

# NEONATOLOGY TODAY

Peer Reviewed Research, News  
and Information in Neonatal and  
Perinatal Medicine



Volume 17 / Issue 2 | February 2022

Social Determinants of Health Among Pregnant Women Shabih Manzar, MD .....Page 3	Medical News, Products & Information Compiled and Reviewed by David Vasconcellos, MS IV .....Page 119
Disaster Series: High-Reliability Organizing (HRO) as Self-Organization Daved van Stralen, MD, FAAP, Sean D. McKay, Thomas A. Mercer, RAdm, USN (Retired) .....Page 14	Genetics Corner: Alpha Thalassemia X-Linked Intellectual Dis- ability Syndrome in an Infant with Developmental Delay and DYS Recurrent Respiratory Failure Confirmed by Whole-Exome Sequencing Carolina Olavarry, MD, Jason W. Tate, MS, Ashleigh Hansen, CGC, MS, Hua Wang, MD, Robin D. Clark, MD .....Page 131
The 35th Gravens Conference on the Environment of Care for the High- Risk Newborn Preview Robert White, MD, Joy Brown, PhD, Vincent Smith, MD, Mitchell Goldstein, MD, MBA .....Page 30	From the National Perinatal Information Center: Cardiovascular Awareness Month: Exploration of Hypertension on Maternal Health and Outcomes Elizabeth Rochin, PhD, RN, NE-BC .....Page 137
Fellows Column: Conservative Approach to Platelet Transfusion in a Preterm Infant Apoorva Jagadish, MD, Shabih Manzar, MD .....Page 43	Infant Health Matters: Knocking Down Pneumococcal Disease Susan Hepworth, Mitchell Goldstein, MD, MBA, CML .....Page 144
Briefly Legal: Delayed Blood Transfusion Leads to Loss of Kidneys for Two Children Maureen E. Sims, MD, Barry Schifrin, MD .....Page 49	Clinical Pearl: Nutritional Management of a Micro-preemie without the need of a PICC line: A Case Report and Review of Literature Mohammad Adnan MD, FAAP, Andrea Coons NNP, Prashant Malviya MD FAAP, Sana Afroz MD .....Page 150
Gravens By Design: What the Ideal NICU Would Look Like Robert White, MD .....Page 60	Abstracts from the California Association of Neonatologists Cool Topics in Neonatology 27th Annual Conference John Cleary, MD .....Page 159
NT Behind the Scenes: Chicken Little, the Sky Isn't Falling: Raising Resil- ient Adolescents in the New Age of Anxiety Kimberly Hillyer, DNP, NNP-BC .....Page 65	Letter to the Editor: Need for Glucose Screening Paul S. Thornton, MD, Barry Schifrin, MD, Mitchell Goldstein, MD, MBA .....Page 190
Improving Reader Engagement by Embedding an Interactive Comment Widget in Digital Publications Fu-Sheng Chou, MD, PhD, Mitchell Goldstein, MD, MBA .....Page 71	Academic True Open Model (ATOM) .....Page 193
Social Determinants of Health: Identifying the Most Vulnerable Scott D. Duncan, MD, MHA .....Page 75	Upcoming Meetings, Subscriptions and Contact Information .....Page 195
The Critical Importance of Correct Infant Product Use Alison Jacobson .....Page 81	Editorial Board .....Page 200
New Technology, Old Problems Rob Graham, R.R.T./N.R.C.P. .....Page 88	Policy on Animal and Human Research, Manuscript Submission .....Page 202
An Introduction to NPA President Viveka Prakash-Zawisza Viveka Prakash-Zawisza, MD .....Page 93	Neonatology and the Arts Herbert Vasquez, MD .....Page 202
Linking Cash Aid and Children's Brain Development Michelle Winokur, DrPH, and the AfPA Governmental Affairs Team, Alliance for Patient Access (AfPA) .....Page 107	NICU Baby's Bill of Rights NICU Parent Network .....Page 206
I CAN Digitally Involved (I CANDI): International Children's Advisory Network Amy Ohmer .....Page 109	Jumping Fish Paula Whiteman, MD .....Page 207
	A Seagull in Flight Herbert Vasquez, MD .....Page 208



**NEONATOLOGY TODAY**  
© 2006-2022 by Neonatology Today  
Published monthly. All rights reserved.  
ISSN: 1932-7137 (Online), 1932-7129 (Print)  
All editions of the Journal and associated  
manuscripts are available on-line:  
[www.NeonatologyToday.net](http://www.NeonatologyToday.net)  
[www.Twitter.com/NeoToday](http://www.Twitter.com/NeoToday)



Loma Linda Publishing Company  
A Delaware "not for profit" 501(c) 3 Corporation.  
c/o Mitchell Goldstein, MD  
11175 Campus Street, Suite #11121  
Loma Linda, CA 92354  
Tel: +1 (302) 313-9984  
[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)



## Envision is built for your career in neonatology — wherever it takes you.

With Envision Physician Services, you'll find opportunities that fit your needs, schedule and goals no matter where you are in your career journey.

We are currently featuring **leadership** and **staff opportunities** across the nation, so there's never been a better time to find your perfect fit.

### WHY NEONATOLOGISTS CHOOSE ENVISION

- Diverse practice environments in attractive locations nationwide
- Competitive compensation and benefits
- Physician-led practices and collaborative work environments
- Flexible scheduling
- Career development and leadership opportunities
- Comprehensive clinician wellness support

Contact our experienced recruiters today at **855.367.3650** to learn more about our featured opportunities and see how you can advance your career with Envision.

[VIEW OPPORTUNITIES](#)

 **Envision**  
PHYSICIAN SERVICES

# Social Determinants of Health Among Pregnant Women

Shabih Manzar, MD

## Abstract

Social determinants of health (SDoH) are the non-medical factors, the conditions in which people are born, grow, work, live, and age, that influence the health outcomes. SDoH includes financial condition, food insecurity, transport facility, physical activity, stress, social connections, housing stability, depression, tobacco, and alcohol use. SDoH among pregnant women has been shown to affect neonatal outcomes. With electronic health records (EHR), SDoH is readily accessible for analysis. By utilizing the Epic® (EHR system), based on the electronically generated color-code (green 0, yellow 1, and red 2), we evaluated the SDoH. We noted a lack of physical activity as a significant SDoH concern among pregnant women. Public health measures should be taken to improve physical activity in our community.

***“We noted a lack of physical activity as a significant SDoH concern among pregnant women. Public health measures should be taken to improve physical activity in our community.”***

## Introduction

As defined by World Health Organization, social determinants of health (SDoH) are the non-medical factors that influence health outcomes. (1) SDoH could include the conditions in which people are born, grow, work, live, and age. It includes financial condition, food insecurity, transport facility, physical activity, stress, social connections, housing stability, depression, tobacco, and alcohol use. In recent years, there has been increased recognition and appreciation of the impact of SDoH on an individual's health. By virtue of increased need for access to healthcare and the detrimental effect on the pregnancy outcome, pregnant women are vulnerable to SDoH.

***“In recent years, there has been increased recognition and appreciation of the impact of SDoH on an individual's health. By virtue of increased need for access to healthcare and the detrimental effect on the pregnancy outcome, pregnant women are vulnerable to SDoH.”***

Previous studies have shown the effect of SDoH and adverse maternal and birth outcomes. Amjad et al. (2), in their meta-analysis, evaluated SDoH and found race and rural residence as predictors of preterm birth (PTB) while low maternal socio-economic status and illiteracy as risk factors for maternal mortality and low birth weight infants. Maness and Buhi (3) in their systematic review of seventeen studies, reported poverty and family structure as the most important SDoH in pregnancy. However, the role of some important SDoH, like the quality of housing, access to healthy foods, access to healthcare services, employment status, were not reported. Therefore, there is a gap in research regarding a comprehensive look at SDoH among pregnant women. With electronic health records (EHR), SDoH is readily accessible for analysis. By utilizing the Epic® (EHR system) (4), based on the electronically generated color-code (green 0, yellow 1, and red 2), we evaluated the SDoH among pregnant women.

## Methods

The information about social determinants of health (SDoH) is built in the electronic health records (Epic) of all patients, including pregnant women. SDoH assessment consists of a questionnaire on ten factors:

1. Financial Resource Strain
2. Food Insecurity
3. Transport Needs
4. Physical Activity
5. Stress
6. Social connections
7. Housing stability
8. Depression
9. Tobacco use
10. Alcohol use

An IRB approval was obtained. On admission to the labor unit of the hospital, all pregnant women completed the SDoH questionnaire (Appendix 1) assisted by the nurse assigned to the patient. When these questionnaires are completed, a color-coded wheel is generated by the electronic record system (Appendix 2). The principal investigator collected the data on the MS excel sheet (Appendix 3)

## Results

**Readers can also follow**  
**NEONATOLOGY TODAY**  
**via our Twitter Feed**  
**@NEOTODAY**

## Social Determinants of Health among Pregnant Women

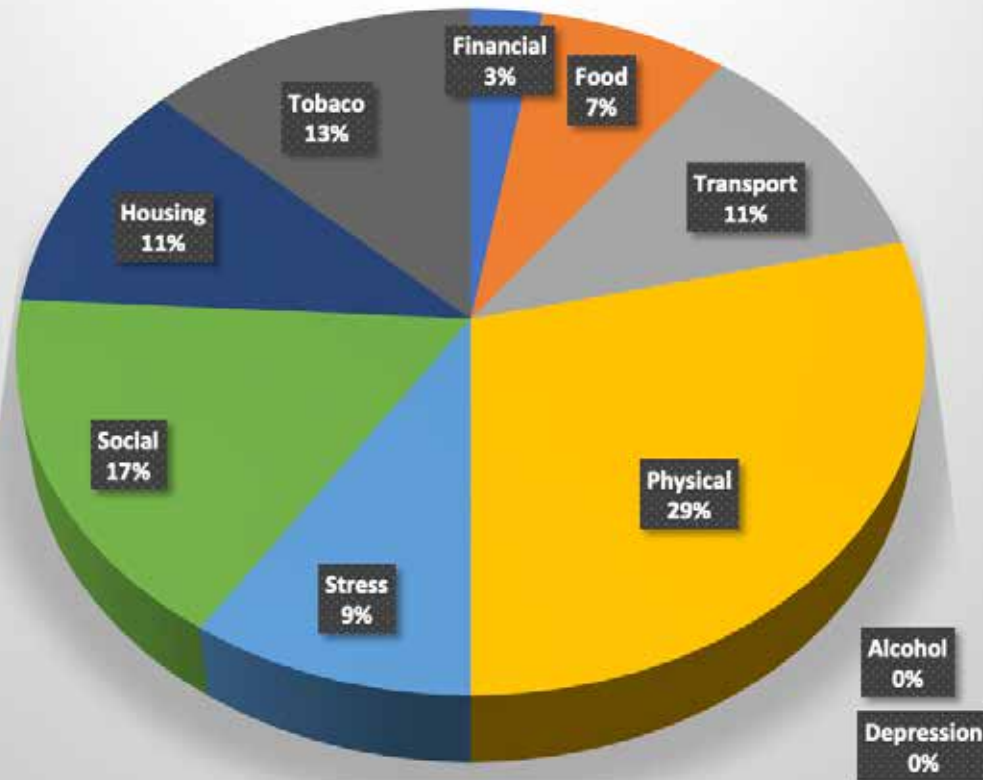


Figure 1: Distribution of Social Determinants of Health among Pregnant women

Out of 35 women, 30 women completed the questionnaire (85% response rate). Physical inactivity was noted to be of highest concern (29%), followed by social support (17%), tobacco use (13%), housing and transport (11%) each, stress (9%), food insecurity (7%) and financial instability (3%). Interestingly alcohol use and depression were zero percent (See Figure 1).

### Discussion

Community health assessment is an integral part of public health wellbeing. Looking at different aspects of social determinants of health (SDoH) provides an idea about which aspect needs the most attention. Our study noted lack of physical activity as one of the major concerns among pregnant women admitted to our hospital. Our finding of high-stress levels among the participant was in line with the earlier report. (5) One important factor in SDoH is housing instability. We found a high proportion of housing problems among our cohort. DiTosto et al. (6) have shown that housing instability and homelessness during pregnancy were significantly associated with preterm birth, low birth weight neonates, neonatal intensive care unit admission, and delivery complications.

We also noted a high number of social concerns. It has been shown earlier those pregnant women with high psychosocial vulnerability face a higher risk of preterm birth. (7,8) We did not find depression a concern among our participants, which was very interesting. It would be interesting to look at the post-partum depression rate among the same cohort in a follow-up study. Although medication abuse has been reported among pregnant women in earlier re-

ports (8), we did not find alcohol use a significant problem among the study participants.

In conclusion, low physical activity is a high concern problem among pregnant women. Public health initiatives should be started on advocating physical activity. Based on our findings, community involvement with other important public health stakeholders should be an urgent need.

### Appendices

#### A) Survey Questions:

Social Determinant of Health (SDOH)- based on ten domains.

1. Financial Resource Strain
2. Food Insecurity
3. Transport Needs
4. Physical Activity
5. Stress
6. Social connections
7. Housing stability
8. Depression
9. Tobacco use
10. Alcohol use

Time taken: 10/29/2021 1501 + Add Group + Add Row + Add LDA Responsible Create Note

## Financial Resource Strain

How hard is it for you to pay for the very basics like food, housing, medical care, and heating?








Create Note

Time taken: 10/29/2021 1501 + Add Group + Add Row + Add LDA Responsible Create Note

## Food Insecurity

Within the past 12 months, you worried that your food would run out before you got the money to buy more.






Within the past 12 months, the food you bought just didn't last and you didn't have money to get more.






Time taken: 10/29/2021 1502 + Add Group + Add Row + Add LDA Responsible Create Note

## Transportation Needs

In the past 12 months, has lack of transportation kept you from medical appointments or from getting medications?





In the past 12 months, has lack of transportation kept you from meetings, work, or from getting things needed for daily living?





Create Note

Time taken: 10/29/2021 1502 + Add Group + Add Row + Add LDA Responsible Create Note

## Physical Activity

On average, how many days per week do you engage in moderate to strenuous exercise (like a brisk walk)?











On average, how many minutes do you engage in exercise at this level?





















Create Note

Time taken: 10/29/2021 1503 + Add Group + Add Row + Add LDA Responsible Create Note

## Stress

Do you feel stress - tense, restless, nervous, or anxious, or unable to sleep at night because your mind is troubled all the time - these days?

Not at all Only a little To some extent Rather much Very much Patient refused

Create Note

Time taken: 10/29/2021 1503 + Add Group + Add Row + Add LDA Responsible Create Note

## Social Connections

In a typical week, how many times do you talk on the phone with family, friends, or neighbors?

Never Once a week Twice a week Three times a week More than three times a week Patient refused

How often do you get together with friends or relatives?

Never Once a week Twice a week Three times a week More than three times a week Patient refused

How often do you attend church or religious services?

Never 1 to 4 times per year More than 4 times per year Patient refused

Do you belong to any clubs or organizations such as church groups, unions, fraternal or athletic groups, or school groups?

Yes No Patient refused

How often do you attend meetings of the clubs or organizations you belong to?

Never 1 to 4 times per year More than 4 times per year Patient refused

Are you married, widowed, divorced, separated, never married, or living with a partner?

Married Widowed Divorced Separated Never married Living with partner Patient refused

Create Note

Time taken: 10/29/2021 1504 + Add Group + Add Row + Add LDA Responsible Create Note

## Housing Stability

In the last 12 months, was there a time when you were not able to pay the mortgage or rent on time?

Yes No Patient refused

In the last 12 months, how many places have you lived?

In the last 12 months, was there a time when you did not have a steady place to sleep or slept in a shelter (including now)?

Yes No Patient refused

Time taken: 10/29/2021 1504 + Add Group + Add Row + Add LDA Responsible Create Note

Over the past 2 weeks, how often have you been bothered by any of the following problems?

Will the patient answer the depression risk questions?

Yes No

Tobacco

Smoking Status: [Warning Icon]

Start Date:

Quit Date:

Types: Cigarettes

Vaping w/o ni

Packs/Day:

Years:

Smokeless Tobacco:

Types: Snuff Chew

Quit Date:

Counseling Given: Yes No

Comments:

Category Select

Search:

Title

- Current Every Day Smoker
- Current Some Day Smoker
- Former Smoker
- Heavy Tobacco Smoker
- Light Tobacco Smoker
- Never Assessed
- Never Smoker
- Passive Smoke Exposure - Never Smoker
- Smoker, Current Status Unknown
- Unknown If Ever Smoked

Time taken: 10/29/2021 1506 + Add Group + Add Row + Add LDA Responsible Create Note

Alcohol Use

B) Score Calculation

How often do you have a drink containing alcohol?

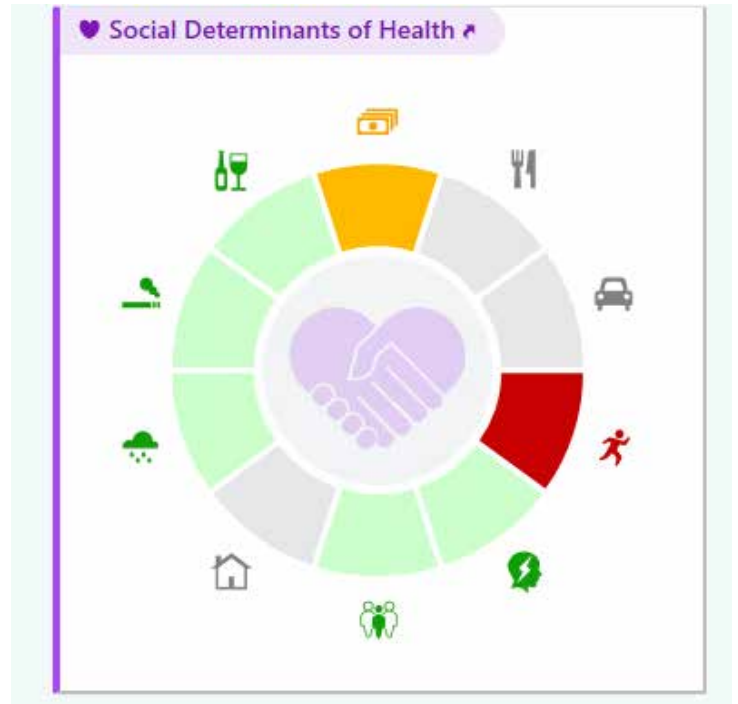
Never Monthly or less 2-4 times a month 2-3 times a week 4 or more times a week Patient refused

How many drinks containing alcohol do you have on a typical day when you are drinking?

1 or 2 3 or 4 5 or 6 7 to 9 10 or more Patient refused

How often do you have six or more drinks on one occasion?

Never Less than monthly Monthly Weekly Daily or almost daily Patient refused



Social Determinant of Health (SDOH):

1. Financial Resource Strain
2. Food Insecurity
3. Transport Needs
4. Physical Activity
5. Stress
6. Social connections
7. Housing stability
8. Depression
9. Tobacco use
10. Alcohol use

Once the SDoH questionnaire is completed, a color-coded diagram would be generated based on which an SDoH score is calculated; see below.

**SCORE Guide (range 0-20):**

Green: 0

Yellow: 1

Red: 2

A total score is calculated using an MS excel sheet for each determinant.

---

*“In conclusion, low physical activity is a high concern problem among pregnant women. Public health initiatives should be started on advocating physical activity. Based on our findings, community involvement with other important public health stakeholders should be an urgent need.”*

---

**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](mailto:LomaLindaPublishingCompany@gmail.com)



A	B	C	D	E	F	G	H	I	J
Financial	Food	Transport	Physical	Stress	Social	Housing	Depression	Tobacco	Alcohol
0	0	0	0	0	0	0	0	0	0
0	0	0	2	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	1
0	0	0	1	0	-		0	0	0
0	2	2	0	0	0	0	0	0	0
0	0	0	2	0	-		0	0	1
0	0	0	1	0		2	0	0	2
0	0	0	2	0		1	0	0	1
0	0	0	1	0		0	0	0	0
1	2	0	1	2	-	-		0	0
0	0	0	0	0		0	0	0	0
1	2	0	0	2		0	0	0	0
0	0	0	1	0		1	2	0	0
0	0	0	0	0		1	2	0	0
0	0	2	1	0		1	0	0	0
1	0	0	2	2		2	2	0	2
0	0	0	1	0		0	0	0	0
0	2	0	2	0		0	0	0	0
0	0	0	2	0		1	0	0	0
0	0	0	1	0		1	0	0	0
0	0	0	2	0		0	0	0	0
0	0	2	1	2		2	0	0	0
0	0	0	0	0		0	0	1	0
0	0	0	1	0		0	0	0	0
0	0	-	0	2		0	2	0	1
0	0	0	1	0		0	-	0	0
0	0	2	1	0		2	-	0	0
0	0	2	1	0		1	2	0	2
0	0	0	2	0		0	-	0	2
0	0	2	2	0		2	2	0	1
<b>3</b>	<b>8</b>	<b>12</b>	<b>31</b>	<b>10</b>	<b>18</b>	<b>12</b>	<b>0</b>	<b>14</b>	<b>0</b>

Appendix 3 (Data)

**References:**

1. [https://www.who.int/health-topics/social-determinants-of-health#tab=tab\\_1](https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1)
2. Amjad S, MacDonald I, Chambers T, et al. Social determinants of health and adverse maternal and birth outcomes in adolescent pregnancies: A systematic review and meta-analysis. *Paediatr Perinat Epidemiol.* 2019;33(1):88-99. doi:10.1111/ppe.12529
3. Maness SB, Bui ER. Associations Between Social Determinants of Health and Pregnancy Among Young People: A Systematic Review of Research Published During the Past 25 Years. *Public Health Rep.* 2016;131(1):86-99. doi:10.1177/003335491613100115
4. <https://www.epic.com/>
5. Moradi G, Zokaeii M, Goodarzi E, Khazaei Z. Maternal risk factors for low birth weight infants: A nested case-control study of rural areas in Kurdistan (western of Iran). *J Prev*

6. Med Hyg. 2021;62(2): E399-E406. Published 2021 Jul 30. doi:10.15167/2421-4248/jpmh2021.62.2.1635
6. DiTosto JD, Holder K, Soyemi E, Beestrum M, Yee LM. Housing instability and adverse perinatal outcomes: a systematic review. *Am J Obstet Gynecol MFM.* 2021;3(6):100477. doi:10.1016/j.ajogmf.2021.100477
7. Pedersen JF, Kallesøe SB, Langergaard S, Overgaard C. Interventions to reduce preterm birth in pregnant women with psychosocial vulnerability factors-A systematic review. *Midwifery.* 2021; 100:103018. doi: 10.1016/j.midw.2021.103018
8. Givens M, Teal EN, Patel V, Manuck TA. Preterm birth among pregnant women living in areas with high social vulnerability. *Am J Obstet Gynecol MFM.* 2021;3(5):100414. doi:10.1016/j.ajogmf.2021.100414

Author contribution: Dr. Manzar conceptualized the study and wrote the draft.

Acknowledgment: I want to thank the nursing staff who helped collect data.

Funding and financial support: None

Disclosures: The author has no disclosures or conflicts of interest

**NT**

Corresponding Author



Shabih Manzar, MD  
Attending  
Department of Pediatrics  
Division of Neonatology  
College of Medicine  
Louisiana State University of Health Sciences  
1501 Kings Highway  
Shreveport, LA 71130  
Telephone: 318-626- 4374  
Fax: 318-698-4305  
Email: [smanza@lsuhsc.edu](mailto:smanza@lsuhsc.edu)



# 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](http://www.nationalperinatal.org/COVID-19)



28<sup>th</sup> Annual Cool Topics in Neonatology  
March 4 -6, 2022  
Coronado Island Marriott Resort, Coronado, California

## CAN Abstract Submission Deadline - Monday, January 24, 2022

The [28th Annual Cool Topics in Neonatology Conference](#) will be hosting the 2022 Cool Topics in Neonatology Poster Session on Friday, March 4, 2022 at the Coronado Island Marriott Resort. The approved posters will be available for our attendees to view during the CAN Poster Session being held from 4:30 pm – 6:00 pm. Authors and presenters are expected to be available for questions during this time.

Neonatal fellows, faculty, and individuals or teams engaged in improving the quality of newborn care are welcome to submit an abstract. We encourage the submission of abstracts which are of general interest to neonatologists. In addition, abstracts which report team-based quality improvement projects are also accepted. Work may have been presented in other academic settings but should not have been published before the date of the presentation. Registration in the Cool Topics in Neonatology Conference is required to submit a poster. To register for Cool Topics 2022 or the CPQCC Improvement Palooza 2022, please click [here](#).

### Abstract Submission Instructions

To submit your CAN abstract, please email Danny Chambers, Program Manager, at [DChambers@mednet.ucla.edu](mailto:DChambers@mednet.ucla.edu). Please ensure your email subject line reads "CAN Abstract Submission." Your file name should follow the following syntax "LastNameFirstName\_CAN2021" (ex: DoeJohn\_CAN2021).

**The Abstract Submission Deadline is Monday, January 24, 2022.** A review process will be completed. Acceptance decisions will be released by **Monday, February 14, 2022**. A handful of abstracts will be chosen to present during the symposium. Authors selected for this additional presentation will be notified by **Friday, February 18, 2022**.

The suggested structure of the abstract should be less than 400 words, fit a single page with the title, author information, introduction, methods, and results. The presenting author should be identified with an asterisk (\*).

Quality improvement projects should follow either Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines with background, objective, design, setting, patients, intervention, measurements, results, limitations and conclusions as suggested headings. Alternatively, the Vermont Oxford Network (VON) learning fair structure with background, smart aim, setting, mechanisms, drivers of change, methods, measures, results, discussion, and team acknowledgement will also be accepted.

\*Note: Submitting an abstract does not include registration for the Cool Topics in Neonatology Conference.

For more information on the Cool Topics in Neonatology Conference, please click [here](#). To reserve your room at the Coronado Island Marriott Resort, please [click here](#)

Thank you so much and we look forward to your submission!

Best regards,

Daniel Chambers

UCLA CME Program Manager

David Geffen School of Medicine at UCLA

Phone: 310-794-2620

Fax: 310-794-2624

[dchambers@mednet.ucla.edu](mailto:dchambers@mednet.ucla.edu)

# CE opportunities — in-person, online and on-demand!

**MEDNAX**<sup>®</sup>  
CREQS

## **NEO: The Conference for Neonatology**

**March 2-4, 2022**

More than 20 world-renowned speakers will address some of the most debated, critical issues that influence the clinical practice of neonatal medicine. Join us for an event designed to move the needle in neonatology. Register today for an opportunity to learn, network and earn CME/CNE credits! [neoconference.com](http://neoconference.com)

neo<sup>™</sup>



The conference  
for neonatology

## **Specialty Review in Neonatology**

**March 1-6, 2022**

Ideal for those preparing for subspecialty certification or just looking for in-depth knowledge of neonatal medicine, Specialty Review boasts expert faculty who will provide a comprehensive review of neonatology. Register now to learn from master teachers, participate in interactive tutorials and earn CME credits and MOC points! [specialtyreview.com](http://specialtyreview.com)



**Early-bird rates for both of these outstanding conferences are available through Dec. 31.**

**Mednax<sup>®</sup> Neonatology Ground Rounds Series:** Discover the latest in newborn medicine. Join us the first Wednesday of every month at 4 p.m. Eastern Time for our hour-long, complimentary Neonatology Ground Rounds Series webinars. Brought to you by The Mednax<sup>®</sup> Center for Research, Education, Quality and Safety (CREQS), the series provides valuable information about new findings and advances in newborn medicine while earning accredited CE. Reserve your spot today!

Webinar topics and speakers subject to change.

For more information and to register, visit [info.mednax.com/continuededucationwebinars](http://info.mednax.com/continuededucationwebinars).

### **Accreditation**

Accreditation Statements are applicable for each one-hour Neonatology Grand Rounds webinar.

The Mednax Center for Research, Education, Quality and Safety is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The Mednax Center for Research, Education, Quality and Safety designates this Internet Live activity for a maximum of 1.0 AMA PRA Category 1 Credits<sup>™</sup>. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The Mednax Center for Research, Education, Quality and Safety is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation (#PO258).

The Mednax Center for Research, Education, Quality and Safety designates this Internet Live activity for a maximum of 1.00 nursing contact hour(s). Participants should claim only the credit commensurate with the extent of their participation in the activity.



**Chief Appointment – Division of Neonatology  
Connecticut Children's Medical Center / UCONN SOM**

***RANKED #37 - US News and World Reports***

**On behalf of Juan Salazar MD, Chair of Pediatrics** CareerPhysician, LLC, a leader in academic pediatric leadership recruitment, has initiated a **national search to identify a transformational leader to name Chief of Neonatology at Connecticut Children's Hospital and UCONN School of Medicine** to lead their U.S News ranked division into the future.

The Chief will have the opportunity to advance the legacy of the neonatology division by continuing to advance the regional and national reputation of the program and create a vision that encompasses the mission and values of Connecticut Children's, dedicated to improving the physical and emotional health of children through family-centered care, research, education, and advocacy.

**Opportunity Highlights:**

- The Chief will hold the Ross Mayer Endowed Chair for neonatology to support resources critical to supporting and continuing to enhance care delivery across the region.
- Lead a clinical enterprise of 42 neonatologists and 104 advanced practice clinicians providing clinical support to 14 neonatal units throughout Connecticut and Eastern New York, and architect a vision to continue to expand through strategic partnerships in the region.
- The new Chief will align and report directly to the Chair of Pediatrics at Connecticut Children's Medical Center and the President of Connecticut Children's Specialty Group (CCSG), joining an institution with strategic and fiscal commitment to building a new, state-of-the-art 65 bed NICU.
- Connecticut Children's comprehensive neonatology program includes, world-class Level IV NICU, a mature Neonatal Neurodevelopmental Follow-Up that houses an extensive database and serves as an integral part of research for the neonatology division, an ROP follow up program, nutrition and lactation support, a Fetal Diagnostic Center, ECMO and Critical Care Transport that serves 40 community hospitals.
- Current research endeavors within the division include clinical trials, studies on microbiome and bacterial populations impact on gut health, genomics, strategies for early identification of acute neonatal problems focusing on NEC and pulmonary hemorrhage, oxygen saturation and outcome changes in VLBW infants and neurodevelopmental studies.
- We believe this to be one of the top leadership positions in Pediatrics, offering the selected leader a chance to create a vision, implement a strategy, and cultivate a culture focused on children. Connecticut Children's is that state's only stand-alone children's hospital and division of neonatology is the premiere neonatal service provider in the region.
- Academic promotion occurs through the University of Connecticut and an Associate Professor rank or above is preferred.

