- Use utensilios SEPARADOS.
- Limpie los utensilios por separado.
- Si está enfermo, evite la cocina.

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Ways to Manage Covid 19 @ Home

Household

1. Stay 6 feet apart from others at all times.
2. Wear protective covering over mouth and eyes (mask AND shield/goggles/glasses) when near others. (Do not put masks on children under 2 years old)
3. Gargle with antiseptic mouthwash in the morning and evening.
4. Wash hands 10-12x a day, before each meal for at least 20 seconds.
5. Keep good ventilation throughout home. (open windows/doors) where possible
6. Do not share towels, blankets, pillows with sick.
7. Call 211 for assistance/free delivery of services.
8. Wear protective clothing (jacket, gloves, mask) that can be removed after being around infected.

Stop the Spread at HOME

MIORA

Sick

1. Self-isolate by staying in separate room with separate bathroom where possible. Don't go into shared spaces.
2. Create a room divider with sheet, if shared space is unavoidable.
3. Ventilate room with fresh air at least 3x per day.
4. Keep water and sanitation products in room.
5. Keep plastic garbage bag in room.
6. Protect pets - don't cuddle.
7. Notify contacts in last 10 days.
8. Don't wait! Call doctor if symptoms get worse.

Maneras de manajer COVID-19 en casa

Hogar

1. Manténgase 6 pies de distancia de los demas en todo momento.
2. Use una cubierta protectora sobre la boca y la máscara para los ojos Y el protector / gafas / anteojos cuando esté cerca de otras personas. No ponga máscaras a niños menores de 2 años.
3. Hacer gárgaras todas las mañanas y noches con productos de enjuague bocal antiséptico que contienen alcohol.
4. Lavesé la manos 10-11 veces al día, y antes de cada comida por lo menos 20 segundos.
5. Mantéga Buena ventilacion en toda la casa. Abra las ventanas y puertas cuando sea posible.
6. No compartá toallas, cobijas, y almohadas con personas que esten infectados.
7. Llame al 211 para obtener servicios de entrego gratuitos.
8. Use ropa protectora, chaqueta, guantes, máscara que se pueda quitar después de estar cerca de infectados.

Detén la propagacion en casa

MIORA

Enfermo

1. Aíslese permanecindo en una habitación separada con baño separado. No vayas a espacios compartidos
2. Si no se puede aislarse crea un separador de ambiente con una sabana.
3. Ventile la habitacion con aire fresco por lo menos 3 veces al día.
4. Mantenga agua y productos de saneamiento en la habitacion.
5. Mantenga una bolsa de basura en la habitación.
6. Proteja a las mascotas, no las abrace.
7. Notifique a todos los contactos de los últimos 10 días.
8. No espere! Si se siente peor llame a su medico.

WEAR A MASK

PROTECT PARENTS + BABIES

COVID-19

When we all wear masks...

We protect parents and babies.

Project Sweet Peas + National Perinatal Association

USA UNA MASCARILLA

PROTEGER A LOS PADRES Y BEBÉS

COVID-19

Cuando todos usamos mascarillas ...

Protegemos a los padres y los bebés.

Project Sweet Peas + National Perinatal Association

Fragile Infant Forums for Implementation of IFCDC Standards (FIFI-S) Column: The First FIFI-S Forum on Implementing Feeding, Eating, and Nutrition Delivery

Joy V. Browne, Ph.D., PCNS, IMH-E

"We agreed that all professions should implement the practice of IFCDC based on the most robust evidence available, so we began establishing our principles, deciding on areas where there is evidence, and evaluating that evidence. The IFCDC standards are readily available at https://nicudesign.nd.edu/nicu-care-standards/"

Background:

The consensus panel for Standards, Competencies, and Best Practices for Infant and Family-Centered Developmental Care (IFCDC) in intensive care began meeting about six years ago. We gathered, recognizing that we, as interprofessionals have similar goals and passion that drive our work. However, we also recognized that we come from different educational perspectives, professional cultures, and practice guidelines. We agreed that all professions should implement the practice of IFCDC based on the most robust evidence available, so we began establishing our principles, deciding on areas where there is evidence, and evaluating that evidence. The IFCDC standards are readily available at https://nicudesign.nd.edu/nicu-care-standards/.

Evidence-based standards, competencies, and best practices are foundational to optimal intensive care for babies and families but do not assure that they are implemented, especially in busy, high-intensity hospital units. Often the standards are not recognized as essential components of care when the "rubber meets the road." Additionally, implementation is often unsuccessful if standards are implemented piecemeal and not woven into the fabric of the unit's values and goals, policies and expected practice.

"Often the standards are not recognized as essential components of care when the "rubber meets the road." Additionally, implementation is often unsuccessful if standards are implemented piecemeal and not woven into the fabric of the unit's values and goals, policies and expected practice."

This realization has resulted in developing the Fragile Infant Forums for Implementation of the IFCDC Standards (FIFI-S). FIFI-S has been designed to provide participants with a guidebook for successful systems implementation and to assure that they have a practical tool kit on which to rely to ensure that evidence-based IFCDC practice becomes "the way we do things around here."

The consensus panel has consistently acknowledged the importance of interprofessional work. A goal of the Forums, then, is to create a collaborative culture of practice that includes interprofessionals concerned with supporting the development of babies and families in intensive care. From the beginning, the consensus panel has developed and successfully employed a collaborative culture among the professionals and families who work in and experience intensive care. Our next steps, emphasized in the initial and subsequent Forums, are to develop strategies for implementing the evidence-based IFCDC standards collectively. These forums will collectively develop and apply interprofessional guidelines for implementing IFCDC in intensive care.

Each person and organization represented at the first Forum (virtual or in person) had the opportunity to contribute to developing implementation guidelines for Feeding, Eating, and Nutrition Delivery to be used productively by all. The outcomes of this and subsequent Forums will include materials and strategies that draw on all wisdom but are not "owned" by any profession or organization. By creating a culture of collaboration, we benefit from each other's wisdom and respect that each contributor has a shared responsibility to protect the group's efforts and contributions.

A brief synopsis of the Forum on Feeding, Eating, and Nutrition Delivery:

The first of the proposed hybrid Forums focused on the standards

of "Feeding, Eating and Nutrition Delivery," held July 13-15, 2022. In the first hybrid meeting, there were on-site participants and a large audience that joined virtually.

Sharon Cox was our keynote speaker, a nationally known expert in hospital management and strategies for clinical change. Sharon provided an inspirational talk and challenge to the participants, including strategies to make change happen. Many of her quotes and challenges reverberated through the entire Forum.

After an overview of the Feeding, Eating, and Nutrition delivery standards and an emphasis on why they are important for the long-term outcomes of babies and families by Dr. Erin Ross, we had presentations by scientists who provided state-of-the-art research that support the standards and competencies. Drs. Pamela Dodrill, Kelly McGlothen-Bell, Britt Pados, and Erin Ross addressed clear evidence for oral feeding strategies, breastfeeding and most importantly the role of parents in successfully feeding their infant. These provided a foundation for attendees to document the significance of the next day and a half.

Drs. Carol Jaeger and Carole Kenner, experts in systems implementation, provided several evidence-based models to identify how units can choose one to develop an implementation plan systematically (See the recommended references of the models they recommended) demonstrated). They provided several clinical examples of how units have strategized their approach to implementation and supported the work groups to use a "hands-on experience" in understanding how systems implementation can apply in their unit. A great deal of the work during the Forum was in workgroups, both in person and virtual, each group addressing individual feeding, eating, and nutrition delivery standards.

Ms. Debra Paul provides an example of an ongoing process used in her unit to implement standardized feeding approaches. She included how barriers could be recognized, understood, and worked around, particularly as the pandemic impeded implementation. Drs. Jaeger and Kenner then provided insights into how barriers could be addressed so that progress is not impeded. They provided essential information on measuring success in an ongoing and long-term manner and emphasized how metrics are essential to successfully implementing standards.

The process for the first FIFI-S Forum is not complete; it will be ongoing in each of the participating professionals' work and their respective intensive care units. As FIFI-S participants attempt to apply the models of change toward implementing the standards, ongoing support from the faculty will be provided.

Our Forum goals were for nationally known research scientists in Feeding, Eating, and Nutrition Delivery to address the evidence for some of the standards. They were followed by examples of professionals who attempted to implement the standards in their units. Each speaker effectively demonstrated why the standards are appropriate for clinical implementation. The Forum participants detailed essential systems supports that were instrumental in guaranteeing the implementation of the standards. As a collective group, the participants and leaders in the field determined the best strategies for practice implementation. They began producing a "white paper "on the system supports necessary to implement the IFCDC feeding, eating, and nutrition delivery standards.

Ongoing efforts:

The initial and ongoing Forums aim to develop implementation strategies so that the IFCDC standards are recognized, implemented widely, and in a sense "cemented" into the expectations for practice in intensive care. We look to all intensive care professionals invested in caring for babies and families to help us develop strategies for getting them accepted, disseminated, and implemented, and invite participation in subsequent Forums.

The next Forum is scheduled for January 18-20, 2023, at Loma Linda University in Loma Linda, California. The Forum focus will be on "Implementing Strategies to Alleviate Stress for Babies and Families in Intensive Care," which is addressed in one of the IFCDC standards https://nicudesign.nd.edu/nicu-care-standards/ifcdc--recommendations-for-best-practice-reducing-managing-pain-stress-in-newborns-families/

Please plan to join us as we revolutionize IFCDC in intensive care. It will take a systems approach which is why we start with each of the standards' implementation guidelines. The focus on how systems can change using evidence-based and clinically meaningful strategies will assure a change toward implementing IFCDC standards of care.

"We are continually reminded of Sharon Cox's entreaty that "very great change starts from small conversations held by people who care." The goal of the Forums, now and in the future, is to start a conversation!"

We are continually reminded of Sharon Cox's entreaty that "very great change starts from small conversations held by people who care." The goal of the Forums, now and in the future, is to start a conversation!

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Corresponding Author

Joy Browne, Ph.D., PCNS, IMH-E(IV)
Clinical Professor of Pediatrics and Psychiatry
University of Colorado School of Medicine
Aurora, Colorado
Telephone: 303-875-0585
Email: Joy.browne@childrenscolorado.org

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Fragile Infant Forums for Implementation of Standards (FIFI S)
Formerly Fragile Infant Feeding Institute
July 13-15, 2022

Rationale: The FIFI S initiative is to promote, facilitate and provide strategies for implementation of the published standards of care for Infant and Family Centered Developmental Care in intensive hospital units in the US. Each of the forums will focus on one of the established sets of standards, competencies and best practices (feeding and nutrition, handling and positioning, promotion of states and arousal, pain and stress, skin to skin care and systems issues) with the goal of:

1. Raising awareness of availability of and need for implementation of current evidence based standards into practice.

2. Developing effective and reproducible strategies for assuring implementation of the competencies and best practices into intensive care and

3. Assuring that systems integration will lead to permanent changes in clinical practice.

The first of the forums will focus on the evidence based section of Feeding, Eating and Nutrition Delivery. Faculty will include influencers and researchers in the field. Audience participants will include professionals who will benefit from current research and systems implementation approaches to clinical care and contribute to discussion of best practices.

Hospitals will be encouraged to send their team of professionals who are leaders, influencers and those who have been selected to support change in their hospitals. A letter of support/commitment from the administration will be required for participation.

The two day intensive forum will bring together thought influencers, researchers, clinical professionals and parents who are invested in assuring practice excellence by implementing the IFCDC Standards, Competencies and Best Practices into baby and family intensive care systems.

Objectives:

- Discuss current best evidence based infant feeding practices
- Establish essential systems issues that guarantee implementation of best practices
- Determine best practice implementation strategies for the Feeding and Nutrition standards in national NICUs

Organizing Committee:

- Joy Browne
- Carol Jaeger
- Erin Ross
- Mitchell Goldstein

Program Consultants:

- Joan Arvedson
- Jacqueline McGrath
- Kelly McGlothen-Bell

Proposed Faculty:

- Suzanne Thoyre
- Barbara Medoff-Cooper
- Erin Ross
- Carol Jaeger
- Kelly McGlothen-Bell
- Carol Kenner
- Pamela Dodrill
- Britt Pados

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Providing guidance to healthcare professionals, hospitals and healthcare systems, stimulating higher levels of excellence and improving outcomes for mothers and babies.

Advocacy

Providing a voice for healthcare professionals and healthcare systems to improve public policy and state legislation on issues that impact the maternal, child and adolescent population.

Consultation

Providing and promoting dialogue among healthcare professionals with the expectation of shared excellence in the systems that care for women and children.

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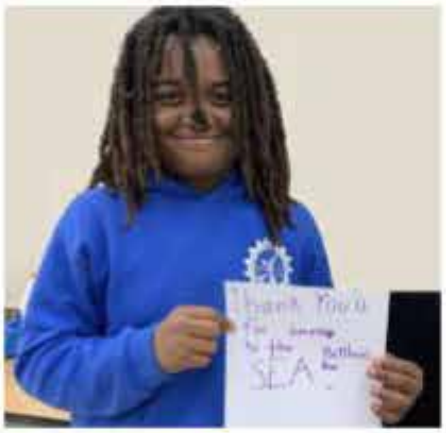

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Manifest Destiny

Bernadette Mercado BS RRT

"However, I believe in destiny, and my fate is to be a Respiratory Therapist. Furthermore, with that destiny comes responsibility, commitment to my patients, and passion for giving back to my profession."

What is there for me beyond being a Respiratory Therapist? This question visited me as I was driving to work one day, and I did not have an answer. Then it revisited me; on my way home after a long 12-hour shift attending to back-to-back deliveries of preterm babies in the NICU, I felt physical tiredness. However, my body still has some leftover adrenaline rush, and the passion for my job as an RT surpassed all the physical exhaustion. I know I have done my duty to save a life, stabilize a baby, and be part of a NICU care team's goal to hand off a stable baby to the parent's arms. When Covid hit, it was challenging physically and mentally. The more days I drive home, I question myself about what is next for me after Respiratory Therapy. I realized my question to myself was incorrect. I found the answer to what I can do NOW while I am an RT. The love for my profession was not a love at first sight; never in my childhood memories did I say I wanted to be a Respiratory Therapist when I grew up. I stumbled into Respiratory Program out of desperation to stay in school because there was a 2-year waiting list for the Nursing program in my Junior College. However, I believe in destiny, and my fate is to be a Respiratory Therapist. Furthermore, with that destiny comes responsibility, commitment to my patients, and passion for giving back to my profession.

Education is limitless, and I believe that education makes this world a better place. This is one reason why I joined the Academy of Neonatal Care (AONC), a not-for-profit educational platform. While giving back, I had to give more of myself which encouraged me to pursue a bachelor's degree in Respiratory. A great way of giving back to my profession is to start by educating myself. Finishing a Bachelor of Science in Respiratory was my tool to get deeper into education. Now the real work begins. ANOC has conducted numerous NICU courses during and after covid, from online to live courses and from California to Utah for the last two years. AONC's passion is to reach more people, look outside California and further down the Pacific to the Philippines and other countries to extend our mission of educating RT, RN, MDs, and families.

Our education becomes a mission. According to an article published by WHO (https://www.who.int/philippines/news/feature-stories/detail/doh-philhealth-who-and-unicef-join-forces-for-premature-and-small-babies-survival-in-national-summit), in the Philippines, almost half of the children who die before their fifth birthday are newborns. (1) Of those babies who die, 60 percent succumb to complications brought about by prematurity and low birth weight.

" Our education becomes a mission. According to an article published by WHO (https://www.who.int/philippines/news/feature-stories/detail/doh-philhealth-who-and-unicef-join-forces-for-premature-and-small-babies-survival-in-national-summit), in the Philippines, almost half of the children who die before their fifth birthday are newborns. (1) Of those babies who die, 60 percent succumb to complications brought about by prematurity and low birth weight."

The most recent key fact found on the World Health Organization (WHO) website (https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021) mentioned the following: (2)

- The first month of life is the most vulnerable period for child survival, with 2.4 million newborns dying in 2020.
- In 2020, nearly half (47%) of all under five deaths occurred in the newborn period (the first 28 days of life), an increase from 1990 (40%), because the global level of under-5 mortality is declining faster than that of neonatal mortality.
- Sub-Saharan Africa has the highest neonatal mortality rate in the world (27 deaths per 1000 live births), with 43% of global newborn deaths, followed by central and southern Asia (23 deaths per 1000 live births), with 36% of global newborn deaths.
- Preterm birth, intrapartum-related complications (birth as-

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phyxia or inability to breathe at birth), infections, and birth defects are the leading causes of most neonatal deaths.

- Children who die within the first 28 days of birth suffer from conditions and diseases associated with a lack of quality care immediately after birth and in the first days of life.
- COVID-19 infections among children and adolescents typically cause less severe illness and fewer deaths than in adults. Moreover, the youngest children are the least vulnerable, with less than 0.1% of global deaths (1902) occurring in children under five.

"AONC believes in training future trainers; we can help decrease the number of 2.4 million babies dying. One life saved makes a big difference by breeding more skilled, educated healthcare workers who can teach and perform effective ways to educate mothers and families on achieving a healthy pregnancy, thus decreasing preterm birth."

AONC believes in training future trainers; we can help decrease the number of 2.4 million babies dying. One life saved makes a big difference by breeding more skilled, educated healthcare workers who can teach and perform effective ways to educate mothers and families on achieving a healthy pregnancy, thus decreasing preterm birth.

There are so many avenues that AONC can pursue in the future, from training in transporting babies from rural areas to facilities that could provide a higher level of care—providing and training the use of low-cost, effective ventilators. With our passion for educating comes dedication, hard work, and support from companies that align with our advocacy. Our mission will never be completed. Instead, it will evolve with the new technology; we must learn, teach and adapt to the changing world. There are so many opportunities for training in Respiratory and Neonatology. Saving lives is a broad spectrum that we entertain every opportunity to expand our service and give back to future healthcare workers.

"One day we can salute ourselves and the professionals who took the step to be educated and trained and give back to the community they served. We do not stop learning and teaching. We only pass the torch to future healthcare workers, and our daunting task continues. "

One day we can salute ourselves and the professionals who took the step to be educated and trained and give back to the community they served. We do not stop learning and teaching. We only pass the torch to future healthcare workers, and our daunting task continues.

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1. *Doh, P, WHO and UNICEF Join Forces for Premature and Small Babies' Survival in National Summit." World Health Organization, World Health Organization, https://www.who.int/philippines/news/feature-stories/detail/doh-philhealth-who-and-unicef-join-forces-for-premature-and-small-babies-survival-in-national-summit.*
2. *Newborn Mortality. World Health Organization, World Health Organization, https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021.*

Disclosures: The author has no conflicts noted.

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Bernadette Mercado BS RRT
Instructor
Academy of Neonatal Care
Email: beme715@gmail.com

The Village Son

A Life's Journey

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

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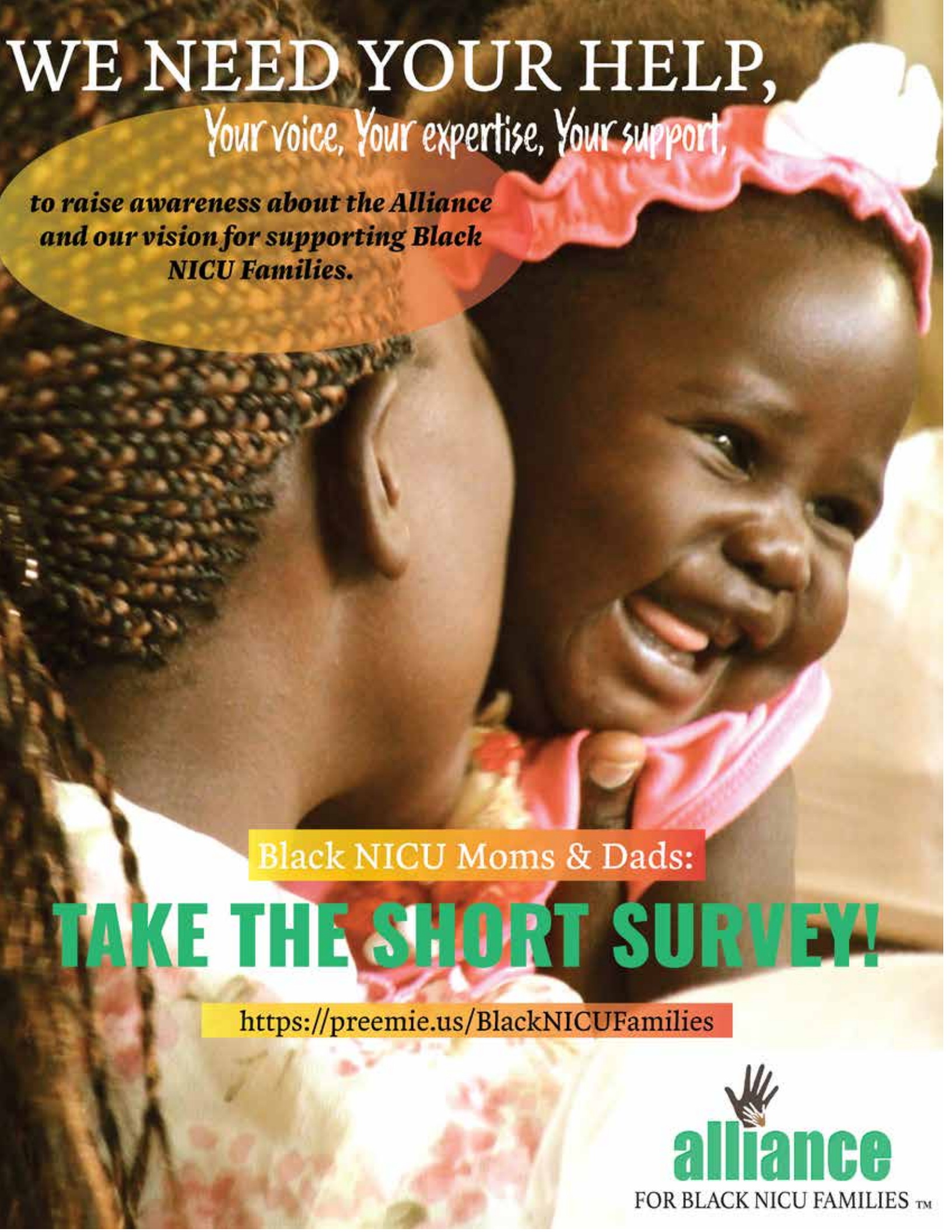
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Revised American Academy of Pediatrics Guidelines for Breastfeeding: The Benefits and Challenges

By Barb Himes, CD

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First Candle's efforts to support families during their most difficult times and provide new answers to help other families avoid the tragedy of the loss of their baby are without parallel.

"In June 2022, the American Academy of Pediatrics (AAP) released its revised guidelines for safe infant sleep, the first since 2016, followed by revised recommendations regarding breastfeeding, which were last issued in 2012."

In June 2022, the American Academy of Pediatrics (AAP) released its revised guidelines for safe infant sleep, the first since 2016, followed by revised recommendations regarding breastfeeding, which were last issued in 2012.

The key points in the updated breastfeeding guidelines include:

- Exclusive breastfeeding should be provided for the first six months, after which it should be supplemented with nutritious complementary foods. The AAP also supports increasing breastfeeding to two years or more, up from one year or more. This provides continued benefits, especially to the mother; long-term breastfeeding is associated with protection against diabetes, high blood pressure, and breast and ovarian cancer.
- The recommendation is that birth hospitals or centers employ maternity care practices that improve breastfeeding initiation, duration, and exclusivity.
- Mothers who breastfeed beyond the first year need support from their medical care providers and protection against workplace barriers.
- Policies that protect breastfeeding, including universal paid maternity leave; the right of women to breastfeed in public; insurance protection for lactation support and breast pumps; on-site childcare; universal workplace break time with a clean, private location for expressing milk; the right to feed expressed milk; and the right to breastfeed in childcare centers and lactation rooms in schools are all essential to supporting families in sustaining breastfeeding.

" The AAP frames breastfeeding as a public health imperative. The AAP cites short- and long-term benefits, including its association with reduced rates of infant mortality, infant immune system support against infections, the development of future immunities, and fostering maternal-infant bonds and well-being"

The AAP frames breastfeeding as a public health imperative. The AAP cites short- and long-term benefits, including its association with reduced rates of infant mortality, infant immune system support against infections, the development of future immunities, and fostering maternal-infant bonds and well-being.

In its policy statement, the AAP identifies breastfeeding and human milk as a cultural norm in the United States, with more than

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80% of women initiating breastfeeding and most women choosing to do so. (1) It also notes that both federal and state laws protect a woman's right to breastfeed as well as the right to breastfeed in public and to continue breastfeeding or to express milk in the workplace.

We support the guidelines but also believe there are personal perspectives that need to be considered. Not everyone can or chooses to breastfeed for reasons that may range from individual health to situational issues. We also know that even though there may be legal protections to support breastfeeding, as the AAP itself put it, "social and systemic changes" need to be supported to help mothers who choose to breastfeed.

In the U.S., White, Hispanic or Latino, and Asian families start breastfeeding at higher rates than Black. (2) Similar disparities are also found with mothers with low income, women younger than 20, and those with a high school education or less. The AAP policy statement acknowledges implicit and structural bias and that structural racism should be addressed to eliminate disparities in breastfeeding and improve the health and well-being of all children and families.

"The AAP policy statement acknowledges implicit and structural bias and that structural racism should be addressed to eliminate disparities in breastfeeding and improve the health and well-being of all children and families."

Anecdotally, We have seen that taking a respectful, collaborative approach with families about infant safe sleep practices can foster compliance, and the same could be said for breastfeeding; a reality-based two-way discussion may have a more significant impact on maternal decision-making than citing research evidence and the importance of public health.

"Breastfeeding is not always easy, and not every mother may be successful in reaching her breastfeeding goals, but if she feels knowledgeable and supported, she may be more likely to try. "

Breastfeeding is not always easy, and not every mother may be successful in reaching her breastfeeding goals, but if she feels knowledgeable and supported, she may be more likely to try. Health care providers should initiate breastfeeding conversations before the baby is born, understanding that new mothers may also seek advice from friends, family, and co-workers. Providing new parents with information on local lactation support groups they can attend prenatally will also help.

Moreover, although policies are ostensibly in place to support breastfeeding in the workplace and public spaces, providers should be ready to discuss a mother's assessment of her work-life situation and how she feels she can best handle breastfeeding, for how long, and if the infant formula needs to be part of this conversation.

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2. *2018 National Immunization Survey (NIS) of the Centers for Disease Control and Prevention.*

Disclosure: *The author is a-Certified Doula, and the Director of Education and Bereavement Services of First Candle, Inc., a Connecticut-based not for profit 501(c)3 corporation.*

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Corresponding Author

Barb Himes, CD
Director of Education and Bereavement Services
First Candle
49 Locust Avenue, Suite 104
New Canaan CT 06840
Telephone: 1-203-966-1300
For Grief Support: 1-800-221-7437
Email: barb@firstcandle.org
Website:: www.firstcandle.org

About First Candle

First Candle, based in New Canaan, CT, is a 501c (3) committed to eliminating Sudden Infant Death Syndrome and other sleep-related infant deaths while providing bereavement support for families who have suffered a loss. Sudden unexpected infant death (SUID), which includes SIDS and accidental suffocation and strangulation in bed (ASSB), remains the leading cause of death for babies one month to one year of age, resulting in 3,600 infant deaths nationwide per year.

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As we indicated last month, we look forward to a number of new features as well.

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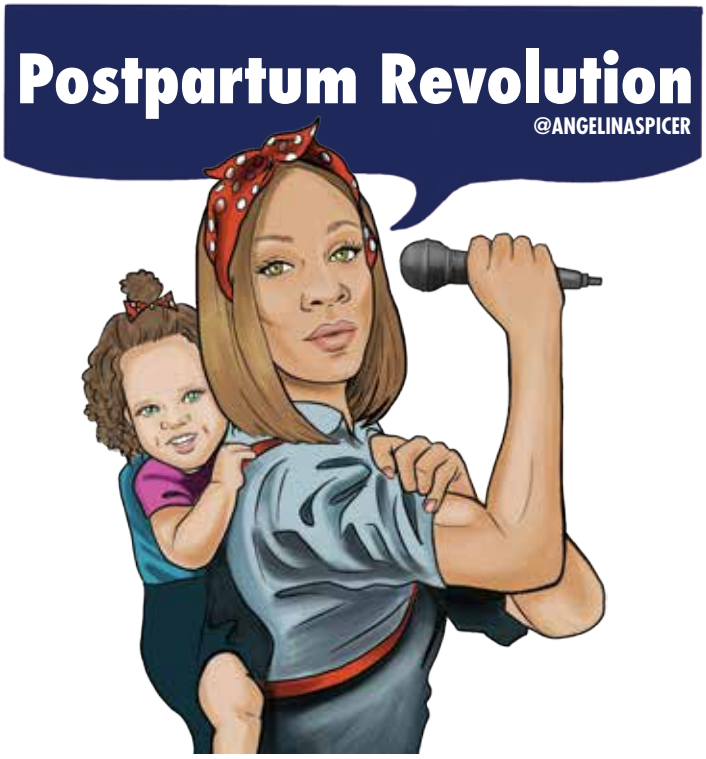

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Molly Fraust-Wylie

NICU Family Program Manager at BIDMC, Board Advisor Project Sweet Peas, Chair of NeoQIC Family Advisory Leadership Committee

NICU Child: Max

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Jennifer Johnson

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Comparison of Occupational Therapy and Osteopathic Manipulative Treatment in Neonatal Intensive Care Units

Saba Saleem BS, Kristina Burger BS, Brenda Takata OTR/L, Claire Oosterbaan BS, Blake Zufall BS

"For this discussion, we will focus on the use of Occupational Therapy (OT) and Osteopathic Manipulative Treatment (OMT) for improving breast or bottle feeding, promoting weight gain, reducing reflux and jaundice, regulating body temperature, achieving developmental milestones, correcting plagiocephaly, and reducing the length of stay of premature babies in the NICU."

Introduction

Premature babies are those born before 37 weeks gestation and can be further characterized as late preterm (34-37 weeks), moderate preterm (32-34 weeks), very preterm (28-32 weeks), and extremely preterm (less than 28 weeks) (4). Due to their smaller size and low birthweight (less than 2,500 grams or 5 lbs. 8 oz), these babies experience complications such as difficulty feeding, hypothermia, anemia, hypoglycemia, apnea, and respiratory distress from surfactant deficiency, infection, necrotizing enterocolitis, patent ductus arteriosus, retinopathy, and increased risk of intraventricular hemorrhage (1,2). For this discussion, we will focus on the use of Occupational Therapy (OT) and Osteopathic Manipulative Treatment (OMT) for improving breast or bottle feeding, promoting weight gain, reducing reflux and jaundice, regulating body temperature, achieving developmental milestones, correcting plagiocephaly, and reducing the length of stay of premature babies in the NICU. Many premature infants born before 35 weeks gestation have oral feeding difficulties and cannot latch properly, which makes it harder for them to gain weight (2). A low birth weight contributes to 60 to 80% of all neonatal deaths due to increased susceptibility to infection, hypothermia, and hypoxemia (3, 21). According to guidelines set by the *American Academy of Pediatrics*, the three major physiologic criteria for hospital discharge of preterm infants are autonomous oral feeding that results in good weight gain, maintenance of appropriate body temperature in a home environment, and mature respiratory control for sufficient oxygenation (5). Thus, these clinical indicators allow us to assess OT and OMT's effectiveness in achieving these criteria and supporting the development of preterm infants.