For more details about this opportunity, or if you would like to recommend an individual(s) who exemplifies the qualities we are seeking in a candidate, please contact Mark Lozano at [mark@careerphysician.com](mailto:mark@careerphysician.com), or at 469-553-9311. All inquiries will remain confidential, and no inquiries will be made without the consent of the applicant. ***Connecticut Children's Medical Center is an AA/EOE/ADA employer committed to excellence through diversity.***

# Disaster Series: High-Reliability Organizing (HRO) as Self-Organization

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

## Abstract

*Oscillatory processes, basic to the functions of life, are intrinsic to the stability of physiological systems. After oscillations gain stochastic resonance, the power spectrum increases in lower frequencies – as environmental stochastic noise, uncommon events gain greater influence on the system. Even weak or relatively small stochastic noise can create and sustain significant oscillations. In physiology, stochastic noise disruption beyond normal bounds is associated with disease, creating the phenomena we observe and treat. Pink noise, the 1/f oscillation, has an increasing power spectrum at low frequencies producing abrupt, rapid fluctuations that bring catastrophic failure. Self-organization promotes stability and stable patterns. As a response to stochastic noise, self-organization is an agile, adaptive response that starts with the engagement of the situation. Paraconsistent and modal logics work with inconsistent and contradictory information and the different ways things are true. Motor cognition adjusts our actions to changing situations; we learn through physical actions. Mirror neurons help us understand the intent and actions of others during self-organization, creating a gateway to social cognition. During a disaster, operations occur in a topological space which constrains and facilitates actions in pink noise crises. Self-organization is the natural and effective response to disruptive environmental stochastic noise.*

***“Mirror neurons help us understand the intent and actions of others during self-organization, creating a gateway to social cognition. During a disaster, operations occur in a topological space which constrains and facilitates actions in pink noise crises. Self-organization is the natural and effective response to disruptive environmental stochastic noise.”***

Readers can also follow

**NEONATOLOGY TODAY**

via our Twitter Feed

**@NEOTODAY**

## Introduction:

Random fluctuations of energy, independent of time, form ‘white noise’ following a Gaussian distribution. Feedback within the system creates stochastic resonance and time dependence, increasing the power spectrum in the lower frequencies, called ‘red noise.’ Time dependence forms a power distribution describing greater influence on the system from uncommon low-frequency events. These red noise events are also poorly predictable. A special relationship occurs at the ‘flicker’ frequency, the 1/f oscillation, where increased power spectrum at low frequencies produces abrupt, rapid fluctuations and catastrophic failure. This noise is ‘pink noise.’

As critical infrastructures, hospitals have a dual function for reliability. They must maintain stability and prevent failures while responding to infrastructure failures. Emery Roe and Paul Schulman described the similarities and differences of these two approaches in nuclear power plant control operators and wildland fire emergency responders. ‘Control room operations’ prevent failure of healthcare infrastructure and undertake recovery while ‘emergency response’ activates when the infrastructure fails (1).

***“In a disaster, healthcare professionals accustomed to the support of the hospital infrastructure must continue the infrastructure-dependent control operator approach and assume the infrastructure-independent emergency response. Healthcare professionals and administrators often lack experience with the ‘logic of operations’ used in emergency response,”***

In a disaster, healthcare professionals accustomed to the support of the hospital infrastructure must continue the infrastructure-dependent control operator approach and assume the infrastructure-independent emergency response. Healthcare professionals and administrators often lack experience with the ‘logic of operations’ used in emergency response, which differs significantly from control room operations (1-3). Environmental stochastic noise, particularly the rapid fluctuations from fractal 1/f ‘pink noise,’ affects both responsibilities for healthcare infrastructure. The method to respond by organizational control room operations and emergency response is the same – self-organization.

Healthcare professionals focus on protecting and treating neonates within an extreme environment (4-6). And the environment may have changed, but the processes did not. “All natural disturbances of various sizes can be seen as part of a seamless 1/f-noise process. In this picture, we need not make any special distinction between normal environmental variation and ecological ‘catastrophes’: it is the same thing seen at different scales,” John M. Halley (7).

Onsite healthcare professionals are the hospital's and NICU's response to a disaster. We cannot foresee every possible deviation in the disaster. Increased task uncertainty and exceptions to routine operations will overload the organizational hierarchy. Control transfers to the work domain level where teams embrace structural forms that fit situational demands by 'self-organizing' (8).

Pre-planned routines are inherently 'brittle' and, when rotely invoked and followed, performance breaks down. Instructions are under-specified for the conditions and contexts. "This is the problem of *unanticipated variability*, which frequently happens during emergencies at complex technological systems. Operators need to continue operating and controlling the system in a new and unprecedented environment and adverse conditions. Coming up with an unprecedented plan is strongly culturally driven," Najmedin Meshkati and Yalda Khashe (8).

---

***"Instructions are under-specified for the conditions and contexts. "This is the problem of unanticipated variability, which frequently happens during emergencies at complex technological systems. Operators need to continue operating and controlling the system in a new and unprecedented environment and adverse conditions."***

---

The 2011 Fukushima earthquake and tsunami damaged the Fukushima Daiichi and Fukushima Daini nuclear plants. (Geologists refer to this earthquake as the "2011 Tōhoku earthquake and tsunami.") The majority of the "pre-planned" response plans did not apply to the situations that operating staff encountered. Control operators became emergency responders. Fukushima Daini operators made personal sacrifices to bring the four reactors to the cold shutdown state. The Fukushima Daiichi operators used their ingenuity on the scene to develop and implement alternative mitigation plans in real-time, showing "courage and resilience ... under extraordinarily difficult conditions. Their actions potentially prevented even more severe outcomes at the plan." "The Fukushima Daiichi accident reaffirmed that people are the last line of defense in a severe accident" (9).

Emergency response problems did occur, generally described as coming from the Emergency Response Center (ERC) or with external teams. Planning was also faulted, "...they did not assume that a situation in which multiple nuclear reactors losing all power sources almost simultaneously would occur and thus did not provide the training and education necessary to implement measures to control such a serious situation." "You can't adequately prepare for a disaster that you don't admit can ever happen" (9).

At the Onagawa Nuclear Power Station plant, the earthquake and tsunami damaged some equipment and structures without affecting structural integrity. The plant "shut down safely" and was "remarkably undamaged." The Onagawa plant experienced the most vigorous shaking that any nuclear plant has ever experienced from an earthquake.

The distances from the epicenter were: Fukushima Daini 100 miles (160 km), Fukushima Daiichi 93 miles (150 km), and Onagawa 50 miles (80 km). Fukushima Daiichi and Daini plants were

owned and operated by Tokyo Electric Power Company (TEPCO). Only the Onagawa power plant, owned by Tohoku Electric, went unscathed (9).

*"Operators are maintained in [complex technological] systems because they are flexible, can learn and do adapt to the peculiarities of the system, and thus they are expected to plug the holes in the designer's imagination."*

Jens Rasmussen (10)

### **Oscillations and Self-Organization**

Oscillations and oscillatory processes are basic to the functions of life and the physical world. Nonlinear feedback systems responding to the entry of noise energy into the open system create oscillations. Through stochastic resonance, weak or relatively small noise creates and can sustain significant oscillations. Temporal dependence of the noise causes these effects on the system to lag.

Time correlation of perturbations creates the stochastic effect of noise. White noise has equal power in every unit of bandwidth; therefore, it is uncorrelated in time. Increased averaging of measurements over time increases accuracy in white noise. A delta-function impulse, or time lag, produces a filter response that correlates perturbations with a copy of itself on all timescales in bounded continuous-time processes. Measurements converge at ever-closer intervals in time, creating temporal autocorrelation and reddened noise. Temporal autocorrelation increases variance of the oscillation and the possibility of negative outcomes (11, 12). Spectral densities reflect the power of the frequencies and give the pattern their 'color' [Table 1]. The color of the noise has a major impact on system responses (13).

White noise $1/f^0$
Brown noise $1/f^2$
Red noise $1/f^\alpha$
value of $\alpha$ between 0.5 and 1.5
Pink noise $1/f^1$

*Table 1. Spectral densities of noise*

The hallmark of pink noise,  $1/f$ , is the presence of rapid fluctuations and a power spectrum that increases at lower frequencies. Pink noise represents long-timescale fluctuations without a well-defined long-term mean. Accuracy does not improve by averaging more measurements over time (12).

Stochastic noise develops from factors intrinsic to the system or extrinsic within the environment. The intrinsic variables we measure, such as vital signs or blood gas analysis, are statistical averages of continuous variables. Because these are continuous processes, the actual measurements constantly change. We see and monitor averaged values; the system experiences fluctuating aggregates of the real measures (11).

Environmental stochasticity reflects the effects of variable parameters within the environment that we simplify by disregarding or treating as constants. Lack of interest or awareness in these processes leads to their exclusion as variables in scientific models. Including them creates variation that may obscure patterns of significance (11). Oscillations develop collective behavior and contribute to the aggregation of oscillations into waveforms (14). Increasing environmental stochastic variance influences these collective behaviors and waves to create unpredictable complexity and chaos within the system.

The order also comes out of chaos through self-organization (15). These systems stabilize and develop order by self-organizing

through local, nonlinear feedback. Positive feedback contributes to growth and structure, while negative feedback restricts growth. These oscillatory, self-organizing processes bring stability and order to the environment, but the nonlinear interactions degrade any ability for predictions. Environmental self-organizing processes create stochastic noise that can increase to a level that forces a system or population to respond. The system or population responses to these forcing functions are also self-organizing oscillatory processes with poor predictability of outcomes. The noise process is independent of timescale or magnitude; we need not characterize normal environmental variation differently from catastrophes (7). A disaster is an open system where energy and entropy freely flow.

---

***“When a NICU experiences a disaster, the external environment enters the NICU (16), and the isolated system, which constrains the flow of energy and entropy, becomes an open system. Energy and entropy freely flow in or out.”***

---

When a NICU experiences a disaster, the external environment enters the NICU (16), and the isolated system, which constrains the flow of energy and entropy, becomes an open system. Energy and entropy freely flow in or out. Entropic energy, the energy not available for useful work, changes order within the NICU system to disorder. Note that entropy is not a measure of disorder *in the moment*, such as scattered, randomized elements. Rather, entropy is disorder as poor predictability because of many possible permutations or possible futures. The *more random* the system becomes, the greater the number of possibilities develops and the greater the increase in entropy. The forcing function of stochastic environmental energy drives the disaster into the NICU, forcing the NICU to become an open system and increasing the possible permutations the Neonatologist must navigate.

Self-organizing systems are dynamic, requiring continual interactions. The disaster environment is an open system with the continual flux of energy and matter. Reactions, therefore, can occur away from their equilibrium state. Structures – termed dissipative structures – emerge through nonlinear kinetics. Patterns then arise from energy dissipation into the environment (17).

However, in healthcare, we are more accustomed to a static, closed system with parts that operate like a jigsaw puzzle – complete once assembled. This utilizes a “static process employed to analyze puzzles in matrixed depictions of the world. In that approach, all assumptions about a problem or mission are built into the matrix at the start, thereby limiting the range of eventual deductions,” Adrian Wolfberg (18).

Self-organizing has a purpose. Disregarding these processes for whatever reason constrains our analysis, as described by Wolfberg above. Adopting full-spectrum analysis, approaching problems as mysteries, expands our experience and findings (19, 20). Stochastic phenomena have significant contributions to the gap between theory and practice (21), discrete concepts and continuous perceptions (22), and abstractions and context (23, 24). Once considered a source of interference, stochastic noise may create the phenomena we observe and treat. Noise, then, may inform us of occult influences (11).

Self-organization creates the oscillations and waveforms that disrupt the environment, forcing responses from populations. Self-organization is also the response of populations to reduce the effect of environmental oscillations. The flow of energy and entropy alter the self-organization of these oscillations. *Stochastic environments become stable from the oscillations of self-organization; populations maintain stability through the oscillations of self-organization.*

---

***“The flow of energy and entropy alter the self-organization of these oscillations. Stochastic environments become stable from the oscillations of self-organization; populations maintain stability through the oscillations of self-organization.”***

---

**The Color of Noise:**

Oscillations occurring with a time component will form waves having frequencies. Noise is a disorganized pattern of waves that do not carry information. Stochastic waves carry energy, and their stochastic character means their probability values will unexpectedly change. Environmental stochastic noise describes the ambi-

Color	Structure	Variance	Distribution
<b>White</b>	No frequencies dominate Flattened spectrum Spectral density has equal amounts of all frequencies	Data <i>decreases</i> variance  Forms Gaussian curve	Gaussian distribution - Elements fully independent - No autocorrelation
<b>Red</b>	Low frequencies dominate Long-period cycles	Data <i>increases</i> variance  Forms power distribution	Power law distribution - Elements <i>not</i> independent - Mutual/ reciprocal relations
<b>Pink</b>	The midpoint of red noise  Slope lies <i>precisely</i> midway between white noise and brown (random) noise	Data <i>continuously increases</i> variance  Distinguishes pink noise from red-dened spectra	Power law distribution - No well-defined long-term mean - No well-defined value at a single point

Table 2. Patterns and Characteristics of Noise



ent noise of the world in which we live.

Environmental stochastic noise can fluctuate over time and through space, correlating with itself (autocorrelation) as serial correlations of that flux. Environmental stochastic noise can also exist as dominant frequencies, longer wavelengths within a power spectrum with greater power or spectral density (7, 25). These differences are critical to understanding the effect of environmental stochastic noise in a system. To visualize the structure of these differences, it helps think of a graph with the *power* of the noise fluctuations on the vertical (y) axis. Power represents the quantity of energy, relative influence, or the spectral density of the waves. The *frequency* of the aggregate waves is on the horizontal (x) axis. The frequency is mapped as the *inverse* of frequency  $1/f$ ; a critical value called fractal or  $1/f$  noise.

---

***“Power represents the quantity of energy, relative influence, or the spectral density of the waves. The frequency of the aggregate waves is on the horizontal (x) axis. The frequency is mapped as the inverse of frequency  $1/f$ ; a critical value called fractal or  $1/f$  noise.”***

---

With the analogy of visible light, these fluctuations are termed ‘color’ to describe the pattern of predominant frequencies in a certain fluctuation range (26) [Table 2]. The various colors of noise refer to the disruptive potential of stochastic energy within the environment and the characteristics of that environment. Low-frequency events (longer wavelengths) have a greater effect on the environment than frequent events with short wavelengths.

The meaning of the types of environmental stochastic noise comes from the characteristics of their fluctuations that cause unpredictable events and the energy of their ‘forcing functions.’ Frequencies with the power to force a system or population to respond to the environment are forcing functions.

- Completely random fluctuations, like Brownian motion, are *brown noise*.
- The absence of a predominant energy frequency is *white noise*, like the white noise of sound-canceling earphones.
- Fluctuations with long frequencies, slow in onset, and that carry greater power to affect the environment are *red noise*, as in long-wavelength red light.
- Fluctuations with long frequencies that can cause abrupt catastrophic events are *pink noise* because they are *precisely* between white noise and red noise or between white noise and the randomness of brown noise.

The variances from data for the different types of noise produce different probability distributions:

- *White noise* is characterized by equal energy over all frequencies.
  - o Environmental elements are fully independent.
  - o Variance decreases over time or with increasing data.
  - o Frequencies are uncorrelated in time with an equal distribution of energy.
  - o They form a Gaussian distribution amenable to statisti-

cal analysis and calculated probabilities.

- *Red noise* contains low frequencies with the energy to affect the environment
  - o Environmental elements are *not* independent
  - o Variance *increases* over time or with increasing data.
  - o Red noise has rapid fluctuations.
  - o Red noise forms a power distribution.
- *Pink noise* (fractal or  $1/f$  noise) power spectral density is inversely proportional to the frequency with the possibility of low frequency, *catastrophic* events.
  - o Environmental elements, over time, do not form a well-defined mean.
  - o Variance *continuously increases* over time; time-series become ‘messier’ with more data making deductions difficult (7).
  - o Pink noise forms a power distribution.

The effect of noise on a population as variance comes from the relative time scales between environmental and population-level processes. This is from the relative magnitudes of environmental stochastic auto-correlation times and population dynamics. Short environmental auto-correlation times act as white noise on populations. The contribution of environmental stochastic noise will dominate in large systems (11).

Red and pink noise disturbances occur on any timescale with any order of magnitude. There is no particular distinction between normal environmental variation and ecological ‘catastrophes’: it is the same thing seen at different timescales (7).

#### **Environments of Noise**

Our environment contains background noise from everyday stochastic processes. Changes in entropy within our open environment amplify this natural noise. We routinely operate with environmental stochastic noise having fluctuations that can sometimes exceed our capabilities. We are then forced to respond to the environment.

---

***“Our environment contains background noise from everyday stochastic processes. Changes in entropy within our open environment amplify this natural noise. We routinely operate with environmental stochastic noise having fluctuations that can sometimes exceed our capabilities.”***

---

Within a NICU environment and over short time horizons, we may not be able to differentiate the color of noise in a particular NICU. A person with limited experience in white noise environments may find a sudden stochastic increase in white noise threatening. Low-frequency red noise events mislead outsiders into believing they are operating in a white noise environment. People transferring from a NICU with a different population of neonates or administrators with authority over equipment and finances may not recognize the NICU by the low frequency of its forcing functions or

Noise	White	Red	Pink
Space	Euclidean	Topological	Topological
Distribution	Gaussian	Power	Power Fractal
Stochastic processes	Independent	Correlated	Correlated
Variance	Decreases with data Constrained	Increases with data	Continuously increases with data
Problem type	Well-structured Algorithms, protocols	Ill-structured Heuristics	Embedded in environment Engagement
Social response	Hierarchical	Self-organizing	Self-organizing
Environment	Linear Deterministic	VUCA Long frequencies mimic white noise	VUCA-2T Liminality

Table 3: Characteristics of Noise

the presence of  $1/f$  noise. When developing a PICU, one author (DvS) was summoned by the hospital's equipment committee to explain why the PICU needed more central venous catheters than the adult or neonatal ICUs. Bewildered what to say, the author suggested it might be related to the limited variance in the physical length of patients in the other two types of ICUs, whereas the PICU had patients from a foot long to over six feet.

There is a difference between a normal environment consisting of multiple *independent* stochastic processes (white noise) and an environment of intermittent *correlated* (linked) stochastic processes (red noise) [Table 3]. Correlation *amplifies* stochastic processes. The first has some degree of predictability while the latter does not. Further, the variance in white noise environments is constrained; collecting more data reduces variance. In red noise environments, more data and time increases variance. In pink noise environments, time and data continuously increase variance. That is, wait long enough, and the catastrophe comes to you. The differences profoundly affect how systems and populations adapt to their environment. 'Environmental stochasticity' describes the unpredictability of the environment (27).

---

***“Despite their stochastic characteristics, white noise environments follow the Gaussian distribution and are amenable to algorithms, rules, and protocols associated with known success. These are the well-structured problems described by Herbert Simon (28).”***

---

Despite their stochastic characteristics, white noise environments follow the Gaussian distribution and are amenable to algorithms, rules, and protocols associated with known success. These are the well-structured problems described by Herbert Simon (28). The environmental stochastic variance of white noise can appear daunting to the uninitiated, believing they have experienced a reddened environment.

Red noise environments with low frequency forcing events have a greater influence on the system than white noise—reddened events within the normal variation of activity act as forcing func-

tions on populations. Red noise environments contain ill-structured problems requiring the use of heuristics (28) and bias-correcting error (29), decision-making driven by feedback (John Boyd's OODA Loop) (30), and practical, common-sense problem-solving approaches (31).

In the pink noise environment, catastrophes occur when the environment becomes a major aspect of the problem. Catastrophic events arising from the change in entropy due to environmental stochastic noise differ only in magnitude and timescale (7). The external and internal environments share feedback, embedding the problem into the external environment. We see this with neonatal care during abrupt and prolonged disasters when the environment intrudes into the NICU, effectively embedding the NICU into the environment (4, 6). This moment-to-moment feedback can create a “loss of cosmology,” which can collapse sensemaking (32), or the individual allows ‘abstractionism’ to supersede contextualization of the problem (24).

In the pink noise environment of a disaster, the shorter time scales and rapid fluctuations will embed the problem into the environment. More insidious is the assimilated problem where problem-boundary issues become diffuse. We see this with white-noise management styles operating in a reddened environment or assimilating “failure by not acting” into the organization (33).

The salience of signals in the environment is learned through experience (19, 20). Signals are cycles with predictability that have meaning. Noise is the residual variability that causes unpredictability. The rarity of severe perturbations and unrecognized salience allows administrators to sustain their assumptions that experience in white noise environments suffices for red and pink noise. Also, leadership practices in white noise environments are loosely coupled to administrative and management practices (34). Too readily, management science displaces the leadership necessary for dangerous contexts in the pink noise environment (35).

Self-organizing is an innate property of human interaction. Self-organizing actions always change the situation. All problems run their course. Self-organization can make any response appear successful or fail, depending on interpretation. This underscores the importance of recognizing the purpose of high-reliability operations and self-organization.

Self-organizing starts with the engagement of the situation (23). For the embedded problem, individuals must enter the environment, that is, become “part of the problem” and work it from within (16). More specifically, we engage negative feedback that some call error or failure. Negative feedback represents the location of

uncertainty, gaps in knowledge, hazards, boundaries of performance, and the border of effective operations. This locus is motor cognition driven by our executive functions – to think by acting and the source of the agency during a crisis (36). People come together to self-organize, supported by mirror neurons (37, 38), and a team forms with a natural leader, though more often an ephemeral leader as leadership migrates to the individual in the best position to lead (35, 39). This hierarchy becomes self-directed self-organizing.

---

***“Self-organizing can make any action or belief look correct through the noncritical use of inductive reasoning. There will always be sufficient ambiguity present to support any decision or outcome.”***

---

. Signs of using white noise approaches in a reddened environment include:

- The drive for precision, what exactly to do, rather than seek accuracy, a product of motor cognition
- Avoiding negative feedback, especially if the feedback relates to a decision that directly leads to failure by not acting, a failure that is not visible, that will easily and uncritically become organizational knowledge
- Self-organized cognitive or affective feedback between members can develop unknowingly into groupthink – signals are missed, salience is lost, and false meaning is given to information
- Protocols and algorithms for gaps between theory and practice (21) or between discrete concepts and continuous perceptions (22)
- Language for white noise is passive and abstract rather than active and concrete, utilizing a different part of the brain

Long periods between events in the red noise environments can be mistranslated as relatively stable white noise, just as the constrained stochastic surprises in the white noise environment can challenge those with less experience. To better describe these environments, civilians borrowed the US Army acronym VUCA (Volatility, Uncertainty, Complexity, Ambiguity) (40, 41) for environments with the characteristics of red noise. We find a more accurate description for pink noise includes time compression and threat; pink noise is a VUCA-2T environment (Volatility, Uncertainty, Complexity, Ambiguity-Threat, and Time Compression see Table 4) (42).

Karl Weick (32) described how “cosmology episodes” collapse sensemaking and leadership. This occurred even with seasoned wildland firefighters during the 1949 Mann Gulch Fire. Pink noise catastrophes are cosmology episodes in a VUCA-2T environ-

ment, creating liminal experiences. Liminality is a transition (43), the space between the world we know and the world we do not. Old rules do not apply, we have not learned new rules, and we do not know what rules will work. This magnifies the gap between theory and practice (21), discrete concepts and continuous perceptions (22), abstractions and concreteness (Karl Weick, personal communication), and the static normative stance and the pragmatic stance from within the trajectory of events (23). In pink noise catastrophes, we find ourselves in a space we do not belong, a space meant for the passage where discomfort arises from the loss of context.

Mistranslation of HRO and the transfer of white noise approaches to a reddened environment risks the creation of the ecology of fear (44). In these organizations, the damage from the fear of error or failure becomes greater than the act itself.

#### **Logics and the Color of Noise**

Increasing entropy increases future possibilities. Oscillations reverse the truth value of information. Taken together, they create stochastic cycles of changing salience, relevance, and meaning for data and information. Certainty becomes ephemeral. However, formal systems of logic have completeness (all formulas can be proved) and consistency (never a contradiction). Truth and falsity are incompatible. Classical logic systems must manage incompleteness and inconsistency.

---

***“Certainty becomes ephemeral. However, formal systems of logic have completeness (all formulas can be proved) and consistency (never a contradiction). Truth and falsity are incompatible. Classical logic systems must manage incompleteness and inconsistency.”***

---

Working with contradictory data in flux, reasoning in complex, time-compressed situations, and solving ill-structured problems under uncertainty, cannot be accomplished with classical logic (2). Practical common-sense problem solving supports immediate engagement (31) but does not offer insight for the study of performance, teaching, or knowledge transfer.

#### **Paraconsistent Logics**

The rigid restraints of classical logic impair usage for uncertainty and inconsistency, particularly the law of the excluded middle. Paraconsistent logics were developed to handle inconsistent information and allow contradictory yet non-trivial theories (45). Paraconsistent logics permit inference from conflicting information in a non-trivial fashion, accommodate inconsistency in a

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

Table 4. VUCA-2T (42)

Logic	Domain	Operators
Modal	Qualify the truth of a judgment	“necessarily,” “possibly”
Epistemic	Knowledge and belief	“It is known that” “x knows that” “x believes that”
Doxastic	Belief revision (add information) Updating (world has changed)	“x holds after contraction / revision / expansion”
Deontic	Moral expression, duty	“ought to be” “obligatory,” “permitted,” “forbidden.”
Temporal	Future, past Linear & branching-time	“it will be / it was” “it will be / it will always be”

Table 5: Modal Logics

controlled way, and treat inconsistent information as potentially informative (46, 47). Paraconsistency is also an important feature of common-sense reasoning which can use exceptions and counterfactuals (31, 48, 49).

Three-valued, paraconsistent logics have an additional third value that is “both true and false.” This allows reasoning with variables that are not embedded directly in a contradiction (49, 50).

#### Modal Logics

Classical logic evaluates a premise by its appearance or form. The modal logics evaluate a premise by the different ways or modes that things are true. We can use these logics to infer reliable information from imperfect information, understand our changing beliefs in a dynamic world, manipulate uncertain information, appreciate how time changes the truths and information we work with, and comprehend how situations create different but logical duties and obligations. Modal logics use partial operators that limit the action of the operator. Modal logic classifies propositions as *contingently* true or false and allows claims about what is necessary, possible, contingent, essential, and accidental. Modal logic is the logic of “modalities,” *modes* (means) of truth, by using a variety of operators dependent on the domain of the logic (51) [Table 5].

**“Classical logic evaluates a premise by its appearance or form. The modal logics evaluate a premise by the different ways or modes that things are true. We can use these logics to infer reliable information from imperfect information, understand our changing beliefs in a dynamic world, manipulate uncertain information, appreciate how time changes the truths and information we work with, and comprehend how situations create different but logical duties and obligations.”**

*Epistemic logic* helps understand how operators perceive the actual world. The person may have belief as conviction, meaning that everything they believe is true. They may only believe what is objectively true; belief is independent of their subjectivity (52,

53). Their knowledge of the situation depends on the frame of reference (23, 54): the subjective internal, the perfect (objective) external, and the imperfect external points of view. In Newtonian mechanics, the physicists must always specify which frame of reference is considered when studying a natural phenomenon. We must do the same for epistemic logic.

The *internal approach* assumes the modeler is one of the agents involved in the situation. The modeler has a subjective point of view that represents how the world is perceived without perfect knowledge of the situation. Any models built might be erroneous (54).

The *external approach* is traditional epistemic logic with the modeler uninvolved and external to the situation. Having an omniscient view, the observer has perfect knowledge of the situation and has access to the minds of the people involved.

*Doxastic logic* (Greek *Doxa*, “belief”) is a form of epistemic logic but is concerned with the logic of 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, creating conviction of belief as epistemic logic. Our beliefs will become refractory to disconfirming evidence-motivated reasoning (55). In the worst case, such logic strengthens cognitive dissonance. Doxastic operators capture belief change, as “belief revisions” or “belief updates,” when they receive conflicting information or encounter a discrepancy or disruption.

We have found that a doxastic approach helps subordinates operate around those with certitude or in a hierarchy with a steep authority gradient that suppresses honest communication (56). Here, “honest” is one of van Stralen and Mercer’s five HRO values. What you say represents what is happening (3). One author (DvS) has had numerous encounters with staff who misrepresent or withhold information because of a management culture that blocks the free flow of information. We encourage such staff who have disconfirming or contradictory information to offer “updates” to their superior:

- *A belief update* refers to accounting for a change in the situation and acquiring new, more reliable information; this requires changing our inaccurate old beliefs to more accurate, new ones.
- *Belief revision* occurs when we identify the old information as less reliable, and we use new, more reliable information to revise our older beliefs; we keep the new belief as close as possible to the old belief while accepting the newer, accurate information.

The tension between belief (doxastic logic) and accuracy (epistemic logic) underscores the resistance to and utility of HRO.

False belief can develop within self or public image, reinforced by serial successes or the routine interpretation of outcomes as successful. Failure to use doxastic logic can produce individual narcissism or social groupthink. Disconfirming information is ignored, and disagreements are punished. Accuracy is a process especially true in reddened noise environments. In dangerous contexts, inaccurate information and models can kill (57). Every member has valuable information to share freely. Disconfirming information is sought, and disagreements are objectively evaluated.

From “duty” and “ought,” Deontic logic is the logic of conditional obligations for action. Conclusions in Classical Logic do not lead to action. Deontic logic provides reasons about duty or obligation and drives action from states. In this logic, every proposition exists in one of three mutually exclusive states: necessary, contingent, or impossible (58). Deontic logic takes us from “is” to “ought to”—that is, if an event occurs, then an action may be *obligated* or *not permitted*. Deontic logic is the logic of norms or accepted standards.

Temporal logic reasons how time qualifies statements and propositions with two basic operators, future and past. The asymmetry of time describes how the past is fixed, yet the future is branching and open to influence and change (59). This fits the effect of increasing entropy as an increase in possible futures rather than an increase in disorder.

Temporal logic can also be modified for concepts of time. For example, X is true at all times, while Y is true only sometimes. While the past is fixed and already determined, logical processes can account for the branching of time in the future. “Temporal logic” addresses problems of causality and mechanism, continuous change, planning actions, concurrent or discontinuous events, and the persistence of a fact rather than the truth of a fact.

Temporal logic moves us from a deterministic view of linear time that focuses on the path to the future. While there may be a feeling of security for families to know the percentage survival rate, such discussions do not reflect time experienced as a liminal state. During live-or-die experiences, there is no sense of time.

---

***“While there may be a feeling of security for families to know the percentage survival rate, such discussions do not reflect time experienced as a liminal state. During live-or-die experiences, there is no sense of time.”***

---

### **Self-Organizing Physiology**

It is easy to appreciate the situation of a premature neonate living with various sources of stochastic noise from numerous complex physiological rhythms and oscillations. These rhythms fluctuate irregularly over time (60). The neonate exists in an environment with stochastic noise, though the constrained environment of the closed NICU system may limit some sources of variance. In utero, the developing infant is exposed to unregulated environmental stochastic noise. Further, there are various levels of increasing or decreasing stochastic noise from developing physiology, emerging pathology, inflammatory responses, counter-inflammatory responses, and treatments. These rhythms arise from stochastic, nonlinear biological mechanisms interacting with a fluctuating environment.

Fluctuations themselves are intrinsic to the stability of the physiological systems. Disruption of the rhythmic processes beyond normal bounds or emergence of abnormal rhythms is associated with disease (60). Disruption in physiology occurs as the body self-organizes around the pathology through sympathetic inflammatory and counter-inflammatory responses. Our treatment causes disruption in pathology with more sympathetic inflammatory and counter-inflammatory responses to the treatment. Healing is a self-organizational process supported by the patient’s physiological responses and treatments.