Occupational Therapy

Occupational therapists working in the NICU have the unique opportunity to provide habilitation to a fragile patient population. The occupational therapy objectives are to make proactive changes to the environment to promote healthy development and optimal growth, help organize behaviors, and foster trust and attachment with the caregiver (60, 61). To accomplish these goals, *The American Journal of Occupational Therapy* states that "knowledge of neonatal neurodevelopment, neurobehavioral organization, the musculoskeletal system, and advanced age-appropriate feeding practices and techniques is essential" (6).

"OT interventions enhance growth by helping premature infants acquire developmental skills, such as feeding at the breast or bottle. Each intervention also supports calm and organized behavior for improved sleep, which leads to weight gain in these patients."

OT interventions enhance growth by helping premature infants acquire developmental skills, such as feeding at the breast or bottle. Each intervention also supports calm and organized behavior for improved sleep, which leads to weight gain in these patients. Feeding interventions emphasize positive experiences to increase dietary intake and enhance the infant's suck, swallow, and breathing coordination. The goal is for them to receive full oral feeds via breast or bottle and be discharged home (22). In order to monitor this progress, the day-to-day assessment examines the infant's muscle tone, reflexes, behavioral responses, and positive feeding experiences. Parent education is provided during all these activities as well. Techniques commonly used by occupational therapists include infant touch and massage, myofascial release, and assessment of feeding skills with a focus on caregiver education (23). Occupational therapists also use neurodevelopmental treatment to enhance proper positioning if the baby has thumb adduction due to increased tone or club feet. For these issues, soft splints are recommended during the NICU stay, and an orthopedics referral is given at discharge.

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Lastly, OT encourages the parents of high-risk infants to engage in kangaroo care. This technique promotes breastfeeding, pain management, physiological regulation, parental self-efficacy, and bonding (24).

"Lastly, OT encourages the parents of high-risk infants to engage in kangaroo care. This technique promotes breastfeeding, pain management, physiological regulation, parental self-efficacy, and bonding (24)."

Neonatal Massage

Occupational therapists use neonatal massage to enhance the parasympathetic nervous system, which improves circulation and digestion. By increasing vagal activity and gastric motility, infant massage helps promote weight gain (26). It also stimulates lymphatic circulation to boost immune function, regulates sleep-wake cycles to increase alertness, provides neuroprotection, and decreases stress hormones to improve parent-infant attachment. Educating caregivers about performing infant massage when the baby is stable (weight above 1500 grams) improves their confidence and encourages more direct participation in the neonate's care. Overall, this technique helps decrease the length of stay in the NICU (23, 25). In order to perform a neonatal massage, different motions can be utilized. The most common motion is gliding, which relaxes and stretches the muscles. It is performed by keeping the fingers together and gliding the hand down along the body's or limb's span while the palmar side maintains contact. Another motion is kneading, using the finger pads to apply firm strokes to the area. Both hands act similarly to kneading dough (25, 27). Contraindications to neonatal massage include infection, bleeding, skin disorders, autonomic medical instability, and fractured bones (26). Sick preterm infants, such as those suffering from necrotizing enterocolitis, often have poor tolerance to external stimulation and require minimal handling care. It is imperative to avoid fluctuations in blood pressure and unsynchronized breathing with a ventilator that can be induced by handling (26).

"Sick preterm infants, such as those suffering from necrotizing enterocolitis, often have poor tolerance to external stimulation and require minimal handling care. It is imperative to avoid fluctuations in blood pressure and unsynchronized breathing with a ventilator that can be induced by handling (26)."

Figure 1: Neonatal massage depicting the gliding motion. Source: Emanate Health Queen of the Valley Hospital, NICU

Myofascial Release

An additional practice beneficial for babies in the NICU is myofascial release (MFR). Occupational therapists can use myofascial release with additional, specialized training. This technique utilizes fascia, the connective tissue that forms a continuous three-dimensional web throughout the body, to enhance function and support. Fascia envelops every muscle, nerve, blood vessel, and organ (28). Premature infants tend to overuse muscles due to poor positioning, which can develop tight fascia that further worsens their posture. MFR aims to increase tone and range of motion and decrease asymmetry and tenderness due to irritability. In order to perform this hands-on technique, the restriction is identified, and gentle pressure is slowly applied in that direction to lengthen the fascia. The stretch is held until a release is felt, and then there is a reassessment of the tissue's mobility. The goal of stretching fascia is to break down abnormal collagenous crosslinks and allow relaxation by reducing molecular colloidal friction drag. Contraindications to MFR are hypotonia, systemic or local infection, open wounds, or if the neonate is febrile. (15, 16, 29).

"Occupational therapists can use myofascial release with additional, specialized training."

Figure 2a: Assessment of shoulder to examine tone and identify the restrictive barrier, shown in a superior direction. Figure 2b: Treatment of shoulder, using indirect MFR to apply a gentle pressure inferiorly into the position of ease. Source: Emanate Health Queen of the Valley Hospital, NICU

Neurodevelopmental Treatment

Neurodevelopmental treatment reduces abnormal postures and movement patterns in premature infants. The goal is to encourage them to normalize their posture and improve sensory stimulation (32, 33). Treatment is based on the concept that muscle tone is changeable and dictates posture and coordination (31). A common issue for neonates is that they demonstrate thumb adduction and maintain this position due to increased tone. Occupational therapists will passively re-position the thumb and improve overall movement. Soft thumb splints can support the desired position when the baby is sleeping (31).

Another problem that can occur for premature infants is club feet. In treating this, the first step is to assess ankle movement to see if it can be brought to the midline. Placing the ankle and hip at midline through a passive range of motion promotes eversion, and this position should be maintained when the baby is at rest. If the therapist cannot bring the ankle to the midline, re-positioning with kinesiotape may improve circulation (31, 32). For both scenarios, follow-up care with Orthopedics is required. However, caregiver education is the most important factor in the treatment plan for thumb adduction and club feet. It is essential to teach parents about proper positioning, home exercise plans, and how to provide a passive range of motion throughout the day, depending on the baby's adjusted age (30, 31).

Kangaroo Care

Kangaroo Mother Care is a technique in which the baby is positioned in skin-to-skin contact with the caregiver's chest for variable periods. Occupational therapists utilize this technique in the NICU to help promote breastfeeding for premature infants. Furthermore, skin-to-skin care significantly increases the mother's milk production and is associated with a longer duration of breastfeeding (24). It has also reduced maternal stress, anxiety, and postpartum depression. This is significant because 28 to 51% of parents with babies admitted to the NICU reported symptoms of acute stress and post-traumatic stress disorder (7). Kangaroo care increases parental satisfaction and improves sleep organization and quiet sleep duration for neonates. It has also decreased pain perception during procedures, such as endotracheal tube placement or other forms of life-saving therapy (24).

Figure 3: Mother utilizing "kangaroo care" or skin-to-skin contact with the neonate. Source: Emanate Health Queen of the Valley Hospital, NICU

In summary, occupational therapy for premature infants includes the following modalities: neonatal massage, myofascial release, neurodevelopmental treatment, skin-to-skin, and most impor-

tantly, caregiver education. These treatments focus on weight gain, improving oral feeding, decreasing hospital length of stay, enhancing neuroprotection, and promoting parental bonding. Parent education for developmental care protocols is emphasized because it builds their confidence when interacting with their infant.

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Osteopathic Manipulative Treatment

Osteopathic physicians are trained to treat musculoskeletal disorders by using manual contact to correct structural imbalances, improve circulation, and relieve pain caused by muscle, bone, or tendon misalignment (8). Using this hands-on approach, Osteopathic Manipulative Medicine (OMM) promotes the body's intrinsic ability for self-healing. Osteopathic Manipulative Treatment (OMT) uses various forms of neuromuscular stimulation, ranging from passive massage to applying an active force to manipulate the muscles, soft tissue, and joints (8). The objectives of OMT for premature infants during the first few days of life are to gain weight, improve latching and physiological function, reduce reflux and constipation, increase range of motion, treat jaundice, and achieve homeostasis, such as temperature regulation if it has been altered by somatic dysfunction (2,9,19, 64). OMT serves as complementary medicine to help reduce the newborns' length of stay in the NICU (10). As these hospitalized infants reach term gestational age, OMT can also assist in reaching developmental milestones or improve cosmetic appearance for positional plagiocephaly and torticollis (9). The immediate indications of OMT's success are macroscopic changes to the affected area discovered on re-examination (11). More gradual indications of success, such as weight gain or improved oral feeding, may occur 1-2 weeks after treatment (2,9).

OMT begins with the osteopathic structural exam, which helps the physician identify somatic dysfunction (11). Somatic dysfunction is "restriction in joints, muscles, and fascia that can affect blood supply, lymph flow, and nervous system function" (11). It is associated with abnormal palpatory findings, known as tissue texture changes, asymmetry, altered range of motion, and tenderness (TART). Acute somatic dysfunction is characterized by the affected area's warm, erythematous, boggy tissue. Restriction can cause sharp pain and asymmetry without anatomic compensation. Chronic somatic dysfunction can cause tissue to be cool, dry, or ropey. Dull pain and asymmetry with anatomic compensation are characteristic of this dysfunction (11). OMT techniques used for premature infants focus on improving acute somatic dysfunction.

Due to the delicate nature of preterm infants in NICU, the techniques utilized are often indirect and passive. An indirect technique moves the restriction into a position of ease, and a passive technique does not involve the patient in the treatment. Instead, the physician manipulates the dysfunction without incorporating patient assistance (12). Commonly used indirect and passive techniques in this population are soft tissue, myofascial release (MFR), and balanced ligamentous tension (BLT) (9,18). These techniques have been shown to improve oxygenation, achieve developmental milestones, and reduce symptoms of jaundice, GERD, and torticollis (17, 35, 37, 38, 39, 43). These gentle techniques can be combined with Cranial OMM techniques, such as v-spread and condylar decompression, to treat infants with positional plagiocephaly and latching issues, respectively (44,45, 46, 48).

Soft Tissue

The soft tissue of the thoracic spine is similar to the gliding motion used in neonatal massage by occupational therapists. While the patient lies prone, the osteopathic physician will first assess the paraspinal musculature for TART changes, indicating somatic dysfunction. Upon identifying the somatic dysfunction, the physician can employ a unilateral prone pressure to the area, known as perpendicular stretching. This is done by placing the thenar eminence lateral to the spinous processes of the vertebrae and contacting the medial border of the injured paraspinal tissue. The other hand is placed on top for additional support. Then, anterior and lateral pressure is applied to induce perpendicular stretch. This force can be a sustained pressure until tissue release is noted or rhythmic kneading for a few seconds at a time (41).

"While the patient lies prone, the osteopathic physician will first assess the paraspinal musculature for TART changes, indicating somatic dysfunction. Upon identifying the somatic dysfunction, the physician can employ a unilateral prone pressure to the area, known as perpendicular stretching."

Almost all premature infants born less than 35 weeks gestation will have elevated total serum and plasma bilirubin levels. Most neonates experience physiologic jaundice in the first few days of life, which is typically harmless. However, jaundice seen in premature infants can be pathologic due to higher bilirubin levels. Hyperbilirubinemia is treated with phototherapy or exchange transfusions. The major risks are acute bilirubin encephalopathy or kernicterus (42, 43). One study found that infant massage in full-term babies significantly lowered total serum bilirubin compared to infants who received standard care (43). This may be due to massage therapy, and soft tissue techniques increasing parasympathetic tone through vagal nerve stimulation and increased bowel movement frequency. This allows neonates to pass greater amounts of bilirubin-containing meconium (34, 43). Neonatal massage and soft tissue also increase blood flow throughout the intestines, further improving waste product excretion (34, 39, 43).

Figure 4: Soft tissue of the thoracic spine demonstrating the perpendicular stretch motion. Source: Claire Oosterbaan, MS-4

Myofascial Release

MFR is a technique provided by both occupational therapists and osteopathic physicians. As discussed previously, MFR is a gentle form of stretching and compression that reduces fascial restrictions and uneven tightness (16). For infants, these restrictions are often linked to in-utero position or if induction of labor, C-section, forceps, or vacuum-assisted delivery occurred (15). MFR can help infants with respiratory distress by releasing the fascia around the diaphragm. This allows for improved oxygenation of the blood supply. This diaphragmatic fascial restriction can be caused by the baby's rotational twist in the birth canal (17). MFR can also help infants reach developmental milestones, such as improved head control and sitting up without support. This can be done by releasing restrictions around the sternocleidomastoid muscle (SCM), which can occur from a twisted neck in-utero or gastroesophageal reflux. It is known as acquired torticollis if this presentation occurs after birth (40). Releasing the shortened muscle helps improve the infant's head posture and cervical spine mobility and supports symmetrical cranial bone growth (17).

"Releasing the shortened muscle helps improve the infant's head posture and cervical spine mobility and supports symmetrical cranial bone growth (17)."

Balanced Ligamentous Tension

Balanced Ligamentous Tension (BLT) is based on the theory that ligaments provide both proprioception and an anatomical framework that guides the muscle response for joint positioning and subsequent motion (36). BLT seeks a "balance point" for the joint or somatic dysfunction by inducing the lowest possible strain to the affected area. This allows the body to restore function to the injured tissue (18). The first step is disengagement, which means the physician applies either compression or decompression to disengage the somatic dysfunction. The next step is to find the balance point by moving the somatic dysfunction through the range of motion in every direction to discover its restrictions. The third step is to monitor the affected area once it is brought to the balance point. The last step is tissue release, where temperature and joint mobility increase at the somatic dysfunction's site to indicate healing (18).

BLT can treat various conditions, but the two we will focus on are congenital muscular torticollis and reflux. Congenital torticollis is present at birth and commonly associated with SCM fibrosis or birth defects such as Klippel-Feil Syndrome (40). A case study published by the *International Journal of Osteopathic Medicine* discovered that BLT could potentially treat congenital muscular torticollis rather than resorting to invasive surgery (38). Similarly, a study in Italy investigated if using indirect OMT procedures, such as BLT, on premature infants in the NICU would decrease either the incidence of gastrointestinal dysfunction or length of stay (37). Gastrointestinal dysfunction incidence was defined as the number of episodes of vomiting, regurgitation, and gastric reflux and the frequency of stooling and enema administration per patient care encounter (37). They discovered that premature infants who received BLT had significantly fewer episodes of gastrointestinal dysfunction and days in the NICU compared to the routine care group. The average number of daily gut symptoms for the OMT group was 28, and the average length of stay was 28 days. For the routine care group, the average number of daily gut symptoms was 60, and the average length of stay was 55 days (37).

Figure 5: OMT for torticollis in a pediatric patient. Techniques used can be a combination of MFR and BLT. Source: Claire Oosterbaan, MS-4

Paraspinal Inhibition

Paraspinal inhibition is a technique that aims to restore the imbalance between the sympathetic and parasympathetic nervous systems. It utilizes the relationship between the thoracic paravertebral musculature and its encompassed sympathetic ganglia (62). While the patient is supine, the physician applies intermittent pressure to the lower thoracic and lumbar spine's paravertebral muscles by flexing their metacarpophalangeal joints and approximating the palms and finger pads. This position is held until warmth and softening are appreciated along the entire lower thoracic and lumbar musculature and surrounding fascia. This treatment affects the sympathetic ganglia within the targeted paraspinal region, leading to medullary-induced inhibition of sympathetic outflow and allowing the parasympathetic function to predominate (63). This treatment was initially used to treat and prevent postoperative ileus in adults by increasing colonic transit time and quickening the passage of stool (62).

"Paraspinal inhibition is a technique that aims to restore the imbalance between the sympathetic and parasympathetic nervous systems. It utilizes the relationship between the thoracic paravertebral musculature and its encompassed sympathetic ganglia (62)."

Healthy full-term neonates commonly pass their first stool within 24-48 hours after birth; however, premature infants often take several days. Functional ileus of prematurity is the delayed passage of meconium that occurs in very low birth weight (VLBW) infants. This predisposes them to intestinal perforation with an increased risk of morbidity and mortality (64). Delayed passage of meconium can be a sign of diseases such as cystic fibrosis or Hirschsprung's disease, or it can be caused by medications, anorectal malformations, and maternal conditions like gestational diabetes (65). In order to use paraspinal inhibition for heightened sympathetic activity in premature infants, the technique is modified with a gentle, static pincer grasp to accommodate for their smaller paravertebral muscular and overall size (66). Although further research is needed to investigate this treatment for the ileus of prematurity, clinical anecdotal evidence suggests that modified paraspinal inhibition can hasten the passage of meconium and flatus in premature infants. This serves to decrease the risk of perforation and relieve neonatal abdominal discomfort.

"In order to use paraspinal inhibition for heightened sympathetic activity in premature infants, the technique is modified with a gentle, static pincer grasp to accommodate for their smaller paravertebral muscular and overall size (66)."

Figure 6: Paraspinal inhibition in a pediatric patient. Source: Claire Oosterbaan, MS-4

Cranial OMM: V-spread

Cranial OMM is based on the theory that cranial sutures are mobile in relation to the skull (49, 50). Just as TART changes indicate somatic dysfunction in the body, the cranial rhythmic impulse (CRI) provides information on the dysfunction of the primary respiratory mechanism (PRM). The PRM is an interrelated unit of the cranial bones, sacrum, dural membrane, and cerebrospinal fluid (49, 50, 51). The normal rate of movement for CRI is 8-14 times per minute. This is felt on palpation as widening and narrowing of the skull by the osteopathic physician (49, 50). Known factors that increase CRI include vigorous exercise, fever, and OMT, while those that decrease CRI are stress, chronic infection, fatigue, and depression. Various cranial strain patterns are also separated into physiologic and pathologic categories (13). The osteopathic physician assesses these patterns through palpatory findings, where the relationship between the sphenoid and occiput and their rotation around different planes is appreciated (49, 50). Many Cranial OMM techniques that target specific strain patterns or decreased CRI exist. A simple yet effective and commonly used one is V-spread, which aims to separate restricted or impacted cranial sutures. It is performed with the patient supine and the physician seated at the head of the table. The physician places two fingers on each side of the restricted suture to create a V-shape. Then, a distracting force and separating traction are applied and held until a release is felt. This manipulation spreads the restricted suture and allows decompression and realignment (50, 51).

Positional, or deformational, plagiocephaly is when an infant has a flattened head shape due to fusion of the coronal suture, which causes the forehead and brow to stop growing (52, 54). Fusion of this suture and subsequent flattening occurs when there is repeated pressure on one part of the head, such as when babies sleep supine in one position. The supine sleeping position is encouraged because it decreases the risk of sudden infant death syndrome (SIDS); however, the tradeoff is an increased risk of plagiocephaly for premature infants who spend extended periods in a fixed position while they recover in the NICU (9, 53). Other common causes of positional plagiocephaly are congenital torticollis and the infant's position in the womb being affected by a multiple gestation pregnancy or if the mother has a small uterus (53, 54). Treatment for plagiocephaly includes exercis-

es, varying sleep positions, and wearing a corrective helmet to direct the regrowth of the baby's skull. However, to receive the most benefit from the helmet, most babies need to wear it for 23 hours a day for 3-6 months (14, 53). For parents concerned about a helmet, the V-spread technique can be used as a complementary or alternate therapy, depending on the degree of flattening. One study found that infants with nonsynostotic occipital plagiocephaly (NSP) significantly decreased cranial vault asymmetry, skull base asymmetry, and transcranial vault asymmetry. This was after receiving Cranial OMT and standard positioning recommendations for eight weeks (48)

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Figure 7: V-spread in a pediatric patient. This technique is typically used for positional plagiocephaly in an infant. Source: Claire Oosterbaan, MS-4

"One study found that infants with nonsynostotic occipital plagiocephaly (NSP) significantly decreased cranial vault asymmetry, skull base asymmetry, and transcranial vault asymmetry."

Cranial OMM: Condylar Decompression

Another type of Cranial OMM technique is condylar decompression. The purpose of this technique is to decompress the occipital condyles and balance tension at the hypoglossal canal to normalize cranial nerve XII function (49, 50, 51). This technique is performed with the patient supine and the physician seated at the head of the table. The physician's forearms should be on the table to establish a fulcrum while the patient's head rests in their palms. The physician uses their index and middle fingers to contact the condylar processes on both sides and then applies a gentle cephalad and lateral traction. This traction is maintained until a release is felt (50, 51).

"One study found that infants who received Cranial OMM, such as condylar decompression, in addition to the mother receiving regular lactation consultations, had better nipple feeding and a higher LATCH score than the control (46, 47). "

It is well-known that premature infants who receive breast milk have a shorter length of stay in the NICU and decreased risk of necrotizing enterocolitis, sepsis, feed intolerance, lung disease, retinopathy of prematurity, neurocognitive delays, and readmission rates (55). However, almost 50% of mothers stop breastfeeding in the first month, even with lactation support, due to biomechanical issues (46, 56, 57). It is reported that the ability to swallow develops at 13 weeks gestation and the ability to suck at 18 weeks gestation. However, the suck and swallow coordination does not occur until 32-34 weeks of gestational age (20). Thus, premature infants born before 35 weeks' gestation struggle with nipple feeding, which requires coordinated suck and swallow (2, 56). This suck and swallow coordination depends on cranial nerves IX, X, and XII for intrinsic muscles of the tongue to function properly (56). One study found that infants who received Cranial OMM, such as condylar decompression, in addition to the mother receiving regular lactation consultations, had better nipple feeding and a higher LATCH score than the control (46, 47).

Figure 8: Condylar decompression in a pediatric patient. This technique is typically used for improved latching in an infant. Source: Claire Oosterbaan, MS-4

Osteopathic manipulative treatment for premature infants includes the following modalities: soft tissue, MFR, BLT, paraspinal inhibition, V-spread, and condylar decompression. These techniques have been shown to help reduce jaundice and GERD, induce passage of meconium, reach developmental milestones, correct torticollis, and plagiocephaly, and improve oxygenation and latching. Osteopathic physicians use palpation to identify somatic dysfunctions and manipulation to improve physiologic function. OMT can be offered as a less invasive and cost-beneficial adjunct to the standard of care for these conditions.

"Osteopathic physicians use palpation to identify somatic dysfunctions and manipulation to improve physiologic function. OMT can be offered as a less invasive and cost-beneficial adjunct to the standard of care for these conditions."

Discussion

Premature infants often have stressful and adverse experiences in the NICU. They are exposed to many procedures, some very painful, and various stimuli (bright light, noise, and temperature fluctuations) heighten their sympathetic nervous system (34). Additionally, the parasympathetic nervous system remains underdeveloped since its completion does not occur until the third trimester. However, research studies from the last decade demonstrate that gentle touch can reduce the amount of cortisol produced and dampen sympathetic tone in premature infants (34). Occupational therapy and osteopathic manipulative treatment capitalize on this knowledge by employing gentle techniques, such as MFR, neonatal massage in OT, and soft tissue and paraspinal inhibition in OMT to increase vagal activity leading to parasympathetic stimulation. These techniques increase gastric motility and effectively treat gastroesophageal reflux and jaundice (34, 43). They also help improve immune function, oral feeding, and range of motion, leading to weight gain and a faster NICU discharge (58).

Occupational therapy differs from OMT because it emphasizes neurodevelopmental treatment, kangaroo care, and caregiver involvement. Family bonding and parental participation in this social component of the infant's care leads to better outcomes for the neonate and mother. In contrast, premature infants who experience a lack of maternal touch have higher levels of negative emotions (34). One study found that the negative consequences of an epigenetic change (methylation of serotonin transporter gene, SLC6A4) were intensified during NICU-related stress for very preterm newborns (59). Therefore, there is a need for future studies to investigate how the absence of parents due to hospital policy changes in response to the COVID-19 pandemic affected the days to discharge for preterm infants.

Osteopathic manipulative treatment focuses on correcting somatic dysfunction found during the physical assessment. The techniques specific to OMT include balanced ligamentous tension, paraspinal inhibition, V-spread, and condylar decompression. The treatment plan does not center around parental involvement to the same degree that it does for occupational therapy. Instead, there is a growing emphasis on incorporating OMT as adjuvant therapy into the standard of care for the NICU. Osteopathic physicians who perform OMT should coordinate with specialists, such as lactation consultants or physical therapists, to improve biomechanical sucking difficulties and positional plagiocephaly (34, 46).

Furthermore, a systemic review with meta-analysis demonstrated OMT as a safety procedure that could potentially reduce the number of days of hospitalization for premature infants (34). Although several studies have shown the positive influences of OMT, it is also important to note their limitations and the need for further research. For instance, the case study that suggested BLT may be more effective than surgery in treating congenital muscular torticollis admitted that investigating torticollis patients without abnormal cranial strain patterns is also warranted (38). This comparison would help analyze the overall validity. Similarly, the study that examined the use of Cranial OMT for nonsynostotic occipital plagiocephaly used a small sample size (*n=12*), which affects its reliability (48).

"While many techniques of OT and OMT are similar, the main differences are that OT places a more significant emphasis on social components of parental education and bonding as part of the therapeutic approach, while OMT relies more on the physical technique to address somatic dysfunction and restore health."

Conclusion

The occupational therapy and osteopathic manipulation treatment objectives are similar in that they both address dysfunction to promote healing and redirect the body towards homeostasis. In the fragile population of premature newborns, the techniques of neonatal massage, MFR, Kangaroo Care, soft tissue, BLT, paraspinal inhibition, V-spread, and condylar decompression all provide a noninvasive and gentle treatment option. While many techniques of OT and OMT are similar, the main differences are that OT places a more significant emphasis on social components of parental education and bonding as part of the therapeutic approach, while OMT relies more on the physical technique to address somatic dysfunction and restore health.

A common core tenet between both approaches is the importance of touch. Whether the soft tissue technique of OMT or the neonatal massage by OT, these treatments rely on a therapeutic touch via techniques such as gliding or kneading to promote healing. Furthermore, techniques like Kangaroo Care are also highly dependent on touch as its benefits are seen with skin-to-skin contact.

These techniques have shown numerous benefits cultivating with the shortening of NICU stays for newborns. However, they are

still underutilized in most settings. In order to move forward, steps need to be taken to encourage these treatment modalities in the NICU and all newborn physical exams when indicated, as they are quick, noninvasive methods that are proven to prevent, treat, and improve patient outcomes.

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Corresponding Author

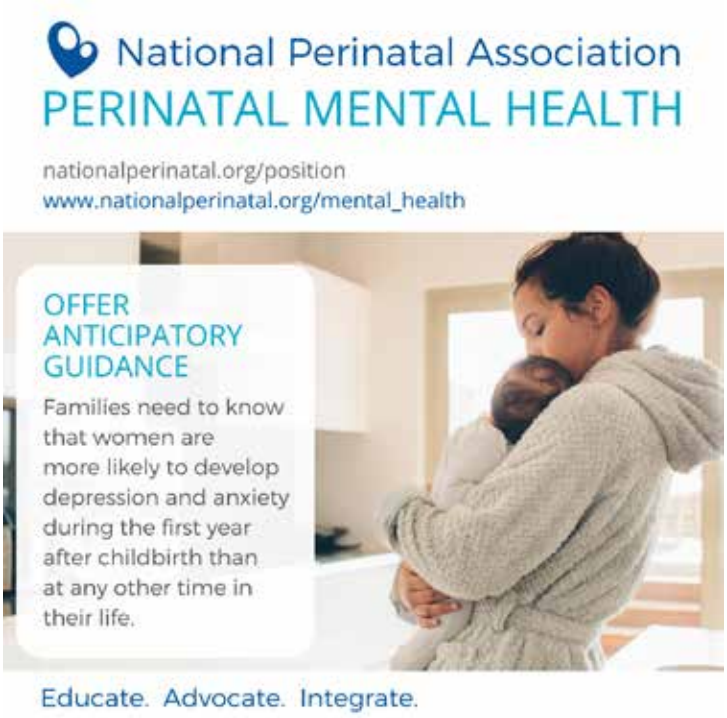
Saba Saleem BS
DO, MPH Candidate 2023
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Johns Hopkins Bloomberg School of Public Health
Pomona, CA
USA
Email: saba.saleem@westernu.edu
Phone: (916) 337-7819

Kristina Burger BS
DO Candidate 2023
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Pomona, CA
USA

Brenda Takata OTR/L
Department of Occupational Therapy
Emanate Health Queen of the Valley Hospital
West Covina, CA
USA

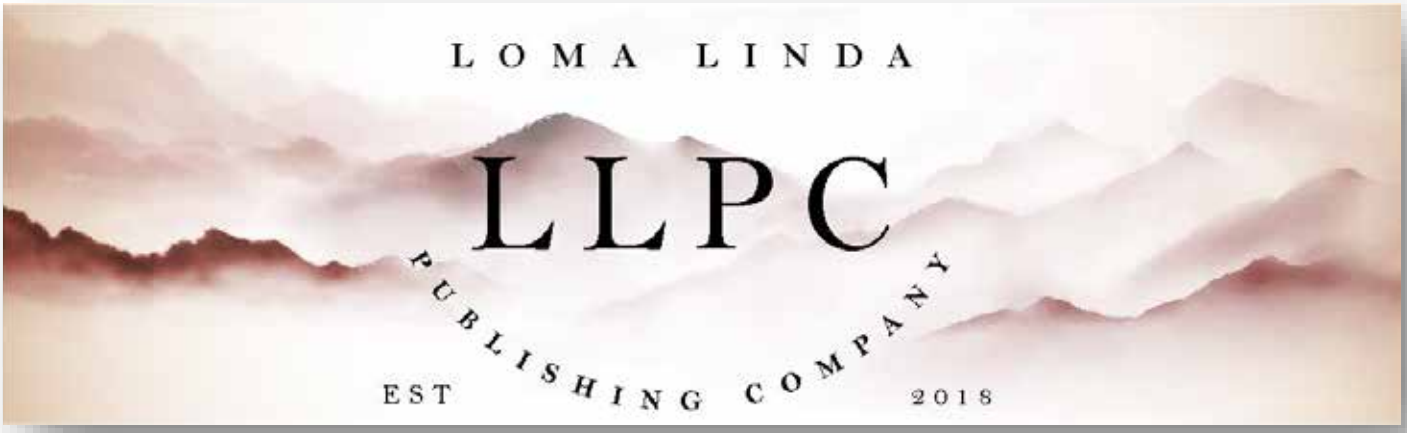
Claire Oosterbaan BS
DO Candidate 2023
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Pomona, CA
USA

Blake Zufall BS
DO Candidate 2023
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Pomona, CA
USA



https://drtomharris.com/

Dr. Thomas R. Harris Memorial
Wednesday, September 21, 2022,
8 pm EST on Zoom



COPING WITH COVID-19

KEEP PATIENTS UP-TO-DATE WITH CHANGES IN POLICIES SO THEY KNOW WHAT TO EXPECT. LISTEN TO THEIR CONCERNS.

Provide culturally-informed and respectful care.

TELL PARENTS HOW YOU WILL KEEP THEM AND THEIR BABIES SAFE DURING THEIR NICU STAY.

Use technology like video chat apps to include family members who can't visit the NICU.

myNICUnetwork.org

and

National Perinatal Association
NICU Parent Network

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

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."

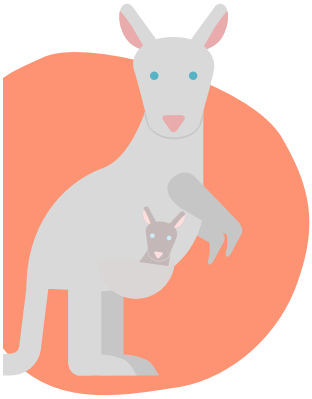
10 HELP US HEAL

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

ONCE UPON A PREEMIE ACADEMY

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+ Deidre McDaniel, MSW, LCSW
Health Equity Resources and Strategies

+ Dalia Feltman, MD, MA, FAAP
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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

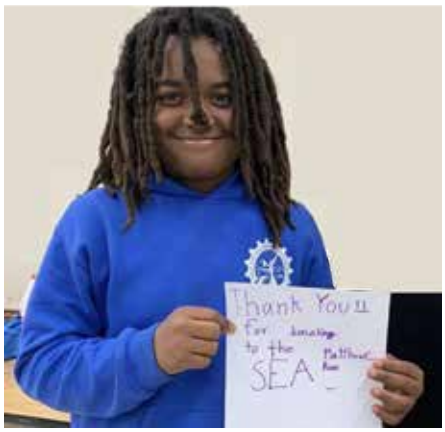
Thirteen-year-old Emily Rose Shane was tragically murdered on April 3, 2010 on Pacific Coast Highway in Malibu, CA. Our foundation exists to honor her memory.

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.

"Prehab" for Preemies: Thoughts on Human Milk for the NICU Patient

Terry S. Johnson, APN, NNP-BC, ASPPS, MN

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.

"For millennia women have labored, delivered, and breastfed their term babies. Over the past sixty years, we have seen the emergence of the disciplines of reproductive technology, high-risk perinatology, and neonatal intensive care. "

This August, the theme for National Breastfeeding Month is ***Together We Can Do Great Things***. The focus is to celebrate the power and impact of our collective efforts to ensure that all newborns, especially preterm and critically ill infants, have access to their mother's milk and optimally to an exclusive human milk diet IEHMD).

For millennia women have labored, delivered, and breastfed their term babies. Over the past sixty years, we have seen the emergence of the disciplines of reproductive technology, high-risk perinatology, and neonatal intensive care. These clinical specialties provide the science, technology, and professional personnel to support the survival of the most extremely low birth weight (ELBW) premature infants and term infants with life-threatening morbidities.

"Such births can result in interruptions and difficulties in establishing and maintaining the mother's lactation efforts to provide her milk for her infant. It is the role of the entire health care team to support the mother's efforts to provide her milk for her infant."

Such births can result in interruptions and difficulties in establishing and maintaining the mother's lactation efforts to provide her milk for her infant. It is the role of the entire health care team to support the mother's efforts to provide her milk for her infant. The American Academy of Pediatrics (2022) advocates exclusive breastfeeding for the first six months of life. For very low birth weight infants (≤ 1500 grams), the ***mother's expressed milk should be considered medical therapy, with higher doses associated with maximal health benefits.*** The American Academy of Pediatrics (AAP) further recommends pasteurized donor human milk when a mother's milk is unavailable or is contraindicated. Fortification of mother's or donor milk with bovine or human milk-derived human milk fortifiers should be considered to optimize appropriate growth and development in infants with very low birth weight (VLBW). (1)

"Human milk is so much more than just food, and it does so much more than just provide for growth. Human milk is a biological substance that is part of an evolutionary process that begins early in gestation."

Human milk is so much more than just food, and it does so much more than just provide for growth. Human milk is a biological substance that is part of an evolutionary process that begins early in gestation. During the first six weeks of fetal development, a substance called womb milk provides some limited protein and immune system effects. It will be followed by the development of the placenta and amniotic fluid. After birth, the infant is exposed to colostrum and finally to the mother's own milk. (2)

Premature birth interrupts this critical process of gut development and maturation. Maternal and infant factors associated with preterm delivery further drives "dysbiosis," an associated inflammatory process in the infant's gut. (3) Literature supports that exposure to more than 100,000 components present in human milk, many of which are immune factors and anti-inflammatory, "affords survival benefit" for term and preterm infants (4). This co-adaptation of maternal physiology, breastmilk composition, and infant physiology merge to form what has been referenced as a "global immunologic organ" for the newborn infant. (5)

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Neonatologist and clinical researcher Dr. Mark Underwood has stated that "The growth and neuro-developmental needs of the evolutionarily new population of very premature infants are best met by the appropriate fortification of human milk." (6) Emerging evidence in the field of human milk science is compelling about the benefits of human milk in down-regulating inflammation and limiting the development of neonatal comorbidities. Three recent papers have identified aspects of the benefits of human milk feeding. This includes the "Mother-Breastmilk-Infant Triad" (7), "Human Milk as a "Biological System" (4), and the "Gut-Breast Axis" (8). These systems play a role in the development of the infant's microbiome, maturation of their immune system, limiting inflammation, and reducing the incidence of neonatal comorbidities. The comorbidities of prematurity include necrotizing enterocolitis, bronchopulmonary dysplasia, retinopathy of prematurity, and late-onset sepsis. They have been described in the literature as the "burdens of prematurity" (9) for the infant, family, medical, educational, and societal services.

"Emerging evidence in the field of human milk science is compelling about the benefits of human milk in down-regulating inflammation and limiting the development of neonatal comorbidities. Three recent papers have identified aspects of the benefits of human milk feeding. This includes the "Mother-Breastmilk-Infant Triad" (7), "Human Milk as a "Biological System" (4), and the "Gut-Breast Axis" (8)."

Another way to look at the role benefits of human milk diets for all infants, especially premature infants, relates to the term "prehab." Most of us employed in health care are familiar with the term "rehabilitation." It is defined as "the action of restoring something that has been damaged to its former condition." Initially, I read about the term in an interview with Tom Brady, currently quarterback of the Tampa Bay Buccaneers. Many sports fans know some basic things about his football career, but few know the breadth of his career accomplishments:

- He is 45 years old
- Has the highest winning percentage among quarterbacks
- Started 316 of 318 games
- Most regular season wins
- Seven times Super Bowl Champion
- Five times Super Bowl MVP
- Most wins in regular season play
- Lifetime leader in passing yards

He credits much of his football success to his commitment to "prehab." Not rehab. Prehab can be defined as a preventive mechanism to decrease the risk of injury and/or optimize your functional ability and quality of life. Prehab focuses on efforts to" decrease the burden on individuals and the healthcare system.

So I invite you this month to focus on breastfeeding and the use of breastmilk for our vulnerable Populations to remember the many benefits of human milk diets as a form of "prehab" in term infants. The American Academy of Pediatrics demonstrated reductions in Sudden Infant Death Syndrome (SIDS), otitis media, asthma, childhood obesity, Type 1 and Type 2 diabetes, leukemia, and other diseases. Similar reductions were noted in diabetes, gestational diabetes, hypertension, and breast and cervical cancer in the mothers who breastfed their infants. Premature infants who received an exclusive human milk diet demonstrated reductions in necrotizing enterocolitis, bronchopulmonary dysplasia, necrotizing enterocolitis, and late-onset sepsis.

"So let us move forward promoting and supporting breastfeeding for all infants. Let us work toward the goal of "pre-habing" our infants - term and preterm -from lifelong comorbidities that both restrict and potentially shorten their lives and limit their possibilities."

So let us move forward promoting and supporting breastfeeding for all infants. Let us work toward the goal of "pre-habing" our infants - term and preterm -from lifelong comorbidities that both restrict and potentially shorten their lives and limit their possibilities. The U.S. Breastfeeding Committee has a vision of healthy, thriving families and communities. However, the committee also reminds us that reaching that goal cannot be achieved by anyone or just by one organization. It happens with a daily effort by us all and by working together to make a change.(12) We at the National Perinatal Association look forward to celebrating all efforts in service to babies, families, and human milk feeding during August.

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

The author is Director of Education and Professional Development, Prolacta Bioscience

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Corresponding Author

Terry S. Johnson, APN, NNP-BC, ASPPS, MN
Director of Education and Professional Development, Prolacta Bioscience

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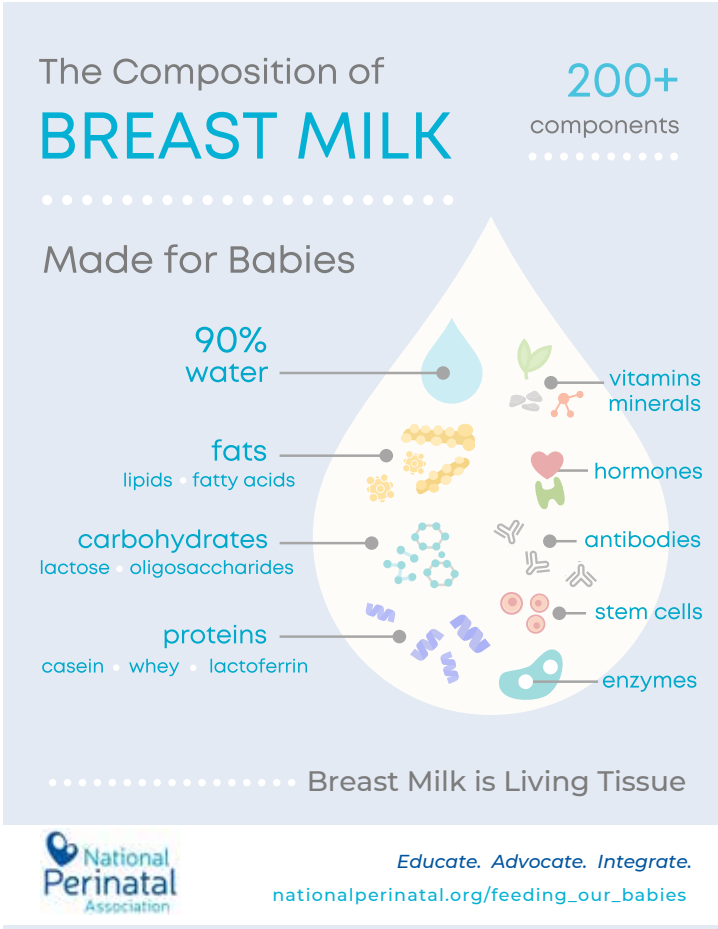

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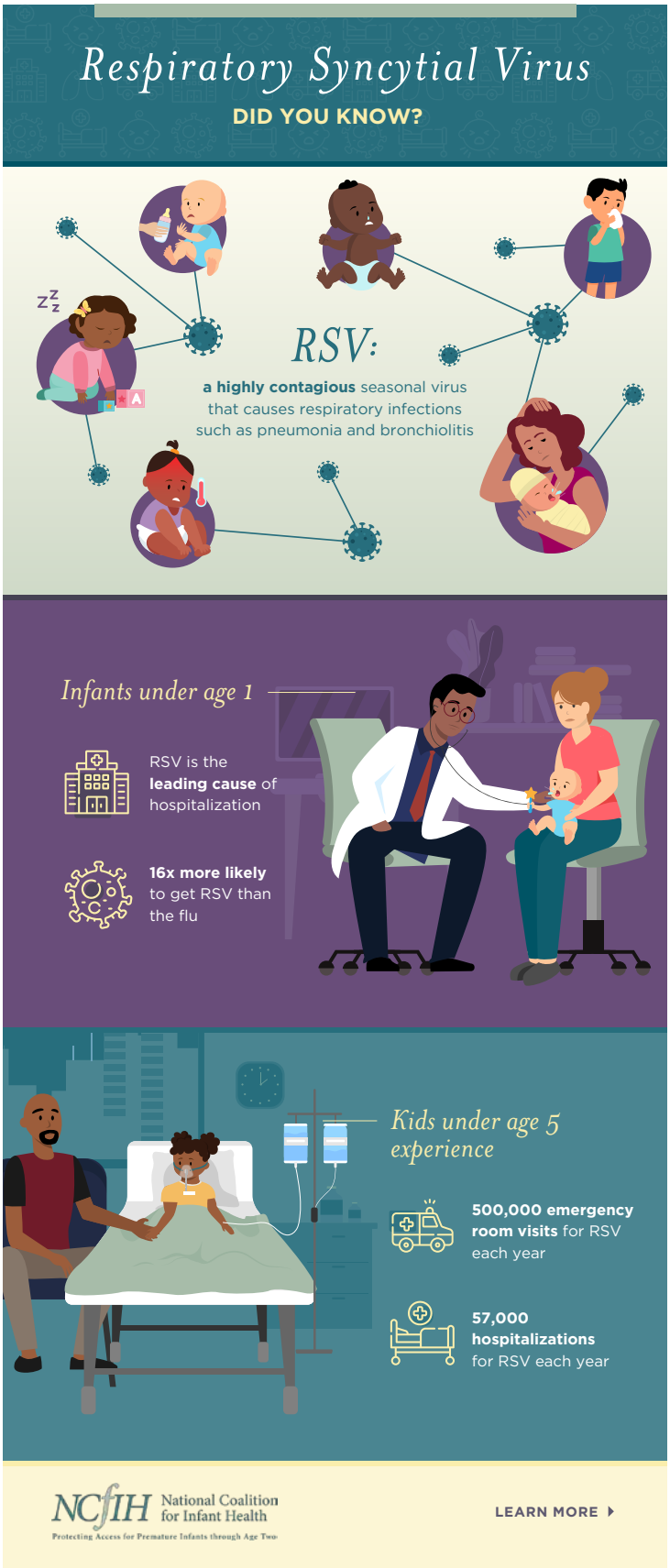
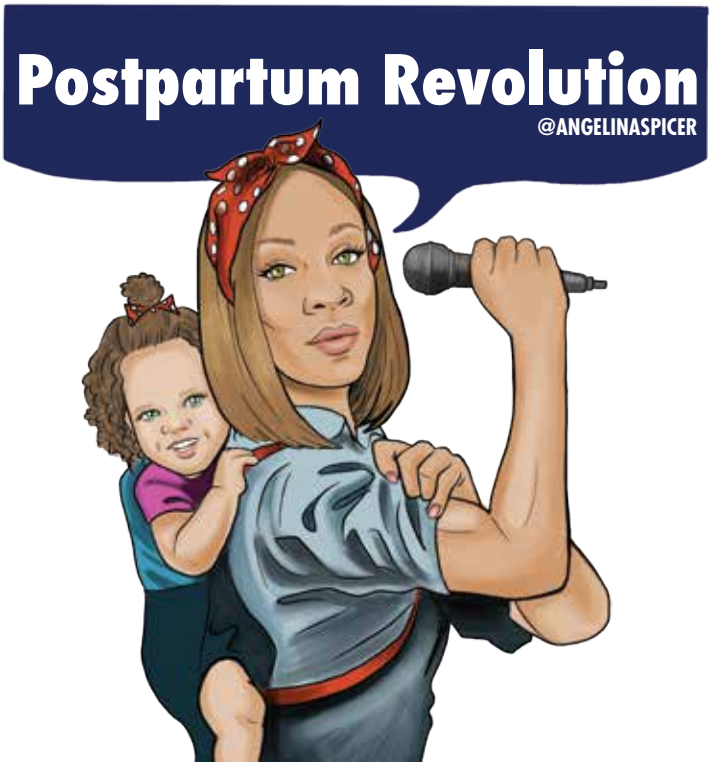


The Gap Baby: An RSV Story



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Peer Reviewed

The Biological Urgency of Families in NICU Based on our Understanding of Trauma

Mary Coughlin, MS, NNP, RNC-E

This is the beginning of a series of Webinars from the Family Centered Taskforce. In this first interview, Mary Coughlin, MS, NNP, RNC-E describes responding to " The Biological Urgency of Families in NICU Based on our Understanding of Trauma."

Mary Coughlin: We are talking about trauma-informed care and the role of the family in mitigating trauma experienced during the NICU stay. I disclose that I am the President of the Caring Essentials Collaborative. My learning objectives are to define family-centered care, describe trauma and trauma-informed care, and communicate the biological urgency of families in NICU based on our understanding of trauma. Patient and family-centered care is an approach to the planning, delivery, and the evaluation of healthcare based on mutually beneficial partnerships among and between healthcare providers, patients, and families. It emphasizes interactions that promote healing relationships. The idea of family-centered care is not new, but we continue to struggle with it. Its origins date back to the 1950s in British children's hospitals and became more prominent in the US in the 80s. It combines different interrelated principles, so its definition can vary.

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In recent evaluations and publications, we are starting to understand better the challenges of what constitutes family-centered care. In our discussion of trauma and trauma-informed care, I hope to raise awareness about the urgency to address these challenges and standardize family-centered care. In a recent paper, they looked at a lack of unifying metrics. Thus, to establish family-centered care as a proper standard connected to positive benefits for everyone, we need metrics that evaluate and demonstrate meeting this goal and the urgency to provide family-centered care. As I alluded to earlier, there are many variables in operationalizing family-centered care practices, here and abroad. As we move forward with this work, we must be mindful of racial, ethnic, and socioeconomic inequities in access to family-centered care.

"It is well known that childhood adversity is linked to mental and physical health outcomes throughout life. The prevalence of toxic stress and pediatric medical trauma and disease leads to financial costs and has social and educational implications. This makes prevention and early intervention crucial. "

This is quoted from Digerati and his co-authors: "the goals of family-centered care are about improving infant and family well-being, enhancing the ability of families to provide appropriate developmental care by including them as an integral part of the care team as essential caregivers, and successfully integrating the infant into the family unit over the continuum of the hospitalization so that we have more success for the families and the baby when they are all at home in the post-discharge period." With those goals set out there, I'd like to dive into the trauma aspects of this. It is well known that childhood adversity is linked to mental and physical health outcomes throughout life. The prevalence of toxic stress and pediatric medical trauma and disease leads to financial costs and has social and educational implications. This makes prevention and early intervention crucial. The traditional view of trauma-informed care in behavioral health guides how to engage with individuals with a history of trauma. But with our patient population, the prevention model and the early intervention approach to care are needed because adverse experiences derail the developmental trajectory of the individual. When we approach healthcare through this trauma-informed paradigm, we proactively mitigate the trauma experience and its consequences. Bessel van der Kolk is a world-renowned psychiatrist who does exhaustive research and works with trauma victims. I appreciate his definition of trauma as "when your reality is not seen or known." Most of our patients' realities and personal journeys through trauma are not seen or known because of their life-threatening illnesses.

The Substance Abuse, Mental Health Services Administration, defines trauma using "the three E's," which are the event, experience, and effect of individual trauma. Trauma results from an event or a series of events or circumstances that is uniquely experienced by the individual. An event that is physically or emotionally harmful or life-threatening has lasting adverse effects on personal functioning. It affects their mental, physical, social-emotional, and even spiritual well-being. Our opinion on the trauma experience

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associated with a heel stick or the removal of tape or a diaper change is irrelevant; it's not our experience that matters. It's what that individual is experiencing at that moment that defines whether it is traumatic or toxic to themself.

"Maternal separation is the first traumatic experience endured by all mammalian newborns; when a child is separated from their parents. Under chaotic circumstances, a monsoon of stress hormones starts flooding the brain and the body. These hormones are essential for navigating stress in the short term; however, they can hinder healthy development and become destructive in high doses."

Maternal separation is the first traumatic experience endured by all mammalian newborns; when a child is separated from their parents. Under chaotic circumstances, a monsoon of stress hormones starts flooding the brain and the body. These hormones are essential for navigating stress in the short term; however, they can hinder healthy development and become destructive in high doses. This exposure to toxic stress significantly increases the risk and vulnerability of the affected individual to develop various non-communicable diseases mediated by their early life adversity and contributes to a shortened lifespan. Many of our scientific colleagues are trying to help us better understand this process or cascade of events. This publication from Agorastos et al., 2019 delineates the different stages that the individual is vulnerable to stress beginning with their genetic predisposition. For the work on trauma-related transgenerational phenomenon, we need to understand the family history, their exposure to social determinants of health, their support network, and other types of social situations that may predispose them to exposure to high doses of stress and toxic stress. Hence, you have that predisposition, and then you have the individual's personal experience.

"The younger the individual, the more susceptible they are to the derangement that's going to happen. This exposure to toxic stress, although individuals are highly vulnerable to its intensity across the entire gestational age continuum, has an acute and chronic duration."

I relate this to early life stress to the NICU stay, so timing of the event is a factor as well. The younger the individual, the more susceptible they are to the derangement that's going to happen. This exposure to toxic stress, although individuals are highly vulnerable to its intensity across the entire gestational age continuum, has an acute and chronic duration. Many of our patients are exposed to regular high doses of toxic stress, which then initiate a myriad of allostatic processes that undermine the biological integrity of the individual and the HPA axis. All that makes perfect sense but understanding how the disturbance influences immune integrity, brain development, epigenetic processing, sleeping, circadian rhythm, metabolic disturbances, and even oxidative stress.

These processes can derail the individual, even down to the mitochondria. Several studies looked at individuals' exposure to toxic stress during early life and how it can result in primary mitochondrial failure. When you ponder this, think about some of the presenting challenges that we have as neonatal clinicians. For our patients, the primary diagnosis plays a pivotal role, but there is also a myriad of other factors behind the scenes that derail the physiologic integrity of the individual. We must understand that exposure to early life stress and childhood trauma leads to disruption in critical phases of perinatal and neonatal brain development into early childhood, and even adolescents are equally susceptible. There's been just a considerable volume of work done by Italian researchers in helping us understand the implications of exposure to trauma.

This research mainly focuses on the premature patient population and has uncovered epigenetic modifications that have been derailed. The disruption of the serotonin transporter gene functionality leads to anxiety and depression in young children and adolescents, which can often go into adulthood. We see shortened telomeres because of these individuals' chronic stress and toxic stress. Another study by Fumagalli and her team correlated epigenetic methylation with brain volumes at term gestational age and developmental milestones. At 12 months of age, there's a correlation with these individuals having contracted brain volumes, epigenetic modifications, and their behavioral development being impaired. This is the beginning of the evolution of derailment. This is caused by a myriad of traumatic experiences, but the leading cause is separation and deprivation from their mother or their parents and family. Thus, it's essential to see these biological consequences and understand that preterm birth is an early adverse experience. It's characterized by exposure to high levels of stress and the altered buffering effects of maternal care. We understand that babies in the NICU with life-threatening illnesses require a myriad of interventions to stay alive. But if we can also consistently ensure parental presence, comfort, and proximity, then these individuals can cultivate resilience. They learn that bad stuff happens in life, but they can get through those challenging times with the help of others, who are ideally the parents.

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The American Academy of Pediatrics now recommends a trauma-informed approach to all child health services. Their clinical report published in August 2021 summarizes what we discussed about exposure to toxic stress in the developing child. It shows brain connectivity being impacted, epigenetic modifications, and

derailed immune function. It's well-known that childhood adversity is pervasive and our first discovery of this was with the study of adverse childhood experiences, and then many subsequent studies confirmed those original findings. Even adult clinicians now recognize the importance of getting a thorough life history from their patients who are adult survivors of very preterm birth. Clinicians can make those connections when they understand the social environment of the nurture aspect, whether there was a paucity of relationships or if there were many healthy relationships. These pieces of information can help us understand the trajectory of the individual. The data that highlights morbidity and mortality information for premature individuals helps us understand the long-term consequences. The prevention and key solution for this is a trauma-informed approach. If the critical intervention is the presence of the family, then it is also essential to understand the ramifications when this does not occur. This would be a shortened lifespan by at least 20 years when looking at health outcomes for individuals between 18 and 45 years of age. The data shows that for a cohort of over 6 million individuals from several Nordic nations, the leading cause of death is non-communicable diseases, such as cardiovascular disease, chronic lung disease, and metabolic disturbances. However, what the data does not show and what the authors do not report is the most common cause of death, excluding non-communicable diseases, is suicide and accidents. We can mitigate this by ensuring more nurturing relationships and loving early experiences through a very integrated and consistent approach to family-centered care. By understanding the stress response, we learn what is impacted when we're experiencing stress and that at any point along the continuum, we can insert social support to get a sense of safety and connectedness. Doing this mitigates the consequences associated with that stress response, reflecting the Polyvagal theory discussed in the American Academy of Pediatrics clinical report.

"When looking at the lived experience of the premature individual and the family, we can relate to the fact that all humans become terrified beyond reason when overwhelmed with stress. Our entire world contracts and the priority becomes survival. We all have an autonomic presentation that signals when we need relational support and reassurance of being in a safe space."

When looking at the lived experience of the premature individual and the family, we can relate to the fact that all humans become terrified beyond reason when overwhelmed with stress. Our entire world contracts and the priority becomes survival. We all have an autonomic presentation that signals when we need relational support and reassurance of being in a safe space. When others miss reading those cues, the individual can spiral out of control, and biological consequences follow that emotional interpretation of the experience. Thus, who better to read those signs and cues than the family? They can help be that intermediary between the patient and the healthcare provider, which is an empowering opportunity. For the family to be that connected to their baby helps reach the goal of family-centered care. As mentioned earlier, it is about empowering and validating the whole identity of the family. Thus, understanding how biology moves through the experience of trauma becomes a tool for us to recognize how we can mitigate it using social relationships. The antithetical hormone to cortisol, the stress hormone, is oxytocin. Research helps us understand how activating oxytocin promotes autonomic regulation and a sense of safety and security. It's very validating when we engage with the family to help them see their critical role.

Clinicians who previously tended to minimize the importance and the biological relevance of family-centered care can turn the tide and recognize the urgency for emotional connectedness and its physiologic consequences. The American Psychiatric Nurses Association has a catchphrase: "all health begins with mental health." We do not think enough about infant mental health, but these individuals have profound and overwhelming emotional responses to the experiences they must endure because of their life-threatening illnesses. We can have that consistent partnership with perfectly poised families and the understanding of biology to balance out the stress response and validate the family's role. This helps them process their experience of the trauma they're undergoing because of their infants' NICU hospitalization. From the perspective of a NICU clinician, we must recognize that feelings matter just as much as empirical knowledge. In the past, I downplayed the importance of feelings and emotions, but now I realize that making those human connections can be transformational across different domains- physical, psychological, emotional, and spiritual. To recognize the healing power of connection and that the primary relationship between parent and infant can be transformative may be the secret ingredient in the preventative health model. When we foster that awareness of connection for the patient, the family, and ourselves, we support "post-traumatic growth." This is when we learn to move beyond the trauma we witness every day because we are facilitating these sincere and significant relationships. Between the baby and the family, we're empowering them to embrace this new role, despite the adversity because we're here to support them through that transition. When we do this correctly, we can impact the future in meaningful and measurable ways. In conclusion, families are critical in the newborn intensive care unit because they are the primary intervention that can mitigate and ameliorate the trauma experienced by the infant and the family.

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Bob White: One of the challenges is parents that are there, and we want to get them involved, but they're just so scared. They are afraid they won't bring their baby, and no matter how much we encourage them, we seem to choose to be unsuccessful sometimes. What strategies would you recommend for that situation?

Mary Coughlin: Yeah, that's an excellent point. Thank you very much for that question. I think in collaboration with a social worker and mental health professionals, we need to help these parents build a sense of confidence and competence, which I am a big proponent of. Mockup scenarios, right? You know, really learning how to do some little technical things like changing a diaper, repositioning a baby, or even just holding their baby. Using a doll for us, so they can kind of work out the tactics of whatever they're being invited to do in a safe situation and then slowly engaging them to transition to their baby out. One of my colleagues uses this re-

markable phrase, and I think it's the best. It's working through the hands of the parent. So really helping the parents do these things, and you be you know not to be the facilitator, but the support instead if that makes sense, like, for example, I think that skin to skin. And a standing transfer, you know being behind that parent literally and helping them and encouraging them, giving them that positive feedback instead of kind of approaching it what I would traditionally do would be very you know instructional but really in a more mentorship kind of a way working through their hands. But they must also have mental health services, and I think we're a little behind on that ball in the United States, and I know many of my European colleagues are starting to embrace and have onboard psychologists in the NICU in the PICU and we need to start moving towards that modeling it's a best practice.

"In the work from Sigurdsson and Profit et al., you know, and saying we need to use a more a QA model around how we're going to delineate and define metrics for family-centered care so they can be more clearly understood and then operationalized more consistently."

Colby Day: Difference between family-centered and integrated care.

Mary Coughlin: Okay, that's a good question, and I hope I get the answer right. So I think family-centered care is kind of like this overarching paradigm, and, as I mentioned at the very beginning. When I was, you know, reviewing the literature as well it's there's an inconsistency in how people operationalize, so even though we may use the exact words, what it looks like in real life might be pretty different. Family integrated care seems a little bit more precise and prescribed, and I don't mean that incorrectly; I mean they have specific protocols, at least when I think about the model from Canada. And you know that parents sign a contract stating a family member will be present X amount of time each day; there are different competencies that families develop in providing care to their baby during their hospital stay, so it's that type of thing, so there's more, it feels like this is the word, intentionality in engaging them to be those essential caregivers; there is more of a script around it, not saying that it is terrible; versus family centered seems a little bit more amorphous, and I think that's one of the challenges. In the work from Sigurdsson and Profit et al., you know, and saying we need to use a more a QA model around how we're going to delineate and define metrics for family-centered care so they can be more clearly understood and then operationalized more consistently.

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Disclosures: No conflicts have been identified. .

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Corresponding Author

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Mary E. Coughlin, MS, NNP, RNC-E
President and FounderPresident and Founder
Caring Essentials Collaborative, LLC · Full-timeCaring Essentials Collaborative, LLC
Boston, Massachusetts, United States
Email: mary@caringessentials.net

Mary E. Coughlin, MS, NNP, RNC-E, is a global leader in neonatal nursing and has pioneered the concept of trauma-informed developmental care as a biologically relevant paradigm for babies, children, families, and professionals.

A seasoned staff nurse, charge nurse, neonatal nurse practitioner, administrator, educator, coach, and mentor, Ms. Coughlin has over 35 years of nursing experience, beginning with her seven years of active duty in the U.S. Air Force Nurse Corp and culminating with her current role as president and founder of Caring Essentials Collaborative, an organization committed to transforming the experience of healthcare for babies and families around the globe through a trauma-informed paradigm.

Ms. Coughlin is a published author with credits that include the seminal paper introducing the concept of core measures for developmentally supportive care, the 2011 Clinical Practice Guidelines for Age-Appropriate Care of the Premature and Critically Ill Hospitalized Infant for the National Association of Neonatal Nurses (NANN); Transformative Nursing in the NICU: Trauma-Informed, Age-Appropriate Care, First and 2nd Editions, and Trauma-Informed Care in the NICU: Evidence-Based Practice Guidelines for Transdisciplinary Neonatal Clinicians endorsed by the NANN and recognized by the National Association of Neonatal Therapists and the Council for International Neonatal Nurses as the definitive resource for evidence-based, best practices in neuroprotective, developmentally supportive care for hospitalized infants and families.

In her role as president of Caring Essentials Collaborative, Ms. Coughlin has educated, inspired, and empowered more than 30,000 interdisciplinary clinicians from over 20 countries to transform the experience of healthcare for infants, children, and families in crisis.

Most recently, Ms. Coughlin and her interdisciplinary faculty have created an assessment-based certificate program endorsed by the NIDCAP Federation International, the National Association of Neonatal Nurses, the Council of International Neonatal Nurses, and the National Association of Perinatal Social Workers in accordance with standards established by the Institute for Credentialing Excellence, to distinguish individuals as Trauma Informed Professionals.

Mary leads her incredible team at Caring Essentials Collaborative with a bold and ambitious vision to create a kinder, more connected, and compassionate world, one moment at a time.