In our intuitive minds, the nonlinearity of stochastic noise is undesirable and likely pathological compared to the more desirable linear and predictable noise we associate with health. Multiple regulatory systems and environmental influences operate over different time scales in a fluctuating manner. These systems operate far from equilibrium. Constancy may not be the goal of physiologic control (61, 62). Pink noise is common with many of these processes, such as the organization of neural networks, Purkinje fibers in the heart, the vascular tree, bronchial tree, bone trabeculae, electroencephalographic rhythms, heart rate variability, and respiratory intervals (62).

---

***“Constancy may not be the goal of physiologic control (61, 62). Pink noise is common with many of these processes, such as the organization of neural networks, Purkinje fibers in the heart, the vascular tree, bronchial tree, bone trabeculae, electroencephalographic rhythms, heart rate variability, and respiratory intervals (62).”***

---

Pink noise (fractal organization) may confer system resiliency, adaptability, and structural integrity, and its degradation may expose a person to sudden death (61, 62). Heart-rate variability displays  $1/f$  noise, and as stochastic properties degrade, the risk of sudden death increases. With age starting in the late 60s or the onset of disease, heart functional capacity decreases, and heart-rate variability shifts from  $1/f$  pink noise to white noise characteristics (61, 62).

In the brain, stochasticity (pink noise,  $1/f$ ) of random spike firing may influence the cognitive operations of decision-making, the stability of short-term memory, memory recall and attention, motor learning, and motor cognition, while movement errors modify planning future movements. Stochastic noise promotes decision-making, creativity, and shifting attention to new tasks (62).

### **Uncertainty and Chaos**

Many interactions are nonlinear with inherent uncertainty, yet even linear interactions can create uncertainty and randomness. Linear, time-variant systems, basically oscillating systems, have an inherent *uncertainty principle* that we can know the frequency or the position but not both. The better-known example from quantum physics is Heisenberg’s Uncertainty Principle. Increasingly precise measurement of one decreases the precision of the other.

This uncertainty affects the causality and prediction of the particle’s behavior. Uncertainty principles result from wave mechanics and oscillation in linear time-variant systems (as their name implies, they vary or oscillate linearly over time). Collecting infor-

mation for a decision takes time. When information is sufficient for a decision, the situation has changed.

---

***“The oscillation continues when the ‘output becomes the new input’ in the same deterministic equation. This is the logistic equation, as the equation for a parabola but using the output for the next input. The constant,  $r$ , is the rate of reaction for the system. As  $r$  increases, the system passes through a series of stable equilibria.”***

---

The oscillation continues when the ‘output becomes the new input’ in the same deterministic equation. This is the logistic equation, as the equation for a parabola but using the output for the next input. The constant,  $r$ , is the rate of reaction for the system. As  $r$  increases, the system passes through a series of stable equilibria. At  $r$  greater than three, the results become random and sensitive to initial conditions, *deterministic chaos* (63). “Deterministic” as it is determined by the logistic equation and “chaos” because the unpredictable outcomes are sensitive to initial conditions” (63, 64). While matter, energy, and probabilities are conserved, information and entropy are not conserved (15).

Veterans of pink noise environments use these concepts. Jim Denney, Capt., LAFD, a veteran of two Vietnam combat tours, would tell his crew, “In the face of a void, move forward.” An LAFD firefighter, approaching a volatile incident to assist one author (DvS), uttered a powerful version of a pragmatic stance: “I may not know what’s happening, but I know what to do.” Both approaches generate information and structure by actions, which generate thinking by acting (65). This process is motor cognition (36). These actions focus on reducing  $r$  to slow the rate of environmental activity, moving the system away from deterministic chaos. Anything that reduces the rate of change for one element will reduce the rate of change for the whole system. There is no wrong decision, no wrong act. This is experienced from within these dangerous contexts. The directed self-organization is not visible to spectators no matter how close they may stand.

### **Motor Cognition and Mirror Neurons**

HRO extends operations and the organization into uncertain, adverse, and hostile environments. The physical actions of care come from motor cognition, the influence of the cerebellum and motor cortex on cognition, and how we learn through physical activity to understand events (36). *Motor cognition* describes how we adjust our actions to changing situations and learn through physical actions.

The cerebellum and motor cortex also influence cognition. Executive and higher-level cognitive cortical functions draw upon interactions with cerebellar motor functions (66-68). High-level knowledge is grounded in sensory and motor experience (66). This action shapes the motor system on anticipation and provides information for the meaning of potential action (69, 70). We rely on reciprocal feedback from the environment (42). We think by acting (65).

Because uncertainty, adverse situations, and hostile environments have different *environmental* geometry, they require a dif-

ferent *engagement* geometry. Circumstances may change during sensemaking or acting, and your mind must keep up. The time course described is not necessarily minutes but could be days. Time compression matches the time horizon, minutes for an active resuscitation, weeks for a growing, healing lung. The problem is how we mentally map events and our responses. We are taught by organizing knowledge and concepts in hierarchies that show relationships and connect terms with measurable distances between points. This is a Euclidean space. There is growth but no movement.

### **Self-Organizing Teams**

HRO operations have common elements with motor cognition. We focus on the consequences of our actions and bottom-up feedback (23). This is similar to pragmatist philosophy and represented in motor cognition by perceivable effects as bottom-up feedback. (71, 72).

Cognitive processes for action include the urge and intention to act and adjust those actions while acting immediately. A mirror system allows us to understand the intent and actions, creating a gateway to social cognition. Mirror systems have motor output, differentiating them from visual perception processing (72). Mirror systems support the heedful interrelating and trust found on an aircraft carrier flight deck (73), physical rescue in the field (42), or neonatal resuscitation.

---

***“Cognitive processes for action include the urge and intention to act and adjust those actions while acting immediately. A mirror system allows us to understand the intent and actions, creating a gateway to social cognition. Mirror systems have motor output, differentiating them from visual perception processing (72).”***

---

Mirror systems are how we learn by watching others (37) and figuring out their intent without speaking (38). Because the mirror system neurons are in the pre-motor cortex, they do not respond unless action is executable. Through the mirror system, we can communicate to others through our actions, called communicative intention (74).

### **The Topology of Self-Organization**

The circumstances during COVID-19 and neonatology as a discipline are in a continuously changing actual world. Our team’s actions are continuous, independent, and interdependent. This geometry describes a *scale-free topology* (75). The central concept of topology is continuity, a notion of nearness preserved by a continuous function. Topology does not localize an object in Euclidean space, allowing a discipline to self-organize and extend beyond Euclidean restrictions (76).

Topological geometry constrains and facilitates actions. Geometry is preserved under continuous motions because distance and dimension are not relevant. During a disaster, operations occur in different kinds of space, with the distance between objects a matter of function of the relations. Differences between objects are a matter of variety in the relations (76). Topological social relations made possible several NICU evacuations and brought to government attention a “lost” NICU (4, 6).

Topological geometry also constrains self-organization and pattern formation. Topological continuity is maintained by transport paths and communication not connected to the process. In embryologic studies, epigenetics builds on topological constraints and self-organization within the egg (77).

---

***“The color of environmental noise relates to the timescale (78). The relevant timescale influencing topological relations may be hours to days for individuals. For the parents of a neonate, timescale and topological relations can be dynamic, from minutes to months, but have a farther social reach with consequent geometric constraints.”***

---

The color of environmental noise relates to the timescale (78). The relevant timescale influencing topological relations may be hours to days for individuals. For the parents of a neonate, timescale and topological relations can be dynamic, from minutes to months, but have a farther social reach with consequent geometric constraints. For the organization, relevant timescales may be years. Environmental color is pertinent as it has greater influence at the level of the organization. Self-organization as a response to color, on the other hand, acts on the individual level and at the organizational level.

### **Self-Organization brings Order from Chaos**

Self-organization promotes stability and stable patterns. Self-organizing systems can have an abrupt transition from one pattern to another even with a small change in the system, termed a *bifurcation*. Transitions can be dramatic and related to a single parameter – such as  $r$  in the logistic equation. (17, 63).

Instability is a measure of lack of information and loss of knowledge about a system, yet instability is also associated with acquiring information and knowledge. We create information when we convert uncertainty to certainty (79). In terms of self-organization, some organizations develop from the loss of information and organizations that develop from acquiring new information (80). The color of environmental noise as a measure of variance is pertinent to self-organization. Self-organization is the response to color at the point of contact with the environment.

Self-organization can occur strictly as a physical phenomenon, such as water on the hood of a freshly waxed car. Surface tension holds the bead in a spherical shape. As it grows, the force of gravity on the water increases until it overcomes surface tension, at which point the bead collapses, shearing into two.

Self-organization can develop through behaviors due to decisions, such as a termite mound where termites deposit material from local physical cues. “Individual organisms may use simple behavioral rules to generate structures and patterns at the collective level that are relatively more complex than the component and processes from which they emerge” (17). This is from nonlinear amplification and cooperativity, making the results sensitive to the initial state. *Complexity* can thus emerge without many rules or components and can be mistaken for the mathematical concept of *chaos*.

The judgment of individuals builds behaviors into self-organiza-

tion. When a crosswalk signal turns green, the people from both sides cross into each other. There is no outside director, no written rules. There are unwritten rules: do not look at or approach anyone too closely. The crossing self-organizes and occurs in a timely and efficient manner worldwide. Self-organizing of biological or physical systems occurs through nonlinear, local interactions internal to the system without external intervention or any external driving forces. Self-organization creates patterns that can appear to result from design or intention, leading us to claim responsibility or assign blame for outcomes inadvertently. However, these patterns result when the energy driving self-organization has dissipated.

Social systems direct self-organization through the behaviors of each member; therefore, the self-organization does not become dissipative. A well-informed leader may direct group activity, but the system is not self-organized. External technical or engineered design is another means for external leadership. Self-organizing as a response appears messy with little control over operators, while engineered designs in a socio-technical system (STS) would appear more reliable and trustworthy.

---

***“Social systems direct self-organization through the behaviors of each member; therefore, the self-organization does not become dissipative. A well-informed leader may direct group activity, but the system is not self-organized.”***

---

STS was first described in British underground coal mining with the introduction of technology to mine longwall segments at one time. The new process replaced the self-organization of lifetime teams of two men who used the “room-and-pillar” technique. During the transition, the technical management of mines did not give miners the security necessary for undertaking new developments. Those mines had low productivity. The technology of mechanization had decreased adaptability and responsible autonomy (81). Both are outcomes from effective social self-organization (36).

*“Technological systems become organized by commands from the outside, as when human intentions lead to the building of structures or machines. But many natural systems become structured by their own internal processes: these are self-organizing systems, and the emergence of order within them is a complex phenomenon that intrigues scientists from all disciplines.”*

Eugene F. Yates (82)

The elements of a system continuously and actively self-organize from local, nonlinear interactions.

### **Alternatives to Self-Organization**

Other paths bring order to chaos – a leader, a representation, sequential instructions, and templates.

- A well-informed leader internally or externally directs the group’s activity what each member should contribute. Having a leader means the activity is not self-organized (83).
- Representations like blueprints guide *what* is done but not *how* and do not synchronize workers.
- Sequential instructions are recipes to guide *how* it is done, but they do not allow for judgment, do not coordinate work-

ers' activity, nor adjust for temporal events (84).

- *Templates* are full-size guides that direct the process of pattern formation.

Some leadership styles are invisible, becoming apparent only in the crisis (3, 35). A symphony conductor confided in one author (DvS) that he, the conductor, was not needed during a performance. The orchestra could play as well without him. Individual fire officers have told the author that they did not do their job if you can see the leader. Leadership should be invisible. That is HRO leadership.

The authors have interviewed civilians and public safety personnel regarding actions during dangerous crises. They all describe ephemeral leadership as the title of "leader" rapidly and quietly shifts between participants (39).

## Conclusion

The study of white-noise influences and environments relies on time independence and equal energy across all frequencies. Feedback creates stochastic resonance, increasing the power spectrum in low frequencies. This is not a gradual change, but an abrupt, punctuated shift as the power distribution replaces the Gaussian distribution. New properties emerge but not new principles. We make no special distinction between normal environmental variation and catastrophes – we can adapt our routines through self-organization.

---

***“This is not a gradual change, but an abrupt, punctuated shift as the power distribution replaces the Gaussian distribution. New properties emerge but not new principles. We make no special distinction between normal environmental variation and catastrophes – we can adapt our routines through self-organization.”***

---

This assumes that we developed our operations used in the white noise environment from operations effective in red or pink noise environments. There is a smooth transition from pink noise to white noise operations. When a dramatic fluctuation occurs, we readily engage through self-organization. This is HRO.

On the other hand, operations developed *for* or *in* the white noise environment will fail during catastrophic fluctuations. The difference is whether the stochastic noise creating the fluctuations is *time-dependent* or *time-independent*. White noise operations can handle *time-independent* fluctuations.

Catastrophes will happen, but they arise from normal processes and respond to human self-organization. Staff must routinely practice self-organization for it to be effective.

In his discussion of issuing orders, George S. Patton, Jr. (85), wrote, “Never tell people *how* to do things. Tell them *what* to do, and they will surprise you with their ingenuity.”

## References:

1. Roe E, Schulman PR. *Comparing Emergency Response Infrastructure to Other Critical Infrastructures in the California*

2. Bay-Delta of the United States: A Research Note on Inter-Infrastructural Differences in Reliability Management. *Journal of Contingencies and Crisis Management*. 2015;23(4):193-200. doi: 10.1111/1468-5973.12083.
3. van Stralen D, Mercer TA. High-Reliability Organizing (HRO) and Abrupt Change from COVID 19: Failure of Scientific Rationality and Classical Logic. *Neonatology Today*. 2021;16(6): 97-109. doi: <https://doi.org/10.51362/neonatology.today/2021616697109>
4. van Stralen D, Inozu B, Byrum S. *High Reliability for a Highly Unreliable World: Preparing for Code Blue through Daily Operations in Healthcare*. North Charleston, SC: CreatSpace Publishing; 2017.
5. van Stralen D, McKay SD, Mercer TA. *Disaster Series: The Abrupt NICU Evacuation – Disasters without a Plan*. *Neonatology Today*. 2021;16(12):10-22.
6. van Stralen D, McKay SD, Mercer TA. *Disaster Series: The Use of Information for Wildland Fire and the NICU: Combined Evacuation and Sheltering*. *Neonatology Today*. 2021;16(11):105-14.
7. van Stralen D, McKay SD, Mercer TA. *Disaster Series: Prolonged Improvisation – High Reliability Organizing, the NICU, and Hurricanes*. *Neonatology Today*. 2022;17(1):10-27.
8. Halley JM. Ecology, evolution and 1f-noise. *Trends in ecology & evolution*. 1996;11(1):33-7.
9. Meshkati N, Khashe Y. *Operators' Improvisation in Complex Technological Systems: Successfully Tackling Ambiguity, Enhancing Resiliency and the Last Resort to Averting Disaster*. *Journal of Contingencies and Crisis Management*. 2015;23(2):90-6. doi: 10.1111/1468-5973.12078.
10. Council NR. *Lessons learned from the Fukushima nuclear accident for improving safety of US nuclear plants*. Washington, D.C.: The National Academies Press; 2014.
11. Rasmussen J. What can be Learned from Human Error Reports? In: Duncan KD, Gruneberg MM, Wallis D, editors. *Changes in Working Life*. New York, NY: Wiley; 1980. p. 97-113.
12. Boettiger C. From noise to knowledge: how randomness generates novel phenomena and reveals information. *Ecol Lett*. 2018;21(8):1255-67. Epub 2018/05/24. doi: 10.1111/ele.13085. PubMed PMID: 29790295.
13. Press WH. Flicker noises in astronomy and elsewhere. *Comments on Astrophysics*. 1978;7:103-19.
14. Greenman J, Benton T. The amplification of environmental noise in population models: causes and consequences. *The American Naturalist*. 2003;161(2):225-39.
15. Garfinkel A. *The Slime Mold Dictyostelium as a Model of Self-Organization in Social Situations*. In: Yates FE, editor. *Self-organizing systems: The emergence of order*. New York, NY: Springer Science & Business Media; 2012. p. 181-212.
16. Yates FE. *Self-organizing systems: The emergence of order*. New York, NY: Springer Science & Business Media; 2012.
17. van Stralen D, McKay SD, Mercer TA. *Disaster Series: Elements of a Disaster*. *Neonatology Today*. 2021;16(10):108-15.
18. Camazine S, Deneubourg J-L, Franks NR, Sneyd J, Theraula G, Bonabeau E. *Self-organization in biological systems*: Princeton University Press; 2020.
19. Wolfberg A. *Full-spectrum analysis: A new way of thinking*



- for a new world. *Military Review*. 2006;86(4):35-42.
19. van Stralen D, Mercer TA. The Art of Neonatology, the Art of High Reliability as a Response to COVID-19. *Neonatology Today*. 2021;16(2):74-83. doi: 10.51362/neonatology.today/202121627483.
  20. van Stralen D, Mercer TA. The Nature of Neonatal Experience during Pandemic COVID-19. *Neonatology Today*. 2021;16(3):87-97. doi: 10.51362/neonatology.today/202131638797.
  21. Zundel M, Kokkalis P. Theorizing as engaged practice. *Organization Studies*. 2010;31(9-10):1209-27.
  22. Weick KE. Organizing for Transient Reliability: The Production of Dynamic Non-Events. *Journal of Contingencies and Crisis Management*. 2011;19(1):21-7. doi: 10.1111/j.1468-5973.2010.00627.x.
  23. van Stralen D. Pragmatic High-Reliability Organization (HRO) During Pandemic COVID-19. *Neonatology Today*. 2020;15(4):3-9.
  24. Weick KE. Remorseless sensemaking: Engaged deliberation sinks the El Faro. in press. 2022.
  25. Fowler MS, Ruokolainen L. Confounding environmental colour and distribution shape leads to underestimation of population extinction risk. *PLoS one*. 2013;8(2):e55855.
  26. Vasseur DA, Yodzis P. The Color of Environmental Noise. *Ecology*. 2004;85(4):1146-52.
  27. Ruokolainen L, Lindén A, Kaitala V, Fowler MS. Ecological and evolutionary dynamics under coloured environmental variation. *Trends in Ecology & Evolution*. 2009;24(10):555-63.
  28. Simon HA. The structure of ill structured problems. *Artificial Intelligence*. 1973;4(3-4):181-201. doi: 10.1016/0004-3702(73)90011-8.
  29. van Stralen D, Gambino W. Error as a Faulty Failure Signal. *Neonatology Today*. 2020;15(9):114-7. doi: 10.51362/neonatology.today/20209159114117.
  30. van Stralen D, Mercer TA. High-Reliability Organizing (HRO), Decision Making, the OODA Loop, and COVID-19. *Neonatology Today*. 2021;16(8):86-96.
  31. van Stralen D, Mercer TA. Common Sense High Reliability Organizing (HRO) in the Response to COVID-19. *Neonatology Today*. 2021;16(7):90-102. doi: 10.51362/neonatology.today/2021716790102.
  32. Weick KE. The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative science quarterly*. 1993;38(4):628-52.
  33. Weick KE. *Enactment and Organizing. The Social Psychology of Organizing*. Second ed. New York, NY: McGraw-Hill, Inc.; 1979. p. 147-69.
  34. van Stralen D, McKay SD, Mercer TA. Disaster Series: High Reliability Organizing for (HRO) Disasters - Disaster Ecology and the Color of Noise. *Neonatology Today*. 2021;16(12):96-109.
  35. van Stralen D, McKay SD, Mercer TA. Pragmatic Leadership Practices in Dangerous Contexts: High-Reliability Organizations (HRO) for Pandemic COVID-19. *Neonatology Today*. 2020;15(8):109-17. doi: 10.51362/neonatology.today/20208158109117.
  36. van Stralen D, Mercer TA. High Reliability Organizing (HRO) is the Extension of Neonatology during Pandemic COVID-19. *Neonatology Today*. 2021;16(5):97-109. doi: 10.51362/neonatology.today/2021516597109.
  37. Rizzolatti G, Craighero L. The mirror-neuron system. *Annu Rev Neurosci*. 2004;27:169-92. Epub 2004/06/26. doi: 10.1146/annurev.neuro.27.070203.144230. PubMed PMID: 15217330.
  38. Iacoboni M. Neural mechanisms of imitation. *Curr Opin Neurobiol*. 2005;15(6):632-7. Epub 2005/11/08. doi: 10.1016/j.conb.2005.10.010. PubMed PMID: 16271461.
  39. van Stralen D, McKay SD, Williams GT, Mercer TA. Tactical Improvisation: After-Action/ Comprehensive Analysis of the Active Shooter Incident Response by the San Bernardino City Fire Department December 2, 2015. San Bernardino, CA: San Bernardino County Fire Protection District; 2018.
  40. Arnold III AV. *Strategic visioning: What it is and how it's done*. Carlisle Barracks, PA: United States Army War College, 1991.
  41. Magee RR. *Strategic leadership primer*. Carlisle Barracks, PA: United States Army War College, 1998.
  42. van Stralen D, Mercer TA. High-Reliability Organizing (HRO) in the COVID-19 Liminal Zone: Characteristics of Workers and Local Leaders. *Neonatology Today*. 2021;16(4):90-101. doi: 10.51362/neonatology.today/2021416490101.
  43. Szokolczai A. Liminality and experience: Structuring transitory situations and transformative events. *International Political Anthropology*. 2009;2(1):141-72.
  44. van Stralen D, Mercer TA. Pandemic COVID-19, the High-Reliability Organization (HRO), and the Ecology of Fear. *Neonatology Today*. 2020;15(12):129-38. doi: 10.51362/neonatology.today/2020121512129138.
  45. Arieli O, Avron A, Zamansky A. Ideal paraconsistent logics. *Studia Logica*. 2011;99(1-3):31.
  46. Priest G. Paraconsistent logic. In: D.M. G, F. G, editors. *Handbook of philosophical logic*. 6. Second ed. Dordrech, Germany: Springer; 2002. p. 287-393.
  47. Priest G, Tanaka K, Weber Z. Paraconsistent logic. In: Zalta EN, editor. *The Stanford Encyclopedia of Philosophy Summer 2018 Edition* ed: Metaphysics Research Lab, Stanford University; 2018.
  48. Rudnicki K. The psychological aspects of paraconsistency. *Synthese*. 2021;199(1):4393-414.
  49. Konieczny S, Marquis P, editors. *Three-valued logics for inconsistency handling*. European Workshop on Logics in Artificial Intelligence; 2002: Springer.
  50. Ciucci D, Dubois D. Three-valued logics, uncertainty management and rough sets. In: Peters JF, Skowron A, editors. *Transactions on Rough Sets XVII. Lecture Notes in Computer Science*. Berlin, Germany: Springer-Verlag; 2014. p. 1-32.
  51. Garson J. Modal Logic. In: Zalta EN, editor. *The Stanford Encyclopedia of Philosophy: Metaphysics Research Lab, Stanford University*; 2021.
  52. Andersen MB, Bolander T, Jensen MH. Conditional Epistemic Planning. In: del Cerro LF, Herzig A, Mengin J, editors. *Logics in Artificial Intelligence. Lecture Notes in Computer Science*. Heidelberg, Germany: Springer; 2012. p. 94-106.
  53. Bolander T, Andersen MB. Epistemic planning for single- and multi-agent systems. *Journal of Applied Non-Classical Logics*. 2012;21(1):9-34. doi: 10.3166/jancl.21.9-34.
  54. Aucher G. An Internal Version of Epistemic Logic. *Studia Logica*. 2010;94(1):1-22. doi: 10.1007/s11225-010-9227-9.
  55. Kunda Z. The case for motivated reasoning. *Psychological bulletin*. 1990;108(3):480.

56. Westrum R. A typology of organisational cultures. *Quality and Safety in Health Care*. 2004;13(suppl\_2):ii22-ii7. doi: 10.1136/qshc.2003.009522.
57. Heggie V. Experimental physiology, Everest and oxygen: from the ghastly kitchens to the gasping lung. *The British Journal for the History of Science*. 2013;46(1):123-47. doi: 10.1017/s0007087412000775.
58. McNamara P, Putte FVD. Deontic Logic. In: Zalta EN, editor. *The Stanford Encyclopedia of Philosophy: Metaphysics Research Lab, Stanford University*; 2021.
59. Goranko V, Rumberg A. Temporal Logic. In: Zalta EN, editor. *The Stanford Encyclopedia of Philosophy: Metaphysics Research Lab, Stanford University*; 2020.
60. Glass L. Synchronization and rhythmic processes in physiology. *Nature*. 2001;410(6825):277-84.
61. Goldberger AL, Amaral LA, Hausdorff JM, Ivanov PC, Peng C-K, Stanley HE. Fractal dynamics in physiology: alterations with disease and aging. *Proceedings of the national academy of sciences*. 2002;99(suppl 1):2466-72.
62. Sejdic E, Lipsitz LA. Necessity of noise in physiology and medicine. *Comput Methods Programs Biomed*. 2013;111(2):459-70. Epub 2013/05/04. doi: 10.1016/j.cmpb.2013.03.014. PubMed PMID: 23639753; PubMed Central PMCID: PMC3987774.
63. May RM. Biological populations with nonoverlapping generations: stable points, stable cycles, and chaos. *Science*. 1974;186(4164):645-7. Epub 1974/11/15. doi: 10.1126/science.186.4164.645. PubMed PMID: 4412202.
64. van Stralen D, McKay SD, Mercer TA. Disaster Series: High Reliability Organizing for (HRO) Disasters—Disaster Ecology and the Color of Noise. *Neonatology Today*. 2021;16(12):96-109. doi: <https://doi.org/10.51362/neonatology.today/2021161296108>.
65. Weick KE. Enacted sensemaking in crisis situations *Journal of management studies*. 1988;25(4):305-17.
66. Caligiore D, Pezzulo G, Baldassarre G, Bostan AC, Strick PL, Doya K, et al. Consensus Paper: Towards a Systems-Level View of Cerebellar Function: the Interplay Between Cerebellum, Basal Ganglia, and Cortex. *Cerebellum*. 2017;16(1):203-29. Epub 2016/02/14. doi: 10.1007/s12311-016-0763-3. PubMed PMID: 26873754; PubMed Central PMCID: PMC5243918.
67. Schmahmann JD. The cerebellum and cognition. *Neurosci Lett*. 2019;688:62-75. Epub 2018/07/13. doi: 10.1016/j.neulet.2018.07.005. PubMed PMID: 29997061.
68. Gallese V, Rochat M, Cossu G, Sinigaglia C. Motor cognition and its role in the phylogeny and ontogeny of action understanding. *Dev Psychol*. 2009;45(1):103-13. Epub 2009/02/13. doi: 10.1037/a0014436. PubMed PMID: 19209994.
69. Jeannerod M. Neural simulation of action: a unifying mechanism for motor cognition. *Neuroimage*. 2001;14(1 Pt 2):S103-9. Epub 2001/05/25. doi: 10.1006/nimg.2001.0832. PubMed PMID: 11373140.
70. Tettamanti M, Buccino G, Saccuman MC, Gallese V, Danna M, Scifo P, et al. Listening to action-related sentences activates fronto-parietal motor circuits. *J Cogn Neurosci*. 2005;17(2):273-81. Epub 2005/04/07. doi: 10.1162/0898929053124965. PubMed PMID: 15811239.
71. Chambon V, Haggard P. Premotor or Ideomotor: How Does the Experience of Action Come About? In: Prinz W, Beisert M, Herwig A, editors. *Action science: Foundations of an emerging discipline*. Cambridge, MA: MIT Press; 2013. p. 359-80.
72. Jeannerod M. *Motor cognition: What actions tell the self*. Oxford, UK: Oxford University Press; 2006.
73. Weick KE, Roberts KH. Collective mind in organizations: Heedful interrelating on flight decks. *Administrative science quarterly*. 1993;38:357-81.
74. Jacob P, Jeannerod M. The motor theory of social cognition: a critique. *Trends Cogn Sci*. 2005;9(1):21-5. Epub 2005/01/11. doi: 10.1016/j.tics.2004.11.003. PubMed PMID: 15639437.
75. Klüver J, Schmidt J. Topology, Metric and Dynamics of Social Systems. *Journal of Artificial Societies and Social Simulation*. 1999;2(3):7.
76. Mol A, Law J. Regions, networks and fluids: Anaemia and social topology. *Soc Stud Sci*. 1994;24(4):641-71. Epub 1994/11/01. doi: 10.1177/030631279402400402. PubMed PMID: 11639423.
77. Glišin V, Savić A, Crkvenjakov R, Ruždijić S, Bajković-Moškov. N. *Molecular Biology in Embryology: The Sea Urchin Embryo*. In: Yates FE, editor. *Self-organizing systems: The emergence of order*. New York, NY: Springer Science & Business Media; 2012. p. 153-65.
78. Halley JM, Inchausti P. The increasing importance of 1/f-noises as models of ecological variability. *Fluctuation and Noise Letters*. 2004;4(02):R1-R26.
79. Shannon CE. *A Mathematical Theory of Communication*. *Bell System Technical Journal*. 1948;27(3):379-423. doi: 10.1002/j.1538-7305.1948.tb01338.x.
80. Pattee HH. *Instabilities and Information in Biological Self-Organization*. In: Yates FE, editor. *Self-organizing systems: The emergence of order*. New York, NY: Springer Science & Business Media; 2012.
81. Trist EL, Bamforth KW. Some social and psychological consequences of the longwall method of coal-getting: An examination of the psychological situation and defences of a work group in relation to the social structure and technological content of the work system. *Human relations*. 1951;4(1):3-38.
82. Yates FE. Preface. In: Yates FE, Garfinkel A, Walter DO, Yates GB, editors. *Self-organizing systems: The emergence of order*. New York, NY Plenum Press 1987. p. xi-xii.
83. van Stralen D, McKay SD, Mercer TA. Flight Decks and Isolettes: High-Reliability Organizing (HRO) as Pragmatic Leadership Principles during Pandemic COVID-19. *Neonatology Today*. 2020;15(7):113-21. doi: 10.51362/neonatology.today/20207157113121.
84. Sneyd J, Theraula G, Bonabeau E, Deneubourg J-L, Franks NR. —*Alternatives to Self-Organization*. *Self-Organization in Biological Systems*: Princeton University Press; 2020. p. 47-62.
85. Patton GS, Harkins PD. *War as I knew it*. Boston, MA: Houghton Mifflin; 1947.

Conflict of Interest: The authors have indicated they have no potential conflict of interest relevant to this article to disclose.

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](mailto:DVanStra@llu.edu)

**Acknowledgments:**

*Karl Weick, Rensis Likert Distinguished University Professor of Organizational Behavior and Psychology, Emeritus, University of Michigan*

*William J. Corr, formerly with the Los Angeles City Fire Department, now deceased*

*Errol van Stralen, Ancora Education*

*Jules Crane, Professor of Zoology, Cerritos College, Cerritos, CA, now deceased*



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)

NATIONAL PERINATAL ASSOCIATION

# CORONAVIRUS

COVID-19

RELIABLE  
RESOURCES:

- **CDC:** 2019 Novel Coronavirus
- **The Lancet:** COVID-19 and pregnancy
- **MotherToBaby:** Coronaviruses
- **WHO:** Emerging respiratory viruses

STAY INFORMED.



[www.nationalperinatal.org](http://www.nationalperinatal.org)

Readers can also follow

# NEONATOLOGY TODAY

via our Twitter Feed

[@NEOTODAY](https://twitter.com/NEOTODAY)

**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](mailto:LomaLindaPublishingCompany@gmail.com)

# Discover the Benefits of an On-Unit NICU MRI System

MRIs offer many benefits for newborns in the Neonatal Intensive Care Unit (NICU), but performing off-unit MRIs is incredibly complex and creates many risks for this vulnerable population. On-unit MRI options for NICU patients greatly reduce these risks and can lead to significant benefits that make them cost-effective and clinically superior to off-unit MRIs.

Discover the benefits of on-unit MRI and learn how the innovative, point-of-care Embrace<sup>®</sup> Neonatal MRI System is transforming neonatal care from *inside* for patients, parents and NICU staff.



Click to download the full white paper at:  
[www.embracemri.com/embrace-the-benefits](http://www.embracemri.com/embrace-the-benefits)  
or call us at **+1 866 609 1554**



Become a part of the transformation.  
Discover more at [embracemri.com](http://embracemri.com)



# Save the Date for the First Fragile Infant Forum for Integration of Standards— FIFI-S July 13-15, 2022

The Forums will address the Standards, Competencies and Best Practices for Infant and Family Centered Developmental Care to allow discourse on current research and integration of the Standards into intensive care practice

The first of the Forums will focus on the *Best Practices for FEEDING, EATING and NUTRITION* developed by the Gravens interprofessional consensus panel.

<https://nicudesign.nd.edu/nicu-care-standards/>

Sponsored by University of South Florida College of Public Health and Loma Linda Publishing, LLC

For more information please contact <https://PACLAC.org>

# The 35th Gravens Conference on the Environment of Care for the High-Risk Newborn Preview

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

The 35<sup>th</sup> Gravens Conference on the Environment of Care for the High-Risk Newborn will meet in Clearwater Beach, Florida, March 9-12, 2022. This year's meeting will be hybrid with full activities for those who attend in-person, and most of the sessions are available for attendance and participation virtually and for viewing online following the meeting. This year's theme is "Transformational Change: Making it Happen in the NICU."

*"The 35th Gravens Conference on the Environment of Care for the High-Risk Newborn will meet in Clearwater Beach, Florida, March 9-12, 2022. This year's meeting will be hybrid with full activities for those who attend in-person, and most of the sessions are available for attendance and participation virtually and for viewing online following the meeting."*

**Day One** of the conference is always devoted to summaries of recent research on caregiving in the NICU. Our first presentation will consider the parent perspective; Dr. Annie Janvier and Ms. Rebecca Pearce will use parents' voices to give examples of how NICU caregivers can better understand what parents view as important outcomes after discharge from the NICU.

Dr. Livio Provenzi from Italy will discuss his pioneering research on the epigenetic effects of being born early. His attention to what "footprints" are laid down early and then sustained in later behavior will help us understand why early nurturing experiences are so important.

Dr. Charlotte Tscherning brings perspectives from her work in Europe and the Middle East on neuroprotective strategies in the NICU and will emphasize the importance of developmental care as an essential component of protecting fragile brains in the NICU.

Dr. Terrie Inder will describe her team's work with premature infants in the convalescent stage of their care. This group is often neglected since their medical status is no longer critical, yet their neurodevelopmental needs remain extraordinarily important, as great, or greater than at any other stage of life.

Dr. Bobbi Pineda has conducted extensive research into a program for parent-directed neurodevelopmental stimulation for pre-

mature babies, with well-defined opportunities for interaction at each gestational age. She will describe this program, her research findings of its value, and plans for refining and expanding its use.

Dr. Daphna Barbeau has delved into the critical area of sleep organization during the fetal and perinatal periods. Insights into the importance of sleep and brain organization will emphasize the importance of identifying sleep states and designing care around sleep and arousal.

Transformational change in the NICU, the theme of the meeting, will be addressed by Dr. Jochen Profit, who will emphasize leadership actions that motivate change, channel resources, and support active problem-solving.

To demonstrate changing practices through quality initiatives, Dr. Paige Church, Ms. Lisa Sampson, and Ms. Ophelia Kwakye will join a panel discussion of their process and outcomes at Sunnybrook NICU in Toronto, Canada. The panel will represent a team approach, including neonatology, nursing, and parents.

*"Ms. Kristy Love is the recipient of the 2021 Gravens Award. She demonstrated how parents could be influential long after their baby was in the NICU. Kristy not only became an advocate for parents who had a baby in intensive care but also went on to be the Executive Director of the National Perinatal Association. Dr. Michael Hynan, the 2022 Gravens awardee, gave us insights into his experience of fathering a baby in and after the NICU stay and has also taught us about the mental health needs of parents."*

The Gravens awards will be awarded to two well-deserving individuals who experienced their child's hospitalization as NICU parents. Ms. Kristy Love is the recipient of the 2021 Gravens Award. She demonstrated how parents could be influential long after their baby was in the NICU. Kristy not only became an advocate for parents who had a baby in intensive care but also went on to be the Executive Director of the National Perinatal Association. Dr. Michael Hynan, the 2022 Gravens awardee, gave us insights into his experience of fathering a baby in and after the NICU stay and

**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](mailto:LomaLindaPublishingCompany@gmail.com)**

has also taught us about the mental health needs of parents. He has recently nurtured the National Network of NICU Psychologists into a thriving organization.

**Day Two** of the conference is divided into a track for Developmental and Family-Integrated Care (Track A) and a second track on NICU Design (Track B).

Track A this year will emphasize the importance of supporting the physiologic, behavioral, and emotional outcomes of both parents and babies.

Dr. Annie Janvier will discuss how to help parents cope in the NICU. As an experienced neonatologist and a premie parent, she has developed many useful strategies based on her own experiences.

Science has shown that babies and young children have sensitive periods during which the right environmental and caregiving experiences provide for optimal development. Dr. Pilyoung Kim will help us understand that parents also have neurophysiological and behavioral changes that influence not only their baby's outcome but also their own physical and mental health outcomes.

---

***“Dr. Nils Bergman is one of the most influential contributors to the “Zero Separation” perspective. He will be presenting the physiologic and behavioral science behind the importance of avoiding the separation of the family (primarily the mother) from their newborn.”***

---

Dr. Nils Bergman is one of the most influential contributors to the “Zero Separation” perspective. He will be presenting the physiologic and behavioral science behind the importance of avoiding the separation of the family (primarily the mother) from their newborn.

Dr. Meg Parker, an expert in breastfeeding the newborn in the NICU, will describe practices that influence breastfeeding outcomes in different populations and how disparities affect those outcomes.

With the ongoing pandemic, there has been an impact on how the caregiving team, including parents, has maintained equilibrium and progress. With utmost concern for the restriction of parental presence in many NICUs, Dr. Kelly McGlothen will moderate a panel discussion of strategies to support the caregiving team.

Dr. Linda Franck will round out the discussion by reflecting on the continued evolution of family-centered care and providing a thoughtful discussion of whether it is likely to adapt to the current change in practices or meet extinction.

Track B will start with a summary from the “Reimagining the NICU” project that began with last year’s Graven Conference. Although that meeting was restricted by its virtual format, participants developed several creative, fascinating visions of the NICU of the Future. These will be summarized with a video presentation, and then attendees will be asked to provide additional perspectives that can be used to refine both minimum standards and best practices for future NICU design. Work on this project will continue during a workshop session on Friday.

We will have two New Unit presentations, one by Dr. Beau Bat-

## 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 IFDCD 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 IFDCD 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/](https://nicudesign.nd.edu/nicu-care-standards/)

©CONSENSUS PANEL ON INFANT AND FAMILY-CENTERED DEVELOPMENTAL CARE 2022

ton and Mary Beth Miller from St. John’s Hospital in Springfield, Illinois, and one from Dr. Bolaji Famuyide and her team from the University of Mississippi Medical Center in Jackson, MS.

Track B will conclude with a “Crowdsourcing” session, in which attendees who have challenges in designing or renovating their existing NICUs will bring those to the floor for discussion by others in the audience, which will include several experts who will be in

attendance.

Day Two at Gravens is always designed as a half-day of formal meetings, allowing informal discussions and meetings in the afternoon or a free afternoon on the beach to catch up on other projects, followed by a beach party in the evening.

**Day Three** will begin with a special plenary session on “Resilience and Change” presented by Natalie Johnson, a specialist who teaches these skills to teams. While this topic was planned before the COVID pandemic, it is fortuitous that its presentation had to be delayed until this year, when the topic has become more important and timely than ever. Ms. Johnson will present a workshop immediately following this plenary session entitled “Stress as a Superpower.”

Day Three will continue with workshops that will allow in-depth, seminar-type exploration of topics presented by speakers during the plenary sessions. There will also be two sessions of abstract presentations on topics that include developmental care, family support, and NICU design.

**Day Four** is a half-day session devoted to exploring new strategies for family support. Dr. John Ibrahim, a neonatologist and father of a NICU baby, will describe his experience as a physician and a parent, providing lessons that have made him a better caregiver.

Dr. Tiffany Willis is a NICU psychologist who will discuss psychosocial support for the often forgotten fathers and partners in the NICU, whose needs can be different from those of the birthing parent.

Dr. Heather Burris is a neonatologist who will help us explore health care inequities from the perspective of molecular biology, describing how the effects of inequities are more than skin deep.

Dr. Odie Ehie, a pediatric anesthesiologist whose interests include diversity, equity, and inclusion, will lead us on a journey to recognizing and responding to microaggressions in the clinical setting so that everyone can make a difference.

---

**“Registration and further information on the Gravens Conference are available at <https://neonatologytoday.org/Gravens/>. In-person registration for individuals with a special rate for groups of three or more or single-day participation ends on February 28; registration for online participation is also available with individual or group rates until March 8.”**

---

Registration and further information on the Gravens Conference are available at <https://neonatologytoday.org/Gravens/>. In-person registration for individuals with a special rate for groups of three or more or single-day participation ends on February 28; registration for online participation is also available with individual or group rates until March 8.

*Disclosures: The authors have no relevant disclosures*

**NT**

*Corresponding Author*



*Robert D. White, MD  
Director, Regional Newborn Program  
Beacon Children’s Hospital  
615 N. Michigan St.  
South Bend, IN 46601  
Phone: 574-647-7141  
Fax: 574-647-3672  
Email: [Robert.White@pediatrix.com](mailto:Robert.White@pediatrix.com)*



*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](mailto:Joy.browne@childrenscolorado.org)*



*Vincent C. Smith, M.D. M.P.H.  
Boston Medical Center  
801 Albany Street Room 2009  
Boston, MA 02119  
(617) 414-3989 (T)  
(617) 414-3833 (F)  
Email: [Vincent.smith@bmc.org](mailto:Vincent.smith@bmc.org)*





Mitchell Goldstein, MD, MBA, CML  
Professor of Pediatrics  
Loma Linda University School of Medicine  
Division of Neonatology  
Department of Pediatrics  
Email: [mgoldstein@llu.edu](mailto:mgoldstein@llu.edu)

New subscribers are always welcome!

# NEONATOLOGY TODAY

To sign up for a free monthly subscription,  
just click on this box to go directly to our  
subscription page



The growth  
they need.  
The flexibility  
you need.



Scan to Explore  
Enfamil® Liquid HMFs

LK3314 NEW 2/22 ©2022 Mead Johnson & Company, LLC

## Matrixx-M™



Evidence-Based  
Headwall to  
Optimize Neonatal  
Developmental Care



Nexspan  
[www.Nexspan.com](http://www.Nexspan.com)



Readers can also follow

## NEONATOLOGY TODAY

via our Twitter Feed

@NEOTODAY

# One Platform. Four Solutions

A seamless, all-in-one experience.



**CameraSystem**  
Live-Stream Video



**OnlineEducation**  
Family Resources



**PatientConnect**  
Text, Photo, Video Messaging



**MilkTracker**  
Feeding Management

AngelEye's HIPAA-compliant Family Engagement Solutions support care team workflows and engage parents to prepare for a successful transition home. Implement them independently or as a comprehensive suite of solutions.



[angeleyehealth.com](http://angeleyehealth.com) • [info@angeleyehealth.com](mailto:info@angeleyehealth.com)



Touching the Lives of More Than 70,000 Premature Infants Globally and Counting

Come Visit Us Today!

Estimated number of premature infants born globally each year: 13.5 million. 10.7 million survive. 2020 Profectus Systems, Inc. All rights reserved. 401179626110001



**nissHa** | HEALTHCARE SOLUTIONS  
MEDICAL TECHNOLOGIES

**TenderTrode+**  
PreWired Electrodes



**EZ-Hold®**  
Nasal Cannula Holder



**HeartSync NICU**  
Defibrillator Pads



**CLARAVUE® NICU/PICU**  
Patient Monitoring Kits



[HS.NisshaMedical.com](http://HS.NisshaMedical.com)

800.669.6905

**NeoPredix**  
Forecast, save and improve lives



**NEW** in the US!

**Breakthrough Prediction Platform**  
NeoPredix B.1

New intelligent neonatal clinical decision support system to predict bilirubin progression

Follow us now!



[neopredix.com](http://neopredix.com)

The 35<sup>th</sup> Annual Gravens Conference on the Environment of Care  
for High Risk Newborns  
**Transformational Change: Making it Happen in the NICU**  
March 9-12, 2022

**TUESDAY, MARCH 8, 2022**

4:30 PM	<b>LET THE FESTIVITIES BEGIN!</b>
4:30 PM – 7:00 PM	REGISTRATION INFORMATION AND AT THE DOOR REGISTRATION DESK OPEN
<b>7:00 PM – 9:00 PM</b>	<b>WELCOME RECEPTION</b>
<b>8:10 PM – 8:30 PM</b>	<b>DOOR PRIZE RAFFLE SMITH</b>

**WEDNESDAY, MARCH 9, 2022**  
**SCIENCE & APPLICATION**

<b>TIME</b>	<b>SESSION / EVENT</b>
6:30 AM-7:15 AM	<b>RUN/WALK/CRAWL ON THE BEACH KOLBERG</b>
7:00 AM – 5:00 PM	REGISTRATION DESK OPEN
<b>7:00 AM – 8:00 AM</b>	<b>CONTINENTAL BREAKFAST</b>
<b>7:45 AM – 5:00 PM</b>	<b>PLENARY SESSIONS</b>
7:45 AM – 8:00 AM	<b>WELCOME &amp; INTRODUCTIONS</b> (Bob White; Joy Browne)
8:00 AM – 9:00 AM	The voice of parents: What are important outcomes for parents after the NICU (and how we got a lot of it wrong as neonatologists) Annie Janvier, Rebecca Pearce and Mai Luu (virtual)
9:00 AM – 9:45 AM	Chasing footprints of early adversities in at-risk babies: Insights from behavioral epigenetics Provenzi
9:45 AM – 10:30 AM	Changing perceptions of neuroprotective strategies Tscherning
10:30 – 11:00 AM	<b>BREAK IN EXHIBIT HALL</b>
11:00 – 11:45 AM	The metamorphosis of neonatal sleep Barbeau (virtual)
11:45 – 12:15 PM	The Extension Division of Neonatology, Gravens award. Goldstein and short presentation by recipients Hynan, Love
<b>12:15 PM -1:30 PM</b>	<b>LUNCH ON OWN</b>
1:30PM – 2:15 PM	Changing practice for babies near discharge Inder (virtual)
2:15 PM – 3:00 PM	Changing how parents care for babies Pineda
<b>3:00 PM - 3:30 PM</b>	<b>BREAK</b>
3:30 PM - 4:15 PM	Changing the Culture of Care in the NICU Profit
4:15 PM – 4:55 PM	Changing practices through quality initiatives Panel of professionals on making change: Church, Sampson, Parent
4:55 PM – 5:00 PM	Final thoughts and take home messages White
<b>6:30 PM – 8:30 PM</b>	<b>EXHIBIT HALL RECEPTION AND POSTER WALK (HEAVY SNACKS PROVIDED) POSTERS MANNED 7:00 – 7:45.</b>

**THURSDAY, MARCH 10, 2022 THEMED TRACKS**

<b>TIME</b>	<b>SESSION / EVENT</b>	
6:30 AM – 7:15 AM	<b>RUN/WALK/CRAWL ON THE BEACH KOLBERG</b>	
7:30 AM – 1:30 PM	REGISTRATION DESK OPEN	
<b>7:30 AM – 8:15 AM</b>	<b>CONTINENTAL BREAKFAST: NETWORKING TABLES</b>	
8:15 AM – 1:00 PM	<b>THEMED TRACKS</b>	
	<b>TRACK A: DEVELOPMENTAL AND FAMILY INTEGRATED CARE BEACH/GULF (Joy Browne)</b>	<b>TRACK B: DESIGN PALM/BAY (Bob White)</b>
	<b>8:15AM – 8:30:AM</b>	<b>8:15 AM – 8:25 AM</b>
	Introduction and Announcements Joy Browne	Introduction and Announcements Bob White
	<b>8:30-9:10 AM</b>	<b>8:25-10:00 AM</b>
	How to help parents cope in the NICU Janvier (virtual)	Report and Next Steps: “Reimagining the NICU”
	<b>9:10-9:50 AM</b>	
	Sensitive Periods for Infants and Parents Pilyoung Kim (virtual)	
	<b>9:50-10:20 AM BREAK</b>	<b>10:00-10:30 AM BREAK</b>
	<b>EXHIBITORS BREAK DOWN AFTER LAST BREAK</b>	<b>EXHIBITORS BREAK DOWN AFTER LAST BREAK</b>
	<b>10:20 AM – 11:00 AM</b>	<b>10:30 AM – 11:15 AM</b>
	Co-Regulation between babies and mothers Nils Bergman (virtual)	New Unit Presentation--Mississippi
	<b>11:00 AM – 11:40 AM</b>	<b>11:15 AM – 12:00 AM</b>
	Disparities in NICU Breastfeeding Rates Meg Parker	New Unit Presentation--Illinois
	<b>11:40 AM – 12: 20 PM</b>	<b>12:00 AM-12:15 PM</b>

Caring for the Caregiving Team during Covid Kelly McGlothen Bell, chair	Panel (Smith, Shepley and White)
<b>12:20 PM – 1:00 PM</b>	<b>12:00 PM – 1:00 PM</b>
The continued evolution of family-centered care: adaptation or extinction? Linda Franck (virtual)	Crowdsourcing New Design Strategies

**ADJOURN FOR DAY**

**2:00-4:00 DESIGN CONSENSUS PANEL DISCUSSION INVITATION ONLY**

**4:00-5:00 PM: DEVELOPMENTAL CARE CONSENSUS PANEL INVITATION ONLY**

**6:00 – 9:00 PM SUNSET DINNER ON THE BEACH AND DANCING. FEE IS \$25.00. PLEASE REGISTER BY FEBRUARY 25 AT <https://www.eventbrite.com/e/beach-party-35th-annual-gravens-conference-tickets-267880847827>**

**FRIDAY, MARCH 11, 2022**  
**ABSTRACTS & WORKSHOPS**

TIME	SESSION / EVENT	
6:30 AM – 7:15 AM	<b>RUN/WALK/CRAWL ON THE BEACH KOLBERG</b>	
<b>7:00 AM – 8:00 AM</b>	<b>CONTINENTAL BREAKFAST</b>	
7:00 AM – 4:30 PM	REGISTRATION DESK OPEN	
8:00-9:00 AM	<b>JOINT SESSION ON RESILIENCE AND CHANGE: NATALIE JOHNSON</b>	
9:00-9:30	<b>AM BREAK</b>	
9:30 AM – 10:45 AM	<b>WORKSHOPS H (75 MIN) INVITED AND SELECTED WORKSHOPS</b>	
	H1: Stress as a Superpower Natalie Johnson	
	H2: Chasing the footprints of early adversities in at-risk babies: From environment to epigenetics...and to clinical practice Livio Provenzi	
	H3: Discharge standards Vincent Smith	
	H4: Change practices TBD	
	H5 Psychological distress in parents Tiffany Willis	
10:45-11:00	SHORT BREAK	
11:00 AM – 12:15 PM	<b>WORKSHOPS I (75 MIN) INVITED AND SELECTED WORKSHOPS</b>	
	I1: Reimagining the NICU - next steps Robert White	
	I2: SENSE program workshop Roberta Pineda	
	I3: Debunking myths about race in the NICU Heather Burriss	
	I4: IFCDC standards implementation Carol Jaeger et al.	
	I5: Practical solutions to increase family engagement in the NICU setting Meg Parker	
12:15 PM – 1:30 PM	<b>LUNCH ON OWN (1 HOUR 15 MINUTES)</b>	
1:30 – 2:45 PM	<b>ABSTRACT SESSIONS (75 MINUTES)</b>	
	<b>A: DEVELOPMENTAL CARE MODERATOR: CAROL JAEGER</b> <ul style="list-style-type: none"> <li>❖ <b>Feasibility and Acceptability of a Motivational Interviewing Intervention to Increase Maternal Presence in a Level IV Neonatal Intensive Care Unit</b> Dailyn Acosta</li> <li>❖ <b>Improving communication in the NICU: a qualitative descriptive study of parent and NICU clinician perspectives</b> Maya Dahan</li> <li>❖ <b>Identifying Barriers to Quality Mother-Infant Interactions in the NICU through Naturalistic Systematic Observations</b> Christine Neugebauer</li> </ul>	BEACH

	<b>B: FAMILY SUPPORT MODERATOR: KATHLEEN KOLBERG</b> ❖ <b>Single family rooms in the NICU: parents in the lead!</b> M.M. Peters-Geven ❖ <b>The STEP Program-A Qualitative Study of Perception &amp; Experience with Supportive Therapeutic Excursion Program</b> Paige Terrien Church ❖ <b>Mothers of Preterm Infants Subjective Experiences of a Newborn Behavioral Observations (NBO) Parenting Support Intervention</b> Lise C. Johnson	GULF
	<b>E: FEEDING/LACTATION MODERATOR: RAYLENE PHILLIPS</b> ❖ <b>You've Got Milk: A NICU Lactation Journey</b> Malathi Balasundaram and Chris Canete ❖ <b>Nutrition Care Team Experience of Novel Human Milk Fortifier in US Neonatal Intensive Care Units</b> Amy Gates ❖ <b>Quality Improvement Project to Achieve Early Full Enteral Feeds in Preterm Infants at a Level IV Neonatal Intensive Care Unit</b> Usha Prasad	ISLAND II
2:45 – 3:15 PM	<b>BREAK</b>	
3:15 – 4:30 PM	<b>ABSTRACT SESSIONS (75 MINUTES)</b>	
	<b>A: DEVELOPMENTAL CARE MODERATOR: CHRISTY LAWRENCE</b> ❖ <b>3 C's of Skin-to-Skin Holding: Communication, Color, Consistency</b> Marissa L. Johnson ❖ <b>Barriers to long durations of kangaroo care in neonatal units in the United States</b> Ashley Weber ❖ <b>Infant Massage as a Stress Management Technique for Parents of Extremely Preterm Infants</b> Dana McCarty	BEACH
	<b>B: FAMILY SUPPORT: MODERATOR: ROSEMARIE BIGSBY</b> ❖ <b>Mother's Quality of Sleep during Their Infant's NICU Hospitalization : Influencing factors and associated characteristics</b> Valarie Lebel ❖ <b>COVID-19 Pandemic Experiences and Maternal Stress in Neonatal Intensive Care Units</b> Carmina Erdei ❖ <b>Characteristics and Outcomes of Neonatal Opioid Withdrawal Syndrome in Preterm Infants: A Retrospective Cohort Study in the Current Era</b> Alicia Marie Heyward	GULF
	<b>C: POT POURRI MODERATOR: VINCENT SMITH</b> ❖ <b>My Brigham Baby App: Using Technology to Advance Parent Engagement and Promote Resilience in the Neonatal Intensive Care Unit</b> Madison Forde ❖ <b>There's No Place Like Home-- Improving NICU Discharge Education and Preparation</b> Malathi Balasundaram and Kari McCallie	PALM

<b>SATURDAY, MARCH 12, 2022</b> <b>SPIRITUALITY &amp; FAMILIES</b>	
<b>TIME</b>	<b>SESSION / EVENT</b>
6:30 AM – 7:15 AM	<b>BEACH RUN/WALK/CRAWL KOLBERG</b>
7:00 AM – 11:50 AM	REGISTRATION DESK OPEN
<b>7:00 AM – 8:00 AM</b>	<b>CONTINENTAL BREAKFAST (Check out of hotel)</b>
8:00 AM – 10:30 AM	<b>GENERAL SESSIONS</b>
8:00 – 8:10 AM	Introduction to the Morning Vincent C. Smith
8:10 – 8:45 AM	Father's Experience A Neonatologist who had an NICU Baby John Ibrahim
8:45-9:30 AM	Psychosocial Support with an Emphasis on Partners Tiffany Willis
9:30 – 10:15 AM	<b>BREAK (check out of hotel)</b>
10:15 – 11:00 AM	Environmental injustice and perinatal health inequity; using molecular epidemiology to explain disparities Heather Burris
11:00 – 11:45 AM	Mindfulness and Microaggression Odinakachukwu (Odi) Ehie
11:45 – 12:00 PM	WRAP-UP (Bob White; Joy Browne)
	<b>FAREWELL UNTIL 2023: MARCH 8-11, 2023; SAFE TRAVELS</b>
<b>12:00 – 2:00 PM</b>	<b>PLANNING COMMITTEE LUNCH</b>

Agenda Subject to change without notice.



**Chief, Division of Neonatology**  
**Project New Born Distinguished Chair in Neonatology**  
**University of Miami Miller School of Medicine**  
**Medical Director, Newborn Services, Jackson Health System**

On behalf of the Department of Pediatrics at the University of Miami Miller School of Medicine (UMMSOM), Jackson Health System (JHS), and Holtz Children's Hospital, CareerPhysician, LLC, the national leader in academic pediatric leadership recruitment, has initiated an international search to identify a transformational leader to serve as the next UMMSOM Chief of the Division of Neonatology, and Medical Director of Newborn Services for JHS.

- The incoming Chief will have the opportunity to continue the renowned legacy of the program and the responsibility of establishing and implementing a strategic plan that will guide the division into the future. Eligible applicants shall be at the academic rank of Associate Professor or Professor, board-certified in Neonatology, and hold or be eligible for an unrestricted medical license in the state of Florida.

**Opportunity Highlights:**

- Dr. Eduardo Bancalari, an international thought leader in Neonatology who has led the division for the past 45-years, has initiated a succession plan and will be stepping down with the naming, transition, and onboarding of his successor. Given the scale and scope of the program and its strong national and international reputation, we believe this opening to be among the premier leadership opportunities currently available in Neonatology.
- The Division has grown to 26 faculty, in addition to administrative and research team members, as well as well as a prestigious and well-respected neonatal fellowship program.
- The incoming leader will also serve as Director of Project: New Born, a nonprofit philanthropic organization supported by the Jackson Foundation.
- JHS hospitals have approximately 7,000 deliveries annually, with the division providing full-time coverage in the Newborn Special Care Center at Holtz Children's Hospital and in two neonatal units at Jackson North and Jackson South hospitals. Division faculty also provide educational support to developing clinical programs in Haiti, the Dominican Republic, and throughout Latin America.
- With 126 beds, the Newborn Special Care Center is one of 11 Regional Perinatal Intensive Care Centers designated by the State of Florida, and is the only Level 4 birthing hospital in Miami-Dade County, a community of 2.8 million people. Of the NICU's 126 beds, 66 are Level IV ICU stations and 60 are Level II/III stations.
- As the only academic Neonatology program in the South Florida region, the division's basic and translational science research interests are comprehensive, with long standing intra and extramural funding.
- As part of the Total Rewards benefits package, University of Miami faculty, staff, and their eligible dependents can receive tuition remission for undergraduate and most graduate degree programs.
- Miami is known as the top ranked healthiest city in the United States, where you will enjoy no state taxes, weather that is never cold, endless recreational pursuits, and world-class amenities!

For more details about this opportunity, or if you would like to recommend an individual(s) who exemplifies the qualities we are seeking in a candidate, please contact Marcel Barbey at [marcel@careerphysician.com](mailto:marcel@careerphysician.com), or at 817-707-9034. All interactions will remain confidential, and no inquiries will be made without the consent of the applicant.

***The University of Miami is an AA/EOE/ADA employer that seeks applicants who add to our culture of diversity and inclusion.***



Save the date: March 9-12, 2022

# 35<sup>th</sup> Annual Gravens Conference on the Environment of Care for High Risk Newborns

*Transformational Change:  
Making it Happen in the NICU*

Jointly Provided by



Call for Abstracts due January 3rd

To view the agenda, submit abstracts, and register for the conference please visit

<https://neonatologytoday.org/Gravens/>



LOMA LINDA UNIVERSITY  
CHILDREN'S HOSPITAL  
Division of Neonatal Medicine

USFHealth



# The Gravens Conference

Sheraton Sand Key  
Clearwater Beach, Florida  
March 9-12, 2022

# 38th Annual Conference

Advances in Therapeutics and Technology: Critical Care Neonates, Children and Adults

**THE CLIFF LODGE SNOWBIRD, UTAH**

**March 29 - April 2, 2022**

Two Events Two Separate Registration

NICU Training concurrent session with Advance In Therapeutics Conference



March 29- April 2, 2022

**Advances in Therapeutics and  
Technology: Critical Care of  
Neonates, Children, and Adults**

*Formally:*

*High-Frequency Ventilation of Infants, Children &  
Adults*

**Registration Link:**

<https://2022.annualmeeting.pac-lac.org/advance-in-care-2022>

38th Annual Conference

The Cliff Lodge  
Snowbird, Utah

This conference will present high quality education and networking opportunities for healthcare professionals who provide care for critically ill neonatal, pediatric, and adult patients with a focus on respiratory problems and management. Along with featured speakers, the conference includes abstract presentations on research in the field of respiratory and cardiovascular issues.

For more information, contact:

Perinatal Advisory Council  
Leadership, Advocacy, and  
Coordination

**pac-lac**

2000 Coward Ave.  
Glenview, CA 94028

(415) 738-3050

[www.pac-lac.org](http://www.pac-lac.org)

**For more information, please visit our  
website at <https://pac-lac.org/advances-in-care-conference/>**

**I WANT TO LEARN TO WORK  
IN THE NICU... BUT HOW?**

WE WANT TO HELP YOU FIND THE ANSWERS  
YOU NEED TO SUCCEED IN YOUR NICU CARE.