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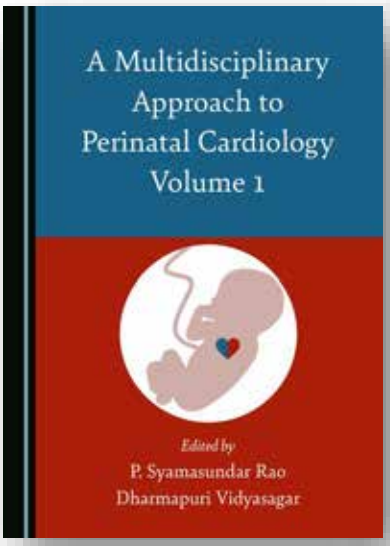
A Multidisciplinary Approach to Perinatal Cardiology *Volume 1*

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.

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- **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

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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.
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  - 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.
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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*.

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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...

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- **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.

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COVID-19

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The NUCDF is a non-profit organization dedicated to the identification, treatment and cure of urea cycle disorders. NUCDF is a nationally-recognized resource of information and education for families and healthcare professionals.

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New Guidance Encourages Moms to Nurse for Two Years

Michelle Winokur, DrPH

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.

"According to the American Academy of Pediatrics new guidelines, mothers are now encouraged to nurse for two years – up from one year. (1)"

According to the American Academy of Pediatrics new guidelines, mothers are now encouraged to nurse for two years – up from one year. (1)

A mother's willingness or ability to initiate breastfeeding is dependent on many factors, including support from family, close friends, and the hospital or birth center where the child is born. However, many other barriers can potentially keep moms from exclusively nursing for even six months, long considered the benchmark before introducing "nutritious complementary foods."

Barriers to Breastfeeding

In recognition of the challenge of a lengthened breastfeeding period, the AAP concurrently released a technical report (2) identifying hurdles and approaches to support nursing moms. Among the challenges moms face are:

- **Societal judgment:** Upwards of 80% of women breastfeed initially, establishing the practice as a "cultural norm." However, just one-third of infants are nursed beyond one year. (3) This sharp decline can lead to judgment and comments from well-intentioned yet misinformed relations – or strangers – who may not recognize the value of longer-term breastfeeding. Similarly, providers should support nursing beyond one year, though there is evidence that is not always the case. (4)
- **Workplace barriers:** The United States is one of only a handful of upper-income countries that does not guarantee paid maternity leave. Lack of income or loss of job protection forces some moms back to work sooner than they would like. Furthermore, few businesses provide on-site childcare, making it more convenient for moms to nurse during the workday. The country also lacks requirements for workplace breaks and the provision of a clean, private space to nurse or express milk.
- **Insurance coverage:** In most cases, insurance will provide or reimburse for select breast pumps, but coverage varies by plan and is not guaranteed. Similarly, only some insurers cover lactation support. While most hospitals and birth centers provide an initial consultation, many moms require additional guidance and support to continue nursing.

"Babies who nurse receive immunities from their moms, making them less likely to develop ear infections and less susceptible to stomach bugs. They also experience sudden infant death syndrome at lower rates. Moreover, breastfed babies have a lower risk of developing certain conditions, including asthma, obesity, and type 1 diabetes, as they grow."

Benefits of Breastfeeding

The benefits (5) of breastfeeding for babies and moms are numerous.

Babies who nurse receive immunities from their moms, making them less likely to develop ear infections and less susceptible to stomach bugs. They also experience sudden infant death syndrome at lower rates. Moreover, breastfed babies have a lower risk of developing certain conditions, including asthma, obesity, and type 1 diabetes, as they grow.

Moms who nurse likewise reap long-term benefits, including re-

duced risk of breast and ovarian cancer, type 2 diabetes, and high blood pressure.

"There is no better time than now, during National Breastfeeding Month, (6) to reflect on the AAP's updated guidance and recommit to reducing barriers that discourage moms from breastfeeding. Providers, policymakers, employers, insurers, and communities all have opportunities to support nursing moms and their babies."

Corresponding Author

Michelle Winokur, DrPH,
Policy Communications Director
Alliance for Patient Access (AfPA) Government Affairs Team
2020 K Street NW, Suite 505
Washington, DC 20006
(202) 964-2625
Email: info@allianceforpatientaccess.org

There is no better time than now, during National Breastfeeding Month, (6) to reflect on the AAP's updated guidance and recommit to reducing barriers that discourage moms from breastfeeding. Providers, policymakers, employers, insurers, and communities all have opportunities to support nursing moms and their babies.

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Michelle Winokur, DrPH, is the Executive Director of the Institute for Patient Access. This article was also published at healthpolicytoday.org.

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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

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

I CAN Digitally Involved (I CANDI): Speaking Opportunities - iCAN needs Youth and Family Voices!

Amy Ohmer

iCAN
International Children's Advisory Network

"In case you missed the week-long, International Children's Advisory Network, Inc. (iCAN) is pleased to share our excitement from the 2022 iCAN Summit presented by Jumo Health in a video highlighting the fantastic event. (1)"

In case you missed the week-long, International Children's Advisory Network, Inc. (iCAN) is pleased to share our excitement from the 2022 iCAN Summit presented by Jumo Health in a video highlighting the fantastic event. (1) Check it out at: https://youtu.be/5faoza6ONFA. (1)

Turning up the advocacy heat for August, iCAN has many exciting events and encourages sharing these terrific initiatives to help support pediatric voices worldwide.

Speaking Opportunities - iCAN needs youth and family voices!

We are looking for members who fulfill one of the following criteria and would be willing to share their voice on that topic:

- A person needed that lives with hemophilia
- A person needed that lives with gene therapy
- A person needed that has treatment with weight management

Learn more about each opportunity to engage as a youth speaker at https://www.icanresearch.org/open-projects. (2)

Partnering with iCAN, The KIDS Connecticut Chapter Medical Students need your help!

iCAN would like youth to take the following survey to tell doctors what you want them to know at https://uconn.co1.qualtrics.com/jfe/form/SV_cvxUkzQs0jLvyNE (3)

If needed, the code to access the survey is 06019.

Partnering with iCAN, Duke Clinical Research Institute (DCRI) is writing a book!

DCRI needs art (all forms) for a project that involves creating a book for clinical research. We need 50 submissions and would love for everyone to submit to the youth council. Learn more at https://www.icanresearch.org/open-projects (4)

iCAN Chapter Startups: iCAN welcomes interested hospitals to join at no cost. Chapter groups can be as small or large - with the

emphasis on helping to spotlight the youth voice. To learn more, check out https://www.icanresearch.org/chapters. (5)

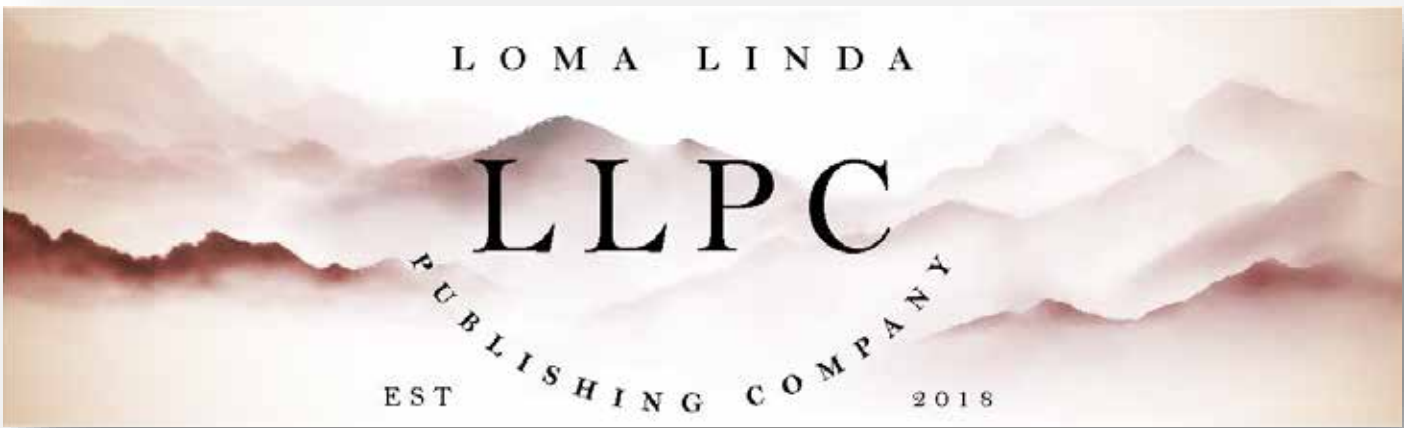
iCAN Youth Council: This is the next leadership level for youth members interested in supporting iCAN in a more significant way. The iCAN Youth Council is active in creating, overseeing, executing, and disseminating pediatric issues/topics through the unique perspective of youth throughout research, science, advocacy, technology, and medicine. Interested young people can learn more at https://www.icanresearch.org/our-youth. (6)

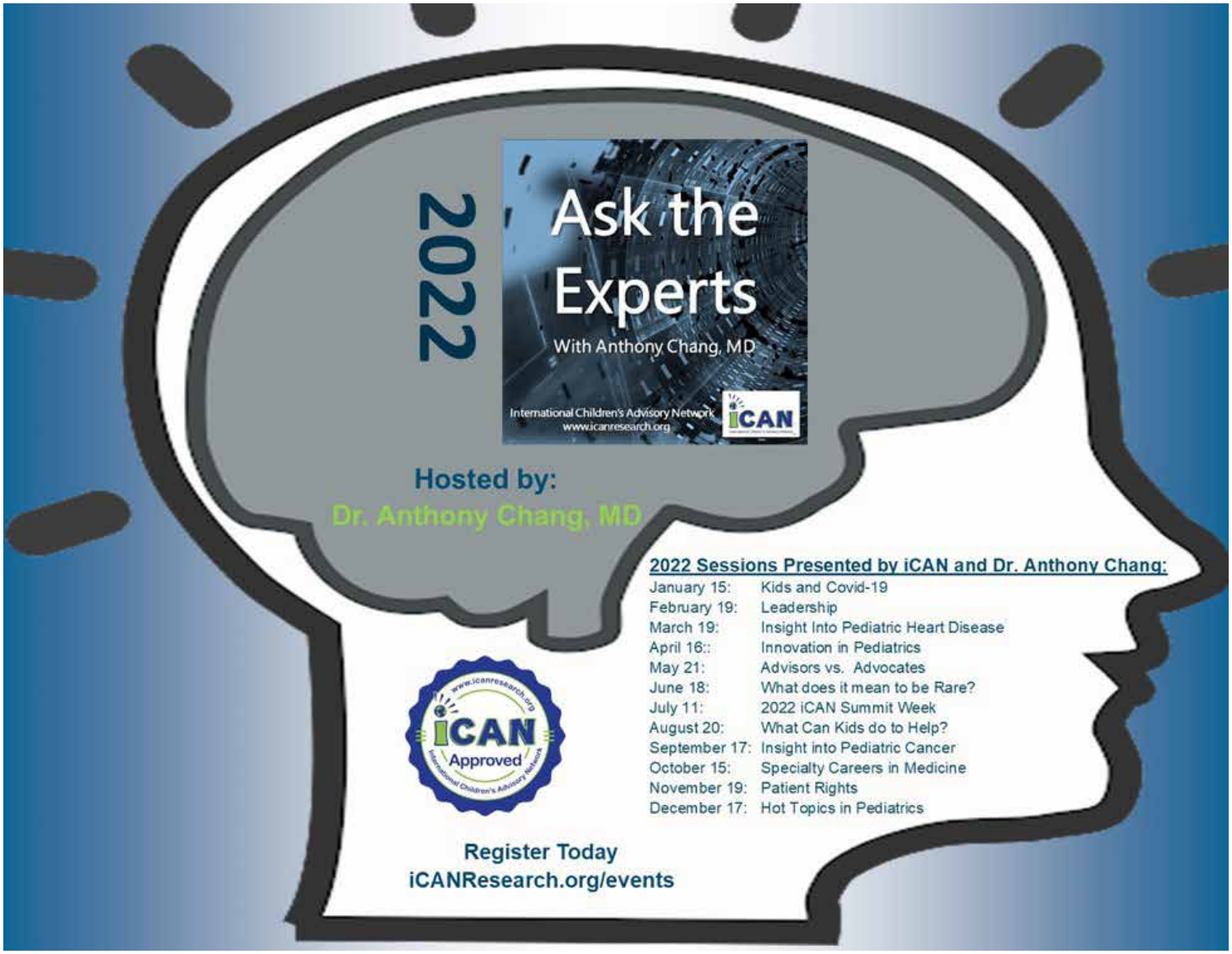
iCAN Young Adult Professionals: This dedicated group of young adults ages 18+ helps to support iCAN at a professional and higher educational level. iCAN offers internships and greater leadership roles to help retain and engage young adults as they begin their careers. To learn more about this group, head over to https://www.icanresearch.org/ican-young-adult-professionals. (7)

iCAN Parents: All parents (and family members) are welcome to join iCAN to participate as advisors for the littlest patients (0-7 years old). Joining is free and can be done by visiting www.icanresearch.org or sending an email to iCANparent@icanresearch.org. To learn more, check out this page at https://www.icanresearch.org/parents-families. (8)

Save the Date:

- iCAN's unique youth series **'Ask the Experts'** has a new session planned for **August 20 at 10:00 AM EST**. To join this fun and free event, please register at www.icanresearch.org/events. (9) All are welcome to attend, and kids of all ages are invited to join. Additional sessions are open for registration, and we welcome all doctors, researchers, and community leaders to join us. Please note, due to the iCAN Summit, there was no 'Ask the Experts' for July.
- Join Amy Ohmer, Director, iCAN, at the **ABMS, Partnering with Patients in Board Certification Session on Wednesday, September 21, 2022, from 11:00 AM – 12:00 PM** in Chicago, Illinois. https://www.abmsconference.com/ (10)
- **Join iCAN and the American Academy of Pediatrics National Conference and Exhibition from October 7th**





- 11th, 2022, at the Anaheim Convention Center, Anaheim, California. We cannot wait to see you at our booth #2034! Look for the iCAN colors and stop by and say hello!

"The summit next year will be held in Southern California from July 10 - July 14, 2023. You can stay up to date on all the coming information and updates by bookmarking www.icanresearch.org/2023-summit. (11)"

- iCAN 2023 Summit Information -The summit next year will be held in Southern California from July 10 - July 14, 2023. You can stay up to date on all the coming information and updates by bookmarking www.icanresearch.org/2023-summit. (11) We need sponsors, speakers, and donations. To join in, email us at amyohmer@icanresearch.org.

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9. http://www.icanresearch.org/events
10. https://www.abmsconference.com/
11. http://www.icanresearch.org/2023-summit

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Corresponding Author

Amy Ohmer
Director, International Children's Advisory Network
Website: www.icanresearch.org
Phone: (+1)734-545-2831
Email:. amyohmer@icanresearch.org

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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.

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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

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HELPING CHILDREN AND FAMILIES COPE

CAREGIVERS NEED CARE TOO

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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

Peer Reviewed

Health Equity Column: Eliminating Breastfeeding Disparities in the NICU Through Implicit Bias Training

Jenné Johns, MPH, Emilia Garcia, DNP, RNC-NIC

Nationally, August marks Breastfeeding Awareness Month, a time dedicated to advancing advocacy, protection, and promotion of breastfeeding to ensure that all families have the opportunity to breastfeed. August 25-31st is also declared Black Breastfeeding Awareness Week to support Black women and families through lactation, cultural empowerment, and ensuring racial equity. As we celebrate and lift up stories across the spectrum of breastfeeding women, let us remember the unique needs of premature babies and their families' joys, struggles, trials, and triumphs with feeding while in the NICU.

"August 25-31st is also declared Black Breastfeeding Awareness Week to support Black women and families through lactation, cultural empowerment, and ensuring racial equity. As we celebrate and lift up stories across the spectrum of breastfeeding women, let us remember the unique needs of premature babies and their families' joys, struggles, trials, and triumphs with feeding while in the NICU."

In this month's Health Equity Column, I am honored to introduce Dr. Emilia Garcia, Neonatal Program Manager at Covenant Children's Hospital, who is on a double mission- to improve health and racial equity institutionally and to replicate her success with eliminating breastfeeding disparity with Black women in her NICU. Dr. Garcia was one of the first NICUs to require the completion of the Once Upon A Preemie Academy e-Learning courses with all NICU staff and specialists. In this column, you will learn the transformational power of implicit bias training personally and within a large hospital system and how these lessons positively impact all NICU families, specifically Black NICU families. As you read this column, I encourage you to reflect on your institutional challenges, gaps, and opportunities for improvement to eliminate disparities based on race, culture, and socioeconomic status in perinatal and neonatal care.

What is your definition of health equity?

I think it's important that everyone recognizes the difference between equality and equity. Equality means that everybody gets the same thing. That seems fair, right? But in reality, every patient and every family has different needs. Those specific needs should be addressed. Health equity means the opportunity to reach our own highest potential of health. As healthcare givers, we should be aware of the individualized care that each person needs. The needs can range from language translation, transportation issues, spiritual care, mental health care, or food insecurity. The best way to know the needs of our patients is in the art and service of listening. There is quite a bit of focus on communicating with patients. In general, we think and act on communication through talking. I think we don't take the time to listen, really listen to our patient's stories.

"The best way to know the needs of our patients is in the art and service of listening. There is quite a bit of focus on communicating with patients. In general, we think and act on communication through talking. I think we don't take the time to listen, really listen to our patient's stories."

And to make matters worse, the nursing shortage encourages task-oriented care. Nurses are incredibly busy trying to complete the nursing tasked care that it can be difficult to take the time necessary to *listen*. Being heard is an innate need for everyone; everybody wants to be heard because it makes us feel valued. It shows other people that you have time for them, and it demonstrates respect. I think listening demonstrates that the person/patient being heard matters.

What are your organizational priorities for addressing health and racial equity in perinatal and neonatal care?

Our organization is committed to addressing health and racial equity. One of the first and critical barriers I have encountered is prioritizing demographic data collection to always include race, ethnicity, and language data (REaL data). We do a good job at data collection during inpatient registration, but sometimes some patients fall through the cracks. For example, there are multiple instances when a neonatal or a maternal transport arrives at our organization, and we do not collect their REaL data demographics. As we all know, data out is only as good as data in. When REaL data is available, patient outcomes can be stratified by race

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and ethnicity to determine if an area of disparate care is identified. If any area of disparate care is identified, we can acknowledge and act upon that information.

It is also critical to maintain any improvement in patient outcomes through the development of a sustainability plan that may include education, dissemination of information through various platforms, administrative changes, and behavioral changes. When neonatal or perinatal patient outcomes are improved, it's assuring to know there's a that's a plan in place, so all our efforts are not in vain and not short-lived. We want to make sure that everything we're doing is sustainable over time and not just because DEI has become more recognized. Health and racial equity without organizational and executive leadership support is only optics. We need to have organizational strategies and funds for DEI to ensure that we are not just providing the appearance of DEI advocacy. Health and racial equity are seen in patient outcomes, not just the paper and print of a DEI commitment statement.

"We need to have organizational strategies and funds for DEI to ensure that we are not just providing the appearance of DEI advocacy. Health and racial equity are seen in patient outcomes, not just the paper and print of a DEI commitment statement"

One last thing I think it's extremely critical to report our quality outcomes. We do a great job with and have a fantastic committee that reports all our quality outcomes throughout our organization, but I think it's important to report those outcomes through an equity lens. A goal I have is to report neonatal and perinatal outcomes through an equity dashboard. I think this will give our staff and leadership some really great visual information that will help leverage some of the projects and changes that we want to make.

What personal and professional experiences led you to focus on health equity in perinatal and neonatal care?

For me, it was some of the experiences during the time I was a bedside nurse and charge nurse in the NICU. I would notice that some of our families were allowed to hold their babies sooner than other families, or some families were allowed extra family members at the bedside pre-COVID times. Looking back, I was guilty of these acts as well – particularly, I'd find myself engaging in providing privileged care to families that were higher socioeconomic status in the community or even privileged care to our staff who had their own infant in the NICU. Now I understand more about implicit bias and that we all have them. What's important is self-reflection and recognizing when an implicit bias is swaying our decision(s) as a healthcare giver.

During my doctoral program, we completed a statistics project, and we found some racial and ethnic disparities as outcomes in our project. It was really eye-opening to me and made me wonder what stratified data in our NICU would look like. One of my responsibilities is the oversight of our Nicu's VON data. I was able to look at our overall outcomes, and then I stratified by race and ethnicity. The findings for our NICU showed disparate outcomes, which led to a health equity project in our NICU with a focus on breastfeeding at discharge. Through our partnership with Once A Preemie Academy and the incorporation of their health equity training courses, we have made statistically significant improvements in our breastfeeding at discharge rates for our Black infants. Breastfeeding rates at discharge for our Black infants was 40% for 2021 and have increased to 75% in 2022, 1st quarter. I am so proud of the improvements thus far! I am hoping to continue to build on the success of the health equity training and to further disseminate the health equity trainings to our newborn nursery and perinatal areas.

"Through our partnership with Once A Preemie Academy and the incorporation of their health equity training courses, we have made statistically significant improvements in our breastfeeding at discharge rates for our Black infants. Breastfeeding rates at discharge for our Black infants was 40% for 2021 and have increased to 75% in 2022, 1st quarter."

What is your call to action for the industry as we seek to eliminate health and racial inequities in perinatal and neonatal care?

During this time that I've developed a passion for equity, I think the big thing is that we need to acknowledge and act. We need to acknowledge our own biases and be mindful about when they occur, and then act to ensure that those biases don't negatively affect the care of our patients. Then we need to acknowledge that racial and ethnic disparities and racism do exist within our organizations and that's sometimes a hard pill to swallow. I think that once we can acknowledge that disparities and racism do exist within our own walls, then we can act. And we can act by making health equity an organizational strategic priority starting with executive leadership. Also, we need to speak up when we see inequities or acts of racism in our organization. Sometimes that's hard to do, but by doing that, we help increase the health of our moms and our babies. Healthier moms mean healthier babies, and when you have healthier moms and babies, then you have healthier communities. I would go as far as to say, this, in turn, would result in a healthier world.

As healthcare providers, we're in a unique position to make a difference in the lives of our patients, and that has the potential to affect generations. My advisor said, "If you only help one person, that's huge." In terms of the ripple effect, so many things in our lives are generational, so if we can start with one mom and one baby, that can change generations. I think we need to do a better job about educating our mothers about the health of their bodies and their babies. They need the support and extra time to make sure that they understand the benefits of things like a healthy diet and the benefits of breastfeeding for both the mom and the baby. Sometimes they just don't know. It's our job to listen to their needs, barriers, and desires. What do they want? What are their

goals for themselves and their babies? We can help provide them resources that they need to be healthy and stay healthy. I think it takes vulnerability for our moms to say, "Hey, I don't understand what you're saying," or "I don't understand what that means." No one likes to be the one that has the question or to seem like they don't know, but if we can create safe spaces and build trust, our families can feel comfortable asking questions and can feel okay being vulnerable. It takes lots of vulnerability and courage to ask questions, especially with the lack of provider concordance.

"Sometimes there's a bit of mistrust when a provider does not look like you. But it is possible to create trust with our patients by showing cultural humility and genuine desire to help meet their needs – equity. Respectful dialogue (listening) elevates the family to their rightful role as the primary caregiver. And it also helps us encourage family-centered care."

I know that my own mother and father feel more comfortable with a Hispanic doctor or nurse because they feel they will be better understood from a shared culture experience. Sometimes there's a bit of mistrust when a provider does not look like you. But it is possible to create trust with our patients by showing cultural humility and genuine desire to help meet their needs – equity. Respectful dialogue (listening) elevates the family to their rightful role as the primary caregiver. And it also helps us encourage family-centered care.

I love the mission statement of Providence St. Joseph Health because I think it really wraps it all up perfectly. The mission statement is: "Know me, care for me, and ease my way." I think that hits every part of what I've been talking about.

Disclosure: *The authors have no disclosures.*

NT

About the Author: Jenné Johns, MPH:

Title: President and Founder

Organization: President, Once Upon A Preemie www.onceuponapreemie.com and Founder, Once Upon A Preemie Academy www.onceuponapreemieacademy.com

Jenné Johns, MPH is President of Once Upon A Preemie, Founder of Once Upon A Preemie Academy, mother of a micropreemie, author, speaker, advocate, and national senior health equity leader. Once Upon A Preemie is a non-profit organization with a two-part mission: 1.) to donate Once Upon A Preemie books to NICU families in under resourced communities, and 2.) lead virtual health and racial ethnic training programs and solutions to the neonatal and perinatal community through the Once Upon A Preemie Academy. Jenné provides speaking, strategic planning and consultation services for fortune 500 companies focused on preemie parent needs from a cultural lens and reading as a tool for growth, development, and bonding. Jenné is also a national senior health equity thought leader and has led solutions-oriented health equity and quality improvement portfolios for the nations' largest health insurance and managed care companies.

About the Author: Emilia Garcia, DNP, RNC-NIC

Title: Neonatal Program Manager

Organization: Covenant Children's Hospital

Bio: Emilia Garcia, MSN, RNC-NIC, is currently employed at Covenant Children's Hospital in Lubbock, Texas. Emilia demonstrates her passion and amazement at neonatal patients daily, serving in the NICU since 2001, the entirety of her nursing career. She transitioned from direct patient care, neonatal transport team member, and charge nurse to her current role of Neonatal Program Manager in 2017. She received her BSN from Texas Tech University Health Sciences Center (TTUHSC) in 2001, MSN from Lubbock Christian University in 2014, and Doctor of Nursing Practice Executive Leadership Program at TTUHSC in May 2022. Emilia is a member of Sigma Theta Tau International, Texas Nurses Association, American Nurses Association, and American Organization of Nurse Leaders.

Emilia is responsible for maintaining the standards of a Level IV NICU mandated by the State of Texas. She has raised the bar for the standard of quality at and around the bedside. Emilia has also raised awareness of the significant role that quality occupies in delivering care at every patient touchpoint, from admission to discharge. She is the leader of NICU quality and research initiatives such as Newborn Admission Temperature statewide QI through Texas Collaborative for Healthy Mothers and Babies (TCHMB) and an ongoing project, "Breastfeeding in the NICU: Addressing Disparate Outcomes Through Quality Improvement." Emilia promotes interprofessional collaboration for success in influencing quality metrics, processes, and patient outcomes.

American Academy of Pediatrics (AAP) Updated Infant Safe Sleep Guidelines Several Notable Additions

Nancy Maruyama, RN, BSN, NCBF

In June 2022, the American Academy of Pediatrics (AAP) updated the 2016 infant safe sleep guidelines. While many of the recommendations remain the same, there are several notable additions as follows:

"In June 2022, the American Academy of Pediatrics (AAP) updated the 2016 infant safe sleep guidelines. While many of the recommendations remain the same, there are several notable additions as follows:"

- Infants must be placed on their back for every sleep event, and the surface must be firm and flat and NOT BE INCLINED more than 10%, unless specifically ordered by a physician. (1) This means it is not safe for an infant to sleep in a bouncer, car seat, or any item that can compromise the infant's airway by having infants' chin resting on their chests. (2) Although reclining sleeper/nappers by Fisher Price and other companies have been recalled and are no longer being sold in stores; there are other avenues where they can be obtained. An infant should sleep in a safe environment alone in the parent's room.
- In-bed sleepers are not recommended due to a lack of risk reduction evidence.(1) Some in-bed sleepers contain all the elements known to be unsafe due to soft, pillowy products that increase the risk of death due to accidental suffocation, positional asphyxiation, entrapment, and overlay.
- There are only three spaces that meet all the current safety standards set by the Consumer Product Safety Commission (CPSC)
    - Full-size crib with stationary rails, manufactured after 6/28/11 (https://www.cpsc.gov/Regulations-Laws--Standards/Rulemaking/Final-and-Proposed-Rules/Full-Size-Crib
    - Bassinets manufactured after 4/23/14 (https://www.cpsc.gov/Regulations-Laws--Standards/Rulemaking/Final-and-Proposed-Rules/Bassinets)
    - Portable Play-yards manufactured after 2/28/13 (https://www.federalregister.gov/documents/2012/08/29/2012-21168/safety-standard-for-play-yards)

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- Weighted blankets and weighted wearable blankets are NOT recommended. 1 There has been some confusion with parents and home visitors thinking that *sleepsacks or wearable blankets* are not considered safe, which is untrue. (Private conversation with health educators on 8/17/22). Wearable blankets that are NOT weighted are considered safe to use with infants as long as they are wearing the correct size. Dressing the baby appropriately for sleep is a safety issue. The number of layers you wear, plus one thin layer for sleep, is a good way to teach parents. The baby's head and face must be uncovered, especially during sleep. Hats are no longer advised for babies while indoors except for the first few hours of life or in the NICU. (1)
- Parents, grandparents, and caregivers must be consistently reminded that "Just because they sell it, does not mean it is safe), a misconception by many because of social media and the ease of selling and purchasing items. There are items targeted to sell to new parents and grandparents that do not follow the AAP Safe Sleep Recommendations, and we need to keep that in mind when teaching safe sleep.
- Breast/Chest/Bottle feeding of human milk is recommended for at least the first six months of the infant's life. (3)
- The use of over-the-counter home cardio-respiratory monitors is increasing. There are no specific contraindications to home use, but parents must be made aware that these are not FDA-approved, so they are not considered medical devices. The concern may be that those who use the OTC monitors on the infant may not follow the safe sleep recommendations, incorrectly thinking it is OK to bring the baby to the parent's bed for sleep because the monitor will let them know if the baby stops breathing. Researchers still are not able to predict or prevent an actual SIDS death. However, all the current recommendations will help reduce the risk of SIDS and prevent other sleep-related infant deaths.
- Tummy time for babies is critical in helping baby meet their milestones. Some parents, many young and teens, do not want to do tummy time until the umbilicus falls off or the baby is much older. Many opportunities have been missed, so parents must know they can begin tummy time at birth in short interval. (1)

" They will not always remember what they are told when it comes to safe sleep but will remember what they saw the staff do when caring for their newborns. It is imperative that we not simply recite to them what the safe sleep guidelines are but also explain the "why" of the recommendations "

As a bereaved mother (my son died in 1985 – SIDS), a healthcare professional, and a SIDS advocate, one of the most important things I have learned is that we must model the behavior we wish to see when working with pregnant and newly delivered parents. They will not always remember what they are told when it comes to safe sleep but will remember what they saw the staff do when caring for their newborns. It is imperative that we not simply recite to them what the safe sleep guidelines are but also explain the "why" of the recommendations

If we are truly to make a difference to the families we serve, we must understand it is not only ***OUR NEED*** for them to follow the safe sleep guidelines but to help them to find ***THEIR NEED*** to follow the safe sleep guidelines. We must always be aware of our implicit and explicit biases because that will help us "meet the family where they are" while respecting their cultural norms and mores.

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Disclosures: No disclosures noted.