[WWW.ACADEMYOFNEONATALCARE.ORG](http://WWW.ACADEMYOFNEONATALCARE.ORG)



## ACADEMY OF NEONATAL CARE

**March 30**

Neonatal  
Assessment - NICU  
Ventilator Settings -  
Prove yourself as a  
NICU Newbie -  
Surfactant  
Administration

**March 31**

Oscillator basics -  
Neonatal Chest X-  
Rays - Non-Invasive  
Ventilation  
Principles and  
Methods

**April 1**

HFNC in the NICU -  
Apneas and  
Bradycardias - INO  
update - Jet  
ventilator basics -  
Psych-social aspects  
of NICU Care

Hands-on workshop all 3 days:

CPAP, HFNC, and prongs fitting and securing - Surfactant practice station  
Flow inflating bags - Intubation Assist/ETT securing



**To Register go to:**

**<https://www.academyofneonatalcare.org>**

# Fellows Column: Conservative Approach to Platelet Transfusion in a Preterm Infant

Apoorva Jagadish, MD, Shabih Manzar, MD

## Abstract:

We describe a case of a preterm infant managed conservatively using a lower threshold of 25 K/uL ( $25 \times 10^3/\mu\text{L}$ ) for platelet transfusion. We saved three extra platelet transfusions by not using the 50 K/uL ( $50 \times 10^3/\mu\text{L}$ ) threshold. No complications of thrombocytopenia, including petechiae, purpura, intraventricular bleeding, ecchymosis, hemorrhage, were noted by following the conservative approach.

## Keywords:

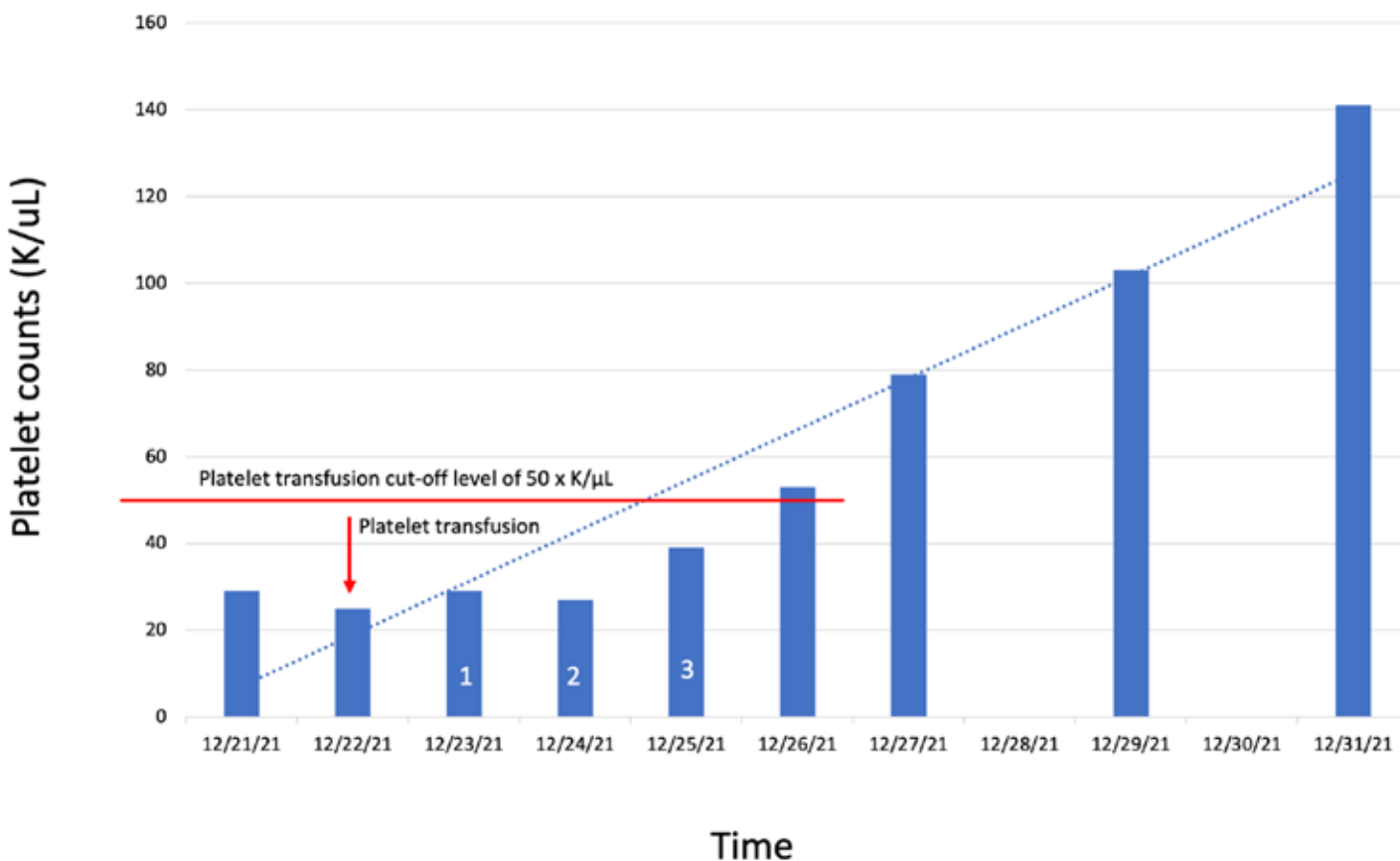
Preterm infant, platelet count, platelet transfusion, thrombocytopenia.

## Introduction:

Shortage of platelet remains an ongoing problem. Some approaches to dealing with the shortage include relaxing the clinical guidelines, reducing prophylactic transfusions, and using split apheresis platelets. (1,2) Recent data support a lower platelet transfusion threshold of  $25 \times 10^9 /\text{L}$  in non-bleeding premature neonates. (3)

Curley et al. (4) reported higher mortality among preterm infants who received platelet transfusions at a platelet-count threshold of  $50 \times 10^3/\mu\text{L}$  than those who received platelet transfusions at a platelet-count threshold of  $25 \times 10^3/\mu\text{L}$ . We changed our platelet transfusion algorithm for preterm infants based on the evolving evidence. Here we present a case of a preterm infant, where we used  $25 \times 10^3/\mu\text{L}$  as a cutoff instead of  $50 \times 10^3/\mu\text{L}$  and prevented the infant from three extra platelets transfusions and risk of donor exposure.

***“We changed our platelet transfusion algorithm for preterm infants based on the evolving evidence. Here we present a case of a preterm infant, where we used  $25 \times 10^3/\mu\text{L}$  as a cutoff instead of  $50 \times 10^3/\mu\text{L}$  and prevented the infant from three extra platelets transfusions and risk of donor exposure.”***



**Legends to Figure:** Graph showing spontaneous recovery of platelet counts. The red arrow points to the only platelet transfusion given for a platelet count of  $25 \times 10^3/\mu\text{L}$ . The horizontal red line shows the platelet transfusion threshold of  $50 \times 10^3/\mu\text{L}$  (if used). Vertical bars labeled 1,2,3 show the three potential platelet transfusions saved by not using the  $50 \times 10^3/\mu\text{L}$  as the threshold.

## Case:

A preterm male infant was born to a 28-year-old gravida 3, para 2 at 30<sup>67</sup> weeks of gestation via cesarean section. The pregnancy was complicated by diabetes mellitus class A2, low-lying placenta, obesity, and herpes simplex virus. Mother was transferred from an outside facility for premature, prolonged rupture of membrane betamethasone, ampicillin, azithromycin, and magnesium sulfate. The mother did not have a history of thrombocytopenia or immune thrombocytopenic purpura.

---

***“An admission laboratory investigation showed a platelet count of 29 x10<sup>3</sup>/μL. Repeat platelet count 24 hours later, was found to be 25 x10<sup>3</sup>/μL and thus received platelet transfusion of 15 ml/kg. Platelet count initially rose to 29 x10<sup>3</sup>/μL the next day but dropped back down to 27 x 10<sup>3</sup>/μL two days following the transfusion.”***

---

At delivery, the baby had a weak cry; he was dried and stimulated. After suctioning the airway, the infant was placed on nasal continuous positive airway pressure (CPAP). The baby was then transported to the NICU on CPAP. An admission laboratory investigation showed a platelet count of 29 x10<sup>3</sup>/μL. Repeat platelet count 24 hours later, was found to be 25 x10<sup>3</sup>/μL and thus received platelet transfusion of 15 ml/kg. Platelet count initially rose to 29 x10<sup>3</sup>/μL the next day but dropped back down to 27 x 10<sup>3</sup>/μL two days following the transfusion. Based on our new evidence-based guideline, we decided to observe clinically and not to transfuse platelet for count > 25 x 10<sup>3</sup>/μL unless clinically indicated. The platelet counts were followed daily. Figure 1 depicts the serial platelet counts showing three consecutive daily platelet counts of < 50 x 10<sup>3</sup>/μL, where no transfusion was given. The infant did not manifest any clinical signs of thrombocytopenia throughout the course, including mucosal bleeding, petechiae, or purpura. Head ultrasound was also normal, and no hemorrhage was seen. On further investigation, maternal platelet indirect antibodies were positive for HLA class 1.

## Discussion:

Platelet transfusion is not cheap. (5,6) Increased mortality and co-morbidity have been associated with platelet transfusion. Recently, Elgendy et al. (7) found platelet transfusion associated with a significant increase in mortality (24.8 vs. 13.8%). They also reported increased co-morbidities as retinopathy of prematurity (22.3 vs. 19.2%), severe intraventricular hemorrhage (18.3 vs. 10.1%), the median length of hospital stays (51 vs. 47 days), and cost of hospitalization (USD 298,204 vs. USD 219,760) with platelet transfusion. The possible reasons for these findings are that platelets are key players in mediating a diverse range of immune and inflammatory processes. (8)

A common reason for platelet transfusion in preterm infants is the scare of intraventricular hemorrhage. Stanworth et al. (9) studied a large cohort of 3652 neonatal admissions and found 194 neonates with severe thrombocytopenia (60 x 10<sup>3</sup>/μL), out of which one third developed thrombocytopenia of < 20 x 10<sup>3</sup>/μL. They found 91% not developing major hemorrhage meaning only 9% of infants with a platelet count less than 20 x 10<sup>3</sup>/μL had a major

hemorrhage. They concluded that most platelet transfusions were given to neonates with thrombocytopenia with no bleeding or minor bleeding only. Similar findings have been reported by Sparger et al. (10)

Our case and literature review highlight the need to follow a conservative approach to platelet transfusion in neonates. This guidance will save donor exposure and cost and decrease the associated mortality and morbidity.

---

***“Our case and literature review highlight the need to follow a conservative approach to platelet transfusion in neonates. This guidance will save donor exposure and cost and decrease the associated mortality and morbidity.”***

---

## References:

1. Smethurst PA, McAndrew M, Proffitt S, et al. Evaluating apheresis platelets at reduced dose as a contingency measure for extreme shortages. *Transfusion*. 2022;62(1):173-182. doi:10.1111/trf.16723
2. Stanworth SJ, New HV, Apolseth TO, et al. Effects of the COVID-19 pandemic on supply and use of blood for transfusion. *Lancet Haematol*. 2020;7(10):e756-e764. doi:10.1016/S2352-3026(20)30186-1
3. Hasan R, Saifee NH. Benefits of lower neonatal platelet transfusion thresholds. *Transfusion*. 2021;61(6):1672-1675. doi:10.1111/trf.16386
4. Curley A, Stanworth SJ, Willoughby K, et al. Randomized trial of platelet-transfusion thresholds in neonates. *N Engl J Med*. 2019;380(3):242-251. doi: 10.1056/NEJMoa1807320
5. Barnett CL, Mladi D, Vredenburg M, Aggarwal K. Cost estimate of platelet transfusion in the United States for patients with chronic liver disease and associated thrombocytopenia undergoing elective procedures. *J Med Econ*. 2018;21(8):827-834. doi:10.1080/13696998.2018.1490301
6. Dodd RY, Stramer SL, Smith R, Young PP. Paid platelet donors: Points to consider. *Transfusion*. 2021;61(4):1000-1003. doi:10.1111/trf.16329
7. Elgendy MM, Durgham R, Othman HF, et al. Platelet Transfusion and Outcomes of Preterm Infants: A Cross-Sectional Study. *Neonatology*. 2021;118(4):425-433. doi:10.1159/000515900
8. McFadyen JD, Kaplan ZS. Platelets are not just for clots. *Transfus Med Rev*. 2015;29(2):110-119. doi: 10.1016/j.tmr.2014.11.006
9. Stanworth SJ, Clarke P, Watts T, et al. Prospective, observational study of outcomes in neonates with severe thrombocytopenia. *Pediatrics*. 2009;124(5):e826-e834. doi:10.1542/peds.2009-0332
10. Sparger KA, Assmann SF, Granger S, et al. Platelet transfusion practices among very-low-birth-weight infants. *JAMA Pediatr*. 2016;170(7):687-694. doi: 10.1001/jamapediatrics.2016.0507

Conflict of Interest: None

Funding Source: None

Conflicts of Interest: The author has no conflicts of interest relevant to this article to disclose.

NT

Corresponding Author



Shabih Manzar, MD  
Attending  
Department of Pediatrics  
Division of Neonatology  
College of Medicine  
Louisiana State University of Health Sciences  
1501 Kings Highway  
Shreveport, LA 71130  
Telephone: 318-626- 1623  
Fax: 318-698-4305  
Email: [shabih.manzar@lsuhs.edu](mailto:shabih.manzar@lsuhs.edu)



Apoorva Jagadish, MD  
Resident, Department of Pediatrics  
School of Medicine  
Louisiana State University Health Sciences Center  
1501 Kings Highway  
Shreveport, LA 71103

Fellow's Column is published monthly.

- Submission guidelines for "Fellow's Column":
- 2000 word limit not including references or title page. Exceptions will be made on a case by case basis
- QI/QA work, case studies, or a poster from a scientific meeting may be submitted..
- Submission should be from a medical student, resident, fellow, or NNP in training.
- Topics may include Perinatology, Neonatology, and Younger Pediatric patients.
- No more than 20 references.
- Please send your submissions to:

Elba Fayard, MD, Interim Fellowship Column Editor  
or Japmeet Sandhu, OMS III, Fellowship Column Assistant Editor  
[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)

# SHARED DECISION-MAKING PROTECTS MOTHERS + INFANTS DURING COVID-19

## KEEPING MOTHERS + INFANTS TOGETHER

Means balancing...



## EVIDENCE

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

## PARTNERSHIP

### SHARED DECISION-MAKING

What is the best for this unique dyad?

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



## TRAUMA-INFORMED

Both parents and providers are confronting significant...

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

## LONGITUDINAL DATA

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

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



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

Partnering for patient-centered care when it matters most.



National Association of Neonatal Nurses

[nann.org](http://nann.org)

National Perinatal Association

[nationalperinatal.org](http://nationalperinatal.org)

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.

– CHRISTINE THEARD, M.D.

# Post-Traumatic Thriving

The Art, Science, & Stories of Resilience



Randall Bell, Ph.D.



## SAVE THE DATE

**March 29- April 2, 2022**

# Advances in Therapeutics and Technology: Critical Care of Neonates, Children, and Adults

*Formally:*

*High-Frequency Ventilation of Infants, Children &  
Adults*

38<sup>th</sup> Annual Conference

The Cliff Lodge  
Snowbird, Utah

This conference will present high quality education and networking opportunities to healthcare professionals who provide care for critically ill neonatal, pediatric, and adult patients with a focus on respiratory problems and management. Along with featured speakers, the conference includes abstract presentations on research in the field of respiratory and cardiovascular issues.

*For more information, contact:*

Perinatal Advisory Council:  
Leadership, Advocacy, and  
Consultation



1010 N. Central Ave.  
Glendale, CA 91202

(818) 708-2850

[www.paclac.org](http://www.paclac.org)

# ***I want to learn to work in NICU... but how?***



**It's a GO! Concurrent session with Advances in Therapeutics Snowbird Conference**

Academy of Neonatal Care Snowbird Course and Workshop  
Wednesday, Thursday, and Friday  
March 30, 31, and April 1, 2022

***20 ceu's total~~~ 1230-1630 Daily***

## **March 30**

Neonatal  
Assessment - NICU  
Ventilator Settings -  
Prove yourself as a  
NICU Newbie -  
Surfactant  
Administration

## **March 31**

Oscillator basics -  
Neonatal Chest X-  
Rays - Non-Invasive  
Ventilation  
Principles and  
Methods

## **April 1**

HFNC in the NICU -  
Apneas and  
Bradycardias - iNO  
update - Jet  
ventilator basics -  
Psych-social aspects  
of NICU Care

Hands-on workshop all 3 days:  
CPAP, HFNC, and prongs fitting and securing - Surfactant practice station -  
Flow inflating bags - Intubation Assist/ETT securing



[AcademyofNeonatalCare.org/register](https://AcademyofNeonatalCare.org/register)

All 3 Days: \$499

How it works: Due to limited time, Participants will  
also have access to the FULL online course





# Briefly Legal: Delayed Blood Transfusion Leads to Loss of Kidneys for Two Children

Maureen E. Sims, MD, Barry Schifrin, MD

## Case 1

The patient is a 34-year-old G3P1 admitted at 34 5/7 with mild vaginal bleeding and regular uterine contractions. Her prenatal course had been uneventful, except for a positive Group B Streptococcus culture. A fetal ultrasound showed an anterior low-lying placenta. On admission, steroids, tocolysis with Mg sulfate, and antibiotics (ampicillin) were started. Six days after admission, an emergency cesarean section was performed because of persistent vaginal bleeding. During the procedure, the placenta was incised with the immediate onset of profuse bleeding. There was no mention of the urgency or maneuvers during the procedure. The time from incision to delivery was 20 minutes.

***“During the procedure, the placenta was incised with the immediate onset of profuse bleeding. There was no mention of the urgency or maneuvers during the procedure. The time from incision to delivery was 20 minutes.”***

The 2500 gram AGA male baby was limp and extremely pale at delivery. He was breathing spontaneously and was given blow-by oxygen. Apgar scores were 4 and 5. at 1 and 5-minutes, respectively. The estimated blood loss was 1000 ml. Neither cord gases nor the placenta was sent for evaluation.

At 14 minutes of life, the baby was admitted to the Newborn Intensive Care Unit, where the heart rate (HR) was 90 beats per minute (bpm), with shallow respirations, weak pulses, poor perfusion, and blood pressure (BP) of 37/20 (mean 26 mmHg). He was intubated for apnea and placed on a low ventilator setting with inspired oxygen of 30%. An umbilical arterial catheter (UAC) was inserted, but the attempts to insert an umbilical venous catheter failed. An arterial blood gas drawn at one hour of life revealed a pH of 7.06, a pCO<sub>2</sub> of 17 mmHg, a pO<sub>2</sub> of 303 mmHg, and a base deficit of 24.

The baby continued to be pale, with weak pulses poor perfusion with diastolic pressures in the teens. A complete blood count (CBC) revealed a WBC of 16,700 x10<sup>3</sup>/uL, hemoglobin of 6 gm/dL, and a platelet count of 236 10<sup>3</sup>/mL. At one hour and 3 hours after birth, 21 ml of normal saline (NS) was given over 10 minutes. Three hours after delivery, the BP continued to drop to profoundly low levels. Urinary output was poor. At 3 hours of life, he received a transfusion of packed red blood cells over the next 90 minutes. A second transfusion was initiated at 15 hours of age, by which time the baby was anuric. He developed disseminated intravascular coagulopathy with renal failure over the next two days [peak creatinine was 4.1 mg/dL]. He was referred to a center for renal replacement therapy and dialysis. The child has profound cognitive delays and is awaiting a kidney transplant on follow-up.

While the neonatologist and the Hospital (Nurses) were sued, the obstetrician performing the delivery was not sued.

The allegations against the neonatologist included:

1. Failure to timely recognize and respond to signs of neonatal hypovolemia secondary to the perinatal hemorrhage.
2. Failure to timely provide emergency blood transfusion beginning immediately after birth.
3. Failure to properly maintain the baby's blood volume while waiting for emergency blood transfusion. Normal saline should have been provided with continuous blood pressure monitoring

The allegations against the Nurses included:

1. Failure to timely recognize and respond to signs of neonatal hypovolemia secondary to the perinatal hemorrhage.
2. Failure to insist on earlier volume replacement; they should have used their chain of command if the physician was resistant to early volume replacement
3. Cord gases should have been sent

***The plaintiff neonatologist and nurses were critical of the nurses and physician for not responding to the obvious hypovolemic situation. Pressors were not appropriate, but emergency uncrossed, untyped blood was needed. Notwithstanding the obvious obstetrical source of the problem, the treating physician responded in her deposition that she was evaluating the newborn for a metabolic and infectious problem.***

***“The plaintiff neonatologist and nurses were critical of the nurses and physician for not responding to the obvious hypovolemic situation. Pressors were not appropriate, but emergency uncrossed, untyped blood was needed. Notwithstanding the obvious obstetrical source of the problem, the treating physician responded in her deposition that she was evaluating the newborn for a metabolic and infectious problem.”***

## Case 2

A 35-year old G2P1 at 32 weeks gestation was admitted for possible preterm labor. Based on an ultrasound three months earlier, she was known to be carrying dichorionic/diamniotic twins and a velamentous insertion of the umbilical cord. Upon admission, the cervix was found to be 90% effaced, 4 cm dilated, with the vertex of the presenting twin at -1 station. Magnesium sulfate for tocolysis and antenatal steroids for lung maturation was administered. Intermittent fetal monitoring showed many variable and late decelerations in twin B. After two weeks of observation, preterm, premature labor ensued. Because of slow progress, labor was

augmented with Pitocin, and epidural anesthesia was provided. Artificial rupture of the membranes occurred 4.5 hours prior to the vaginal delivery. Twin A, a female weighing 2571 grams, was delivered by forceps and received positive pressure ventilation for 20 seconds. Apgar Scores were 8 and 9 at 1 and 5-minutes, respectively, and she pursued an uneventful neonatal course and is normal on follow-up evaluations. Following the delivery of Twin A, there was copious bleeding from the uterus. Nevertheless, it took 20 minutes to deliver Twin B with vacuum assistance. The blood loss was estimated to be >1000 ml. At delivery, Twin B, a male, weighing 2051-grams. He was pale, flaccid, lethargic, had poor perfusion and a weak cry. Suctioning of his nose and oropharynx in the delivery room produced moderate, thick, cloudy blood-tinged secretions. Positive pressure ventilation was provided for 20 seconds, followed by continuous positive airway pressure (CPAP) for 5 minutes. Apgar Scores (assisted) were 6, 8, and 7 at 1, 5, and 10 minutes respectively. Neither cord gases nor the placenta was sent for evaluation.

---

***“Positive pressure ventilation was provided for 20 seconds, followed by continuous positive airway pressure (CPAP) for 5 minutes. Apgar Scores (assisted) were 6, 8, and 7 at 1, 5, and 10 minutes respectively. Neither cord gases nor the placenta was sent for evaluation.”***

---

On admission to the Newborn Intensive Care Unit (NICU), his heart rate was 156 beats per minute (bpm), his respiratory rate was 55 breaths per minute (BPM), his BP was 49/31 (mean 43 mmHg). Femoral pulses were strong. He was placed on continuous positive airway pressure (CPAP) with 40% inspired oxygen. Umbilical lines were inserted. Within 1 hour, his BP dropped to 21/11 (mean 18mmHg) and remained at that level over the next 24 hours. At 3.5 hours after birth, pressors and 20 ml of normal saline infusion per hour were initiated.

The first hematocrit was 34% but was 24% at 6 hours. The WBC was  $8.7 \times 10^3/\mu\text{L}$ ; the platelet count was  $144 \times 10^3/\mu\text{L}$ . The first arterial blood gas at 2 hours showed a pH of 7.15, a pCO<sub>2</sub> of 12mmHg, a pO<sub>2</sub> of 130 mmHg, and a base excess of -22.5. At 5 hours, the baby was intubated for apnea. At 6 hours, an arterial gas showed a pH of 6.8, a pCO<sub>2</sub> of 12mmHg, a pO<sub>2</sub> of 158mmHg, and a base excess of -28.5. At 6.5 hours, he received 4 meq of bicarbonate. At 7 1/2 hours, 30 ml of packed red blood cells were given over 3 hours. After the transfusion, the BP was 35/24 (mean 27mmHg). At 14 hours, his creatinine was 1.8 mg/dL; his SGOT was 3200 u/L and SGPT 412 u/L. He developed disseminated intravascular coagulopathy, treated with fresh frozen plasma and another transfusion of packed red blood cells. His creatinine continued to increase and peaked at 4.6 mg/dL. An epinephrine drip was added to his other pressors for BP support. He became anuric and was transferred to another facility for renal replacement therapy and dialysis. He received a gastric tube because of feeding and aspiration issues. He was sent home at 48 days for home dialysis and received a cadaveric renal transplant at 16 months.

### **Allegations**

The allegations against the neonatologist included:

1. Failure to timely recognize and respond to signs of neonatal

hypovolemia secondary to the perinatal hemorrhage.

2. Failure to timely provide emergency blood transfusion beginning immediately after birth.
3. Failure to properly maintain the baby's blood volume while waiting for emergency blood transfusion. Normal saline should have been provided with continuous blood pressure monitoring

The allegations against the Nurses included:

1. Failure to timely recognize and respond to signs of neonatal hypovolemia secondary to the perinatal hemorrhage.
2. Failure to insist on earlier volume replacement; they should have used their chain of command if the physician was resistant to early volume replacement
3. Cord gases should have been sent

In both cases, the neonatologist and the Hospital were sued and settled. The obstetrician was not sued.

### **Discussion**

#### **Introduction**

Acute kidney injury (AKI) is common in neonates who require admission to the neonatal intensive care unit (NICU). Compared to older infants, the newborn has specific physiological characteristics that increase AKI risk, including the kidney's high susceptibility to hypo-perfusion, high vascular resistance, elevated plasma renin activity, and decreased sodium reabsorption in the proximal tubules. Adding to the vulnerability of the neonatal kidney is the functional and developmental immaturity that affects glomerular filtration and tubular function (e.g., concentrating ability), hemodynamic changes that occur at delivery, as well as the various potential complications that may befall the fetus during the birthing process. The newly born has a number of potential clinical problems that increase the risk of AKI, namely perinatal asphyxia, hemorrhage during birth, prematurity, infection, congenital cardiac disease, and issues requiring abdominal and thoracic surgical intervention as well as extracorporeal membrane oxygenation. Nephrotoxic medications commonly used on NICU patients are also associated with AKI (Table 1). The 2 cases presented here are unusual because of the problems created by fetal hemorrhage and hypoxia prior to delivery leading to prolonged and profound hypotension after birth resulting in hypoxic brain injury and irreversible renal damage.

---

***“The 2 cases presented here are unusual because of the problems created by fetal hemorrhage and hypoxia prior to delivery leading to prolonged and profound hypotension after birth resulting in hypoxic brain injury and irreversible renal damage.”***

---

In both cases, massive hemorrhage at birth from the incised placenta or torn umbilical cord resulted in significant hypovolemia. Because their depleted intravascular volumes were not timely replaced, profound hypotension and irreversible kidney damage ensued. More typically, AKI occurs in babies who have sustained hypoxic-ischemic insults during the intrapartum period because of fetal intolerance of labor secondary to placental insufficiency or

Prenatal	Intrapartum	Postnatal
Factors that increase risk of prematurity Renal anomalies	Delivery complications resulting in hypoxia and/or ischemia Exposure to maternal nephrotoxic medications	Conditions causing hypotension and/or hypoxia Prematurity Exposure to nephrotoxic medications Congenital cardiac disease Abdominal and thoracic surgery Sepsis Extracorporeal membrane oxygenation Inborn errors of metabolism

Table 1 Risk Factors Associated with AKI

Stage	Serum Creatinine (SCr) mg/dL	Urine Output
0	No change in SCr or rise <0.3	≥0.5 mL/kg/h
1	Increase in SCr ≥0.3 within 48 h or rise in SCr ≥1.5-1.9 x times the reference SCr level within 7 d	<0.5 mL/kg/h for 6-12 h
2	Rise in SCr ≥2-2.9 times the reference SCr level with 7 d	<0.5 mL/kg/h for ≥12 h
3	SCr level ≥3 times the reference SCr level or SC level >2.5 or receipt of renal replacement therapy	<0.3 mL/kg per h for ≥24 h or anuria for ≥12 h

Table 2 Neonatal AKI KDIGO Classification

repeated cord compressions or difficult deliveries. In these situations, babies initially have normal or reduced urine output and a modest and transient rise in creatinine. AKI in these types of situations is secondary to myocardial dysfunction with resultant impaired perfusion to the kidneys. Generally, renal function in these babies is restored by discharge, but long-term issues remain possible.

***“In these situations, babies initially have normal or reduced urine output and a modest and transient rise in creatinine. AKI in these types of situations is secondary to myocardial dysfunction with resultant impaired perfusion to the kidneys. Generally, renal function in these babies is restored by discharge, but long-term issues remain possible.”***

#### Definition of AKI

AKI, formerly called acute renal failure, is defined as an acute reduction in kidney function that results in a decline in glomerular filtration rate (GFR). It has traditionally been defined by an increase in serum creatinine (SCr), leading to retention of urea and other nitrogenous waste products and loss of fluid, electrolytes, and acid-base regulation. Various definitions of neonatal AKI have been used in research studies to understand the disease better and predict the outcome. The neonatal modified Kidney Disease Improving Global Outcome (KDIGO) definition is used in clinical practice and most epidemiological studies (Table 2). KDIGO is a nonprofit organization developing and implementing evidence-based clinical guidelines in kidney disease by translating global

scientific evidence into practical recommendations for clinicians and patients. Clinicians most commonly define AKI as SCr >1.5mg/dL or an increase of at least 0.2-0.3 mg/dL per day. This definition underestimates the prevalence of AKI because during early AKI, a reduction in GFR has only a modest effect on creatinine excretion, and the level may remain unchanged. At birth, the SCr value reflects the maternal SCr, which is usually low during pregnancy.

***“The exposure of neonates to nephrotoxic medications in the NICU also contributes to AKI. The primary medications include aminoglycosides, vancomycin, amphotericin B, acyclovir, and nonsteroidal antiinflammatory drugs (NSAID). NSAID treatment of patent ductus arteriosus (PDA) adds risk for mild AKI,”***

#### Incidence of AKI

The incidence of neonatal AKI is dependent on the definition used, the characteristics of the study population (e.g., preterm versus term), the severity of illness, and whether surveillance of kidney function was performed proactively. Observational studies from the United States report an incidence that ranges from 20-40% for infants cared for in NICUs, with the risk of AKI being inversely proportional to gestational age and higher in the more severe illnesses. The reported incidence of AKI for very low birth weight neonates ranges between 16% and 40%, while the incidence of AKI in neonates born at ≥36 weeks and admitted to a NICU is 37%. There is a positive correlation between AKI and the severity of hypoxic-ischemic encephalopathy (HIE) with the incidence of

Location and incidence of AKI	Pathogenesis
<b>Prerenal 85%</b>	<p><b>Reduction of effective circulation</b></p> <p>Impaired cardiac output secondary to perinatal asphyxia</p> <p>Prematurity with cardiovascular instability</p> <p>Critical cardiac heart defects</p> <p>Complete heart blockage</p> <p>Sepsis</p> <p>Third spacing</p> <p><b>Hypovolemia</b></p> <p>Bleeding</p> <p>Diarrhea</p> <p>Increased evaporative fluid loss (radiant warmer, thin skin of premature babies, abdominal wall defects, phototherapy)</p>
<b>Intrinsic Renal disease 11%</b>	<p><b>Tubular and/or interstitial injury Acute tubular necrosis (ATN)</b></p> <p>Ischemic injury if hypoperfusion is prolonged direct tubular endothelial and epithelial cell injury from ischemia and inflammation.</p> <p>Perinatal asphyxia, if it is severe, results in tubular damage and dysfunction with impaired reabsorption of Na<sup>+</sup> and water decreased GFR.</p> <p>Prematurity with cardiovascular instability</p> <p>Nephrotoxic exposures</p> <p>aminoglycosides, indomethacin, vancomycin, amphotericin B</p> <p>Sepsis</p> <p>direct tubular injury (as well as prerenal hypoperfusion injury)</p> <p><b>Renal vasculature disease</b></p> <p>renal artery thrombosis</p> <p>renal vein thrombosis</p> <p><b>Glomerular and cystic renal disease</b></p> <p>polycystic kidney</p> <p>congenital nephrotic syndrome</p>
<b>Postrenal disease 3%</b>	<p><b>Anatomic bladder obstruction</b></p> <p>posterior urethral valves</p> <p>bilateral anomalies of renal pelvis or ureter</p> <p><b>Nephrocalcinosis</b></p> <p>premature baby</p>

*Table 3 Location, Incidence, and Pathogenesis of AKI*

AKI. 7.4% 70% with HIE stages II and III respectively. AKI occurs in 30% to 50% of patients undergoing surgery for congenital heart disease and in almost 75% of babies undergoing extracorporeal membrane oxygenation (ECMO). almost 60% of infants with surgically managed necrotizing enterocolitis (NEC) had severe AKI.

The exposure of neonates to nephrotoxic medications in the NICU also contributes to AKI. The primary medications include aminoglycosides, vancomycin, amphotericin B, acyclovir, and nonsteroidal antiinflammatory drugs (NSAID). NSAID treatment of patent ductus arteriosus (PDA) adds risk for mild AKI, while the risk of severe AKI diminished when NSAID treatment was effective.

#### **Pathogenesis of AKI**

The causes of neonatal AKI can be divided into pathophysiologic categories based on the anatomical locus of the initial injury (Table 3). The most common cause of AKI is prerenal, accounting for about 85% of cases. In term babies, it is most commonly secondary to impaired cardiac output from perinatal asphyxia, and in premature babies, it usually results from cardiovascular instability. Overlap exists for the various categories. For example, premature babies are vulnerable to prerenal, intrinsic, and postrenal AKI.

#### **Prevention of AKI**

The prevention of AKI in newborn infants requires maintaining an adequate circulatory volume, careful fluid and electrolyte man-

agement, and prompt diagnosis and treatment of hemodynamic or respiratory abnormalities. Nephrotoxic medications should be avoided in neonates at high risk for AKI. In babies with perinatal asphyxia, therapeutic hypothermia (TH) reduces the incidence of neonatal AKI compared to those untreated. Aminophylline has shown promise as rescue therapy in neonates with AKI treated with therapeutic hypothermia. Two studies revealed that AKI occurred less frequently in VLBW infants and preterm infants <33 weeks' GA who received caffeine within the first week of life. Based on these data, the number that needed to treat with caffeine to prevent 1 episode of AKI was 4.3.

---

***“Two studies revealed that AKI occurred less frequently in VLBW infants and preterm infants <33 weeks' GA who received caffeine within the first week of life. Based on these data, the number that needed to treat with caffeine to prevent 1 episode of AKI was 4.3.”***

---

#### **Asphyxia, Hemorrhage, and AKI**

Renal impairment occurs in 23-70% of asphyxiated infants. Poor renal perfusion can be secondary to hypovolemia of the fetus or neonate because of perinatal hemorrhage at the time of birth or from diminished fetal cardiac output secondary to the adverse effect of hypoxia on the fetal myocardium. Causes of perinatal hemorrhage include umbilical cord rupture, placental abruption, vasa previa, velamentous insertion of the cord, fetomaternal or twin-to-twin transfusion, internal organ bleeding, or incision (trauma to) the placenta. Causes of fetal hypoxia during labor include placental insufficiency, multiple cord compressions, tachysystole, prolonged labor, and difficult delivery.

#### **Prematurity, Birth Weight, and Nephron Number**

In critically ill neonates, early gestational age and low birth weight are significantly associated with an increased risk of AKI. The earlier the gestational age and/or the lower the birth weight, the lower is the number of nephrons, and the less mature their function. Low birth weight (<2.5 kg at birth) increases by 70% the risk of developing chronic kidney disease. Low birth weight, in turn, may be the result of intrauterine growth restriction (IUGR) and/or preterm birth (<37 weeks' gestation). IUGR is multifactorial and generally results from restricted blood flow with inadequate delivery of oxygen and nutrients to the developing fetus. In developed countries, placental insufficiency is the primary cause of IUGR in the third trimester. Nephrogenesis begins at the fifth week of gestation and continues until 34-36 weeks' gestation, with a direct linear relationship between human birth weight and nephron number with linear regression predicting an additional 250,000 nephrons for each 1-kg increase in birth weight. The fetus has reached its adult complement of 2.0 to 2.7 million nephrons at term. However, because 60% of nephron formation occurs during the third trimester, nephrogenesis may be limited and/or disrupted by preterm birth while nephrogenesis is still ongoing. Of particular concern are infants born very (28 to 32 weeks gestation) or extremely premature (<28 weeks' gestation) because their kidneys are vulnerable and face stormy neonatal courses.

In addition to reduced nephron endowment, preterm infants experience other prerenal causes of AKI such as hypotension, hypox-

ia, and sepsis. Postrenal complications secondary to nephrocalcinosis also may contribute to AKI in preterm babies. Deposition of calcium phosphate and/or calcium oxalate within the tubulointerstitial regions of the kidney is common. Factors such as a high intake of calcium, phosphorous, and ascorbic acid; a low urinary citrate/calcium ratio; a high urinary calcium/creatinine ratio; and medications to prevent or treat chronic lung disease (with hypercalcemic side effects) are associated with the high incidence of nephrocalcinosis. The reported prevalence of nephrocalcinosis differs widely among populations (ranging from 7% to 41% or more) depending upon differences in the study populations, ultrasound equipment, and study criteria.

Premature babies have a low GFR at birth, which increases with gestational and postnatal age. The cause of the glomerular abnormalities associated with preterm birth is currently unknown. The abnormal glomeruli are found only in the outer cortex, suggesting that only the most recently formed glomeruli are at risk. Indeed, the extrauterine environment must be considered an abnormal environment for nephrogenesis. It may be that the changes in oxygen levels and/or hemodynamics that occur at the time of birth lead to persistent abnormalities. In contrast to the in utero environment (with low oxygen levels, high renal resistance, and low renal blood flow), preterm birth has been shown to accelerate renal maturation but with several structural glomeruli abnormalities.

#### **Nephrotoxicity**

Nephrotoxic-medication exposure is common in neonates and is increasingly recognized as the potentially most avoidable cause of AKI in this population. Nephrotoxic medications can cause AKI in a variety of ways, including decreased renal perfusion (nonsteroidal antiinflammatory drugs, diuretics, angiotensin-converting enzyme inhibitors), direct tubular injury (aminoglycosides, amphotericin B, vancomycin nonsteroidal antiinflammatory drugs), or tubular obstruction (acyclovir). Prostaglandins maintain the patency of the fetal ductus arteriosus through its relaxant effect. After birth, when it is desirable to constrict the patent ductus in a preterm baby, a nonsteroidal antiinflammatory drug (NSAID) such as **indomethacin** is used to oppose the effect of prostaglandin E2 and cause the ductus to constrict. Simultaneously, however, these drugs cause afferent renal arteriole vasoconstriction, reducing the kidney's ability to regulate (increase) glomerular blood flow. While indomethacin can cause acute AKI, it is usually reversible.

---

***“Simultaneously, however, these drugs cause afferent renal arteriole vasoconstriction, reducing the kidney's ability to regulate (increase) glomerular blood flow. While indomethacin can cause acute AKI, it is usually reversible.”***

---

Maternal exposure to NSAID drugs also predisposes neonates to decreased renal perfusion and AKI. Interestingly, Guillet et al. have suggested that the PDA's underlying physiology is more important than management strategy in determining the likelihood of AKI in neonates <1500 grams. **Aminoglycosides** (gentamicin, amikacin, and tobramycin) are frequently used for neonates and are well known to potentially cause AKI, primarily by causing proximal tubular damage and intrarenal vasoconstriction. There is

a gradual rise in SCr levels with toxicity, and babies may become oliguric. Additionally, in animal studies, aminoglycosides have been shown to interfere with nephrogenesis.

---

***“The major side effect of Amphotericin B is its nephrotoxicity; its adverse effects are a combination of intrarenal vasoconstriction and direct distal tubular toxicity. Clinically it presents with polyuria and impaired urinary concentrating ability. Newer lipid-based preparations decrease nephrotoxicity but do not eliminate it.”***

---

The major side effect of **Amphotericin B** is its nephrotoxicity; its adverse effects are a combination of intrarenal vasoconstriction and direct distal tubular toxicity. Clinically it presents with polyuria and impaired urinary concentrating ability. Newer lipid-based preparations decrease nephrotoxicity but do not eliminate it.

**Intravenous contrast** is associated with intrarenal vasoconstriction, tubular injury, and direct tubular injury. SCr rises 24-48 hours after exposure, and it usually presents as a non-oliguric AKI. Adequate intravascular volume must be maintained before exposure to this agent.

**Acyclovir** nephrotoxicity is classically attributed to tubular obstruction secondary to drug crystallization, but direct tubular toxicity from acyclovir metabolites may also contribute. Again, adequate hydration and slow infusion rates can prevent AKI.

**Captopril** is an angiotensin-converting enzyme (ACE) inhibitor used for treating high blood pressure and heart failure. The renin-angiotensin system is critical to fetal renal development, and interference with this delicate balance of intrarenal vasoconstrictor and vasodilator forces carries risk. ACE inhibitors decrease angiotensin II production leading to a reduction in GFR via decreased efferent arteriolar vasoconstriction. The risk is increased with volume depletion, renal ischemia, and reduced renal blood flow. Given the potential deleterious impact on postnatal renal development, it may be appropriate to avoid using ACE inhibitors in neonates < 32 weeks of age.

The role of **vancomycin** as a nephrotoxin remains controversial, particularly in the context of monotherapy with appropriate medication levels. Risk factors for AKI in neonates who receive vancomycin include higher troughs, concomitant nephrotoxins and/or diuretics, and severe illness. The possible cause of tubular injury is related to a generation of reactive oxygen species.

#### **Renal blood flow**

The conversion from fetal to postnatal circulations at birth substantially increases renal blood flow (RBF) as renal vascular resistance decreases and systemic blood pressure increases. By one week of age, as a proportion of cardiac output, RBF increases from 2 to 4% in the fetus to approximately 10% (the normal adult value is approximately 20%). After birth, the blood flow transitions from deeper, more mature glomeruli to superficial cortical glomeruli. The GFR normally improves slightly during the first several

weeks of life. The urinary concentrating ability is low at birth and does not reach adult levels until one year.

Autoregulation accommodates changes in GFR and RBF. As a result of autoregulation, small changes in systemic BP produce parallel changes in afferent renal vascular resistance. A constant RBF and GFR are maintained over a range of systemic BPs and are set at a lower range of BP for infants compared with adults. If GFR is too low, metabolic wastes will not get filtered into the renal tubules from the blood. If GFR is too high, the renal tubules' absorptive capacity of salt and water becomes overwhelmed. Interference with this transition occurs with perinatal asphyxia and other perinatal stressors. The impaired autoregulation of the premature and critically ill newborn predisposes to AKI during periods of hypotension because the mechanisms to compensate for significant hemodynamic changes are overwhelmed. Although hypoperfusion usually results in prerenal AKI, prolonged hypoperfusion causes direct tubular endothelial and epithelial cell injury from ischemia and inflammation. Severe asphyxia results in diffuse tubular damage and dysfunction with impaired sodium and water reabsorption and decreased GFR. For infants with milder asphyxia, the impairment may only be a loss of renal concentrating ability. Renal tubules are particularly susceptible to ischemic injury after a mild and short-term insult and are further complicated with nephrotoxic medications.

---

***“Severe asphyxia results in diffuse tubular damage and dysfunction with impaired sodium and water reabsorption and decreased GFR. For infants with milder asphyxia, the impairment may only be a loss of renal concentrating ability. Renal tubules are particularly susceptible to ischemic injury after a mild and short-term insult and are further complicated with nephrotoxic medications.”***

---

#### **Serum Creatinine and Urine Output**

Normally in term infants, SCr declines rapidly in the first two weeks to a nadir of 0.2-0.4mg/dL. In preterm infants, the decline is slower, and nadir values are reached over 1-2 months. In extremely preterm (<28 weeks) and very preterm infants (28-31 weeks), SCr may increase after birth, most likely due to low GFR and impaired tubular reabsorption of creatinine, followed by a slower decline over two months with the SCr values inversely related to decreasing gestational age.

The time of first void and urine volume is variable, but at least 50% of newborns void by 8 hours and nearly all before 24 hours. Urine output is not affected by gestational or postnatal age during the first week of life, averaging 3 to 4 mL/kg per hour.

Neonatal AKI may be oliguric (urine volume <1mL/kg/hour) or non-oliguric, depending upon the severity of the reduction in GFR and the degree of tubular reabsorption. Urinary concentration is limited in the newborn. Sodium reabsorption is lower in neonates compared with older individuals and is affected by gestational and postnatal age. Neonates have a lower threshold for proximal bicarbonate reabsorption than older children and adults. The net acid excretion by the distal nephron is limited in newborn infants,

especially preterm infants. It is important to also keep in mind that the first void may reflect urine in the fetal bladder before any in-utero hypoxic-ischemic insult occurs.

### **Biomarkers for AKI**

Because of the diversity of gestational ages and the etiologies of AKI in neonates, a single biomarker is not a reliable predictor of AKI. SCr reflects kidney function, not injury, and is a delayed marker. A rise in SCr level indicates a loss of kidney function, reflecting injury up to 48-72 hours before.

**Cystatin C (CysC)** is a protease inhibitor that is freely filtered by glomeruli and reabsorbed in the proximal tubule. A rise in **serum** CysC level reflects a change in kidney function, whereas an elevated **urinary** CysC level is considered reflective of tubular injury. An increase in serum CysC level is thought to reflect a change in GFR, whereas an elevated urinary CysC is considered reflective of tubular injury. CysC has been shown to help in predicting a rise in SCr level 24 to 96 hours later in neonates post-surgery or after perinatal asphyxia.

---

*“A rise in serum CysC level reflects a change in kidney function, whereas an elevated urinary CysC level is considered reflective of tubular injury. An increase in serum CysC level is thought to reflect a change in GFR, whereas an elevated urinary CysC is considered reflective of tubular injury.”*

---

**Neutrophil gelatinase-associated lipocalin (NGAL)** is a protein-bound to neutrophil granules, filtered by the glomerulus and reabsorbed by the proximal tubules. NGAL is highly sensitive and specific for AKI in neonates with perinatal asphyxia.

### **AKI – Clinical Presentation**

The signs in neonatal AKI are due to alterations of renal function and include edema secondary to progressive fluid accumulation, decreased or no urine output, and/or hypertension. Edema may result from fluid overload or other comorbidities, such as a capillary leak, heart failure, or hypoalbuminemia. The presence of normal urine output does not rule out AKI since some infants are nonoliguric. Hypertension is occasionally found in AKI. Abnormal laboratory findings may be the first clue to the problem; most commonly, the diagnosis of neonatal AKI is identified by routine testing of kidney function using SCr for at-risk patients in the NICU. Other laboratory findings that emerge in AKI include: a) hyponatremia because of an inability of the kidneys to excrete free water, b) hyperkalemia secondary to reduced GFR, decreased tubular secretion of potassium, tissue breakdown with the release of intracellular potassium, and metabolic acidosis resulting in transcellular movement of potassium, c) metabolic acidosis because of the injured kidneys' inability to regulate acid-base status d) hyperphosphatemia because the kidneys play a significant role in phosphate excretion e) hypocalcemia because of the hyperphosphatemia.

### **Chronic kidney disease (CKD)**

The presentations of AKI and CKD are similar at birth, but in AKI, the kidney recovers over days and weeks; kidney dysfunction that persists for months to years is classified as CKD. The distinction between acute and chronic kidney disease at birth is difficult, as

presentations are similar. Identifying the underlying cause is important since it provides information on the probability of the ultimate recovery of kidney function. The presence of dysmorphic features on physical examination, congenital anomalies, genetic disorders, and congenital nephrotic syndrome increases CKD's likelihood.

### **Late-onset AKI**

Late-onset neonatal AKI occurs in infants older than seven days of age. These infants often have had an earlier episode of AKI and had comorbidities, including congenital heart disease, kidney anomalies, and necrotizing enterocolitis.

### **Medical Management**

In the case of established oliguric AKI, a urinary catheter should be placed to exclude lower urinary tract obstruction. After bladder drainage is accomplished and no urine output is established, a 10-20 mL/kg fluid challenge should be administered over 1-2 hours to exclude prerenal AKI. The administration of a vasopressor will help to ensure adequate mean arterial pressure and sufficient renal perfusion. After assurance of the absence of lower urinary blockage and no response to a fluid challenge, management turns to fluid resuscitation and adequate mean arterial pressure maintenance. The goal is to provide supportive care until renal function is restored. During this period, fluid intake should be restricted to insensible losses, urine output, and other measured losses, e.g., through nasogastric or chest tubes. Twice daily weights and careful measurement of intake and output are essential to follow volume status. Nephrotoxic drugs should be discontinued. Medication should be adjusted by dose and interval. Metabolic acidosis may require treatment with sodium bicarbonate. Loop diuretics may be helpful, but if no response occurs or in the case of anuria, they should not be employed.

Renal replacement therapy should be considered if maximum medical management fails to maintain acceptable fluid and electrolyte levels. Indications include hyperkalemia, hyponatremia with symptomatic volume overload, acidosis, hypocalcemia, hyperphosphatemia, uremic symptoms, and an inability to provide adequate nutrition because of the need for fluid restriction in the face of oliguria. The two purposes of renal replacement therapy are ultrafiltration to remove water and dialysis to remove solutes. Generally, only neonates >1.5 kg may be considered for renal replacement therapies. Continuous renal replacement therapy is being used more frequently in neonates with AKI. For this procedure, the baby's blood is continuously circulated through a pump-driven extracorporeal circuit

---

*“The two purposes of renal replacement therapy are ultrafiltration to remove water and dialysis to remove solutes. Generally, only neonates >1.5 kg may be considered for renal replacement therapies. Continuous renal replacement therapy is being used more frequently in neonates with AKI. For this procedure, the baby's blood is continuously circulated through a pump-driven extracorporeal circuit”*

---

## Outcome

AKI is not just a marker of severity of illness in neonates but is also independently associated with poor outcomes. In the past, AKI was felt to be completely reversible in neonates, with the idea that kidney function returning to baseline indicated no further renal risk. However, studies have demonstrated high rates of CKD in survivors of neonatal AKI and increased risks of bronchopulmonary dysplasia, intraventricular hemorrhage, hypertension, and poor long-term neurocognitive impairments. The term “crosstalk” was introduced in 2013, whereby AKI creates dysfunction in other organs and vice-versa, probably secondary to an inflammatory process. All neonates with an identified episode of AKI should be referred to nephrology for outpatient follow-up, especially with AKI stages 2 and 3, significant prematurity, IUGR, or underlying renal anomalies. Early identification of CKD allows implementation of strategies to slow the loss of kidney function

## Obstetrical Considerations

Finally, it is necessary to comment on the obstetrical contribution to the above problems. In case #1, the placenta was in the path of the cesarean section incision. Ultrasound mapping of the placenta may permit avoiding it. When it cannot be avoided, there must be the understanding that fetal blood loss through the placenta may be rapid with devastating consequences. Under such circumstances, experienced neonatal providers and emergency blood replacement must be available at delivery. For the operating surgeon, when the placenta is cut, or the umbilical cord disrupted (in case #2), from the vulnerable attachment of the cord, either the fetus must be delivered with haste, or the amniotic cavity entered and the umbilical cord clamped with the fingers of the operating surgeon. In both cases, these potential problems were known before the delivery. There can be no justification for disregarding these potentially devastating complications.

---

**“In both cases, these potential problems were known before the delivery. There can be no justification for disregarding these potentially devastating complications.”**

---

## Suggested reading

1. Askenazi DJ, Koralkar R, Patil N, Halloran B, Ambalavanan N, Griffin R. Acute kidney injury urine biomarkers in very-low-birth-weight infants. *Clin J Am Soc Nephrol*. 2016;11(9):1527–1535
2. Basu RK, Wheeler DS. Kidney-lung crosstalk and acute kidney injury. *Pediatr Nephrol*. 2013;28(12):2239–2248
3. Bezerra CT, Vaz Cunha LC, Lib # orio AB. Defining reduced urine output in neonatal ICU: importance for mortality and acute kidney injury classification. *Nephrol Dial Transplant*. 2013;28(4):901–909
4. Hanna, MH, Askenazi DJ, Selewski, DT Drug-induced acute kidney injury in neonates *Curr Opin Pediatr* 2016; 28: 180-187
5. Carmody JB, Harer MW, Denotti AR, Swanson JR, Charlton JR. Caffeine exposure and risk of acute kidney injury in a retrospective cohort of very low birth weight neonates. *J Pediatr*. 2016;172: 63–68.e1
6. Chock VY, Cho SH, Frymoyer A. Aminophylline for renal protection in neonatal hypoxic-ischemic encephalopathy in the era of therapeutic hypothermia. *Pediatr Res*. 2021;89(4):974–980
7. Devarajan P. Neutrophil gelatinase-associated lipocalin: a

- promising biomarker
8. for human acute kidney injury. *Biomarkers Med*. 2010;4(2):265–280
  9. Guillet R, Selewski, DT, Griffin, R Relationship of patent ductus arteriosus management with neonatal AKI *Journal of Perinatology* (2021) 41:1441–1447 <https://doi.org/10.1038/s41372-021-01054-1>
  10. Shantanu Rastogi, David J. Askenazi, Carl T. D’Angio on behalf of the Neonatal Kidney Collaborative
  11. Harer MW, Askenazi DJ, Boohaker LJ, et al.; Neonatal Kidney Collaborative (NKC). Association between early caffeine citrate administration and risk of acute kidney injury in preterm neonates: results from the AWAKEN study. *JAMA Pediatr*. 2018;172(6):e180322
  12. Jetton JG, Guillet R, Askenazi DJ, et al.; Neonatal Kidney Collaborative. Assessment of worldwide acute kidney injury epidemiology in neonates: design of a retrospective cohort study. *Front Pediatr*. 2016;4:68
  13. KDIGO AKI Work Group: KDIGO clinical practice guideline for acute kidney injury. *Int Suppl*. 2 (1): 1-138 2012
  14. Michelle C. Starr, MD, MPH, a Jennifer R. Charlton, MD, MSc, b Ronnie Guillet, *Advances in Neonatal Acute Kidney Injury Pediatr* 2021;
  15. Nakashima T, Inoue H, Fujiyoshi J, Matsumoto N. Longitudinal analysis of serum cystatin C for estimating the glomerular filtration rate in preterm infants. *Pediatr Nephrol*. 2016;31(6):983–989
  16. Selewski DT, Charlton JR, Jetton JG, et al. Neonatal acute kidney injury. *Pediatrics*. 2015;136(2). Available at: [www.pediatrics.org/cgi/content/full/136/2/e463](http://www.pediatrics.org/cgi/content/full/136/2/e463)
  17. Starr MC, Charlton JR, Gullet R, *Advances in Neonatal Acute Kidney Injury Pediatrics* 2021; 148:148 (5) e2021051220; DOI: <https://doi.org/10.1542/peds.2021-051220>
  18. Wasung ME, Chawla LS, Madero M. Biomarkers of renal function, which and when? *Clin Chim Acta*. 2015;438:350–357

Disclosures: The authors have indicated no conflicts of interest.

NT

New subscribers are always welcome!

NEONATOLOGY TODAY

To sign up for a free monthly subscription, just click on this box to go directly to our subscription page





Corresponding Author:

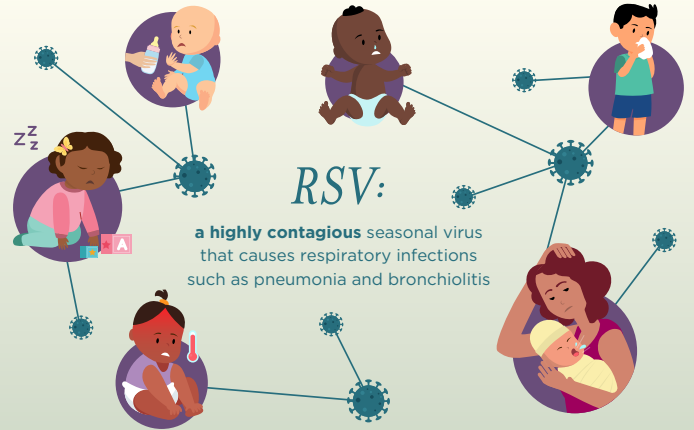
Maureen E. Sims, M.D.  
Professor of Pediatrics  
Geffen School of Medicine,  
University of California, Los Angeles  
Los Angeles, California  
email: [mes@g.ucla.edu](mailto:mes@g.ucla.edu)



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

# Respiratory Syncytial Virus

DID YOU KNOW?



## Infants under age 1



RSV is the **leading cause** of hospitalization



**16x more likely** to get RSV than the flu



## Kids under age 5 experience



**500,000 emergency room visits** for RSV each year



**57,000 hospitalizations** for RSV each year



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

LEARN MORE ▶



ONCE UPON A PREEMIE ACADEMY

# eLearning Courses

## Health and Racial Equity Continuing Education Courses

- + An Intro to Health and Racial Equity and Implicit Bias
- + Solutions for Addressing Inequities and Implicit Bias In the NICU
- + Black NICU Mother's Mental and Emotional Health
- + Black Premie Parents as Partners in Premie Care

**Register at**  
**OnceUponAPremieAcademy.com**

**\$150**

physicians

**\$175**

equity-focused  
solutions for  
healthcare  
professionals



The first and only virtual training academy focused on delivering health and racial equity educational programs for perinatal and neonatal healthcare professionals. Our purpose is to raise awareness and offer real-time solutions for addressing health and racial equity.

- + Earn Continuing Education Credits
- + Learn from nationally recognized perinatal and neonatal professionals and premie parents
- + Gain actionable tools to drive health and racial equity solutions in your organization!

# SHARED DECISION-MAKING PROTECTS MOTHERS + INFANTS

DURING COVID-19

## KEEPING MOTHERS + INFANTS TOGETHER

Means balancing  
the risks of...

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



## EVIDENCE

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

## PARTNERSHIP

What is the best  
for this unique dyad?

### SHARED DECISION-MAKING

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



## TRAUMA-INFORMED

Both parents and providers  
are confronting significant...

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

## LONGITUDINAL DATA

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

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



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

Partnering for patient-centered care  
when it matters most.

[nann.org](http://nann.org) [nationalperinatal.org](http://nationalperinatal.org)



National  
Association of  
Neonatal  
Nurses



National  
Perinatal  
Association

# Gravens By Design: What the Ideal NICU Would Look Like

Robert White, MD

***“It is sometimes hard to imagine the ideal NICU – the concept is still evolving, so there is no one available to visit, and even the elements of what could be optimal are evolving. For example, if this exercise were undertaken a few decades ago, it would be difficult to imagine what the digital transformation might permit – and even now, we cannot predict its full potential.”***

It is sometimes hard to imagine the ideal NICU – the concept is still evolving, so there is no one available to visit, and even the elements of what could be optimal are evolving. For example, if this exercise were undertaken a few decades ago, it would be difficult to imagine what the digital transformation might permit – and even now, we cannot predict its full potential. Still, the effort seems worthwhile, not only for those who will soon be building a NICU that will have to meet the needs and expectations of its inhabitants for the next 20-30 years but also for those who cannot rebuild soon but could undertake an interim facelift that would be of value to all its constituents.

## **A NICU should be welcoming to families**

This concept has many elements, starting even before one enters the hospital doors. It is usually easy to find the hospital, especially in the digital age, but there are often many places to park and enter the massive complex where most higher-level NICUs are located. Few people will say that finding their way from the street to the NICU is easy; it is hardest for young parents or other family members coming from an outlying community - often at night and almost always under stressful conditions. Proper signage on the street, at the preferred entrance, and through the hallways can greatly facilitate this first encounter. Written directions, both on paper and a hospital website, can also be helpful and allay anxiety even at the start of the journey.

Many hospitals have a foreboding “front door” because of where they are located, how old they are, and their restrictions to entry, but once one reaches the entrance to the NICU, none of these should be factors. The entrance should be well-lit with an attractive color scheme and devoid of stern signage. An individual to welcome and direct families and visitors should always be available. The décor should have more in common with a hotel lobby than an ICU – spacious, relaxing, and, where appropriate, informative. Both signage and artwork should reflect the diversity of cultures served by the NICU and should address parents as members of the care team rather than as visitors.

This paper is not intended to explore the operational aspect of

the ideal NICU, but these are immensely important to how families can be made to feel welcome. I have vivid memories of an old NICU in Madrid where several mothers sat in a circle rocking their premature infants while talking and singing together – a stark contrast to most similar NICUs in much wealthier countries I have seen that were largely devoid of parents and dominated by the sights and sounds of technology. The Madrid parents were made to feel welcome not by the physical environment but by the policies of the NICU, and they, in turn, made it more welcoming to every new family.

## **The NICU should only separate babies from their parents under the most extreme circumstances**

There is now abundant evidence of the value of early and extensive intimate contact of a baby with its parents and the safety of single-family rooms. There is no evidence that separating babies from their mothers for extended periods in the first days of life benefits either baby or parent. The ideal NICU would provide space and caregivers for all mothers after their delivery except for those who require highly specialized care. Likewise, accommodation would be provided for fathers or other support persons that will be sufficient for their comfort over extended periods.

***“The ideal NICU would provide space and caregivers for all mothers after their delivery except for those who require highly specialized care. Likewise, accommodation would be provided for fathers or other support persons that will be sufficient for their comfort over extended periods.”***

## **A NICU should present sights and sounds to all inhabitants that are nurturing rather than stressful**

There was a point in the early NICU days when audio alarms and bright lights were imperative, but we have known how to minimize these stressors for decades now. Most alarms can be transmitted electronically and visually, a technique learned in every other part of the hospital and adopted in some NICUs as early as the 1980s but has only recently achieved widespread acceptance and is still not a reality for some NICUs. Similarly, there was a time before the advent of transcutaneous oximetry when constant bright lights were needed to assess skin color and perfusion. However, the pendulum swung to a constantly dim environment based on the premise that this was the expected environment *in utero* and, therefore, safer and less stressful for premature infants. This belief has persisted long after it was disproven (1); it is past time for the pendulum to swing back to a middle ground where babies are presented with a circadian rhythm for lighting while still protected from direct light sources.

Adult caregivers and families need appropriate lighting as well. Lighting should be of sufficient intensity and the proper spectrum to provide a circadian and alerting stimulus for caregivers (2) and a welcoming signal to families. In contrast, lighting levels and spectrum at night will minimize melatonin suppression in caregivers while still supporting alertness.