NT

Nancy Maruyama, RN, BSN, NCBF
Mother of Brendan 6/1/85 – 10/18/85 SIDS
Executive Director
Sudden Infant Death Services of Illinois, Inc.
6010 State Route 53, Suite A
Lisle, IL 60532
630-541-3901 office
630-541-8246 fax
Website: www.sidsillinois.org
Email: nancy@sidsillinois.org

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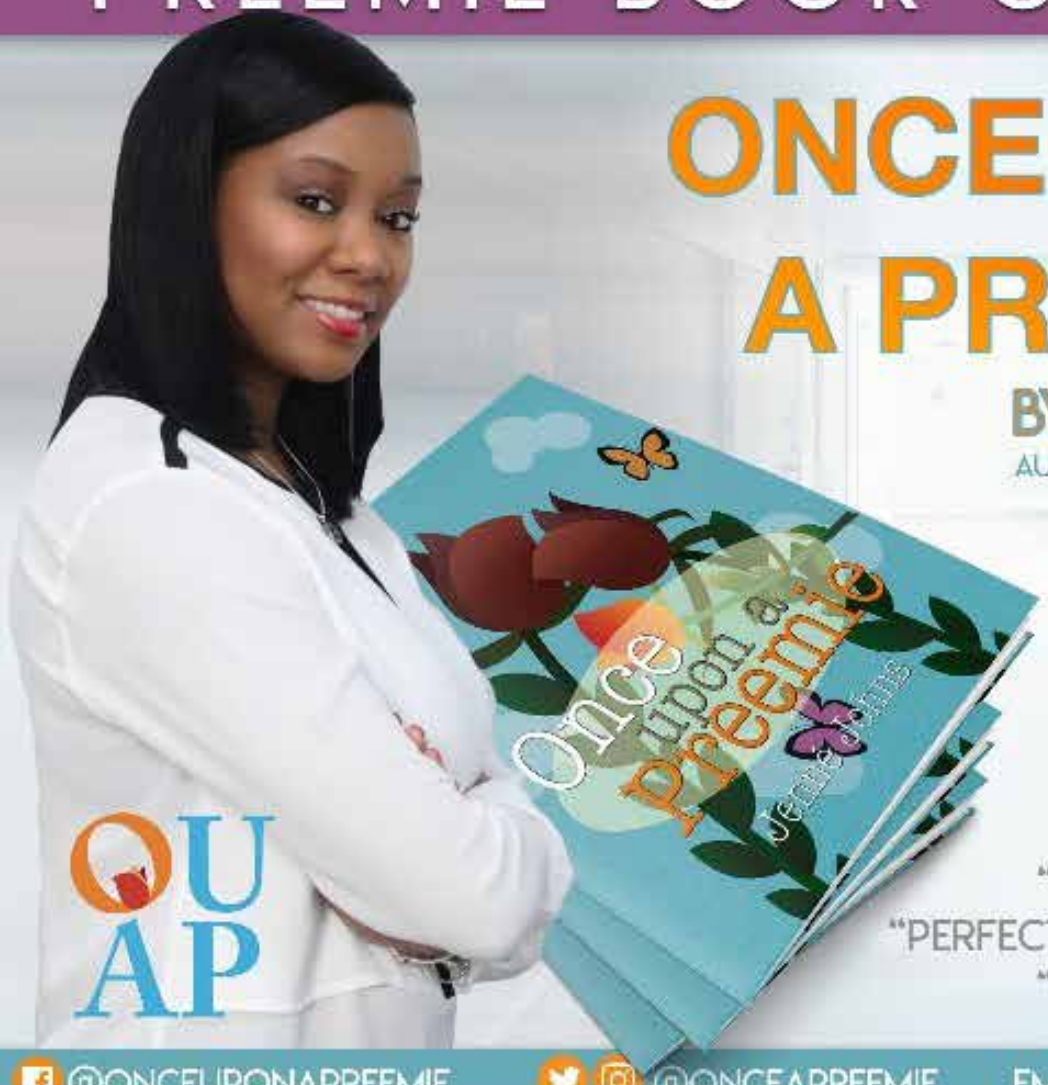

ONCE UPON A PREEMIE

BY JENNÉ JOHNS

AUTHOR | SPEAKER | ADVOCATE

QUAP

"ONE OF A KIND"
"PERFECT FOR PREEMIE FAMILIES"
"ENCOURAGING"

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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.

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HUDSON VALLEY PERINATAL PUBLIC HEALTH CONFERENCE
MATERNITY CARE COALITION ADVOCACY DAY

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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.

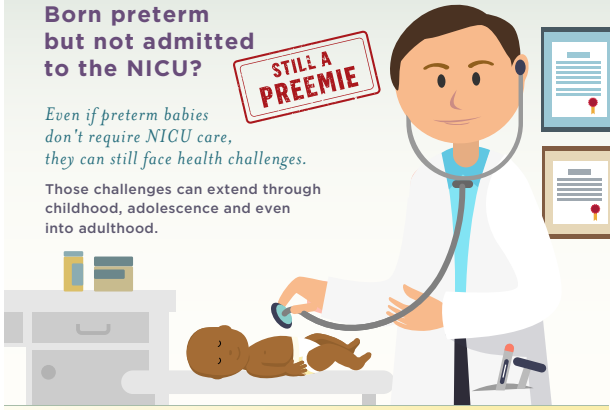
But because some health plans determine coverage based on a preemie's weight, **families of babies that weigh more may face access barriers and unmanageable medical bills.**

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

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OPIOIDS and NAS

When reporting on mothers, babies, and substance use

LANGUAGE MATTERS

I am not an addict.

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

I was exposed to opioids.

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

NAS is a temporary and treatable condition.

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

My mother may have a SUD.

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

My potential is limitless.

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

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NIH *Eunice Kennedy Shriver* National Institute of Child Health and Human Development

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Compiled and Reviewed by David Vasconcellos, MS IV

American Academy of Pediatrics Revises Clinical Guidelines for Preventing, Treating, and Monitoring Hyperbilirubinemia in Newborns

August 5, 2022

A committee of neonatologists, hospitalists, general pediatricians, a nurse, and breastfeeding experts worked from 2014 through 2022 to evaluate new evidence to inform the revised guidelines

The American Academy of Pediatrics has revised clinical guidelines on treating infants born at least 35 weeks into pregnancy for hyperbilirubinemia. For most babies, hyperbilirubinemia leads only to jaundice, a yellow appearance to the skin and whites of the eyes. However, very rarely, it can lead to severe complications affecting the brain.

The "Clinical Practice Guideline Revision: Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation," published in the September 2022 *Pediatrics* (published online Aug. 5) incorporates new research findings on risk-assessment and treatment. The guideline updates and replaces the 2004 AAP clinical practice guideline for the management and prevention of hyperbilirubinemia. A technical report, "Diagnosis and Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation," also will be published.

"It's important for hospitals and clinicians caring for newborns to have plans in place to prevent the serious complications of hyperbilirubinemia, including measuring bilirubin on all newborns prior to discharge," said Alex R. Kemper, MD, MPH, MS, FAAP, chair of the guideline authoring committee.

"There are ways we can help prevent hyperbilirubinemia, starting with good prenatal care and breastfeeding support," Dr. Kemper said. "However, measuring bilirubin levels on all babies is a critical step in knowing which babies need phototherapy, or light treatment, to bring down the bilirubin level, or how soon a baby needs follow-up after discharge."

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The committee considered the effectiveness of therapy and the potential harm of phototherapy in developing these guidelines.

If a high bilirubin level goes untreated, it can cause kernicterus, a type of permanent brain damage that is associated with cerebral palsy and serious movement problems. "This is why we need to make sure clinicians understand why it is important to test bilirubin levels and for families to understand their babies' risk and recommended follow-up," added Dr. Kemper.

Another treatment called exchange transfusion can be used in severe cases of hyperbilirubinemia. It is an approach to rapidly replace the baby's blood to lower the bilirubin level. Because research published since 2004 suggests bilirubin does not cause toxicity unless it reaches levels higher than previously thought, the revised clinical guideline raises phototherapy and exchange transfusion thresholds by a narrow range.

The AAP also used new research findings to revise the risk-assessment approach based on the difference between the phototherapy threshold and the infant's current bilirubin level to guide when bilirubin should be measured again. This approach will help clinicians make sure there is timely follow-up.

"Fortunately, kernicterus is rare, but the impact on children and their families can be devastating," Dr. Kemper said. "The guideline provides clinicians, birthing centers and hospitals with strategies to prevent the worst-case scenarios and to help educate families so they recognize the signs of jaundice and know when to follow-up with their pediatrician."

To request a copy of the clinical guideline or request an interview with an author, contact AAP Public Affairs. A HealthyChildren.org article for parents is here.

Editor's note: A solicited commentary, "Applying an Equity Lens to Clinical Practice Guidelines: Getting Out of the Gate," will be published in the same issue of Pediatrics.

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

Media Contact: Lisa Black, 630-626-6084, lblack@aap.org

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Active Treatment for Extremely Preterm Babies on the Rise

— Yet researchers find racial and ethnic disparities in treatment initiation

August 16, 2022

By Amanda D'Ambrosio, Enterprise & Investigative Writer, MedPage Today

Babies born extremely preterm were more likely to receive active treatment in recent years, but there were gaps in treatment among different racial and ethnic groups, according to a cross-sectional study.

From 2014 to 2020, the proportion of extremely preterm infants who received active treatment rose nearly 4% each year (45.7% to 58.8%), increasing in all racial and ethnic groups, reported Kartik K. Venkatesh, MD, PhD, of the Ohio State University College of Medicine in Columbus, and colleagues.

The frequency of active treatment increased in all gestational age groups, and most rapidly among babies born in week 22 of pregnancy, at an average increase of 14.4% per year in the study time period (from 14.0% to 29.7%), they stated in *JAMA*.

However, babies born to white individuals were more likely to undergo treatment compared to those born to Asian or Pacific Islander, Black, or Hispanic people. The authors stated that in "2019, 66% of periviable neonates were born to a mother who identified as either non-Hispanic Black or Hispanic,» and said «one possible explanation for variations in active treatment in the periviable period by race and ethnicity may be differing decisions of clinicians and families when faced with the high likelihood of morbidity and mortality and predictive uncertainty."

In an accompanying editorial, Henry Lee, MD, and Deirdre Lyell, MD, both of the Stanford University School of Medicine in California, noted that more data are needed about treatment efficacy and prognosis. They added a lack of data describing an infant's individual morbidity and mortality risk after active treatment creates barriers to effective counseling, as the definition of active treatment is unclear and dependent on the region where a patient receives care, the level of care at a hospital, and the individual family.

"Unlike other interventions that may be considered appropriate or optimal for a broad population, it is challenging to characterize active treatment and its components for the extremely premature population as always the 'right' treatment, given the uncertainties in the likelihood of survival and survival without morbidity," they stated. "Quality care in this context should be viewed not as a simple matter of pursuing active treatment but rather as the optimal alignment of treatment, prognosis, and the values of the mother and family."

The serial cross-sectional study, obtaining data on live births between 2014 and 2020 with data from the U.S. National Vital Statistics System Natality Files. Venkatesh's group collected data from all live births,

defining periviable births as infants born between 22 weeks' and 25 weeks and 6 days' gestation. The researchers excluded infants who were not U.S. residents and those with clinical anomalies.

They analyzed the proportion of neonates who received active treatment, which included interventions such as surfactant therapy, immediate assisted ventilation at birth, assisted ventilation for more than 6 hours, and antibiotic therapy during neonatal ICU admission. They adjusted for covariates including maternal education, insurance status, year of delivery, age, parity, prepregnancy BMI, preterm birth, gestational diabetes, infant birthweight and sex, among others.

Of nearly 27 million live births in the U.S., approximately 62,000 extremely preterm neonates were included in the final analysis. The median maternal age was 28 and 54% of births were covered by Medicaid.

Around 5% of the infants in the study were Asian or Pacific Islander, 37% were Black, 24% were Hispanic, and 34% were white.

Of all periviable births, just over half received active treatment. Approximately 45% who received active treatment underwent surfactant therapy, 96% immediate assisted ventilation at birth, 60% assisted ventilation for more than 6 hours, and 47% antibiotic therapy.

Compared to infants born to white individuals, those born to Asian or Pacific Islander (adjusted risk ratio [aRR] 0.82, 95% CI 0.79-0.86), Black (aRR 0.90, 95% CI 0.89-0.92), or Hispanic (aRR 0.83, 95% CI 0.81-0.85) individuals were less likely to receive active treatment. Infants born to people of color who were also delivered at 23, 24, and 25 weeks' gestation were all significantly less likely to receive active treatment.

Study limitations included the lack of assessment of neonatal morbidity and mortality. Also, the researchers did not include stillbirths in the analysis, which raises the possibility for selection bias regarding the coding of deliveries as live births or stillbirths. And previous studies have had varying definitions of active treatment, the authors pointed out.

Amanda D›Ambrosio is a reporter on MedPage Today's enterprise & investigative team. She covers obstetrics-gynecology and other clinical news, and writes features about the U.S. healthcare system. Follow

Disclosures

The study was funded by the Care Innovation and Community Improvement Program at the Ohio State University and the National Heart, Lung, and Blood Institute.

Venkatesh disclosed no relationships with industry. Co-authors disclosed support from, and/or relationships with, the NIH, Baxter International, Siemens Healthcare, Progenity, and the American Heart Association.

Lee and Lyell disclosed support from, and/or relationships with the NIH, the Society for Maternal-Fetal Medicine, the University of California San Francisco, Bloomlife, and Zenflow.

Primary Source

JAMA

Source Reference: *Venkatesh K, et al "Trends in active treatment of live-born neonates between 22 weeks 0 days and 25 weeks 6 days by gestational age and maternal race and ethnicity in the US, 2014 to 2020" JAMA 2022; DOI: 10.1001/jama.2022.12841.*

Secondary Source

JAMA

Source Reference: *Lee HC and Lyell DJ "Active treatment and shared decision-making for infants born extremely preterm at 22 to 25 weeks" JAMA 2022; DOI: 10.1001/jama.2022.13364.*

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08/05/2022

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"It's important for hospitals and clinicians caring for newborns to have plans in place to prevent the serious complications of hyperbilirubinemia, including measuring bilirubin on all newborns prior to discharge,"

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said Alex R. Kemper, MD, MPH, MS, FAAP, chair of the guideline authoring committee.

"There are ways we can help prevent hyperbilirubinemia, starting with good prenatal care and breastfeeding support," Dr. Kemper said. "However, measuring bilirubin levels on all babies is a critical step in knowing which babies need phototherapy, or light treatment, to bring down the bilirubin level, or how soon a baby needs follow-up after discharge."

The committee considered the effectiveness of therapy and the potential harm of phototherapy in developing these guidelines.

If a high bilirubin level goes untreated, it can cause kernicterus, a type of permanent brain damage that is associated with cerebral palsy and serious movement problems. "This is why we need to make sure clinicians understand why it is important to test bilirubin levels and for families to understand their babies' risk and recommended follow-up," added Dr. Kemper.

Another treatment called exchange transfusion can be used in severe cases of hyperbilirubinemia. It is an approach to rapidly replace the baby's blood to lower the bilirubin level. Because research published since 2004 suggests bilirubin does not cause toxicity unless it reaches levels higher than previously thought, the revised clinical guideline raises phototherapy and exchange transfusion thresholds by a narrow range.

The AAP also used new research findings to revise the risk-assessment approach based on the difference between the phototherapy threshold and the infant's current bilirubin level to guide when bilirubin should be measured again. This approach will help clinicians make sure there is timely follow-up.

"Fortunately, kernicterus is rare, but the impact on children and their families can be devastating," Dr. Kemper said. "The guideline provides clinicians, birthing centers and hospitals with strategies to prevent the worst-case scenarios and to help educate families so they recognize the signs of jaundice and know when to follow-up with their pediatrician."

To request a copy of the clinical guideline or request an interview with an author, contact AAP Public Affairs. A HealthyChildren.org article for parents is **here**.

Editor's note: A solicited commentary, "Applying an Equity Lens to Clinical Practice Guidelines: Getting Out of the Gate," will be published in the same issue of Pediatrics.

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

Contact information for AAP headquarters

American Academy of Pediatrics

345 Park Blvd, Itasca, IL 60143

New AAP main number: 630-626-6000

NT

CDC Investigation Notice: Small turtles purchased online linked to Salmonella outbreak affecting children

July 21, 2022

A CDC investigation notice regarding a multistate outbreak of *Salmonella* infections has been posted: https://www.cdc.gov/salmonella/stanley-07-22/index.html

Key Points:

Fifteen people infected with the outbreak strain of *Salmonella* have been reported from 11 states. Five people have been hospitalized. No deaths have been reported. Many people in this outbreak are children.

The true number of sick people is likely higher than the number reported, and the outbreak may not be limited to the states with known illnesses. This is because some people recover without medical care and are not tested for *Salmonella*.

Interviews with ill people, laboratory data, and purchase information show that small turtles (shells less than 4 inches long) are making people sick. Most people reported buying small turtles online. Half of the people who purchased their turtles online bought them from a website called myturtlestore.com, despite the federal law banning the sale of small turtles as pets.

What You Should Do:

Only buy turtles with shells longer than 4 inches and buy them from reputable pet stores or rescues.

Stay healthy around your pet turtle by always washing your hands after touching, feeding, or caring for your turtle. Adults should make sure young children are washing their hands properly.

Don't toss your turtle if you decide you no longer want it. Reach out to your local pet store or reptile rescue.

Pick the right pet for your family. Pet turtles are not recommended for children younger than 5, adults aged 65 and older, and people with weakened immune systems as they are more likely to get a serious illness from germs that turtles can carry.

About *Salmonella*:

Most people infected with *Salmonella* develop diarrhea, fever, and stomach cramps 6 hours to 6 days after being exposed to the bacteria.

The illness usually lasts 4 to 7 days, and most people recover without treatment.

In some people, the illness may be so severe that the patient is hospitalized.

Children younger than 5, adults 65 and older, and people with weakened immune systems are more likely to have severe illness.

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NT

CDC Says More Is Needed to Protect Infants From Hepatitis B

August 11, 2022

Progress has occurred in reducing maternal-to-child transmission of hepatitis B but is still lagging, particularly in Africa, according to a recent report from the Centers for Disease Control and Prevention (CDC) on maternal-to-child transmission (MTCT) of hepatitis B virus (HBV).

By December 2020, 190 (98%) of 194 World Health Organization (WHO) member states had introduced universal infant vaccination with hepatitis B vaccine (HepB), four countries more than in 2016. During this period, there was a 10% increase in providing hepatitis B birth dose (HepB-BD) to all newborns within 24 hours of birth, up to 110 countries (57%).

The slow increase suggests progress may have stalled, the authors write. In 2020, fewer than half of infants globally were given a HepB-BD shot.

Rania Tohme, MD, MPH, the team lead of the Hepatitis B and Tetanus Team in the Global Immunization Division at the CDC, told *Medscape Medical News:* «There are still almost 50 countries that do not provide the hepatitis B birth dose, most of them in the African region…The coverage has dropped more recently in 2020 and 2021 as a result of the COVID 19 pandemic, which impacted the access and the use of healthcare services.»

She emphasized that Africa "has the highest prevalence of hepatitis B infection in children, over 4 million infected with hepatitis B, representing a 2.5% prevalence of chronic infection in children under 5, which is the highest among all regions globally."

Other regions have less than 1% prevalence of hepatitis B in children. Yet, "despite the higher burden in the African region, it's still lagging behind in the introduction of the hepatitis B birth dose and HepB3," Tohme said.

Hepatitis B Leading Cause of Liver Disease

HBV is the leading cause of cirrhosis of the liver and liver cancer in adulthood. The scale of the problem is vast. If not prevented with vaccination, 90% of children will become infected at birth. There are currently 6.4 million young children with chronic HBV globally.

Initially, the World Health Assembly focused on three doses of the hepatitis B vaccine (HepB3). In 2016, they set a new goal to also attain ≥ 90% coverage with HepB-BD. WHA aims to eliminate viral hepatitis as a public health threat by 2030. Demonstrating a ≤ 0.1% prevalence of HBV surface antigen (HBsAg) among children aged 5 and younger and vaccinated would validate that their goal had been reached. In 11 countries in 2020, prevalence of HBV surface antigen among children was less than 0.1%, the report says.

Asked why African countries lag behind other nations in vaccination, Tohme said policymakers "might not be giving it as much attention or priority as some of the other maybe vaccine-preventable diseases in children because it is a silent infection…They will only start to manifest themselves in terms of liver disease, cirrhosis, and cancer when they are older… so people don't link this to a transmission that happened during birth or childhood."

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In countries with historically low HBV prevalence, "ensuring equal access for foreign-born women to antenatal services and MTCT prevention interventions is important," Tohme and colleagues write in the report.

Tohme said, "Countries that do not have a high prevalence of hepatitis B, in general, have to remain aware about screening for hepatitis B and also making sure the children are vaccinated for hepatitis B when people are coming from other countries."

She emphasized the magnitude of the problem and the urgency of improving vaccination. "There are 296 million people living with hepatitis B around the world, including 6 million children under the age of 5," Tohme said. "And it's a disease that is vaccine-preventable. It is the leading cause of cirrhosis and liver cancer. And if children are not vaccinated at birth, and are infected at birth, then 9 out of 10 children will get chronic disease and will be at risk of liver cancer."

Public Education Key to Improve Vaccination

Anna Suk-Fong Lok, MD, is assistant dean for clinical research and professor in hepatology at the University of Michigan Medical School in Ann Arbor. Lok, who was not involved with the article in the CDC's *Mor-*

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bidity and Mortality Weekly Report, noted that one of the reasons HepB-BD is not given in many African countries is that many children are born at home, in rural areas.

Lok suggested that educating both physicians and the public was key to improving vaccination rates.

"But a public can be requesting things to happen also," she says. "If the public is not aware, they cannot be pushing; they cannot be requesting. They cannot be asking: 'Why is my baby not getting the vaccine? Or can you make sure that my baby gets a vaccine?' So the public has to be educated…and to know that this is what the baby's going to be getting."

Lok echoed that lack of governments' willpower and resources was a barrier. Her take-home message is: "We need to do a better job. We know that we have very effective means that can prevent MTCT transmission…If you compare 2016 and 2020, it seems that we're not making progress, but if you compare to 2000, we've made progress."

There needs to be more focus and funding for hepatitis, Lok concluded, but with both governments and NGOs the focus "stays on HIV, malaria, and TB."

Tohme and Lok report no relevant financial relationships.

MMWR. Published online July 29, 2022. Full text

Judy Stone, MD, is an infectious disease specialist and author of Resilience: One Family's Story of Hope and Triumph Over Evil and of Conducting Clinical Research, the essential guide to the topic. You can find her at drjudystone.comor on Twitter @drjudystone.

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NT

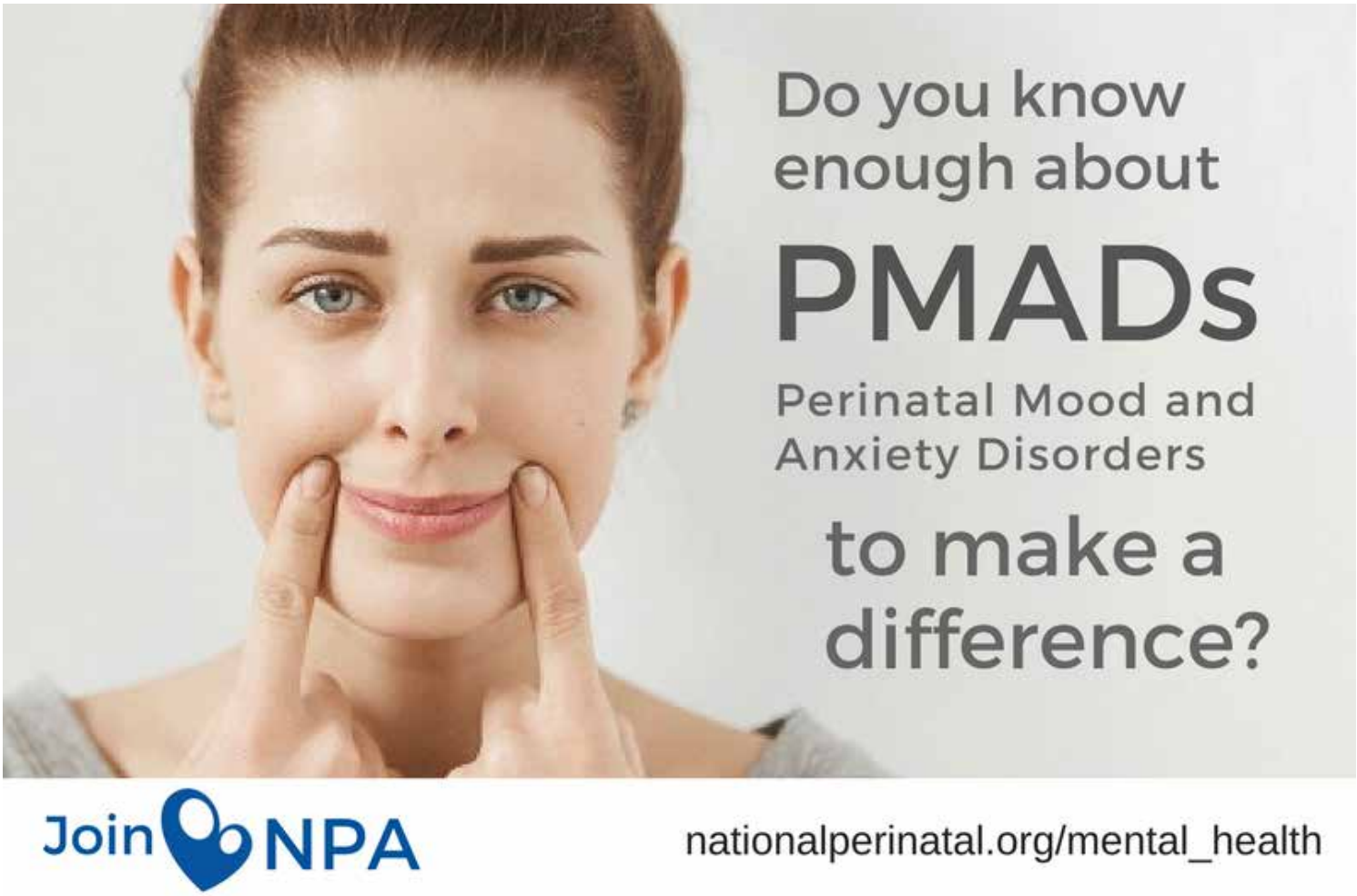
NIH-funded researchers develop same-day test to detect abnormal fetal chromosomes

STORK helps identify cause of miscarriage and potentially improves in vitro fertilization process

August 17, 2022

What

Scientists funded by the National Institutes of Health have developed a same-day test to identify abnormal fetal chromosomes. The Short-read Transpore Rapid Karyotyping (STORK) test can detect extra or



missing chromosomes (i.e., aneuploidy) using samples collected from prenatal tests, such as amniocentesis and chorionic villus sampling, as well as tissue obtained from miscarriage and biopsies from pre-implantation embryos produced using *in vitro* fertilization (IVF). The study is led by Brynn Levy, Ph.D., and Zev Williams, M.D., Ph.D., from Columbia University Fertility Center and Columbia University Irving Medical Center, New York City, and is supported by NIH's *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) through the Human Placenta Project.

The study team compared STORK to standard methods by testing 218 samples that included tissue from miscarriage, chorionic villi, amniotic fluid and trophectoderm biopsies, which are used to evaluate embryos before IVF implantation. In this set of samples, STORK had an accuracy of 98 to 100%. In another set of 60 samples, technicians in a clinical laboratory certified for quality testing, called a Clinical Laboratory Improvement Amendments certification, performed STORK. In these samples, STORK was 100% in accordance with standard clinical testing.

Overall, the study shows that STORK is comparable to standard clinical tests and has many advantages. STORK is faster, providing results within hours versus several days. It is also cheaper, with the study team estimating STORK to cost less than $50 per sample, if 10 samples are run at the same time, or up to $200 if a sample is run on its own. STORK can also be done at the point-of-care for a patient, eliminating the need to ship a sample to a clinical laboratory.

According to the study authors, STORK may be particularly useful in identifying genetic causes of miscarriage. Currently, professional societies only recommend genetic testing if a person has had multiple miscarriages, but an easy, cost-effective test like STORK can potentially be offered after the first miscarriage. STORK can also be used to streamline the IVF process. Currently, embryos must be frozen while genetic tests are run and analyzed before implantation. STORK's ability to provide results within hours can presumably eliminate this freezing step, which saves time and cost. More work is needed to validate STORK, but if results continue to show promise, STORK could improve the quality of reproductive healthcare.

Additional NIH funding comes from the National Cancer Institute.

Who

Diana W. Bianchi, M.D., NICHD Director, is available for interviews.

To arrange an interview with Dr. Bianchi, please e-mail nichdpress@mail.nih.gov(link sends e-mail) or call 301-496-5133.

Reference

Wei S, *et al.*, Nanopore-based sequencing for rapid aneuploidy analysis in reproductive care has significant advantages. *New England Journal of Medicine* DOI: 10.1056/NEJMc2201810 (2022)

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

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NT

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Released: Thursday 12/13/2018 12:32 PM, updated Saturday 3/16/2019 08:38, Sunday 11/17/2019 and Friday 11/20/2020

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NT

Physician Mothers and the Breastfeeding Challenge

August 16, 2022

August is National Immunization Awareness Month (NIAM), a good time to elevate the importance of The responses to the survey are frustrated and angry, and they paint an unflattering picture of life as a breastfeeding physician.

"I pumped 2 years on a hospital bathroom floor."

"Any changes to schedule had to be approved by chair. There was no way he was going to approve pumping slots."

"My chief resident thought it was funny to 911 page me while I was pumping — or knock on the door telling me to get back to work!"

"I lose quite a bit of my pay due to pumping milk because I am paid strictly on RVU [relative value unit]. I chose this for my family, but the pay disparity is pretty high."

Many of the statements came as no surprise for Snigdha Jain, MD, who conducted the survey, a national study of breastfeeding physicians that was recently published in the Journal of General Internal Medicine. Jain, who works in pulmonary/critical care and geriatrics at the Yale School of Medicine, is currently breastfeeding her second child and has ample experience with the problems breastfeeding physicians face when they return to work.

"I had the perspective of pumping at work both as an attending physician and then going back to training as a fellow," Jain says. "And that got me thinking about writing about these experiences and also advocating for other women who were in my position or are going to be in my position."

If any cohort understands the many benefits of breastfeeding children, it's doctors. Numerous organizations, including the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Obstetricians and Gynecologists, and the World Health Organization, strongly recommend breastfeeding. They advise that infants exclusively receive breast milk until 6 months of age and that breastfeeding be continued for up to 2 years or longer.

All breastfeeding parents who return to the workplace must regularly express breastmilk to provide for their children and maintain their supply. But the widespread lack of accommodation for physician parents shown in Jain's survey and others is startling, given the support for breastfeeding in the medical field. Wouldn't it be expected that physicians would practice what they preach?

Studies have found that physician parents as a group are particularly at risk for ending breastfeeding prematurely or before they have reached their personal goals. Over 90% of physician mothers initiate breastfeeding, but by 12 months post partum, the figure drops to about 41%, according to a 2018 studyfrom Brigham and Women's Hospital. Previous studies found rates as low as 34%. Nearly half of respondents in the 2018 study reported that they would have breastfed flonger had their jobs been more accommodating.

The Challenges: Time and Space

Federal law requires employers to provide "reasonable" break time to express breastmilk and also to provide a private space to do so that is not a bathroom. But the law only applies to employers that have more than 50 employees and allows break times to be unpaid. Some states have passed additional laws with further protections. In reality, physicians say, accessing time and space is often very challenging, especially since working hours can be unpredictable and the "private space" may be nowhere near their clinical area.