---

***“Daylight and views of the outside world and nature provide a substantial psychological benefit to many adults. However, most NICUs will not have an opportunity to improve access to these features until new construction occurs because of the misguided belief in past years that because babies did not need access to daylight, their caregivers and families did not need it either.”***

---

Daylight and views of the outside world and nature provide a substantial psychological benefit to many adults. However, most NICUs will not have an opportunity to improve access to these features until new construction occurs because of the misguided belief in past years that because babies did not need access to daylight, their caregivers and families did not need it either. The ideal NICU will provide windows in almost all spaces where adults spend extended periods during the day. Even hallways should have a window on at least one end rather than closing off that vista by making an office a little larger or for storage space. In the meantime, attention to the visual environment remains even more important. The walls of NICUs have the potential to be palettes conveying subtle messages through artwork, photos, and stories of NICU grads. Even ceilings and floors have been used creatively to provide additional opportunities for the eye to find the color, whimsy, distraction, and information.

Sound control has been difficult to achieve in many NICUs, even after monitor alarms were tamed. For many NICUs, there are still too many sources of noise and too few sound-absorbing surfaces. There are now alternatives to the hard flooring that transmits and reflects the sound of everything that moves across it, for example. All surfaces should absorb more noise than they generate. HVAC systems were often designed in an era when high airflow was recognized as valuable but not understood as an important source of ambient noise, above which all other desirable sounds such as voices and even monitor alarms must be heard. Design or redesigning these HVAC systems to be quiet and where air can be extensively cleaned and filtered are overdue for many NICUs.

#### **Infection control can be improved in most NICUs**

Nosocomial infection continues to be a frustratingly common complication of neonatal intensive care. Something as basic as a handwashing sink is often designed to fail and, even when well-designed, can be misused in a way that contributes to ongoing contamination of NICU surfaces. The ideal NICU will have sinks readily accessible in all patient care and support areas; these

sinks should be hands-free, large enough for cleaning hands and forearms, have drains that are offset from the faucets, rims that do not permit objects to be placed on them (and thereby contaminated), splash guards to protect adjacent areas from splatter, quiet paper towel dispensers, and should be handicapped-accessible.

Among new sanitizing techniques being explored, ultraviolet light in the UV-C spectrum has been demonstrated to reduce bacterial and viral presence in circulating air and on certain devices, including hand-held communication devices. There is also increasing evidence that UV-A can be used to reduce contamination of surfaces in occupied spaces (3).

#### **Support spaces should provide respite and support for families and caregivers**

In many NICUs, support spaces for caregivers and families are cramped and windowless. These spaces would be large and relaxing in the ideal NICU with abundant daylight and access to an outdoor garden. Likewise, there would be smaller individual spaces that provide privacy and an opportunity to nap, pray, exercise, or do yoga.

#### **The patient care space should be a home away from home for those families who desire it and those babies for whom it is appropriate**

This principle comes with qualifiers. Babies whose families rarely interact with them may benefit from being in a shared space with other such babies. A few families prefer being in a space where their baby can be easily seen by caregivers, although this often is based on a misunderstanding of how little we can tell about a baby when we are not directly at the bedside and how much we depend on monitors to provide us information about a baby's status. Most families, though, appreciate a space they can call their own with comfortable seating, a private sleep surface and shower, a refrigerator, and the opportunity to personalize the space with decorations suitable for the baby and the season. Even in a more open setting, parents should have the opportunity for privacy, especially for breastfeeding and skin-to-skin care and space to store their personal belongings.

---

***“To some extent, this is an unreachable goal – walls will get nicked, floors will get stained, equipment will look worn. However, accumulating items in hallways and on counters and signs taped to walls or doors is not inevitable. Instead, it is tolerated mainly by people who get desensitized to its presence and forget that for families in this crucial moment, it announces a lack of attention to details and cleanliness that we would not tolerate in other public venues or indeed in our own homes if we were expecting visitors.”***

---

## The ideal NICU should look better than the day it opened

To some extent, this is an unreachable goal – walls will get nicked, floors will get stained, equipment will look worn. However, accumulating items in hallways and on counters and signs taped to walls or doors is not inevitable. Instead, it is tolerated mainly by people who get desensitized to its presence and forget that for families in this crucial moment, it announces a lack of attention to details and cleanliness that we would not tolerate in other public venues or indeed in our own homes if we were expecting visitors. It is a rare NICU that cannot find ways to enhance its appearance from time to time with upgrades as mundane as light bulbs with a warmer spectrum or as heart-warming as a piece of art from a graduate or the child of a staff member. Likewise, if allowed, families and staff can transform a patient care area from a sterile medical unit to something that feels more like home.

### References:

1. *Recommended Standards for Newborn ICU Design. J Perinatol Sep; 40(Suppl 1), 2020.*
2. *European Standards of Care for Newborn Health – NICU design.* <https://newborn-health-standards.org/standards/standards-english/nicu-design/>
3. *Designing the World's Best Children's Hospitals, volumes 1, 2, and 3. Komiske BK. Images Publishing.*

Disclosure: The authors have no conflicts of interest

NT

Corresponding Author



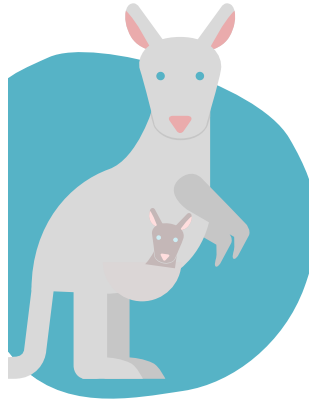
Robert D. White, MD  
Director, Regional Newborn Program  
Beacon Children's Hospital  
615 N. Michigan St.  
South Bend, IN 46601  
Phone: 574-647-7141  
Fax: 574-647-3672  
Email: [Robert\\_White@pediatrix.com](mailto:Robert_White@pediatrix.com)

# 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



[nicuparentnetwork.org](http://nicuparentnetwork.org)  
[nationalperinatal.org/skin-to-skin](http://nationalperinatal.org/skin-to-skin)



The Mount Sinai Light and Health Research Center (LHRC) in collaboration with the National Lighting Bureau (NLB) are putting on a series of virtual monthly interviews with experts in light and health fields. The series aims to bring together attendees of vast backgrounds in lighting, clinical, academic, and novices alike to promote conversations centered around specialized topics.

# Out of the womb

## Lighting up the NICU



**Robert White, MD**

Director

Regional Newborn Program at Beacon Children's Hospital

In the second installment of the series, Dr. Robert White will be interviewed about his role in redesigning the structure of the NICU, how lighting can impact circadian rhythms in babies, new disinfection techniques, and more!

Join in for the live Q&A following the interview.



28 February 2022



12 pm ET

[View our calendar](#)

[Register](#)

Interested in sponsoring this topic? Contact Randy Reid at [randy@nlb.org](mailto:randy@nlb.org)

2022 SERIES

# 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 down.
- 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 assistance.
- Call 211 for FREE delivery services.

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

# COVID-19

## DETENER LA PROPAGACION 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.
- Limpia 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.

### 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 room.
- Don't cuddle with pets.
- Use SEPARATE utensils.
- Clean utensils separately.
- If sick avoid the kitchen.

### KITCHEN

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



Visit Miora.org

Brought to by Miora in partnership with United2Care



### AISLAMIENTO

- Los enfermos deben estar separados del hogar.
- Habitación con ventana preferida.
- Alinea la habitación 3x al día.
- Crear un separador de ambientes con sábanas.
- Mantener agua y líquidos de saneamiento cerca.
- Mantenga una bolsa de basura en la habitación.
- Use utensilios SEPARADOS.
- Limpie los utensilios por separado.
- Si está enfermo, evite la cocina.

### COCINA

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



Visitar Miora.org

Tráido por Miora en asociación con United2Care



## Ways to Manage Covid 19 @ Home

### Household

- Stay 6 feet apart from others at all times.
- 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)
- Gargle with antiseptic mouthwash in the morning and evening.
- Wash hands 10-12x a day, before each meal for at least 20 seconds.
- Keep good ventilation throughout home. (open windows/doors) where possible
- Do not share towels, blankets, pillows with sick.
- Call 211 for assistance/free delivery of services.
- Wear protective clothing (jacket, gloves, mask) that can be removed after being around infected.

### Sick

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

Stop the Spread at HOME Miora



## Maneras de manejar COVID-19 en casa

### Hogar

- Manténgase 6 pies de distancia de los demás en todo momento. 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.
- Hacer gárgaras todas las mañanas y noches con productos de enjuague bucal antiséptico que contienen alcohol.
- Lavé la manos 10-11 veces al día, y antes de cada comida por lo menos 20 segundos.
- Mantenga Buena ventilación en toda la casa. Abra las ventanas y puertas cuando sea posible.
- No compartá toallas, cobijas, y almohadas con personas que estén infectados.
- Llame al 211 para obtener servicios de entrega gratuitos.
- Use ropa protectora, chaqueta, guantes, máscara que se pueda quitar después de estar cerca de infectados.

### Enfermo

- Aíslase permaneciendo en una habitación separada con baño separado. No vayas a espacios compartidos
- Si no se puede aislarse crea un separador de ambiente con una sábana.
- Ventile la habitación con aire fresco por lo menos 3 veces al día.
- Mantenga agua y productos de saneamiento en la habitación.
- Mantenga una bolsa de basura en la habitación.
- Proteja a las mascotas, no las abra.
- Notifique a todos los contactos de los últimos 10 días.
- No espere! Si se siente peor llame a su médico.

Detén la propagacion en CASA Miora



## WEAR A MASK

PROTECT PARENTS + BABIES

COVID-19

When we all wear masks...

We protect parents and babies.



## USA UNA MASCARILLA

PROTEGER A LOS PADRES Y BEBÉS

COVID-19

Cuando todos usamos mascarillas ...

Protegemos a los padres y los bebés.





# NT Behind the Scenes: Chicken Little, the Sky Isn't Falling: Raising Resilient Adolescents in the New Age of Anxiety

Kimberly Hillyer, DNP, NNP-BC



Neonatology Today has a new YouTube. As we previously announced in November of this year, we now have our own Neonatology Today Media. Please use the link to subscribe today, “Neonatology Today Media.”

Neonatology Today Media will expand the knowledge of our subscribers with new insights into common problems and historical looks backwards into how technology has favored the enhanced care of our most at risk patients.

enhanced care of our most at risk patients.

*“The following is an amended transcript of the Q&A with Dr. Kimberly Hillyer and Erica Komisar for Neonatology Today Media. Subscribe to our YouTube channel: Neonatology Today Media. Hit the notification button to see the preemie spotlight and the full interview.”*

A preemie spotlight is a quick “question and answer” with Erica Komisar, author of *Chicken Little, the Sky isn't Falling: Raising Resilient Adolescents in the New Age of Anxiety*. The following is an amended transcript of the Q&A with Dr. Kimberly Hillyer and Erica Komisar for Neonatology Today Media. Subscribe to our YouTube channel: Neonatology Today Media. Hit the notification button to see the preemie spotlight and the full interview.

Dr. Hillyer: How would you hashtag your book?

Erica Komisar: I would probably hashtag it as #teen parenting. Hashtags are usually no more than two words, so it's a little tough because it would be #adolescent mental health, but you could do #teen parenting or #parenting or #mental health or #kids mental health. Those would be my hashtags.

Dr. Hillyer: If you had not decided upon this title (*Chicken Little the Sky Isn't Falling*) for your book, what would have been another title?

Erica Komisar: I had another title it was “Second Chances,” and it didn't go over, but I liked it because I think of adolescence as parents' second chance. If you miss the first critical window of

brain development, it's a second chance to influence your children in terms of the future and their future mental health and emotional security.

*“Interested in being featured on Neonatology Today Media? Please email [LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com). Include your name and a Press or Authors kit describing the project or book that you would like featured on our channel.”*

Dr. Hillyer: How many pages did you write on your very first day?

Erica Komisar: Oh boy, I am an impulsive writer, so that's an interesting question. I can write 50 pages in three hours. I mean, I can just once I start going. So, I can't remember to be honest, how many pages I wrote on the first day. When I get going, as my collaborator, who's an editor, basically she takes my writing Sid Miner, she's wonderful, and she says, “You know, you just kind of vomit on the page, and then I sort through it.”

Dr. Hillyer: So that's funny, but that's very amazing. I could have used you for my Doctorate of Nursing Practice.

Can you tell me who your book is dedicated to?

Erica Komisar: My book is dedicated to my own children. I have three children; they are twenty-two, twenty, and seventeen. I have two sons and a daughter, and they are my inspiration for all the parenting books I write. And my husband who has supported my career and is my hero in many ways.

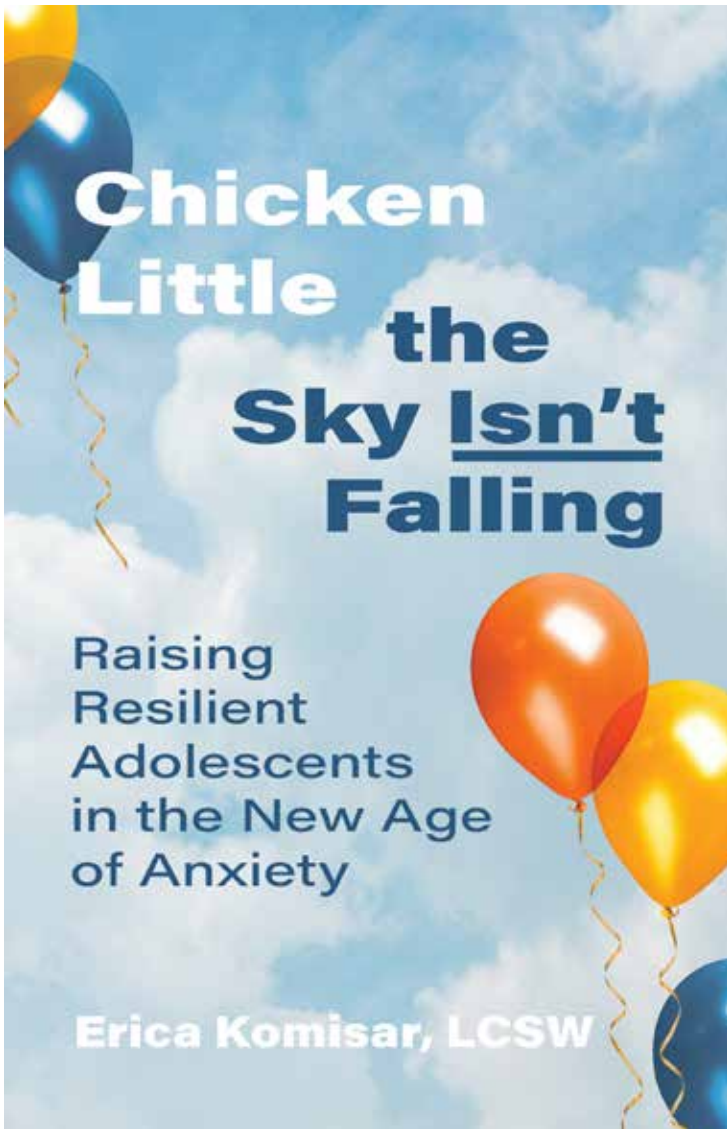
Dr. Hillyer: How did you come up with the design for your cover?

Erica Komisar: Well, that's easy. They give you two from the publisher, and they usually give one that's not so good and one that's great and that they make it easy for you. Actually, it was a discussion because the cover had to be optimistic. There was one cover that was kind of the sky being dark, and there was another cover that they sent me, which is the cover of the book, which was skies and balloons and sunshine. The truth is that this book is hopeful. It's a hopeful book, it does have a lot of depressing statistics, and it is meant to shake parents up, but it's a hopeful book. There's something you can do, and that's hopeful.

Dr. Hillyer: I think what I really appreciated about your book is that it didn't leave you off in a place of continued anxiety or despair. You are actually giving us tools. Tools that we could use, so I did appreciate that, and now I can see why you chose that cover. It

**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](mailto:LomaLindaPublishingCompany@gmail.com)**



was perfect.

Dr. Hillyer: How many times have you read your book?

Erica Komisar: That's a hard question. I have read chapters of my book thousands of times, literally thousands of times. Altogether, the whole book together, probably two or three times. As you put a book together, you work on it chapter by chapter, and I can tell you, chapter by chapter, we have looked at those chapters a thousand times.

Dr. Hillyer: How do you get the flow of which chapter goes where? Because it was really thoughtful in my mind and made sense of why you started first with helping us (parents) understand the current age of anxiety. Then building up into the understanding of the brain of an adolescent, then breaking each area down. I thought it was really thoughtful and then to come back around and then to help guide us as parents.

Erica Komisar: You have to introduce what the book is about, which is this is a particular time in history this new age of anxiety. I always like to talk about health first, again, because you have to have a baseline of knowledge as a parent of what health looks like. What does mental health look like? What does emotional security look like? What should it look like? Because there's a lot of challenges to childhood into adolescence, it's full of adversity, and it's full of trauma, too. That's part of normal trauma. You

know, people don't think of trauma as normal, but adolescence is a kind of trauma because there's so many crazy things happening to your body and your mind and socially. So, you have to have a baseline of what's normal, and then from there, you can talk about when things go awry. So that's sort of how I organized the book, and I organized my last book (Being There: Why Prioritizing Motherhood in the First Three Years Matter) that way too.

Dr. Hillyer: Now that your book is published, is there another chapter you wish you had added?

Erica Komisar: I probably would have added another chapter about how COVID-19 has amplified the mental health crisis. This book came out now, but really it's been in the process. You know books take a long time to get published. It was finished when COVID wasn't really nearly as bad or at the very beginning. So yeah, I would say that I would probably add a chapter about COVID.

**Disclosure:** The author has no disclosures.

**NT**



**Readers can also follow**  
**NEONATOLOGY TODAY**  
**via our Twitter Feed**  
**@NEOTODAY**

About the Author: Kimberly Hillyer, DNP, NNP-BC:



Title: NT News Anchor and Editor

Title: Neonatal Nurse Practitioner & News Anchor, Editor for Neonatology Today

Organization: Loma Linda University Health Children's Hospital

Neonatology Today in partnership with Loma Linda University Publishing Company.

Bio: Kimberly Hillyer, RN LNC, NNP-BC DNP, completed her Master's degree specializing as a Neonatal Nurse Practitioner in 2006 and completed her Doctorate of Nursing Practice (DNP) at Loma Linda University in 2017. She became an Assistant Clinical Professor and the Neonatal Nurse Practitioner Coordinator at Loma Linda University. Her interest in the law led her to attain certification as a Legal Nurse Consultant at Kaplan University.

As a Neonatal Nurse Practitioner, she has worked for Loma Linda University Health Children's Hospital (LLUH CH) for twenty years. During that time, she has mentored and precepted other Neonatal Nurse Practitioners while actively engaging in multiple hospital committees. She was also the Neonatal Nurse Practitioners Student Coordinator for LLU CH. A secret passion for informatics has led her to become an EPIC Department Deputy for the Neonatal Intensive Care at LLUH CH.

She is a reviewer for Neonatology Today and has recently joined the Editorial Board as the News Anchor.

About the Author: Erica Komisar



Erica Komisar is a clinical social worker, psychoanalyst, parent coach and author. With 30 years of experience in private practice, she works to alleviate pain from individuals who suffer from depression, anxiety, eating, and other compulsive disorders. By helping them live better lives and have richer, more satisfying relationships, she assists them in achieving their personal and professional goals and living up to their potential.

A graduate of Georgetown and Columbia Universities and The New York Freudian Society, Erica is a psychological consultant bringing parenting and work/life workshops to clinics, schools, corporations, and childcare settings including The Garden House School, Goldman Sachs, Shearman, and Sterling and SWFS Early Childhood Center.

Erica is also the author of the book *Being There: Why Prioritizing Motherhood in the First Three Years Matters* and has appeared on major media networks such as CBS, ABC, FOX, and NPR. She is a regular contributor to the Wall Street Journal, Washington Post, New York Daily News, and FOX 5 NY. She is a Contributing Editor to the Institute for Family Studies. Her upcoming book, *Chicken Little The Sky Isn't Falling: Raising Resilient Adolescents in the New Age of Anxiety* will be released in Fall 2021.

She lives in New York City with her husband, optometrist, and social entrepreneur Dr. Jordan Kassalow with whom she has three teenage and young adult children.

Visit her website at: [www.komisar.com](http://www.komisar.com).

*Chicken Little, the Sky Isn't Falling: Raising Resilient Adolescents in the New Age of Anxiety*

Publisher: HCI Books

Release Date: November 2, 2021

ISBN-10: 0757324002

ISBN-13: 9780757324000

Trade Paperback, 288 pages

Available from Amazon.com



**99nicu**

Readers can also follow

**NEONATOLOGY TODAY**

via our Twitter Feed

@NEOTODAY

MedEd On The Go® presents  
3 Accredited Education Programs in Short-Form Video Format  
Available for CME/CNE Credits

**The Role of Nutrition & Exclusive Human Milk for Very Low Birth Weight Infants**



**Preventing Bronchopulmonary Dysplasia**

1.75 credit hours

WATCH NOW



[www.MedEdOTG.com/video/program/599](http://www.MedEdOTG.com/video/program/599)

**Preventing Neonatal Sepsis**

0.5 credit hours

WATCH NOW



[www.MedEdOTG.com/video/program/609](http://www.MedEdOTG.com/video/program/609)

**Preventing Retinopathy of Prematurity**

1.0 credit hour

WATCH NOW



[www.MedEdOTG.com/video/program/608](http://www.MedEdOTG.com/video/program/608)



**Stephen E. Welty, MD**  
Clinical Professor of Pediatrics  
University of Washington  
School of Medicine  
Seattle, WA



**Dan L. Stewart, MD**  
Professor of Pediatrics & International Pediatrics  
University of Louisville School of Medicine  
Co-Director of NICU & ECMO  
Norton Children's Hospital  
Louisville, KY



**Jonathan R. Swanson, MD, MSc**  
Associate Professor of Pediatrics  
University of Virginia  
Children's Hospital  
Charlottesville, VA



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

# *In Loving Memory*

*August 9, 1996 - April 3, 2010*



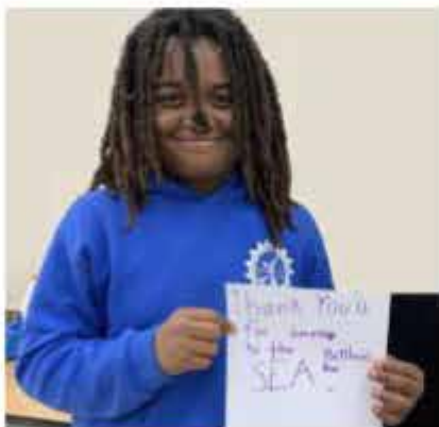
Each year, the Emily Shane Foundation SEA(Successful Educational Achievement) Program provides academic and mentoring support to over 100 disadvantaged middle school students who risk failure and have no other recourse. We have served over 700 children across Los Angeles since our inception in the spring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

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

Please visit [emilyshane.org](http://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.*

CALL FOR  
POSTER SUBMISSIONS

2 0 2 2

# Perinatology

at the Intersection

of Health Equity

and Social Justice

NPA's 42<sup>nd</sup> ANNUAL INTERDISCIPLINARY CONFERENCE

DATES May 2 - 4



## SEEKING POSTER ABSTRACTS

- Innovative Models of Care
- Applied or Basic Research
- Public Policies or Local Initiatives

STUDENT RESEARCHERS ARE ENCOURAGED TO SUBMIT.

VENUE Hyatt Regency Aurora-Denver

[www.NPAconference.org](http://www.NPAconference.org)



# Improving Reader Engagement by Embedding an Interactive Comment Widget in Digital Publications

Fu-Sheng Chou, MD, PhD, Mitchell Goldstein, MD, MBA

Neonatology Today launched a new website (<https://neonatology-today.org>) in August 2020 to better serve the Neonatology Today community in this digital era by having a better representation in the digital format. We used the RStudio integrative development environment and the *Shiny* package to create a website capable of displaying responsive content. The website also has a built-in module for online manuscript submission and peer review. A handful of managerial web apps were developed alongside facilitating the population of content without needing to access and modify the source codes. For example, updates to the artwork

*“The hope is that when the readers come across manuscripts that involve this methodology for data analysis, there will already be a basic understanding of machine learning and what this term entails. In this issue, the objective is to provide a more in-depth discussion about the fundamental differences between statistical modeling and machine learning algorithms.”*

file repository, sponsorship logos, corresponding weblinks, and even editor profiles can be achieved using ancillary web apps. We also developed web apps for rendering articles into the hypertext markup language (HTML) format and managing News & Views content.

We used the *R Markdown* package to render HTML files, which allows us to embed table and figure images in one single file, hoping that the digital publications can be as “portable” as their PDF counterparts. Rendering HTML files has not been an easy task, mostly because of the extensive knowledge required to display an article in HTML following pre-determined typesetting requirements properly. The task requires a basic understanding of the markdown language, HTML, and cascading styling sheets (CSS). Luckily, so far, we have had two talented helpers (Japmeet S. and Akshaya R.) to perform the task, and we have managed to convert twenty-four issues of articles (January 2020 to December 2021) into HTML for online display.

One additional benefit of publishing in the digital format that has become more and more obvious now is the ability to engage readers promptly, thanks to the constant advancement of interactive functionalities of the world wide web. However, Neonatology Today has not been taking advantage of these interactive web functions while other commercial publishers and self-publishing individuals (bloggers) have already begun to do so. After thorough

consideration and a detailed comparison of various available approaches for creating an interactive environment for our readers, we are happy to announce that, starting from the January 2022 issue, all-digital articles will have a comment widget embedded in the R markdown-rendered HTML files (Figure 1). The widget will be located just before the References section. We will utilize the service provided by a commercial comment widget-maker, Disqus, to store and retrieve comments and replies posted by readers and authors.

## General tips

Most readers and authors are familiar with website commenting functions, thanks to the wide availability of social media. The comment widget is no exception. Before a comment can be submitted, a commenter must log in using an existing Disqus account. Alternatively, an existing Facebook, Twitter, or Google account can be used to log in to Disqus. Brief and constructive comments are encouraged. We will keep the guest commenting function turned off to hold commenters responsible for their comments. Notably, Disqus also has a built-in function to spam any inappropriate automatic comments to protect the authors. These comments do not necessarily replace Letter to the Editor when a more vigorous

*“The statistical approach is a bottom-up approach, like building a house brick by brick, step by step, to assess the likely variables associated with the outcome. It is based on rational deduction according to clinical observations and hypotheses.”*

academic discussion with documentation is needed, especially if you would like to include Dr. Goldstein’s expert opinion. The Editorial Office does not endorse the comments posted online; therefore, it is not an ideal place to submit your error inquiry and error correction request. The Editorial Office reserves the right to delete any comments that encourage disrespect to the authors and Neonatology Today community. It should also be mentioned that the website URL indexes the comments stored on Disqus’ data server for retrieval. Therefore, a copy of the HTML file downloaded to a local computer will not display the comments correctly. In other words, only the HTML files that are opened directly from the Neonatology Today server will display the comments.

## What does this mean for the readers?

The primary goal of having an embedded comment widget is to engage readers in their interactions with the authors and the Editorial Office. We encourage the readers to post their reflections, questions, and suggestions in the comment widget professionally to initiate a conversation with the authors, editors, and even the other readers around the globe. After a comment is posted, we encourage the readers to “subscribe” to the comment thread. This



Figure 1. A screenshot of the Disqus comment widget. Please note the log-in pull-down menu on the right upper corner and the “Subscribe” button on the left lower corner.

will allow notifications of any replies to your comments to be sent to your E-Mail. The original commenter may simply “reply to” the notification E-Mail to further respond to the replies.

#### What does this mean to the authors?

We work hard for the go-live of digital publications to coordinate with PDF publication without too much delay but admit that this has not always been easy given limited resources. We encourage the authors to return to the website periodically to check whether the article authored by you has become available in the HTML format. Once available, we encourage the authors to subscribe to the commenting thread even before posting any comment. This will ensure that the authors receive notifications of any comment posting. We also encourage the authors to reply to questions or suggestions posted by the readers to facilitate academic exchange. If the potential answer to a posted question is part of your unpublished work, please indicate so and do not share any unpublished findings in the comment widget.

---

*“We also encourage the authors to reply to questions or suggestions posted by the readers to facilitate academic exchange. If the potential answer to a posted question is part of your unpublished work, please indicate so and do not share any unpublished findings in the comment widget.”*

---

#### Comment widget for the Neonatology Today website

We recently revamped the website, hoping that the new appearance will allow us to present the content more explicitly and that

the various tools will be easier to find (Figure 2). We also added a comment widget to the bottom of the homepage. Any comments and suggestions on ways to further improve our readers’ digital experience are welcome and highly appreciated. Please use the comment widget embedded on the website to do so.

---

*“We will also be adding functions to the website to increase reader engagement. Additionally, we are also exploring the possibility of using the website as an interface to share some of our ongoing research on data visualization predictive modeling with the readers and to see how we may be able to collaborate with interested readers in developing clinically helpful prediction tools using real-life datasets to give back to the community.”*

---

#### Future directions and concluding remarks

We will continue to improve the website appearance to meet the modern standards for website development. We will also be adding functions to the website to increase reader engagement. Additionally, we are also exploring the possibility of using the website as an interface to share some of our ongoing research on data visualization predictive modeling with the readers and to see how we may be able to collaborate with interested readers in developing clinically helpful prediction tools using real-life datasets to give back to the community. If you have any thoughts or ideas about the digital platform, reader engagement, or collaborations, please feel free to leave your comments on the newly embedded com-





# NEONATOLOGY TODAY

Peer Reviewed Research, News, and information in Neonatal and Perinatal Medicine

Follow us on [social media icons]

MONDAY FEBRUARY 14, 2022

CURRENT ISSUE PAST ISSUES SEARCH NEWS & VIEWS EDITORS' CORNER ARTWORK SPONSORSHIP

## CURRENT ISSUE (UNDER CONSTRUCTION)

2022 January | Vol 17 Issue 1

PDF

Original Research - Non-Clinical Trial Vol 17 Issue 1 Page 3-7

### Anti-Intellectualism and Covid19 Vaccine Hesitancy

Benjamin S'Merno, JD, Ernest Flores

HTML PDF (new)

Original Research - Non-Clinical Trial Vol 17 Issue 1 Page 10-26

### Disaster Series: Prolonged Improvisation during Hurricanes - High Reliability Organizing in the NICU

Daved van Stralen, Sean D. McKay, Thomas A. Mercer

HTML PDF (new)

Perspective Vol 17 Issue 1 Page 30-37

### Disaster Series: Appendix 1: Hurricane Meteorology

Daved van Stralen, Thomas A. Mercer

HTML PDF (new)

Fellow's Column Vol 17 Issue 1 Page 25-37

### Capnocytophaga Sepsis in a Preterm Neonate: A Case Report

Najmus Sahr Aneah, Elizabeth Auralos, Asaph Rohitky

HTML PDF (new)

Medical Legal Forum Vol 17 Issue 1 Page 42-48

### Briefly Legal: Term pregnancy, Uterine Rupture, Hypoxic-Ischemic Encephalopathy, Autism Spectrum Disorder - Part I

Maureen E. Gira, Darry Schlein

HTML PDF (new)

Search Keyword

expand by default

Article Type



0 Comments neonatologytoday Disqus Privacy Policy

Fu-Sheng Chou

Favorites Tweet Share

Sort by Best

Start the discussion...