"One of the biggest challenges I encountered as a fellow was telling your attending that you needed to go pump," says Jain. "The second was finding space. And that was a theme we found in this qualitative study. Most hospitals now have lactation rooms, but [often] you don›t know where they are. I would end up using a call room, which was intended for residents, so I›d always feel like this is somebody else›s space, not a dedicated facility for lactation.»

Many physicians report that even rooms specifically designated for lactation may lack essentials, such as a fridge for storing breast milk, a sink for cleaning breast

pump parts, or a computer for continuing work-related tasks.

Gul Madison, MD, an infectious disease physician at Mercy Fitzgerald Hospital near Philadelphia, has breastfed three children and says she found that breastfeeding the third was the most difficult, owing to her work situation. At the time, she was part of a private practice and conducted rounds in seven hospitals. Time and space were hard to find.

"I had conversations with each of these hospitals to see how I could pump milk," Madison says. "Some of them looked at me like I had two heads, and some were very accommodating. One of them gave me key for a little closet and said, 'This is yours. You can use it.' One of them actually had a lactation room. It was extremely challenging, and there were many times when I ended up pumping in the hospital bathroom or in my car."

Madison also found herself working longer hours. Although she was able to take breaks, she was adding 15 minutes three times a day to her work schedule and felt she was still expected to see the same number of patients. Although her colleagues were supportive, she says the lack of a structure and the expectation that she maintain productivity were stressful with a baby and two older children at home.

"There's a disconnect," Madison believes, "in terms of what we recommend vs whether we apply that to our lives or not."

The Financial Cost

A few months after returning from maternity leave with her second child, Rebecca Shatsky, MD, received a troubling email from her hospital administration. She was seeing fewer patients, and this was a problem. Shatsky, who is a medical oncologist specializing in breast cancer at the University of California San Diego Health, does not have a fixed salary. A large percentage of her income is determined by RVUs, a common compensation model based on the number of patient visits or procedures a physician performs. To produce enough breast milk for her infant son, Shatsky had to block at least two time slots at her clinic per day. She realized how much her financial situation would suffer as a result.

"My administration wasn't very happy, because I wasn't as productive as I previously was because I was pumping," Shatsky explains. "And while they didn't come right out and say, 'Please stop pumping,' they would give me monthly reminders that my productivity wasn't as good as it used to be. It was really stressful."

Shatsky took her concerns to Twitter, posting, "I am an academic physician getting penalized for breastfeeding my infant son." Her tweet received nearly a thousand likes, but she also got angry messages from men protesting that they shouldn't have to pick up the bill for her decision to breastfeed or suggesting that she simply quit medicine and stay home.

Ann Kellams, MD, is a pediatrician at the University of Virginia Health and also serves as president of the Academy of Breastfeeding Medicine, a global organization for physicians aimed at promoting, protecting, and supporting breastfeeding. The group has published more than 30 clinical protocolsrelated to breastfeeding, including one for creating a breastfeeding-friendly office. Kellams sees accommodation for lactating doctors as an "investment" that all institutions should be making in their employees. The result, Kellams believes, will be more loyalty and greater retention.

I think that as a whole, the profession is starting to wake up and realize that we need to be taking care of ourselves," Kellams says. "And the investment in young families, making accommodations for them, being flexible with scheduling, and supporting maternity leave, paternity leave, and childcare are going to be what helps us get there."

Solutions That Work

At a time when nearly half of graduating medical students are women, the need to find solutions for breastfeeding physicians is especially urgent. Some institutions have taken a receptive approach, encouraging their trainees and faculty to voice concerns so that problems can be addressed.

Hannah Hughes, MD, an assistant professor and associate medical director with the University of Cincinnati emergency medicine department, has a 6-month-old baby and has received strong support for breastfeeding from her colleagues. Hughes uses a recent innovation in breast milk expres-

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sion: wearable breast pumps. She says they have been a "game changer."

As an emergency department physician, it is often impossible for Hughes to leave the department. Unlike traditional breast pumps that are bulky and must be plugged in, cordless wearable pumps fit directly into a bra. Although she prefers to pump privately — there is a separate lactation room inside the emergency department — it is possible for Hughes to walk around and see patients. She even rushed to a bedside and performed an intubation in the middle of a pumping session.

"It's been a huge win for trying to maintain our breastfeeding culture," Hughes says. "That case actually spurred us to have a conversation as a department. And now my department funds wearable breast pumps for any of our providers, our residents, PAs, NPs, and attendings who come back from leave, if they want them."

However, wearable pumps don't work for everyone, and so Hughes' hospital has gone further, creating a formal lactation committee to share best practices across specialties and encouraging specific departments to write their own lactation policies. These can dictate shift schedules, allowing employees to take breaks, and also return-to-work protocols after maternity leave.

Other institutions are beginning to address the pay disparity by adjusting the RVU model. Acknowledging that pumping breast milk results in decreased productivity, the University of California San Francisco Health recently began providing RVU credits that apply to the breaks needed for lactation. The program allows physicians to schedule a 30-minute break for each half-day clinic session for up to 1 year following childbirth. Those breaks are reimbursed with a set amount of RVUs, and in addition, RVU targets are reduced.

Elsewhere, individual groups of physician parents are pushing for changes. Madison has been involved with designating a lactation room at her hospital. At the University of Texas Southwestern Medical Center, where Jain began her fellowship training, she formed a committee and scheduled meetings with the administration. The institution has two hospital sites. At one, Jain says they were able to procure a lactation room, laptop computers, and a fridge. Despite multiple discussions, no changes materialized at the other site.

Still, Jain feels that the burden on physician parents to organize their own breastfeeding support is too great. For people already stretched in many directions, she says it's unfair that they should be expected to make changes happen on their own time.

"Returning to work is so stressful post maternity," Jain says. "To have experiences like this where your work environment is really adding stress is just unacceptable.... It's kind of like creating restrooms. They just need to be there. You should not have to go and build one yourself."

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NT

Prematurity, Family Environment Linked to Lower Rate of School Readiness

August 15, 2022

Among children born prematurely, rates of school readiness were lower in comparison with rates for children born full term, new data indicate.

In a Canadian cohort study that included more than 60,000 children, 35% of children born prematurely had scores on the Early Development Instrument (EDI) that indicated they were vulnerable to developmental problems, compared with 28% of children born full term.

"Our take-home message is that being born prematurely, even if all was well, is a risk factor for not being ready for school, and these families should be identified early, screened for any difficulties, and offered early intervention," senior author Chelsea A. Ruth, MD, assistant professor of pediatrics and child health at the University of Manitoba in Winnipeg, told *Medscape Medical News*.

The findings were published online August 8 in *JAMA Pediatrics.*

Gestational Age Gradient

The investigators examined two cohorts of children who were in kindergarten at the time of data collection. One of them, the population-based cohort, included children born between 2000 and 2011 whose school readiness was assessed using the EDI data. Preterm birth was defined as a gestational age (GA) of less than 37 weeks. The other, the sibling cohort, was a subset of the population cohort and included children born prematurely and their closest-in-age siblings who were born full term.

The main outcome was vulnerability in the EDI, which was defined as having a score below the 10th percentile of the Canadian population norms for one or more of the five EDI domains. These domains are physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication skills and general knowledge.

A total of 63,277 children were included in the analyses, of whom 4352 were born prematurely (mean GA, 34 weeks; 53% boys) and 58,925 were born full term (mean GA, 39 weeks; 51% boys).

After data adjustment, 35% of children born prematurely were vulnerable in the EDI, compared with 28% of those born full term (adjusted odds ratio [AOR], 1.32).

The investigators found a clear GA gradient. Children born at earlier GAs (<28 weeks or 28 – 33 weeks) were at higher risk of being vulnerable than those born at later GAs (34 – 36 weeks) in any EDI domain (48% vs 40%) and in each of the five EDI domains. Earlier GA was associated with greater risk for vulnerability in physical health and well-being (34% vs 22%) and in the Multiple Challenge Index (25% vs 17%). It also was associated with greater risk for need for additional support in kindergarten (22% vs 5%).

Furthermore, 12% of children born at less than 28 weeks' gestation were vulnerable in two EDI domains, and 8% were vulnerable in three domains. The corresponding proportions were 9% and 7%, respectively,

for those born between 28 and 33 weeks and 7% and 5% for those born between 34 and 36 weeks.

"The study confirmed what we see in practice, that being born even a little bit early increases the chance for not being ready for school, and the earlier a child is born, the more likely they are to have troubles," said Ruth.

Cause or Manifestation?

In the population cohort, prematurity (<34 weeks' GA: AOR, 1.72; 34 – 36 weeks' GA: AOR, 1.23), male sex (AOR, 2.24), small for GA (AOR, 1.31), and various maternal medical and sociodemographic factors were associated with EDI vulnerability.

In the sibling subset, EDI outcomes were similar for children born prematurely and their siblings born full term except for the communication skills and general knowledge domain (AOR, 1.39) and the Multiple Challenge Index (AOR, 1.43). Male sex (AOR, 2.19) was associated with EDI vulnerability in this cohort as well, as was maternal age at delivery (AOR, 1.53).

"Whether prematurity is a cause or a manifestation of an altered family ecosystem is difficult to ascertain," Lauren Neel, MD, a neonatologist at Emory University in Atlanta, Georgia, and colleagues write in an accompanying editorial. "However, research on this topic is much needed, along with novel interventions to change academic trajectories and care models that implement these findings in practice. As we begin to understand the factors in and interventions for promoting resilience in preterm-born children, we may need to change our research question to this: could we optimize resilience and long-term academic trajectories to include the family as well?"

Six Crucial Years

Commenting on the study for Medscape, Veronica Bordes Edgar, PhD, associate professor of psychiatry and pediatrics at the University of Texas Southwestern Medical Center's Peter O'Donnell Jr Brain Institute, in Dallas, Texas, said, "None of the findings surprised me, but I was very pleased that they looked at such a broad sample."

Pediatricians should monitor and screen children for early academic readiness, since these factors are associated with later academic outcomes, Edgar added. "Early intervention does not stop at age 3, but rather the first 6 years are so crucial to lay the foundation for future success. The pediatrician can play a role in preparing children and families by promoting early reading, such as through Reach Out and Read, encouraging language-rich play, and providing guidance on early childhood education and developmental needs.

"Further examination of long-term outcomes for these children to capture the longitudinal trend would help to document what is often observed clinically, in that children who start off with difficulties do not always catch up once they are in the academic environment," Edgar concluded.

The study was supported by Research Manitoba and the Children's Research Institute of Manitoba. Ruth, Neel, and Edgar have disclosed no relevant financial relationships.

JAMA Pediatr. Published online August 8, 2022. Full text

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Prolacta Bioscience Appoints Dr. Erin Hamilton Spence as Director of Clinical Education and Professional Development

Prolacta Bioscience

Aug 02, 2022, 09:07 ET

DUARTE, Calif., Aug. 2, 2022 /PRNewswire/ -- Prolacta Bioscience®, the world›s leading hospital provider of 100% human milk-based nutritional products for critically ill, premature infants, announced today that neonatologist and breastfeeding advocate Erin Hamilton Spence, MD, IBCLC, has been appointed director of clinical education and professional development.

Dr. Erin Hamilton Spence

Hamilton Spence brings more than 14 years of clinical experience as a board-certified neonatologist and lactation consultant to Prolacta's Medical Science Liaison team, having practiced at multiple hospital neonatal intensive care units (NICUs), including Cook Children's Medical Center and Baylor Scott & White Health-Andrews Women's Hospital.

At Pediatrix Medical Group of Texas, Hamilton Spence has been an attending neonatologist and lead physician for the breast milk continuous quality improvement (CQI) initiative. At Cook Children's Medical Center, Hamilton Spence currently chairs the Department of Critical Care. She founded the Gastrointestinal Rehabilitation Adaptive Care & Education (GRACE) team in 2020. Since 2010, Hamilton Spence has also served as associate medical director of the NICU at Baylor Scott & White Health- Andrews Women's Hospital leading QI efforts, including as lead physician for multidisciplinary round as well as its Uber Preemie Team, caring for infants less than or equal to 24 weeks gestation, since 2016.

"Dr. Erin Hamilton Spence is an experienced neonatologist with a demonstrated history of clinical leadership in some of the country›s top NICUs,» said Melinda Elliott, MD, chief medical officer at Prolacta. "Her extensive NICU and milk banking experience makes her perfect for the role of educating other neonatologists about the importance of an Exclusive Human Milk Diet (EHMD). Her leadership will be key to ensure that more critically ill, premature infants can benefit from human milk when they need it most."

A noted human milk researcher, Hamilton Spence has authored or co-authored studies published in the *Journal of Perinatology, PLOS One, Gut,* and the *Journal of Human Lactation*. She has presented her work at numerous conferences, including those of the Academy of Breastfeeding Medicine, the Pediatric Academic Societies, the American

College of Obstetrics and Gynecology, and the Human Milk Banking Association of North America.

Hamilton Spence holds an academic appointment as a clinical assistant professor at Texas Christian University School of Medicine. She served as the co-medical director and past president of the Mother›s Milk Bank of North Texas and is a member of the Texas Breastfeeding Coalition. Additionally, Hamilton Spence serves on the faculty of both the Scott & White Annual Neonatology (SWAN) Conference and the NEO Conference.

“I’m honored to join Prolacta’s Medical Science Liaison team. I’ve witnessed the lifesaving value of Prolacta’s products in our NICUs. This position for Prolacta marries all my strongest interests in human milk nutrition research, education, and quality,” Hamilton Spence said. “Prolacta has led the way in advancing human milk-based nutritional care for premature infants in the NICU, and I am thrilled to make a difference beyond my own NICU for the most vulnerable infants and their families.”

A fellow of the Academy of Breastfeeding Medicine and the American Academy of Pediatrics, Hamilton Spence completed her fellowship and pediatrics residency at the University of Texas Health Science Center – Houston. She graduated from medical school at the University of Texas Medical Branch in Galveston.

About Prolacta Bioscience

Prolacta Bioscience® Inc. is a privately held, global life sciences company dedicated to Advancing the Science of Human Milk® to improve the health of critically ill, premature infants. Prolacta’s 100% human milk-based nutritional products have been evaluated in more than 20 clinical studies published in peer-reviewed journals. More than 80,000 premature infants have benefited from Prolacta’s nutritional products worldwide to date.1 Established in 1999, Prolacta is the world’s leading provider of human milk-based nutritional products for hospital use and is also exploring the therapeutic potential of human milk across a wide spectrum of diseases. Prolacta maintains the industry’s strictest quality and safety standards for screening, testing, and processing donor human milk. Operating the world’s first pharmaceutical-grade human milk processing facilities, Prolacta uses vat pasteurization and a patented, FDA-reviewed manufacturing process to ensure pathogen inactivation while protecting the nutritional composition and bioactivity of its human milk-based products. Prolacta is a global company with headquarters in Duarte, California, and can be found online at www.prolacta.com, on Twitter, Instagram, Facebook, and LinkedIn.

Media Contact:
Loren Kosmont
Lkosmont@prolacta.com
310-721-9444

Reference

1. Estimated number of premature infants fed Prolacta’s products from January 2007 to December 2021; data on file.

SOURCE Prolacta Bioscience

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Genetics Corner: An Infant with a Right Congenital Diaphragmatic Hernia and a Small 1h5q26.3 Deletion with Loss of IGF1R

Robin Clark, MD, Subhadra (Subha) Ramanathan, M.Sc., M.S.

Clinical Summary:

A preterm SGA female with unrepaired right-sided diaphragmatic hernia (CDH) was found to have a pathogenic 68 Kilobase deletion of 15q26.3 on chromosome microarray: arr[hg19] 15q26.3 (99,173,480-99,241,724) x1. A genetic consultation was requested. Other problems included severe pulmonary HTN, mild Ebstein's anomaly, MSSA bacteremia, history of lower extremity deep vein thrombosis, intermittent hypertensive episodes and seizures, well controlled with phenobarbital.

" A genetic consultation was requested. Other problems included severe pulmonary HTN, mild Ebstein's anomaly, MSSA bacteremia, history of lower extremity deep vein thrombosis, intermittent hypertensive episodes and seizures, well controlled with phenobarbital."

This infant was born preterm at 34w 2 d by C-section in the vertex presentation to a 37-year-old G10P4-5SAb5 mother who presented with polyhydramnios and premature rupture of membranes. Intrauterine growth retardation and diaphragmatic hernia had been diagnosed prenatally by fetal ultrasound. The delivery was complicated by nuchal cord x1, fetal decelerations, and bleeding from placental abruption and previa. Apgar scores were 5^{1} and 7^{5}. Birth weight was 1650 grams (8^{th} %ile), birth length 42 cm (18^{th} %ile), and birth head circumference 30 cm (27^{th} %ile). Her growth remains poor at 52 days (corrected 41w 5d gestational age). Her most recent weight is 2.635 kg ($<1^{st}$ %ile); her length and head circumference are also $<1^{st}$ %ile.

Physical exam was limited by oral intubation and dependent edema. Pertinent features were a square forehead, anteverted nares, long fingers, and toes; the little finger overlapped the ring finger on the left.

Relevant labs include: normal chromosome analysis (46, XX) and IGF1

Component *Latest Ref Rng & Units*	6/29/2022	7/3/2022
IGF-1 Z-score *-2.0 - 2.0*	-1.65	-1.04
Insulin-Like Growth Factor I *ng/mL*	27	37

The family history was pertinent for five spontaneous abortions in the patient's mother. She had four miscarriages with her first partner and one with her current partner; all were in the first trimester and unexplained. Both parents are of average stature: Mother is 5'2", and the father, age 43, is 5'8". The couple has one other son together, a healthy 18-month-old.

"A genetic diagnosis can be established in about 37% (1) of patients who present with a congenital diaphragmatic hernia (CDH), with a greater share of diagnoses in the "complex" or "non-isolated" group in whom additional anomalies are present in other organ systems (2)."

Discussion:

A genetic diagnosis can be established in about 37% (1) of patients who present with a congenital diaphragmatic hernia (CDH), with a greater share of diagnoses in the "complex" or "non-isolated" group in whom additional anomalies are present in other organ systems (2). Our patient presented with a small size for gestational age and a cardiac defect, Ebstein's anomaly. This puts her in the group of "non-isolated" or "complex" CDH, in whom a genetic diagnosis is more likely.

Chromosome microarray is a first-line test that identifies copy number variants, deletions, and duplications in infants with unex-

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plained CDH(3). Yu *et al.* (2014) identified *de novo* copy number variants (CNVs) in 11/256 parent-child trios with CDH, which is more than double the expected rate. *De novo* CNVs occur in 0.5-3% of the general population. The most common recurrent CNVs reported in association with CDH are duplications of 11q23 and deletions of 1q41-42, 8q23.1, and 15q26.

Patients with CDH and 15q26 deletion were first reported almost 20 years ago (4,5,) and since then, the association has been well established. The deletions on distal 15q26 associated with CDH have variable breakpoints, ranging from 15q26.1 to 15q26.3, but all are generally much larger than the deletion in our patient. However, not all patients with 15q26 deletions have CDH. The various reports of 15q26.1-q26.3 deletions associated with CDH share a critical region comprising four genes: *IGF1R, NR2F2, CHD2*, and *MEF2A (*myocyte-specific enhancer factor 2). *NR2F2* has been identified as the most promising candidate gene for CDH. A heterozygous *de novo* frameshift mutation in *NR2F2* has been reported in a patient with CDH and an atrial septal defect(6). Trio exome sequencing of 22 fetuses with CDH identified likely damaging variants in 6 genes, including *NR2F2* (7). Such evidence supports a role for *NR2F2* in the pathogenesis of CDH and makes it all the more remarkable that *NR2F2* was not deleted in our patient, whose small 15q26.3 deletion includes only one of the four genes in the critical region for CDH.

"Such evidence supports a role for NR2F2 in the pathogenesis of CDH and makes it all the more remarkable that NR2F2 was not deleted in our patient, whose small 15q26.3 deletion includes only one of the four genes in the critical region for CDH."

Deletion of *IGF1R* alone causes small size for gestational age (SGA) at birth and subsequent poor growth (OMIM #612626), but deletion of I*GF1R* alone has not previously been reported with SGA and diaphragmatic hernia. The smallest reported 15q26.2 deletion involving *IGF1R* that we could find is in a patient with 95 kb deletion in a family with moderate to severe short stature. The proband presented with mild developmental delay and short stature. The endocrine evaluation revealed variable but normal serum IGF1 levels in all family members without consistent peripheral IGF1 resistance(8). Patients with *IGF1R* deletion have been treated with growth hormone with good growth response.

Our patient may have the smallest 15q26 deletion reported in association with CDH. Notably, it includes only *IGF1R* and a long non-coding RNA, *IRAIN*, which is transcribed in an antisense direction from an intronic promoter within *IGF1R*. *IGF1R* encodes the Insulin-like Growth Factor 1 Receptor, and its loss explains our patient's small size at birth and subsequent poor growth. Although this is likely to be a *de novo* variant because the parents and siblings of our patient are of normal size, parental testing must be done to establish whether this is a *de novo* or a familial deletion. Given the family history of multiple maternal miscarriages, a subtle familial chromosome rearrangement, such as an inversion involving distal 15q26 in one parent, must be excluded.

"It is important to establish the etiology in infants with complex CDH and those with genetic causes for CDH, as they tend to have a poorer prognosis (9)."

It is important to establish the etiology in infants with complex CDH and those with genetic causes for CDH, as they tend to have a poorer prognosis (9).

Practical Applications:

1. Order chromosome microarray in infants with an unexplained congenital diaphragmatic hernia, isolated or complex CDH. Recall that recurrent copy number variants are associated with CDH, including deletion 15q26.2.
2. Search for other birth defects in infants with CDH to identify the "non-isolated" or "complex" CDH group in whom an underlying genetic disorder is more likely.
3. Consider ordering chromosome microarray analysis in infants with unexplained small size at birth. SGA infants are also more likely to have a copy number variant on chromosome microarray. Recall that deletion or genetic variant within *IGF1R* can cause small size at birth with subsequent poor growth.

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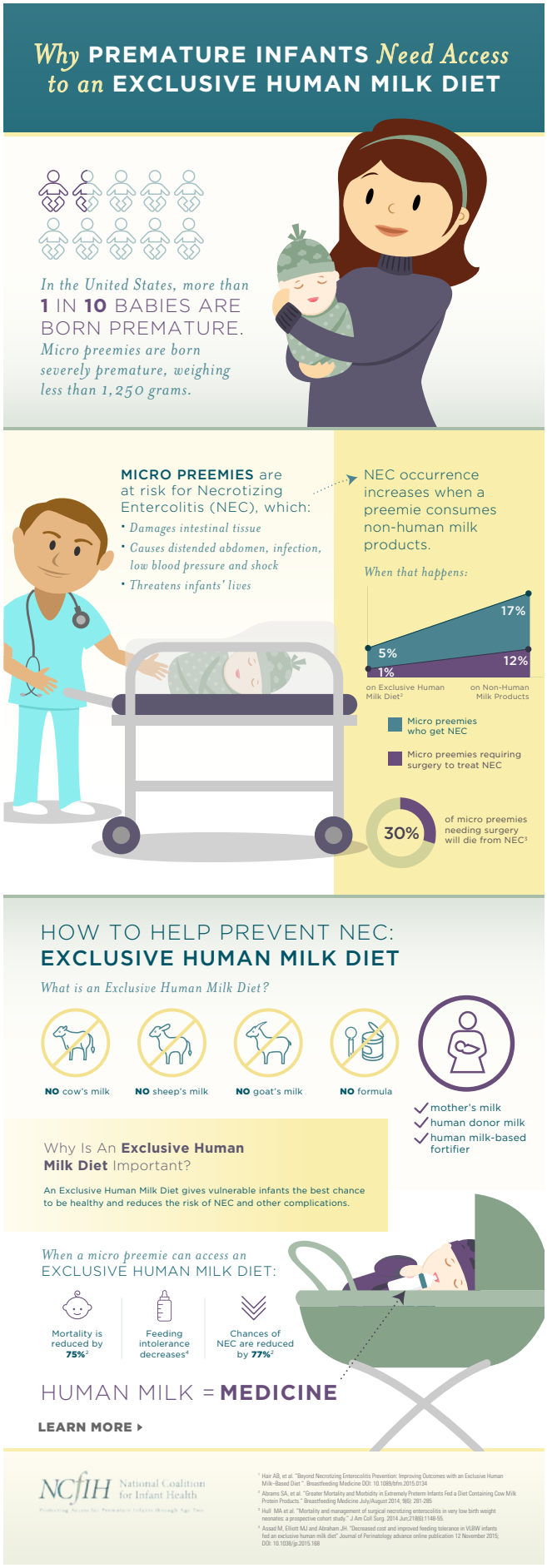
Corresponding Author

Robin Clark, MD
Professor, Pediatrics
Loma Linda University School of Medicine
Division of Genetics
Department of Pediatrics
Email: rclark@llu.edu

Corresponding Author

Subhadra (Subha) Ramanathan, M.Sc., M.S.
Licensed and Certified Genetic Counselor
Assistant Professor, Pediatrics
Loma Linda University Health
2195 Club Center Drive, Ste A
San Bernardino, CA 92408
SRamanathan@llu.edu

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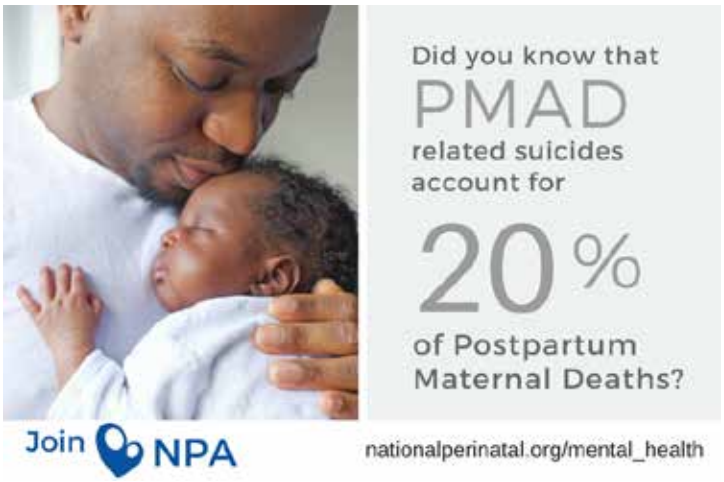
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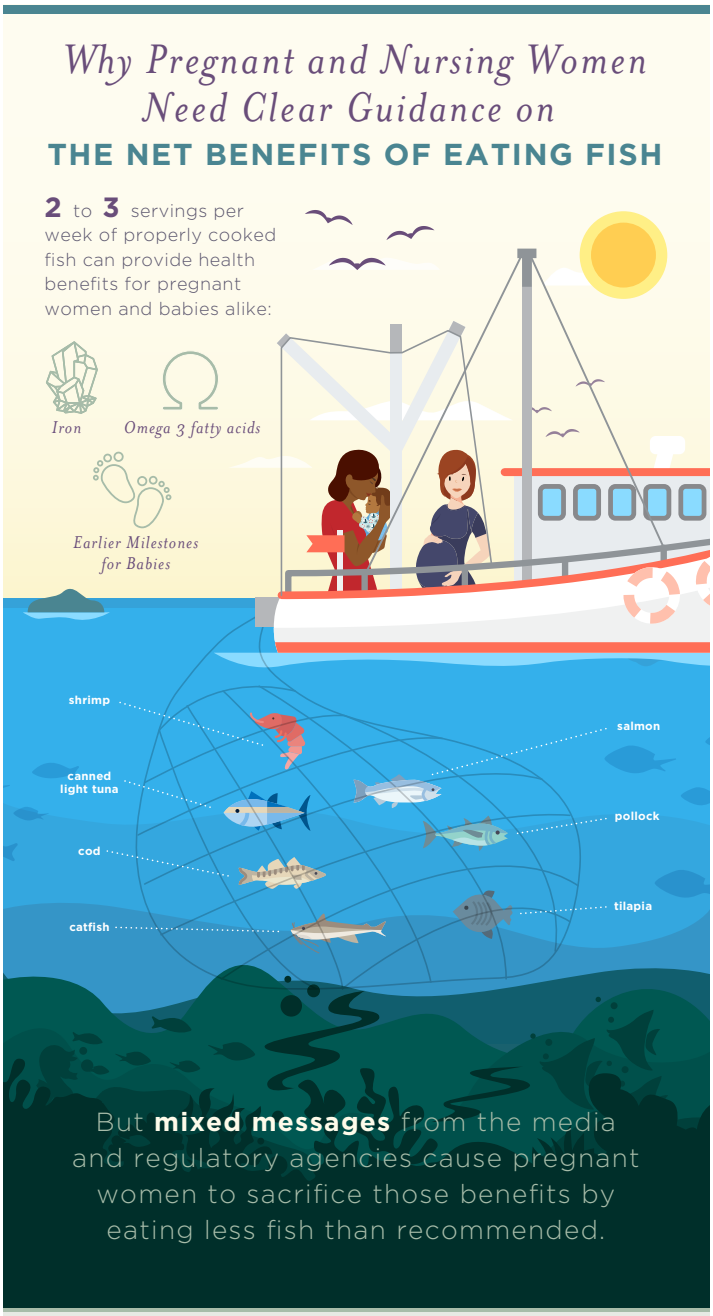
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Section on Neonatal-Perinatal Medicine Update – The National Election for the Next President of the American Academy of Pediatrics

Lily J. Lou, MD, FAAP

Dear Fellow Neonatologists.

The National Election for the next president of the American Academy of Pediatrics will be held August 17-31st. Please be on the lookout for an email with you personalized link to vote. Traditionally, less than 15% of AAP members vote, and as the largest subspecialty in pediatrics, neonatologists can play a large role in increasing voter turnout.

The candidates for the next AAP president are:

Benjamin Hoffman, MD, FAAP and Warren Seigel, MD, MBA, FSAHM, FAAP

To better inform your voting decision, the Section on Neonatal-Perinatal Medicine asked both candidates to provide statements about their priorities SPECIFICALLY for newborns and neonatologists. Both these statements are attached to this email, and I urge you to read them both and vote in the upcoming election.

If you want to learn more about the candidates, you can visit this link: https://publications.aap.org/aapnews/news/20194/?autologincheck=redirected or see below.

Thank you,

Lily Lou, MD, FAAP

Chair, AAP Section on Neonatal-Perinatal Medicine Executive Committee

Shetal Shah, MD, FAAP

Member, AAP Section on Neonatal-Perinatal Medicine Executive Committee

On behalf of the Neonatal-Perinatal Medicine Advocacy Group

Disclosure: There are no reported conflicts.

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As an academic pediatrician and former residency program director, I know the NICU is the heart of any pediatric department. As AAP President, I will ensure neonatologists, in every type of practice, are supported and treated equitably throughout the organization.

As the largest subspecialty, neonatal-led initiatives like NRP and Helping Babies Breath are central to academy programming. But AAP can be more attentive to neonatologists' needs. We must better support your work through advocacy for payment parity for inpatient care as vigorously as we've done for ambulatory practice.

Under my leadership, I'll ensure fair representation, including neonatologists in leadership pportunities at the national level, including the AAP Board. We must be consciously inclusive, and this means considering a standing position on the board for neonatologists. Homogenizing all subspecialists together misunderstands the unique way neonatologists practice and contribute to child health.

The Academy is the natural home for neonatologists, but we must provide you more value. We have a workforce crisis in many pediatric subspecialties, and we must work to expand pediatric subspecialty loan repayment, to ensure equity in access and care for infants who are uninsured or covered by Medicaid. We must reconsider dues structures to meet the needs of neonatologists and their distinctive presence in the AAP.

I have collaborated with you my entire professional career, as a clinician and child advocate. With neonatal leaders, we published a "Blueprint for Advocacy in Neonatology," in NeoReviews.

We created the first NICU-based Medical Legal Partnership (MLP) in the country at my institution, to help address social impactors of health and mitigate toxic stress for NICU families.

We are better together, and must address the unique challenges neonatologists face, leveraging AAP's resources to address and mitigate the inequity and social structures that precipitatepreterm birth, reducing the burden of prematurity and benefitting all babies.

Benjamin Hoffman, MD, CPST-1, FAAP

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Healthy children require a strong start at birth. As neonatal practice evolves, the AAP is increasingly the rightful professional home for neonatologists. You create the foundation for all other AAP initiatives to improve child health. The AAP needs to renew focus on its 3,500 neonatal-perinatal members.

While Chair of New York State AAP, we achieved meaningful wins for neonatologists and babies such as:

1. Separate Medicaid and Insurance Coverage for Donor Milk for VLBW infants and those with GI anomalies,
2. A full year of post-partum Medicaid Coverage for mothers, which improves newborn outcomes, and
3. An almost 20% increase in state funding for Regional Perinatal Centers, from $3.8 to $4.5 million.

New York's donor milk program is enormously successful. Building on work done in 3 other states, the Neonatal-Perinatal Section created the Donor Milk Advocacy Toolkit. This assisted neonatologists win coverage in Washington, Maine, Florida and Georgia, and a bill is pending in Ohio. This is a prime example of how the AAP can support neonatologists and reduce the burden of NEC.

As a board member, I walked the halls of Congress in Washington D.C. with your colleagues advocating for subspecialty loan repayment, a now funded program that will reduce your educational debt.

Your work drives the financial health of pediatric departments. I will promote Medicaid Parity, a longtime AAP priority, for INPATIENT SERVICES, to ensure that your work is compensated at the same level as adult ICU physicians. Your patients are as complex and payment must be equitable.

My presidency would bridge the gaps that exist between the inpatient and outpatient world to benefit babies, their families and neonatologists.

The AAP needs a louder neonatal community voice. As AAP president-elect, I will work to ensure that our state chapters have resources sufficient to prioritize newborn/neonatal-specific advocacy issues.

Warren M. Seigel MD, MBA, FAAP, FSAHM

Corresponding Author

Lily J. Lou, MD, FAAP
Chair, AAP Section on Neonatal-Perinatal Medicine
Co-chair, SONPM Advocacy Committee
Immediate Past Chair, AAP-Alaska Chapter
Professor of Clinical Pediatrics
Director of Government Relations
University of Illinois at Chicago
Division of Neonatology, MC 856
Department of Pediatrics
1253 CSB
840 S. Wood St.
Chicago, IL 60612
Email: lilylou@uic.edu
(312) 996-4185 office
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Book Review: The Problem of Practice Variation in Newborn Medicine Critical Insights for Evaluating and Improving Quality

Gilbert I. Martin, MD

The Problem of Practice Variation in Newborn Medicine Critical Insights for Evaluating and Improving Quality Springer Nature ISBN 978-3-030-94654-8

Joseph Schulman, M.D.

"There have been many famous high-risk newborn babies throughout history. These include Sir Isaac Newton (3 pounds), Sir Winston Churchill (33-34 weeks), and Stevie Wonder, who developed retinopathy of prematurity secondary to oxygen toxicity."

The official derivation of the word "Neonatology" was coined in 1960 by Alexander Schaffer, who stated, "neonatology designates the art and science of diagnoses and treatment of the disorders of the newborn infant." There have been many famous high-risk newborn babies throughout history. These include Sir Isaac Newton (3 pounds), Sir Winston Churchill (33-34 weeks), and Stevie Wonder, who developed retinopathy of prematurity secondary to oxygen toxicity.

Technology has exploded, evidence-based decision-making has expanded, and the Perinatal Section has become the largest in the American Academy of Pediatrics.

Fortunately, although many algorithms and experiences are available, there are considerable practice variations worldwide. The goal remains the same, and improving the quality of newborn care is most important.

Joseph Schulman, a neonatologist in the California Department of Healthcare Services, has written a treatise entitled "The Problem of Practice Variation in Newborn Medicine." This monograph is essential to our understanding of what is necessary to ensure the best outcome for the newborn infant.

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"The monograph is divided into 19 chapters which deal with the definitions of practice variation, the need for quality improvement, the interpretation of each unit's performance, and the measures necessary to achieve the goals. "

The monograph is divided into 19 chapters which deal with the definitions of practice variation, the need for quality improvement, the interpretation of each unit's performance, and the measures necessary to achieve the goals.

Well-known entities such as the Vermont Oxford Network (VON), The California Perinatal Quality Care Collaborative (CPQCC), and others are described. There are changing demographics, different efficiency measures, and practice variations explored. These include the use of antibiotics, the differences in medical records, analytic statistics, and comparisons of hospitals and practices.

Should we care? Are we doing the right things? Are we doing our best? What is our ultimate aim, and what should we do differently? These questions are thoroughly discussed in Dr. Schulman's monograph and are presented with a meaningful dialogue.

The references are current, as is the index, and there is sensitivity and specificity.

"Whether a neonatologist, a nurse, an administrator, or part of the ancillary personnel group involved in the care of the newborn, this book has the information necessary to practice quality-care neonatology."

Whether a neonatologist, a nurse, an administrator, or part of the ancillary personnel group involved in the care of the newborn, this book has the information necessary to practice quality-care neonatology.

The variation in newborn care worldwide is necessary to advance neonatology as a sub-specialty. This monograph offers "critical in-

sights for evaluating and improving quality care in neonatology."

Although the players and equipment have changed over centuries, the goals of each generation remain the same: To Cure Sometimes, To Help Often, To Console Always. These concepts were Bill Silverman's creed, one of the neonatology icons. Joseph Schulman reflects many of these concepts in his monograph dealing with Practice Variation in Newborn Medicine.

Disclosure: There are no reported conflicts.

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Corresponding Author

Gilbert I Martin, MD, FAAP
Division of Neonatal Medicine
Department of Pediatrics
Professor of Pediatrics
Loma Linda University School of Medicine
Email: gimartin@llu.edu
Office Phone: 909-558-7448

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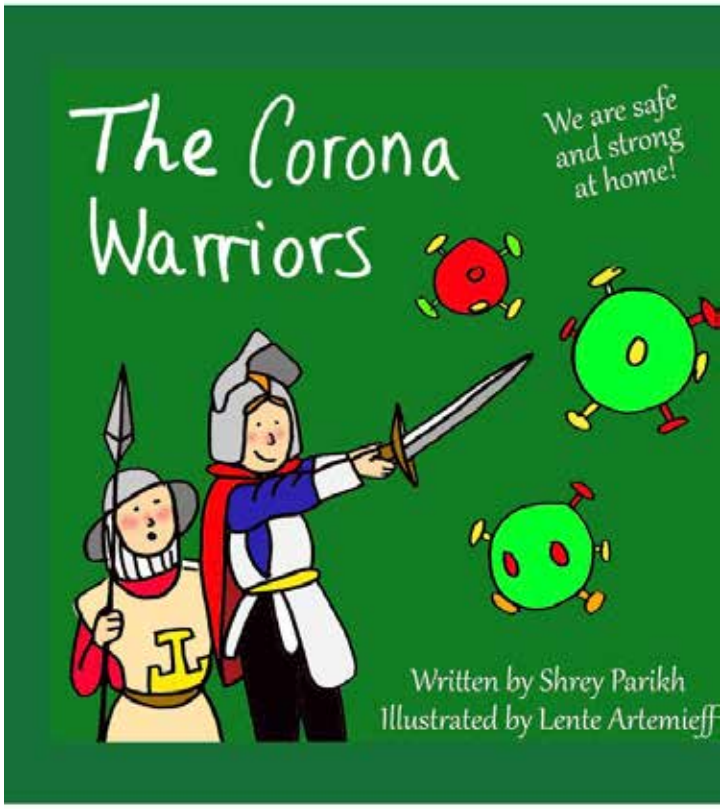

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NCfIH 2022 Infant Health Policy Summit

Mitchell Goldstein, MD, MBA, CML, Susan Hepworth

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.

"We welcome you to the 2022 Policy Summit held live and in the virtual space this year. "

We welcome you to the 2022 Policy Summit held live and in the virtual space this year. Due to an overwhelming response from attendees, on-site registration is no longer available.

This year's summit seeks solutions to the ongoing black maternal health crisis. There is a congressional update from the United States House of Representative Alma Adams, Ph.D., Chair of the Black Maternal Health Caucus.

Providing appropriate care requires much more than just medical therapy. The need to redefine the essential care team for babies is addressed.

Respiratory Syncytial Virus (RSV) prevention is evolving with new therapies on the horizon. The state of RSV Prevention is provided as well as a synopsis of "The Direct and Indirect Impact of RSV" provided by United States House of Representative Bruce Westerman.

Finally, the ongoing drug, formula, and product shortages impact infants and children. A panel examines these shortages and solutions that may be needed to effectuate better care that is not imperiled by supply disruption. Mitchell Goldstein, MD, concludes the summit with a call for the need for advocacy efforts to solve these problems and provide workable solutions that ensure that the best possible products are available for the best possible price.

"A panel examines these shortages and solutions that may be needed to effectuate better care that is not imperiled by supply disruption."

2022 Infant Health Policy Summit

Wednesday, August 31

10 a.m. to 2 p.m. EST

The Willard InterContinental

Washington, DC

9:00 a.m. **Registration and Continental Breakfast**

10:00 a.m. **Welcome**

- *Susan Hepworth, Executive Director, National Coalition for Infant Health*

10:05 a.m. **Opening Remarks**

- *Christy Gliniak, Ph.D., OTR/L, CNT, CPXP, National Association of Neonatal Therapists*

10:15 a.m. **Congressional Update: Black Maternal Health Caucus**

- *The Honorable Alma S. Adams, Ph.D., U.S. Representative (NC-12)*

10:30 a.m. **Finding Solutions to the Black Maternal Health Crisis**

- *Valencia P. Walker, MD, MPH, Physician Advocate, Nationwide Children's Hospital*
- *Kanika Harris, Ph.D., MPH, Director of Maternal Health, Black Women's Health Imperative*
- *Moderator: Susan Hepworth, National Coalition for Infant Health*

11:00 a.m. **Redefining the Essential Care Team for Babies**

- *Nicole Nyberg, MSN, APRN, NNP-BC, CEO, Empowering NICU Parents, Novant Healthcare*
- *Wakako Minamoto Eklund, DNP, APRN, NNP-BC, FAANP, Neonatal Nurse Practitioner, Pediatrix Medical Group of T.N., Council of International Neonatal Nurses*
- *Michael Hynan, Ph.D., Professor Emeritus, Clinical Psychology, Univ. of WI-Milwaukee*

- *Moderator: Susan Hepworth, National Coalition for Infant Health*

11:35 a.m. **The State of RSV Prevention**

- *Joseph Domachowske, MD, FAAP, FPIDS, Professor of Pediatrics, Professor of Microbiology and Immunology, Director of the Maternal-Child and Pediatric Global Health Program at the Institute for Global Health and Translational Science, SUNY Upstate Medical University*
- *Moderator: Susan Hepworth, National Coalition for Infant Health*

12:05 p.m. **LUNCH & NETWORKING**

12:35 p.m. **The Direct and Indirect Impact of RSV**

- *The Honorable Bruce Westerman, U.S. Representative (AR-04)*

12:45 p.m. **BREAK**

1:00 p.m. **Ensuring Donor Human Milk Quality and Safety**

- *Aly Fuller, J.D., Ph.D., Vice President, Government Affairs & Intellectual Property, Prolacta Bioscience*
- *Sandra Sullivan, MD, IBCLC, Clinical Associate Professor, Department of Pediatrics, Division of Neonatology, University of Florida*
- *Moderator: Amanda Conschafter, Alliance for Patient Access*

1:30 p.m. **Drug, Formula, and Product Shortages Impacting Infants and Children**

- *Suzanne Staebler, DNP, NNP-BC, FAANP, FAAN, Clinical Professor, Emory University Nell Hodgson Woodruff School of Nursing, Policy Advisor, National Coalition for Infant Health*
- *CAPT Valerie Jensen, USPHS, (Ret.), Associate Director, CDER Drug Shortage Staff, FDA*
- *Susan Mayne, Ph.D., Director of the Center for Food Safety and Applied Nutrition, FDA*
- *Moderator: Susan Hepworth, National Coalition for Infant Health*

2:00 p.m. **Closing Remarks**

- *Mitchell Goldstein, MD, Professor of Pediatrics, Loma Linda University Children's Hospital, Medical Director, National Coalition for Infant Health*

To watch virtually, register here: https://www.infanthealth.org/register

Disclosure: No relevant disclosures noted

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Corresponding Author

Mitchell Goldstein, MD, MBA, CML
Professor of Pediatrics
Loma Linda University School of Medicine
Division of Neonatology
Department of Pediatrics
Email: mgoldstein@llu.edu

Corresponding Author

Susan Hepworth
Director
National Coalition for Infant Health
1275 Pennsylvania Ave. NW, Suite 1100A
Washington, DC 20004
Email: info@infanthealth.org

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.

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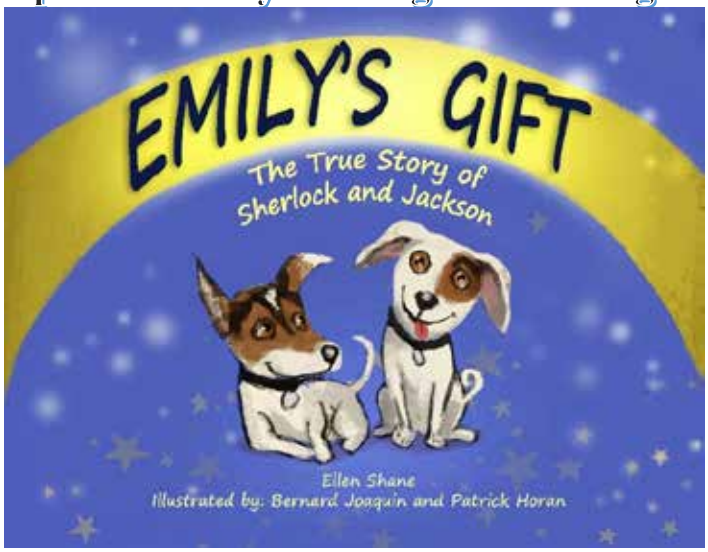

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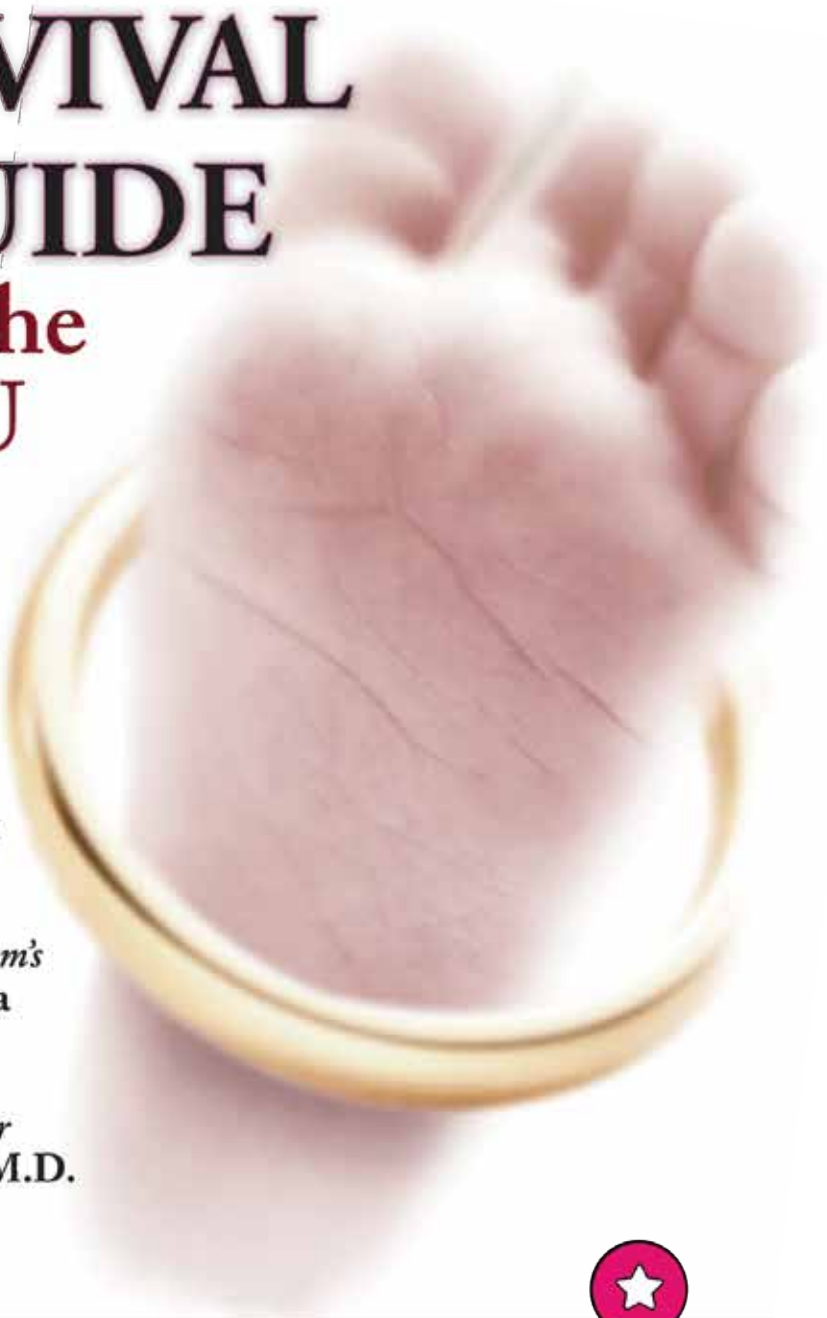
The Emily Shane Foundation is a 501(c)3 nonprofit charity. Our flagship SEA (Successful Educational Achievement) Program is a unique educational initiative that provides essential mentoring/tutoring to disadvantaged middle school children across Los Angeles and Ventura counties. All proceeds fund the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

For more information, please visit emilyshane.org.

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

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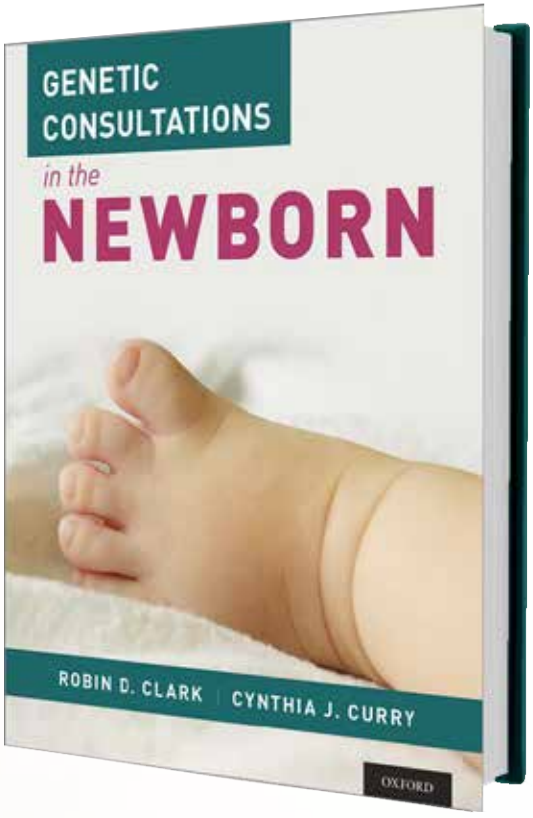

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OXFORD

Peer Reviewed

Clinical Pearl: Do You Still Believe in the Existence of Culture Negative Sepsis in Neonates?

Jina Park, MD, Theodore DeBerrito, MD, Michael Schreiber, MD, Kenneth Alexander, MD, Angela Douglas, MD, Mitchell Goldstein, MD, Joseph R. Hageman, MD

"About 45 years ago, when I was the senior pediatric resident on the Pediatric Infectious Disease floor and in the Neonatal Intensive Care Unit (NICU), and Mike Schreiber was one of our interns, we believed in a clinical concept, which was called culture negative sepsis (CNS) in our neonates (1)."

About 45 years ago, when I was the senior pediatric resident on the Pediatric Infectious Disease floor and in the Neonatal Intensive Care Unit (NICU), and Mike Schreiber was one of our interns, we believed in a clinical concept, which was called culture negative sepsis (CNS) in our neonates (1). The baby had signs of sepsis or a systemic inflammatory response syndrome (SIRS) which could include at least 2 of the following four criteria in Table 1, one of which would be an abnormal temperature or leukocyte count (1-2). However, when a blood culture was drawn, ideally 1 ml in volume peripherally, the culture returned negative after 48 hours. Because of our heightened clinical suspicion of sepsis in this infant, we decided to continue antibiotic therapy for 5 to 7 days despite the negative culture. More recently, there has been more discussion about whether neonatologists still believe in CNS (1-2). A commentary by Cantey and Prusakov provides a "proposed framework for the clinical management of neonatal CNS (3)". These authors consider two facts (1) neonatal CNS exists; (2) it should be rare 3). Here are several excellent practice considerations to optimize sepsis diagnostics and avoid unnecessary antibiotic use for CNS.

1. Consider noninfectious mimics of sepsis and localized infections that may not be associated with bacteremia.
2. Optimize blood volume for blood culture (1 ml) to maximize yield and minimize antibiotic use.
3. Do not waste blood on ancillary non-culture biomarkers.
4. Microbiological diagnostics are critical. Anaerobic blood cultures may be helpful when gastrointestinal pathology like spontaneous intestinal perforation or necrotizing enterocolitis is considered.
5. Consider respiratory viral panel in the context of viral late-onset sepsis.
6. Parasitic and fungal cultures can be done if the clinical situation dictates.
7. Treatment of suspected CNS can be considered if the index of suspicion is high but should be short (3).

One must consider that in adult and larger pediatric patients, it is

Table 1. Definitions of SIRS, Infection and Sepsis Modified for Pediatric Patients Including Neonates

Systemic inflammatory response syndrome (SIRS): The presence of the findings listed under at least two of the following four criteria, one of which must be abnormal temperature or leukocyte count.

Temperature

- Core temperature of >38.5°C or <36°C

HR

- Tachycardia, defined as a mean HR >2 SD above normal for age
  - in the absence of external stimulus, chronic drugs, or painful stimuli
- Otherwise unexplained persistent elevation over a 0.5- to a 4-h time period
- Bradycardia, defined as a mean HR <10th percentile for age
  - in the absence of external vagal stimulus, b-blocker drugs, or congenital heart disease
- Otherwise unexplained persistent depression over a 0.5-h time period

Respiratory rate

- Mean respiratory rate >2 SD above normal for age
- Mechanical ventilation for an acute process not related to underlying neuromuscular disease or the receipt of general anesthesia

Leukocyte count

- Leukocyte count elevated or depressed for age
- >10% immature neutrophils

Infection:

A suspected or proven (by a positive culture, tissue stain, or PCR test) infection caused by any pathogen or a clinical syndrome associated with a high probability of infection. Evidence of infection includes positive findings on clinical examination, imaging, or laboratory tests (e.g., white blood cells in normally sterile body fluid, perforated viscus, chest radiograph consistent with pneumonia, petechial or purpuric rash, or purpura fulminans).

Sepsis:

SIRS in the presence of or as a result of suspected or proven infection.

HR.heart rate; PCR.polymerase chain reaction; SIRS.systemic inflammatory response syndrome (1).

not unusual for at least 10 – 15 mL of blood to be utilized to obtain not one but two or three culture bottles. While 1 mL may be sufficient, evolving sepsis is more likely to give a positive result with a higher sample volume. The positive culture is sufficient but not necessary in the neonate to demonstrate the need for a 5-7 day course of antibiotics. The value of a physical exam and vital signs in this context cannot be emphasized enough. Furthermore, although biomarkers may appear to direct therapy, they too are subject to interpretation and missense due to overemphasizing their importance when the clinical picture does not match the result.

"The positive culture is sufficient but not necessary in the neonate to demonstrate the need for a 5-7 day course of antibiotics. The value of a physical exam and vital signs in this context cannot be emphasized enough. "

In our antibiotic stewardship initiative working with Illinois Perinatal Quality Collaborative (ILPQC), thus far, we have reviewed 660 babies with blood cultures and complete blood counts along with their clinical histories beginning in October 2020- July 2022. We have found that 51/414 or 12.3% of babies born at ≥ 35 weeks gestation received antibiotic therapy for 5-7 days for CNS (j.Hageman, personal communication, July 14, 2022). For those babies born at < 35 weeks gestation treated for CNS, our review demonstrated that 38 of 246, or 15.4%, were treated for CNS for 5-7 days (j Hageman, personal communication, July 14, 2022).

References:

1. *Piantino JH, Schreiber MD, Alexander K, Hageman JR. Culture negative sepsis and systemic inflammatory response syndrome in neonates. NeoReviews 2013; 14 (6): e294-e305.*
2. *Cantey J, Prusakov P. A proposed framework for the clinical management of neonatal "Culture Negative" Sepsis. J Pediatr. https://doi.org/10.1016/jpeds.2022.01.006.*

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Corresponding Author

Jina Park, MD
Neonatal-Perinatal Medicine Fellow
Division of Neonatology,
Oregon Health and Science and University
3181 S.W. Sam Jackson Park Road
Portland, OR 97239-3098
Email: parkjin@ohsu.edu

Theodore De Beritto, MD, MS
Mattel Childrens Hospital
University of California Los Angeles
Los Angeles, California

Michael D. Schreiber, M.D.
Chief, Section of Neonatology
Professor and Executive Vice-Chair
Department of Pediatrics
The University of Chicago
5841 S. Maryland Ave.
Chicago, IL 60637

Kenneth Alexander, MD, PhD
Chief, Division of Infectious Diseases
Nemours Children's Hospital
Professor of Clinical Sciences
The University of Central Florida College of Medicine
Nemours Children's Health, Florida

Angela Douglas, MD
Associate Professor of Pediatrics,
Division of Neonatology,
Oregon Health and Science and University
3181 S.W. Sam Jackson Park Road
Portland, OR 97239-3098

Mitchell Goldstein, MD, MBA, CML
Professor of Pediatrics
Loma Linda University School of Medicine
Division of Neonatology
Department of Pediatrics
Email: mgoldstein@llu.edu

Corresponding Author

Joseph R. Hageman, MD
Senior Clinician Educator
Pritzker School of Medicine
University of Chicago
MC6060
5841 S. Maryland Ave.
Chicago, IL 60637
Phone: 773-702-7794
Fax: 773-732-0764
Email: jhageman@peds.bsd.uchicago.edu

Clinical Pearls are published monthly.

Submission guidelines for "Clinical Pearls":

1250 word limit not including references or title page.

May begin with a brief case summary or example.

Summarize the pearl for emphasis.

No more than 7 references.

Please send your submissions to:

jhageman@peds.bsd.uchicago.edu

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.

AfPA
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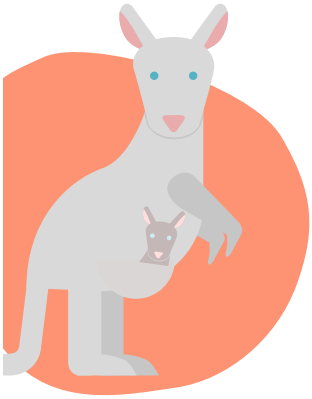
SKIN-TO-SKIN CARE DURING COVID-19



GET INFORMED ABOUT THE RISKS + BENEFITS

work with your medical team to create a plan

GET CLEAN

WASH YOUR HANDS, ARMS, and CHEST

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

PUT ON FRESH CLOTHES

change into a clean gown or shirt.

IF COVID-19 + WEAR A MASK

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

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Jonathan R. Swanson, MD, MSc
Associate Professor of Pediatrics
University of Virginia
Children's Hospital
Charlottesville, VA

I Gotsta Get Paid: CPT® Codes and Lessons from ZZ Top

Scott D. Duncan, MD, MHA

"Ten years ago, "That Little Ol' Band from Texas," ZZ Top reworked a 1989 rap song titled "25 Lighters" into a minor hit, "I Gotsta Get Paid." Like many other musical scores, "I Gotsta Get Paid" is structured using a three-chord progression, in this example, D, C, and A, with variants thrown in for interest. This article will examine a common structure for songwriters and relate it to Current Procedure Terminology (CPT®)."

Ten years ago, "That Little Ol' Band from Texas," ZZ Top reworked a 1989 rap song titled "25 Lighters" into a minor hit, "I Gotsta Get Paid." Like many other musical scores, "I Gotsta Get Paid" is structured using a three-chord progression, in this example, D, C, and A, with variants thrown in for interest. This article will examine a common structure for songwriters and relate it to Current Procedure Terminology (CPT®).

CPT® code categories use a "three-*code*" structure, which includes: (1)

- Category I codes – These codes are for reporting services or procedures and devices and drugs required for services or procedures, which are billable for reimbursement. An example of this code in neonatology would be 99468, the initial day of critical care for the evaluation and management of a neonate, 28 days or lessT
- Category II – These codes are for reporting performance measures, utilized by the Performance Measures Advisory Group, which is populated by members from the American Medical Association (AMA), and Centers for Medicare and Medicaid Services (CMS), among others. An example would include 3294F, Group B Streptococcus screening documented as performed during week 35-37 gestation.
- Category III – These are temporary codes for emerging technology, services, or procedures, which either progress to Category I codes, are renewed for an additional five years, or are removed. The most recent example in neonatology is found in cooling for hypoxic-ischemic encephalopathy.

The code set is maintained and revised by the CPT® Editorial Panel, which the AMA Board of Trustees appoints. The Editorial Panel is supported by CPT® Advisors representing the various medical specialties, including the American Academy of Pediatrics. The CPT® Advisors inform the Editorial Panel by proposing revisions, additions, and changes to the CPT® code set. (1)

In neonatology, most providers will deal primarily with Category I CPT® codes.

Had ZZ Top simply recorded a new version of "25 Lighters", it would have been referred to as a 'cover version'; however, when modified and changed, it is called a derivative work, and the new song must be reviewed and approved by the original artist. In this case, the original artists of "25 Lighters" had passed away; subsequently, the estate reviewed and approved the version, "I Gotsta Get Paid."

Establishing a proposed new CPT® code follows a similar, related pathway. Consider the cooling codes, for example. Recognizing new technology and procedures, The CPT® Editorial Panel established the temporary Category III codes 0260T and 0261T for ongoing evaluation for total body and selective head cooling for hypoxic-ischemic encephalopathy, respectively. By 2014, the temporary codes for cooling were replaced with +99481 total body systemic hypothermia in a critically ill neonate per day and +99482 selective head hypothermia in a critically ill neonate per day, with the plus (+) designation signifying that the code is added to the primary service code for the day. By 2015, these codes were replaced with the current 99184, which recognizes the increase in initial work of the physician in commencing cooling.

"Yet, musicians may create tension and emotional reaction by altering the chord structure and timing, creating a degree of harmonic dissonance. Further, there can be dissonance, tension, and emotional reactions as some of the codes we choose are not always "black and white"!"

One of ZZ Tops' early hits, "LaGrange," uses this familiar three-chord structure A-C-D. Yet, musicians may create tension and

emotional reaction by altering the chord structure and timing, creating a degree of harmonic dissonance. Further, there can be dissonance, tension, and emotional reactions as some of the codes we choose are not always "black and white"! Within CPT®, our *code* structure is aligned to the Relative Value Unit (RVU) assigned to the code. The physician payment system or resource-based relative value scale (RBRVS) is structured on the principle that physician payments should vary with the costs of resources used for providing those services. The individual CPT code is based on Relative Value Units (RVUs) and built around three (chords) components (2):

- Physician work (PW) - The majority of the total RVU is encompassed by physician work, which includes the time it takes to perform the service, technical skill, physical effort, mental effort, and judgment. A portion also includes stress due to the potential risk or harm to the patient. This component is updated annually and focused on changes in medical practice.
- Practice expense (PE) - This component addresses the costs of maintaining a practice and has differing values based upon whether the service was provided in a healthcare facility (i.e., hospital), or non-facility, the latter rare in neonatology. Examples of consideration in practice expense calculations in a facility setting might include direct costs such as equipment, supplies, and nonphysician staff costs and indirect (allocated) costs.
- Professional liability insurance (PLI) - This is typically the least of the components making up the RVU values for the code and represents professional liability expenses.

The RVUs for these components are updated annually, based on recommendations from the AMA/Specialty Society Relative Value Scale Update Committee (RUC).

"In songwriting, harmonic dissonance can be accomplished by adding different chords, altering the chord progression, or utilizing a different series of note progressions. For example, sharps (#), sevenths (7), or minors (m) are frequently added to the melodic line. Similarly, to complete the construction for a CPT® code for an individual area, region, or state, a geographical adjustment, the geographic practice cost index (GPCI), is included in the calculation for each component."

In songwriting, harmonic dissonance can be accomplished by adding different chords, altering the chord progression, or utilizing a different series of note progressions. For example, sharps (#), sevenths (7), or minors (m) are frequently added to the melodic line. Similarly, to complete the construction for a CPT® code for an individual area, region, or state, a geographical adjustment, the geographic practice cost index (GPCI), is included in the calculation for each component. For example, the cost of physician work and practice expense is higher in Houston, TX (the origin of ZZ Top) than in Louisville, KY (PW GCPI 1.032 vs. 1.000; PE 1.029 vs. 0.869), yet the cost of professional liability is less (0.550 vs. 0.827). (3) Finally, the total RVUs are multiplied by the conversion factor (CF), which is adjusted to maintain budget neutrality. The proposed CF for 2023 is $33.28, allowing for the expiration of the 3% increase in 2022. (4) This will be the lowest CF in the last 25 years, from a peak CF of $38.0870 in 2008. (5)

To complete our code, here is an example of CMS payment for CPT® code 99468 in Houston for 2022. (You may need to consult with a statistician!)

[(PW 18.46 RVU * 1.032 GPCI) + (PE 6.80 RVU * 1.029 GPCI) + (PLI 1.24 RVU * 0.550 GPCI)] * CF 2022 $34.61 = $925.13.

Note that CMS has a search function that will allow for a search of the individual RVUs and other components of the physician fee schedule. (6)

This ongoing series of coding articles first appeared in December 2019 with an article titled "Neonatal Coding and Documentation: The History." (7) The article reported a brief history of Current Procedural Terminology and the International Classification of Disease (ICD), noting that CPT® codes are "descriptive and report procedures and medical services performed by healthcare professionals." Similarly, the ICD code utilizes a common language for diagnosis. The history of CPT® coding, including neonatology, is full of covers and derivatives, and neonatology has benefited from those who sought to simplify, standardize, and value our current codes.

"I just got paid today

Got me a pocket full of change."

- Just Got Paid (ZZ Top)
- Song by Bill Hamm and Billy F Gibbons

Author's Note: Thanks to Gilbert I. Martin, MD, for editorial comment and lyrical inspiration. As Dr. Martin "notes," music and medicine have always been related. He poses the question and suggests: Can we relate the codes we choose in the same fashion? Can we alter, modify well-known songs, or create lyrics that can be interposed? We are all familiar with Somewhere Over the Rainbow, recorded by Judy Garland for the 1939 film "The Wizard of Oz."

Somewhere over the Rainbow

Way up high

There's a land that I hear of

Once in a lullaby….

Now with the derivative, code-related lyrics, authored by Gil Martin, MD, "Learning About CPT."

Someday, choosing a code

Will set me free

Why must I add to my frustration

Learning about CPT….

Thanks, Gil.

References:

1. *American Medical Association. CPT® overview and code approval. American Medical Association, Accessed August 16, 2022, https://www.ama-assn.org/practice-management/cpt/cpt-overview-and-code-approval*
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NT

Corresponding Author:

Scott D. Duncan, MD, MHA.
Professor and Chief
Division of Neonatal Medicine
University of Louisville
571 S. Floyd St.
Suite 342
Louisville, KY 40202
P:502-852-8470
F:502-852-8473
*Email:*sddunc02@louisville.edu

Biographical Sketch

Dr. Duncan received his undergraduate degree from Transylvania University in Lexington, KY, and completed his medical training at the University of Louisville. He completed a Master's Degree in Healthcare Administration at the Gillings School of Global Public Health at the University of North Carolina at Chapel Hill in 2011. He is currently the Chief of the Division of Neonatal Medicine at the University of Louisville. Dr. Duncan is a Fellow of the American Academy of Pediatrics and is the Chair of the Coding Trainers Committee of the Section on Neonatal-Perinatal Medicine, where he has been a member since 2010.

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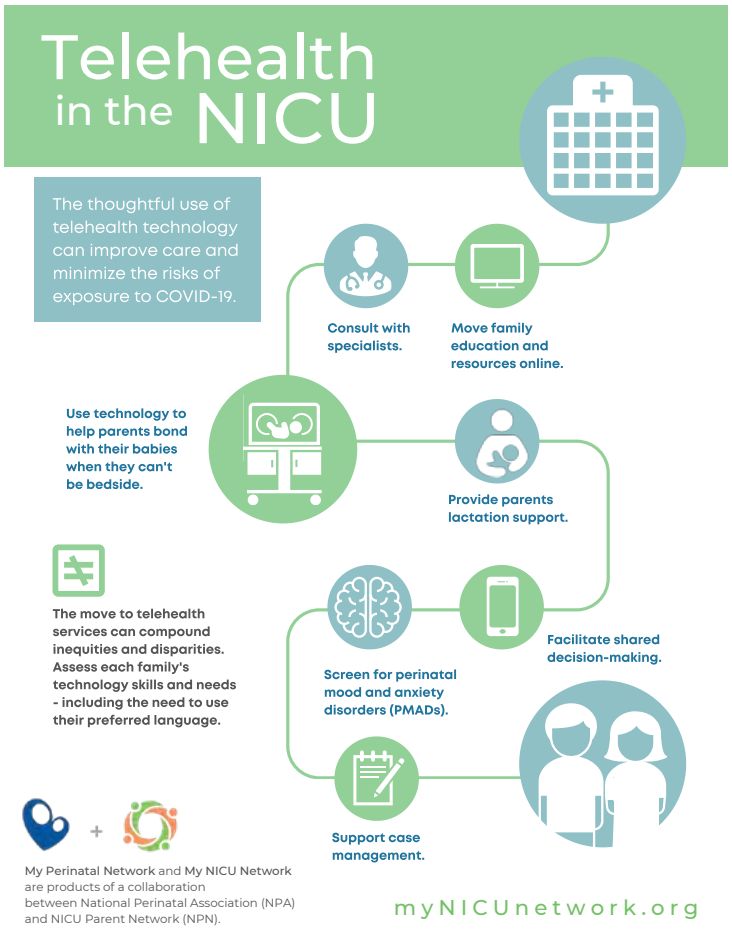

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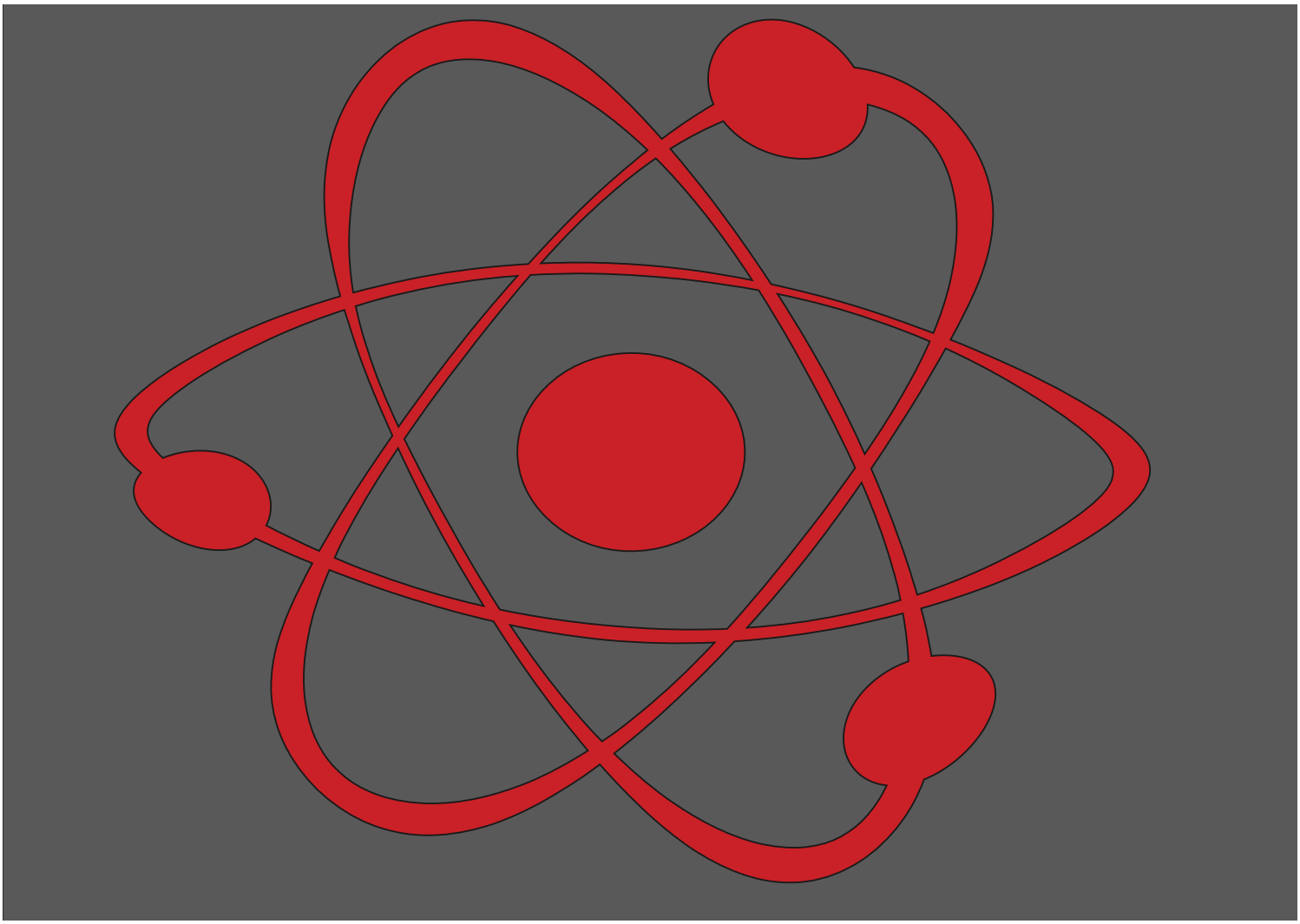

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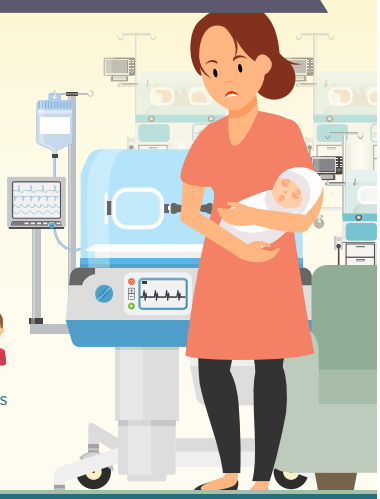
Will your **PRETERM INFANT** *need* **EARLY INTERVENTION** *services?*

Preterm infants are:

2x more likely to have developmental delays

5x more likely to have learning challenges

1 in **3** preterm infants will require support services at school

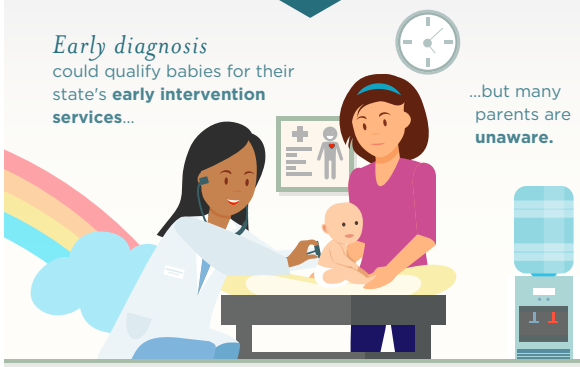


Early intervention can help preterm infants:

- Enhance language and communication skills
- Build more effective learning techniques
- Process social and emotional situations
- Address physical challenges
- Prevent mild difficulties from developing into major problems

Early diagnosis could qualify babies for their state's **early intervention services**...

...but many parents are **unaware.**



NICU staff, nurses, pediatricians and social workers **should talk** with NICU families about the challenges their baby may face.

Awareness, referral & timely enrollment in early intervention programs can help **infants thrive** and grow.

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

Visit **CDC.gov** to find contact information for your state's early intervention program.

Las nuevas mamás necesitan acceso a la detección y tratamiento para **LA DEPRESIÓN 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
Protecting Access for Premature Infants through Age Two
www.infanthealth.org

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- **June 1** — Growth assessment and coding for malnutrition in the NICU.

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Anaheim Convention Center
Anaheim, CA
October 7-12, 2022
https://aapexperience.org/conference-event-locations/

Once Upon a Preemie Presents 1st Annual Conference Accelerating the Health and Racial Equity in Maternal and Neonatal Care
University City Science Center
3675 Market Street, 2nd Floor
Philadelphia, PA 19104
November 17th, 2022
https://www.eventbrite.com/e/accelerating-health-and-racial-equity-in-black-maternal-and-neonatal-care-tickets-380986168887

39th Annual Advances In Care Conference – Advances In Therapeutics And Technology: Critical Care Of Neonates, Children, And Adults
Ontario, CA
https://paclac.org/advances-in-care-conference/

AAP Workshop on Perinatal Strategies
February 3-5, 2023
Scottsdale, AZ
https://shop.aap.org/2023-workshop-on-neonatal-perinatal-practice-strategies-scottsdale-az/

NEO: The Conference for Neonatology
February 22-24, 2023
Las Vegas, NV
https://www.mednax.com/neo-conference/

California Association of Neonatologists (CAN) Annual Conference
San Diego, CA
March 3-5, 2023
https://canneo.org

36th Annual Gravens Conference on the Environment of Care for High Risk Infants
The Future is Now for Babies, Families, and Systems
Sand Key, FL
March 8-11, 2023
Hold the Date

Southeastern Association of Neonatologists (SAN)
Marco Island, FL
May 25-28, 2023
www.southeastneo.com

Perinatal District 8 Conference
June 1-4, 2023
San Diego, CA
https://district8sonpm.org/

Perinatal District 6 Conference
Date: TBA
Chicago, IL
https://www.d6an.org

For up to date Meeting Information, visit NeonatologyToday.net and click on the events tab.

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Publication
Mitchell Goldstein, MD
Loma Linda Publishing Company
11175 Campus Street
Suite #11121
Loma Linda, CA 92354
www.NeonatologyToday.net
Tel: +1 (302) 313-9984
LomaLindaPublishingCompany@gmail.com

Editorial and Subscription
Mitchell Goldstein, MD
Neonatology Today
11175 Campus Street
Suite #11121
Loma Linda, CA 92354

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Outstanding BC/BE Neonatologist Opportunities in Florida's Collier County

Nicklaus Children's Health System and Nicklaus Children's Pediatric Specialists (NCPS), the health system's physician-led multispecialty group practice, have three exceptional opportunities for board-certified or board-eligible (BC/BE) fellowship-trained neonatologists with a minimum of three years of experience (preferred) for a 19-bed Level II NICU located on Florida's Gulf Coast in Collier County.

Each position will be part of a comprehensive perinatal and neonatal program for babies in a Level II NICU. These roles present a unique and exciting opportunity for motivated candidates to flourish in a burgeoning market. Applicants should possess a passion for advocacy and improving care for all children. The BC/BE neonatologists will be responsible for attending deliveries, providing prenatal consultations to high-risk babies, resuscitating and stabilizing newborns in the delivery room, rounding on well babies, as well as provide leadership, oversight and supervision in the Level II nursery. Candidates should be proficient in newborn resuscitation, including neonatal intubation, umbilical line placement and peripheral cannulation, lumbar punctures, etc. These roles offer salaries that are competitive and commensurate with experience.

Nicklaus Children's neonatology program is consecutively ranked among the best in the nation by *U.S. News & World Report*. It was the first of its kind in South Florida and receives referrals of the most critically ill neonates from hospitals throughout Florida, Latin America and the Caribbean. The Level II NICU will be a part of the NCPS Section of Neonatology and the neonatologists will have access to the educational and professional development resources of Nicklaus Children's Health System.

Founded in 1950, the rebranded Nicklaus Children's Hospital, a 309-bed freestanding children's hospital and Level I trauma center, is renowned for excellence in all aspects of pediatric medicine and has numerous subspecialty programs that are routinely ranked among the best in the nation. It is also home to the largest pediatric teaching program in the southeastern U.S. Many of our physicians have trained or worked at other leading medical institutions. Join a phenomenal team that brings lifelong health and hope to children and their families through innovative and compassionate care.

Collier County is located on the Southwest Coast of Florida with easy access to Southwest Florida International Airport. Outdoor activities include golf, boating, fishing and beautiful beaches.

Competitive compensation and benefits package.

Qualified candidates please contact:

Joyce Berger, Physician Recruiter

joyce.berger@nicklaushealth.org or 786-624-3510

nicklauschildrens.org/NCPS

DFW

Overview

St. Luke's Neonatology in Idaho is seeking an NNP to join 11 BC Neonatologists and 11 NNPs to assist with coverage of our four St. Luke's NICUs. This position is primarily based at the Level IV NICU in Boise, Idaho. An additional position is available in Twin Falls, Idaho, which is in the process of expanding its scope of coverage to Level III status.

The Level IV facility is within St. Luke's Children's Hospital, a CHA-designated children's hospital-within-a-hospital located in downtown Boise, Idaho. The NICU was built in 2002 and is a modern 61-bed unit, with advanced technology support (HFV, iNO, therapeutic hypothermia, noninvasive ventilation), semi-private rooms, and a priority of family-centered care. It maintains an ADC of 37 and approximately 900 admissions peryear. NNPs provide daily rounding support and in-house night coverage with an in-house Neonatologist at this facility. Our Level II NICU is located 10 miles away in Meridian, Idaho, and this 12-bed facility was fullyrenovated in 2007. NNPs assist with weekend coverage and home call at the Meridian facility. Coming in fall of 2017 will be our new Nampa facility with 8 private NICU rooms and 7 NICU/LDRP Family Care Suites.

The Children's Hospital provides a full complement of Pediatric Subspecialty services with the exception of ECMO or complex congenital heart surgery. The program is supported by a skilled Obstetrical department including 4 full time MFM specialists.

ABOUT BOISE:

Known as the "City of Trees," Boise is Idaho's capital city—both a cultural center and a playground for those who love the outdoors. A vibrant downtown area affords fine dining, theatre, music, and college and semi-professional sports. Whole Foods, Trader Joe's, The Boise Co-op, and seasonal farmers markets are within a mile of the hospital. The Greenbelt follows the beautiful Boise River corridor for more than 30 miles, and the Boise foothills are home to miles of hiking and biking trails.

MINIMUM REQUIREMENTS:

1. Graduation from a School of Nursing, passing results on the certification examination administration by an organization recognized by the Idaho Board of Nursing, and a Nurse Practitioner Program with current RN, APRN and controlled substance licensure from Idaho.
2. Current, unrestricted DEA certificate.
3. Current national certification as NNP. Exception: Flex NNPs will not be required to maintain Idaho Controlled substance licensure or unrestricted DEA certificate.
4. Excellent communication skills to include oral and written comprehension/expression.

WHY ST. LUKE'S?

St. Luke's, Idaho's largest employer, has been recognized for distinguished patient care, named a best state to practice, and rated in the top 15 health systems in the country by Truven Health

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
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With over 900 beds in four hospitals, we operate some of the largest clinical programs in the nation. We also offer the only Level I Regional Trauma Center and Children's Hospital in the Inland Empire servicing the largest county in the US. We lead in many areas of excellence; pediatrics, cardiac services, cancer treatment and research, mental health, chemical dependency, and other essential clinical disciplines. All this adds up to endless possibilities for our patients and for you.

The Neonatal Intensive Care Unit (NICU) at Loma Linda University Children's Hospital is committed to providing high-quality, family-centered care with our highly skilled, multi-disciplinary neonatal team. Our unit has 84 licensed beds for the most critically ill infants and a new Tiny Baby Program focusing on improving survival and outcomes of extremely low birth weight infants (<1000g at birth). As one of the only level 3 tertiary centers in Southern California, we are equipped to provide the highest level of care for the most complex disorders. We have subspecialists in all medical and surgical areas that are available at all times and are supported by hospital staff with technical, laboratory, and service expertise.

At Loma Linda University Health, we combine the healing power of faith with the practices of modern medicine. We consist of a University, a Medical Center with four hospitals, and a Physicians Group. These resources have helped us become one of the best health systems in the nation.

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Editorial Board

Mitchell Goldstein, MD - Editor-in-Chief
LomaLindaPublishingCompany@gmail.com
MGoldstein@llu.edu `
Professor of Pediatrics
Loma Linda University School of Medicine
Division of Neonatology, Department of Pediatrics
Loma Linda University Children's Hospital

T. Allen Merritt, MD - Senior Associate Editor for Contributions & Reviews
AllenMerritt.md@gmail.com
Professor of Pediatrics
Loma Linda University School of Medicine
Division of Neonatology, Department of Pediatrics
Loma Linda University Children's Hospital

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LTinsley@llu.edu
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Division of Neonatology-Perinatal Medicine
Loma Linda University Children's Hospital

Elba Fayard, MD - Interim Fellowship Editor
Efayard@llu.edu
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Division of Neonatology-Perinatal Medicine
Loma Linda University Children's Hospital

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MKadri@llu.edu
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Michael Narvey, MD - Canada Editor
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tclarke347@gmail.com
Emeritus Consultant in Neonatology
The Rotunda Hospital,
Dublin. Ireland

Jan Mazela, MD - Central Europe Editor
janco@pol-med.com.pl
Associate Professor
Poznan University of Medical Sciences
Poznan, Greater Poland District, Poland

Stefan Johansson, MD PhD - Scandinavian Editor
stefan.johansson@99nicu.org
Consultant Neonatologist, Sachs' Childrens Hospital
Associate Professor, Karolinska Institutet
Stockholm, Sweden

Francesco Cardona, MD - European Editor at Large
francesco@99nicu.org
Consultant, Medical University of Vienna
Department of Paediatrics and Adolescent Medicine
Vienna, Austria

Arun Pramanick, MD - India Editor
aprama@lsuhsc.edu
Professor, Pediatrics,
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Andrea Schwartz Goodman, MSW, MPH
Senior Editorial Project Director
Andrea.SchwartzGoodman@NeonatologyToday.net
Washington, D.C.

Mita Shah, MD - Arts Editor

Neonatal Intensive Care Unit Medical DIrector
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Emanate Health
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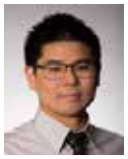
Giang Truong, MD - QI/QA Editor
GTruong@llu.edu
Associate Professor of Pediatrics
Division of Neonatology-Perinatal Medicine
Loma Linda University Children's Hospital

Jerasimos Ballas, MD, MPH - Perinatology Editor
jballas@ucsd.edu
Associate Professor of Obstetrics and Gynecology
University of California, San Diego

Maha Amr, MD - Academic Affairs Editor
maha.amr@neonatologytoday.net
Assistant Professor of Pediatrics
Division of Neonatology, Department of Pediatrics
Loma Linda University Children's Hospital



Fu-Sheng Chou, MD, PhD - Senior Associate Editor, Director, Digital Enterprise
FChou@llu.edu
Assistant Professor of Pediatrics
Division of Neonatology, Department of Pediatrics
Loma Linda University Children's Hospital

Mikko Hallman MD, Ph.D. - Finnish Editor
mikko.hallman@oulu.fi
PEDEGO Research Unit, and MRC Oulu, University of Oulu
Department of Children and Adolescents, Oulu University Hospital, Oulu, Finland

Kimberly Hillyer, DNP, RN, LNC, NNP-BC - News Anchor
KHillyer@llu.edu
Neonatal Nurse Practitioner/ Neonatal Intensive Care
Loma Linda University Health Advanced Practice Services

Dilip R. Bhatt, MD - Kaiser Fontana, Fontana, CA
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Luis Rivera, MD - Loma Linda University Children's Hospital
Japmeet Sandhu, OMS IV - Western University of Health Sciences
P. Syamasundar Rao, MD - UT-Houston Medical School
Joseph Schulman, MD, MS - California Department of Health Care Services
Steven B. Spedale, MD, FAAP - Woman's Hospital
Alan R. Spitzer, MD
Cherry Uy, MD, FAAP - University of California, Irvine
Dharmapuri Vidysagar, MD - University of Illinois Chicago
Farha Vora, MD, Loma Linda University Children's Hospital
Leonard E. Weisman, MD - Texas Children's Hospital
Stephen Welty, MD - Seattle Children's Hospital
Robert White, MD - Memorial Hospital
T.F. Yeh, MD - John H. Stroger Jr. Hospital of Cook County and Taipei Medical University

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https://www.nc3rs.org.uk/arrive-guidelines

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Neonatology and the Arts

This section focuses on artistic work which is by those with an interest in Neonatology and Perinatology. The topics may be varied, but preference will be given to those works that focus on topics that are related to the fields of Neonatology, Pediatrics, and Perinatology. Contributions may include drawings, paintings, sketches, and other digital renderings. Photographs and video shorts may also be submitted. In order for the work to be considered, you must have the consent of any person whose photograph appears in the submission.

Works that have been published in another format are eligible for consideration as long as the contributor either owns the copyright or has secured copyright release prior to submission.

Logos and trademarks will usually not qualify for publication.

This month we continue to feature artistic works created by our readers on one page as well as photographs of birds on another. This month's original artwork features Paula Whiteman, MD who presents a pair of parrots. Our bird of the month are nesting hummingbirds submitted by Douglas Deming, MD.

Mita Shah, MD,
Neonatal Intensive Care Medical Director
Queen of the Valley Campus
Emanate Health, West Covina, CA

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Manuscript Submission: Instructions to Authors

1. Manuscripts are solicited by members of the Editorial Board or may be submitted by readers or other interested parties. Neonatology Today welcomes the submission of all academic manuscripts including randomized control trials, case reports, guidelines, best practice analysis, QI/QA, conference abstracts, and other important works. All content is subject to peer review.

2. All material should be emailed to: LomaLindaPublishingCompany@gmail.com in a Microsoft Word, Open Office, or XML format for the textual material and separate files (tif, eps, jpg, gif, ai, psd, or pdf) for each figure. Preferred formats are ai, psd, or pdf. tif and jpg images should have sufficient resolution so as not to have visible pixilation for the intended dimension. In general, if acceptable for publication, submissions will be published within 3 months.

3. There is no charge for submission, publication (regardless of number of graphics and charts), use of color, or length. Published content will be freely available after publication. There is no charge for your manuscript to be published. NT does maintain a copyright of your published manuscript.

4. The title page should contain a brief title and full names of all authors, their professional degrees, their institutional affiliations, and any conflict of interest relevant to the manuscript. The principal author should be identified as the first author. Contact information for the principal author including phone number, fax number, e-mail address, and mailing address should be included.

5. A brief biographical sketch (very short paragraph) of the principal author including current position and academic titles as well as fellowship status in professional societies should be included. A picture of the principal (corresponding) author and supporting authors should be submitted if available.

6. An abstract may be submitted.

7. The main text of the article should be written in formal style using correct English. The length may be up to 10,000 words. Abbreviations which are commonplace in neonatology or in the lay literature may be used.

8. References should be included in standard "NLM" format (APA 7th may also be used). Bibliography Software should be used to facilitate formatting and to ensure that the correct formatting and abbreviations are used for references.

9. Figures should be submitted separately as individual separate electronic files. Numbered figure captions should be included in the main file after the references. Captions should be brief.

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.

11. NT recommends reading Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals from ICMJE prior to submission if there is any question regarding the appropriateness of a manuscript. NT follows Principles of Transparency and Best Practice in Scholarly Publishing(a joint statement by COPE, DOAJ, WAME, and OASPA). 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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NEONATOLOGY TODAY is interested in publishing manuscripts from Neonatologists, Fellows, NNPs and those involved in caring for neonates on case studies, research results, hospital news, meeting announcements, and other pertinent topics.

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.**

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NANT 13 - Call for Abstracts

Presented by the National Association of Neonatal Therapists (NANT)

Conference Dates:

Main Conference: April 14-15, 2023

Pre-Conference: April 13

Location: Tucson, AZ USA*

*Barring any restrictions to the contrary, NANT 13 is scheduled to be held in- person. However, in the event such restrictions occur, the event will be hosted online including all accepted sessions/posters.

The theme for NANT 13 is ***Inspiring Competence & Confidence***.

NANT and our Members aim to deliver best practices for NICU babies and parents all over the world. This advanced practice area requires a high level of competence, fueled by interprofessional collaboration and research.

Competence is not finite—it is an ongoing commitment to the pursuit of scientific knowledge and skill proficiency. We never arrive or are experts in all areas of practice. We rely on each other and use our unique professional lenses and experiences to advance the field of neonatal therapy.

We are calling upon you to share your research and clinical expertise. What can you contribute to the standard of care? How can you fill the gaps in neonatal therapy competency?

NANT intends to develop attendees' confidence to serve, lead, and implement collaboratively. We seek the right individuals, research, and tools to make that happen.

Sharing your valuable work in this internationally attended conference is a powerful way to inspire new levels of competence and confidence in this specialty.

We invite you to submit an abstract to present an oral or poster presentation at NANT 13.

Click here to submit an abstract.

Abstract Submission Deadline: Monday, August 15, 2022

Save the Date for the Second Fragile Infant Forum for the Implementation of Standards (FIFI-S)

January 18-20, 2023

"Implementing Evidence Based Strategies to Alleviate Stress in the Baby and Family in Intensive Care"

For more information contact

PACLAC.org

"Storyteller" painting by Sharron Montague Loree, 1982


@drpaulawhiteman

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