Be the first to comment.

Subscribe Add Disqus to your site On Next Sell My Data

DISQUS

Figure 2. A screenshot of the revamped website.

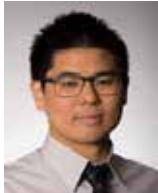
ment widget on the revamped website landing page (Figure 2).

This new addition of a comment widget in our digital publications will hopefully spark further academic exchange and facilitate networking among readers and authors of the Neonatology Today community. The Editorial Office will do its best to ensure the appropriateness of the comment postings. We are confident that the digital enterprise of Neonatology Today will continue to grow steadily.

*Disclosure: The author identifies no conflict of interest*

**NT**

*Corresponding Author*



*Fu-Sheng Chou, MD, PhD -  
Senior Associate Editor,  
Director, Digital Enterprise  
Neonatology Today  
Assistant Professor of Pediatrics  
Division of Neonatology, Department of Pediatrics  
Loma Linda University Children's Hospital  
Email: [FChou@llu.edu](mailto:FChou@llu.edu)*



*Mitchell Goldstein, MD, MBA, CML  
Professor of Pediatrics  
Loma Linda University School of Medicine  
Division of Neonatology  
Department of Pediatrics  
Email: [mgoldstein@llu.edu](mailto:mgoldstein@llu.edu)*

## Neonatology Today's Digital Presence

Neonatology Today's now has a digital presence. The site is operational now and defines the future look of our digital web presence. By clicking on this <https://www.neonatologytoday.org/web/>, researchers can download individual manuscripts both in digital format and as part of the original PDF (print journal). While the PDF version of Neonatology Today will continue in its present form, we envision that the entire website will be migrated to this format in the next several months. We encourage you to take a look, "kick the wheels," and let us know where we still need to improve. We are working towards making the website more functional for subscribers, reviewers, authors and anyone else. Although we have not yet applied for inclusion in the National Library of Medicine Database (Pub-Med), this new format meets several of the important metrics for this ultimate goal. As of December, 2020, NT has its own account with Cross-Ref and will assign DOI to all published material.

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

1. An online submission portal: Submitting a manuscript online will be easier than before. Rather than submitting by email, we will have a devoted online submission portal that will have the ability to handle any size manuscript and any number of graphics and other support files. We will have an online tracking system that will make it easier to track manuscripts in terms of where they are in the review process.
2. Reviewers will be able to review the manuscript online. This portal will shorten the time from receipt of review to getting feedback to the submitting authors.
3. An archive search will be available for journals older than 2012.
4. A new section called news and views will enable the submission of commentary on publications from other journals or news sources. We anticipate that this will be available as soon as the site completes the beta phase
5. Sponsors will be able to sign up directly on the website and submit content for both the digital and PDF issues of Neonatology Today.

Neonatology Today will continue to promote our Academic True Open Model (ATOM), never a charge to publish and never a charge to subscribe.

If there are any questions about the new website, please email Dr. Chou directly at:

[fu-sheng.chou@neonatologytoday.net](mailto:fu-sheng.chou@neonatologytoday.net)



**Did you know that premature and low birth weight babies have a 4x greater risk for SIDS?**

**At First Candle we're educating parents, grandparents and caregivers about safer sleep to make sure all babies reach their first birthday. Learn more at [firstcandle.org](http://firstcandle.org)**

# Social Determinants of Health: Identifying the Most Vulnerable

Scott D. Duncan, MD, MHA

*“There has been an increased emphasis on the social determinants of health in recent years. Conditions found in the places where people live, learn, work, and play affect health and quality of life, increasing risk and adversely altering outcomes.”*

There has been an increased emphasis on the social determinants of health in recent years. Conditions found in the places where people live, learn, work, and play affect health and quality of life, increasing risk and adversely altering outcomes. Consider the following common scenario:

“A neonatologist is called to assume care of a newborn infant on DOL 1. The infant is exhibiting jitteriness and irritability. The maternal history is significant for a family history of alcoholism and domestic violence. The mother ran away from home at 15 and currently lives in a homeless camp. She admits to using marijuana, methamphetamine, and heroin. Finnegan scoring is initiated, and scores of 10, 12 & 12 are recorded. The infant is admitted with cardiorespiratory monitoring and begun on oral morphine.”

The astute practitioner is aware of health inequities and their effects on our patients and families. In the above vignette, we see issues related to socioeconomic status, abuse, education, housing, food security, employment, family support, and access to health care. The AAP News (January 2021, Coding Corner) published an article titled “Use ICD-10-CM codes when the social determinant of health identified.” Here is a partial list of the social determinants of health (SDOH):

- Abuse (History of)
- Economic difficulties
- Education
- Environmentally compromised housing
- Family support group issues
- Food insecurity
- Housing issues
- Nutrition
- Parent/sibling child issues
- Social issues
- Substance use
- Transportation difficulty
- Upbringing issues

While the associated ICD-10 codes may or may not be used in the NICU, they may impact Neonatal Follow Up. Identification of one

or more SDOHs that constrains diagnosis or treatment options increases “risk” and may impact the Current Procedural Terminology (CPT®) evaluation and management (E/M) code. The physician needs to document these issues when they influence the encounter and place the proper ICD-10 codes when documenting in the medical record.

Coding for SDOH may be based on medical record documentation from ancillary providers, as this information is categorized as social information and not diagnosis. Alternatively, the information may be provided by the patient and/or caregiver, with inclusion into the medical record. Below are the broad categories of Z codes that might be used in such an encounter:

- Z55 Problems related to education and literacy
- Z57 Occupational exposure to risk factors
- Z59 Problems related to housing and economic circumstances
- Z60 Problems related to the social environment
- Z62 Problems related to upbringing
- Z63 Other problems related to the primary support group, including family circumstances
- Z71 Persons encountering health services for other counseling and medical advice, not elsewhere classified
- Z77 Other contacts with and (suspected) exposures hazardous to health

Consider the following scenario:

“A NICU graduate is being seen in Neonatal Follow Up with poor weight gain, despite being fed a hypercaloric formula. In filling out a risk assessment, the mother notes a lack of transportation and is recently separated and divorced. The mother states she has a prescription for formula and qualifies for WIC; however, she relies on a “friend” to get her to the WIC office.”

The limited access to free formula and unreliable means of transportation to get the formula places this patient at a high risk of treatment failure due to the food shortage in the home. Appropriate ICD-10 coding would include:

- Z59.6 Low income
- Z63.5 Disruption of the family by separation and divorce
- Z59.4 Lack of adequate food

There are CPT® codes related to standardized assessment of the SDOH, whether patient-focused or caregiver-focused. If a standard instrument determines SDOH risk factors, CPT® codes include:

- 96160 Administration of **patient-focused** health risk assessment instrument (e.g., health hazard appraisal) with scoring and documentation, per standardized instrument
- 96161 Administration of **caregiver-focused** health risk assessment instrument (e.g., depression inventory) for the benefit of the patient, with scoring and documentation, per standardized instrument

If SDOH risk factors are determined during an E/M service via a non-standardized tool, the determination of SDOH is included in the E/M service. As previously noted, adverse SDOH may impact risk within medical decision making and/or time as related to office

CPT® E/M codes, resulting in a higher level E/M code selection. Beyond the revenue impact of a specific E/M encounter, reporting of SDOH codes may affect risk-adjusted and/or value-based payment initiatives. The recognition of the adverse effects of SDOH on the patient experience will likely result in an impact on care delivery and future reimbursement.

***“Beyond the revenue impact of a specific E/M encounter, reporting of SDOH codes may affect risk-adjusted and/or value-based payment initiatives. The recognition of the adverse effects of SDOH on the patient experience will likely result in an impact on care delivery and future reimbursement.”***

Emma Lazarus was a Jewish Sephardi Portuguese American poet who penned a sonnet titled the New Colossus, which compares the Statue of Liberty to the ancient Greek Colossus of Rhodes, which is one of the Seven Wonders of the Ancient World. She wrote the poem in 1883 to raise money to construct the pedestal for the Statue of Liberty. In his musical Miss Liberty, Irving Berlin used the final stanza as the basis for a song, and Joan Baez used part of the poem in writing lyrics to some of her compositions.

She states in the poem:

*“Give me your tired, your poor, your huddled masses yearning to breathe free, the wretched refuse of your teeming shore. Send these, the homeless tempest-tost to me, I lift my lamp beside the golden door!”*

As healthcare providers, we are the lamp and are tasked with recognizing the vulnerable and reducing disparities in our healthcare delivery system.

For more information on coding for the social determinants of health, go to <https://downloads.aap.org/AAP/PDF/SDOH.pdf>

Disclosure: The author has no disclosures.

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](mailto:sddunc02@louisville.edu)

# 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](http://www.nationalperinatal.org/COVID-19)



# 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



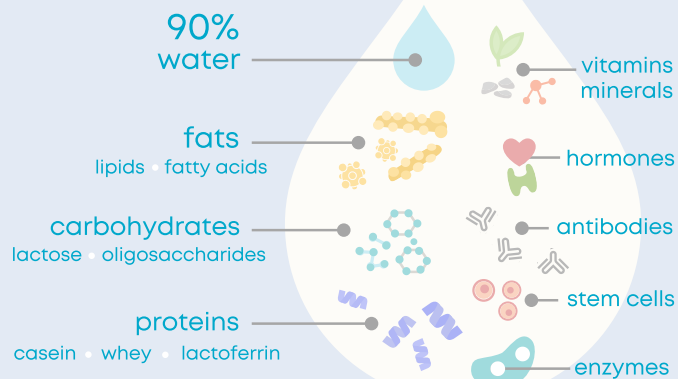
[nicuparentnetwork.org](http://nicuparentnetwork.org)  
[nationalperinatal.org/skin-to-skin](http://nationalperinatal.org/skin-to-skin)



# The Composition of BREAST MILK

200+ components

Made for Babies



Breast Milk is Living Tissue



Educate. Advocate. Integrate.  
[nationalperinatal.org/feeding\\_our\\_babies](http://nationalperinatal.org/feeding_our_babies)

# La composición de la LECHE MATERNA

200+ componentes

La leche materna está hecha para bebés.



La leche materna es tejido vivo.



Educate. Advocate. Integrate.  
[nationalperinatal.org/feeding\\_our\\_babies](http://nationalperinatal.org/feeding_our_babies)

# The Village Son



## A Life's Journey

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

Houchang D. Modanlou

Paperback  
USD 24.99



National Perinatal Association  
**PERINATAL MENTAL HEALTH**

[nationalperinatal.org/position](http://nationalperinatal.org/position)  
[www.nationalperinatal.org/mental\\_health](http://www.nationalperinatal.org/mental_health)

**OFFER ANTICIPATORY GUIDANCE**

Families need to know that women are more likely to develop depression and anxiety during the first year after childbirth than at any other time in their life.



Educate. Advocate. Integrate.

National Network of NICU Psychologists

[www.nationalperinatal.org/psychologists](http://www.nationalperinatal.org/psychologists)

COVID-19

**FREE RESOURCES** for your NICU

- Helping Children and Families Cope
- Bonding with Your Baby
- Caregivers Need Care Too

FREE ONLINE EDUCATION

Coping with COVID-19



**COPING WITH COVID-19**

Trauma-Informed Care for Frontline Maternity, Pediatric, and NICU Providers during the COVID-19 Pandemic



SEE ALL OF OUR COURSES



**CARING FOR PREGNANT PATIENTS AND THEIR FAMILIES**

Providing Psychosocial Support During Pregnancy, Labor and Delivery

**CARING FOR BABIES AND THEIR FAMILIES**

Providing Psychosocial Support in the NICU



[WWW.MYPERINATALNETWORK.ORG](http://WWW.MYPERINATALNETWORK.ORG)



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

© 2020

# WE NEED YOUR HELP,

*Your voice, Your expertise, Your support,*

*to raise awareness about the Alliance  
and our vision for supporting Black  
NICU Families.*

Black NICU Moms & Dads:

## TAKE THE SHORT SURVEY!

<https://preemie.us/BlackNICUFamilies>

  
**alliance**  
FOR BLACK NICU FAMILIES™



# The Critical Importance of Correct Infant Product Use

Alison Jacobson

## first candle

Saving babies. Supporting families.

*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.*

*"As I have written over the past several months, First Candle is committed to engaging in conversations with families and providing them with practical information on the importance of safe sleep practices that are not only evidence-based but reality-based."*

The troubling issue of unintended consequences presents itself again.

As I have written over the past several months, First Candle is committed to engaging in conversations with families and providing them with practical information on the importance of safe sleep practices that are not only evidence-based but reality-based.

We know parents want to do what is best for their baby but are

overwhelmed with so many messages and directives that it is often difficult to understand and make the right decisions for their family.

Most juvenile products that are on the market are created with a baby's safety top of mind. They also are sold with clear instructions and warnings regarding the proper use of the product. Unfortunately, products are not used as intended in some cases, leading to tragic consequences.

**To be precise, products created to be used when the baby is awake and supervised should never be used as a sleep space.**

*"To be precise, products created to be used when the baby is awake and supervised should never be used as a sleep space."*

However, products that are not designed, intended, or marketed for sleep are being reviewed by the Consumer Product Safety Commission (CPSC) against the standards for sleep products. Consequently, "stop use" advisories for these products are being issued by the CPSC, causing distress and confusion among consumers.

This situation has now occurred with two popular brands of infant loungers. When used as directed (only when the baby is awake and supervised), loungers and other activity-related products are extremely beneficial to parents when they need somewhere to place their baby during awake time.

We are deeply concerned that if juvenile products that parents need to care for their baby safely are no longer on the market, they will turn to other make-shift solutions that have no safety standards and are not intended for caring for a baby.

We are committed to ensuring that parents receive accurate information to make informed choices. While cribs and bassinets are safe places for babies to sleep, they become dangerous if other items such as blankets, pillows, and stuffed animals are in the area. Our education campaigns are intended to clearly communicate the "whys" behind the safe sleep guidelines and what



To every NICU nurse who has cared for these precious babies we say.....  
"Thank you."

first candle

Did you know that premature and low birth weight babies have a 4x greater risk for SIDS?

At First Candle we're educating parents, grandparents and caregivers about safer sleep to make sure all babies reach their first birthday. Learn more at [firstcandle.org](http://firstcandle.org)

a safe sleep space looks like. We engage in conversations with parents to meet them where they are at, considering their lived experiences, cultural beliefs, and socio-economic barriers to help them make the safest choices for their baby.

---

*“ Our education campaigns are intended to clearly communicate the “whys” behind the safe sleep guidelines and what a safe sleep space looks like. We engage in conversations with parents to meet them where they are at, considering their lived experiences, cultural beliefs, and socio-economic barriers to help them make the safest choices for their baby.”*

---

Parents should be encouraged to visit the [Juvenile Products Manufacturer’s Association website](#) to learn more about product safety and the proper usage of infant products. (1)

**References:**

1. <https://www.jpma.org/page/parents>

**Disclosure:** The author is the Director of Education and Bereavement Services for First Candle, a 501c (3) non-profit organization.

**NT**

**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.

Readers can also follow

**NEONATOLOGY TODAY**

via our Twitter Feed

**@NEOTODAY**



Corresponding Author

Alison Jacobson  
Executive Director  
Chief Executive Officer  
First Candle  
49 Locust Avenue, Suite 104  
New Canaan, CT 06840  
Telephone: 1-203-966-1300  
For Grief Support: 1-800-221-7437  
Email: [Alison@firstcandle.org](mailto:Alison@firstcandle.org)  
[www.firstcandle.org](http://www.firstcandle.org)





## Supporting NICU Staff so they can support families



Providing online education that is...

- Story-Driven
- Trauma-Informed
- Evidence-Based

 National  
Perinatal  
Association

 NPN  
NICU PARENT NETWORK

The preeminent provider of compelling perinatal education on psychosocial support created through interprofessional collaboration

[www.mynicunetwork.org](http://www.mynicunetwork.org)

**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](mailto:LomaLindaPublishingCompany@gmail.com)

# COPING WITH COVID-19

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



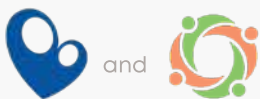
Provide culturally-informed and respectful care.

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](http://myNICUnetwork.org)



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



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.



#### 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

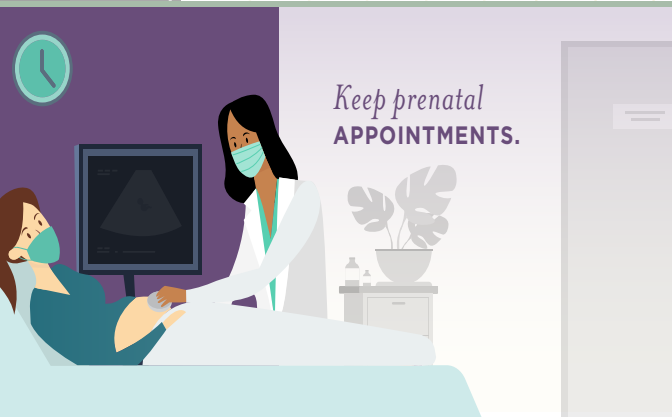
Welcome the pastoral care team into your NICU to serve families & staff.

[SUPPORT4NICUPARENTS.ORG](http://SUPPORT4NICUPARENTS.ORG)

## The PREGNANT MOM'S Guide To Staying SAFE DURING COVID-19



Maintain at least  
**A 30-DAY SUPPLY**  
OF YOUR MEDICATIONS.



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

## 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



[nicuparentnetwork.org](http://nicuparentnetwork.org)  
[nationalperinatal.org/skin-to-skin](http://nationalperinatal.org/skin-to-skin)



# eLearning Courses

## Health and Racial in the NICU

### Meet Our Faculty



+ Jenné Johns, MPH  
Once Upon A Premie Academy



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



+ Dawn Godbolt, Ph.D.  
National Birth Equity Collaborative



+ Dalia Feltman, MD, MA, FAAP  
Univ. of Chicago Pritzker School of Medicine



+ Chavis A. Patterson, Ph.D.  
Children's Hospital of Philadelphia



+ Terri Major- Kincade, MD, MPH  
Pediatrician and Neonatologist



+ Shanté Nixon  
Connect2NICU



+ Ashley Randolph  
Glo Premies



**REGISTER TODAY**

[OnceUponAPremieAcademy.com](https://OnceUponAPremieAcademy.com)

### Health and Racial Equity + On-Demand Continuing Education

The first and only virtual training academy focused on delivering health and racial equity educational programs for perinatal and neonatal healthcare professionals. Our purpose is to raise awareness and offer real-time solutions for addressing health and racial equity.

# 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 5<sup>th</sup> 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](http://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.



## New Technology, Old Problems

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

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

*“The availability of adjuncts such as synchronization, volume targeted ventilation, and flow graphics has afforded clinicians the ability to ventilate babies with a degree of lung protection and reduced work of breathing that we could only imagine 30 years ago.”*

Neonatal ventilation and ventilators have come a long way since “The Bird.” The availability of adjuncts such as synchronization, volume targeted ventilation, and flow graphics has afforded clinicians the ability to ventilate babies with a degree of lung protection and reduced work of breathing that we could only imagine 30 years ago. High-frequency jet ventilation as well as machines offering both conventional modes and high-frequency oscillation (HFO), and more recently, the ability to monitor and control volumes in HFO (HFO/VG) provide more options and flexibility than ever before.

While undeniably superior to ventilators of old, as sophisticated as they are, modern neonatal ventilators are not infallible; they are only as good as the information they receive. It is up to those at the bedside to determine the accuracy of that information and take corrective action when required.

Synchronized breath delivery reduces work of breathing and provides more uniform volumes, but this has introduced a problem familiar to those who have worked with these modes in the adult population: auto-triggering. The culprit here is water. When condensation builds up to the point of rain out, water gathers in the lowest part of the circuit. Bias flow produces a form of oscilla-

tion not dissimilar to bubble CPAP and, in doing so, may provide enough flow through the flow sensor to trigger the machine. This causes an inadvertent increase in respiratory rate, asynchrony, and breath stacking.

There are, of course, tell-tale signs that this is occurring. In volume control modes, this results in increased peak inspiratory pressure (PIP) as well as rate. Properly set alarm parameters may alert caregivers to the problem. However, it is not uncommon for minute volume and rate alarms to be set quite liberally above or below baseline, especially in the presence of large leaks. Appropriate setting of maximum pressure limits in volume targeted modes ( $\leq 5$  cmH<sub>2</sub>O above-average PIP or amplitude) offers the best warning of trapped water and the need for suctioning or a decrease in compliance. In the absence of alarms, other parameters offer clues that something is amiss. Maximum pressures being used consistently is one indicator, as is high respiratory rates with no apparent efforts from the baby. The pressure waveforms on machines so equipped may appear somewhat jagged or saw-toothed, particularly between breaths.

*“Water trapped in the expiratory limb of the conventional circuit may increase effective ventilation by superimposing low amplitude oscillation on top of HFJV, not unlike bubble CPAP.”*

Water accumulation in HFJV may not be as easy to spot since the conventional ventilator may not have graphics. However, the same suspect pressure waveform may appear on those that do (Figures 1,2). Water trapped in the expiratory limb of the conventional circuit may increase effective ventilation by superimposing low amplitude oscillation on top of HFJV, not unlike bubble CPAP. This water also creates resistance to gas flow which may create inadvertent PEEP, which decreases the pressure gradient of the jet breath and may decrease ventilation.

Dual heated wire ventilator circuits have greatly decreased circuit rainout and virtually eliminated “spill and fill” rounds, but there are situations where rainout can and will still occur. Low ambient temperature may be more than the heated wires can cope with. Circuits with an extension are particularly prone to water accumulating near the temperature probe at the end of the heated wire portion. The flow around the temperature probe is such that it tends to stop rainout from the unheated extension from passing

**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](mailto:LomaLindaPublishingCompany@gmail.com)



through. Accumulated water also cools the probe and may trigger a low-temperature alarm from the humidifier. This is most common if ambient temperature outside the incubator or in the incubator itself is relatively low. (Figure 3)

The temperature of modern humidifiers may not be adjustable other than “invasive” or “non-invasive” settings. Changing the setting to non-invasive when a patient is intubated is not recommended as it lowers the temperature below that required to provide 100% relative humidity at 37 degrees C. On older models increasing the circuit temperature or the pot/circuit offset will reduce circuit rainout but lowering pot temperature below 37 degrees C is not recommended. With the Bunnell jet, reducing cartridge (or water) temperature to 37 degrees while maintaining a circuit temperature of 40 degrees will reduce rainout. With any ventilator, avoiding having drafts or room ventilation from blowing over the circuit will also decrease the risk of rainout.



Figure 1: Normal HFJV pressure waveform on conventional ventilator



Figure 2: HFJV pressure waveform with water in circuit

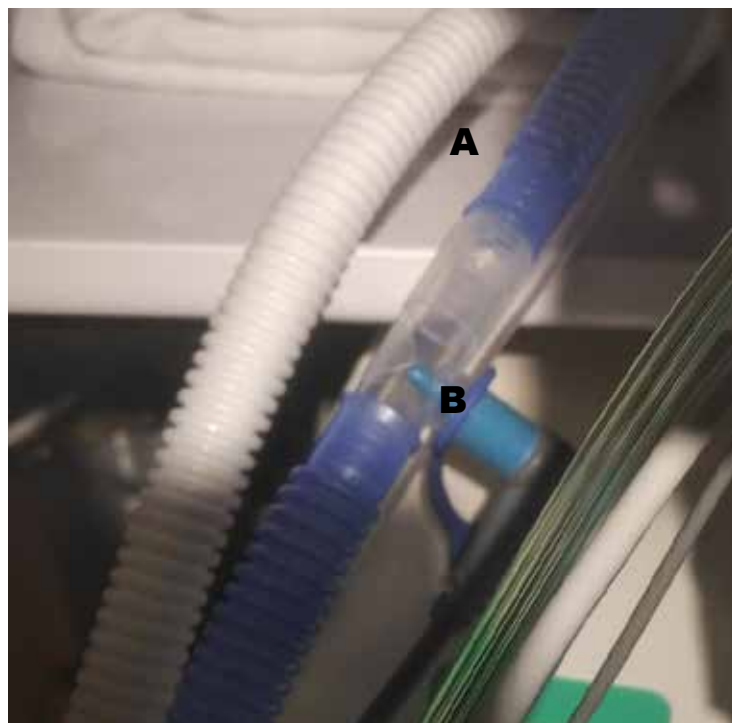


Figure 3. A: Unheated circuit extension. Removing will decrease rainout (keep if handy extra length is needed i.e. for kangaroo care). B: Junction of heated & non-heated circuit. Water accumulates here.

Since water flows downhill, gravity can be either friend or foe. Sloping the ventilator circuit downward from the baby helps prevent water accumulation in the patient wye where it can be introduced into the endotracheal tube, a potential source of ventilator-associated pneumonia. Guidelines for neuroprotective management of the micro or nano premature infant call for elevating the head of the bed 15-30 degrees. This greatly increases the likelihood of rainout reaching the baby, and baffles at the head of the bed exacerbate the problem. If the baffle incorporates a grommet, removing it may help.

Although the Bunnell jet ventilator incorporates a purge for the pressure line, it is not uncommon for the water to enter the line, particularly if positioned dependently and/or after saline instillation for suctioning. This effect dampens the signal and may cause a “loss of PIP” alarm condition. Purging the pressure line with a syringe will quickly clear the water and eliminate the alarm. (It may be necessary to hit “enter” before the machine locks in pressure again). (Figure 4)

**“Water can also create problems with hot wire anemometer sensors since it cools the wires resulting in erroneous measurements. Ensuring the heated wire elements are positioned upright helps prevent this, and “messy” flow graphics may indicate this is occurring.”**



Figure 5: hot wire anemometer and connecting cable. A: Look for damage or discoloration (usually greenish) here as it may affect signal quality. Look for corrosion at the base of the connecting pins. B: The cable should connect such that it is at the top of the sensor.

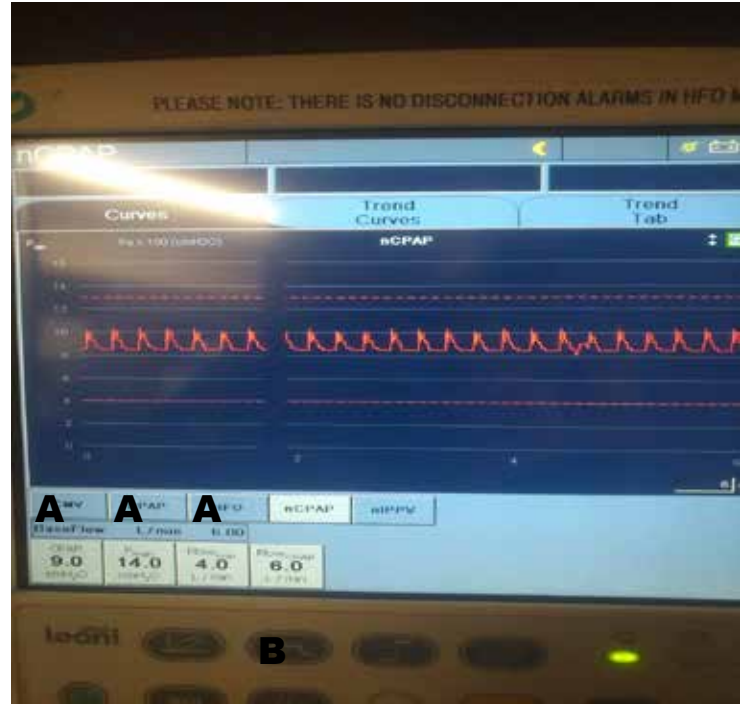


Figure 6. A: Note flow & pressure settings for manual breaths. B: Manual breath button.

Any machine relying on a flow sensor to deliver targeted volumes is only as good as the sensor's data. Loose connections or corroded contacts may interfere with the signal sent to the ventilator.

Evidence of oxidation or corrosion on either the flow sensor or cable are signs one or the other should be replaced. Often the flow graphic waveform displayed may not be as clean in appearance, or the machine may deliver higher PIP than necessary. If high

***“Evidence of oxidation or corrosion on either the flow sensor or cable are signs one or the other should be replaced. Often the flow graphic waveform displayed may not be as clean in appearance, or the machine may deliver higher PIP than necessary.”***

PIP is being used consistently, this may signify a faulty signal. If pushing the flow sensor cable firmly into the flow sensor results in a flow waveform improving and/or PIP decreasing, either the flow sensor or cable or both should be replaced. It is important to note that the flow sensor may calibrate successfully in these situations. Over time, as with any plug, the snugness of the connection may lessen, providing an unreliable connection. Flow sensors and sensor cables are consumables and must be replaced regularly.

**Other Considerations:**

I have mentioned setting maximum pressure limits tightly enough

to promptly alert the clinician to changes. The manual breath's pressure and flow (or slope) are often not considered. It is very common for the person at the bedside to use the manual breath button to bring the baby out of bradycardia or a desaturation episode or to re-recruit after suctioning or circuit disconnection. If this pressure is too high, it can damage the lungs of a tiny (or not so tiny) baby. It is my practice to set manual pressure at 5 cmH<sub>2</sub>O above PEEP (or MAP with HFO) and reduce the flow (or increase the slope) of these breaths to make them as gentle as possible. Should higher pressure be required, it can be adjusted. (Figure 6)

As the edge of viability is pushed ever lower, we must adapt our practices accordingly; one is the length of the endotracheal tube.

---

***“As the edge of viability is pushed ever lower, we must adapt our practices accordingly; one is the length of the endotracheal tube. Many ETTs are precut. The standard 2.5 mm ETT is 11 cm long. We tend to think of resistance related to diameter and having an exponential effect; this is indeed by far the most significant determinant of resistance to flow.”***

---

Many ETTs are precut. The standard 2.5 mm ETT is 11 cm long. We tend to think of resistance related to diameter and having an exponential effect; this is indeed by far the most significant determinant of resistance to flow. We tend to forget that tube length also affects resistance, albeit linearly. The significance of ETT length is greater with smaller babies as it increases resistance (and any associated gas trapping) and dead space. Reducing the length of a 2.5 ETT from 11 to 9 decreases resistance by 18% and dead space by approximately 0.1 mL. When dealing with volumes of 2 mL or less, this becomes significant. Decreasing ETT length as much as is practically possible can only be beneficial.

An old driver's educational film proclaimed the most dangerous part of an automobile was the nut behind the steering wheel. As sophisticated as cars have become, the statement still holds true.

The same could be said for ventilators!

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

**NT**

Corresponding Author



Rob Graham, R.R.T./N.R.C.P.  
Advanced Practice Neonatal RRT  
Sunnybrook Health Science Centre  
43 Wellesley St. East  
Toronto, ON  
Canada M4Y 1H1  
Email: [rcgnrcp57@yahoo.ca](mailto:rcgnrcp57@yahoo.ca)  
Telephone: 416-967-8500



Credentialed for Clinical Trials  
Autism NCJH National Institute for Mental Health



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

*In Loving Memory*

*August 9, 1996 - April 3, 2010*



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

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

Please visit [emilyshane.org](http://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.*

# An Introduction to NPA President Viveka Prakash-Zawisza

Viveka Prakash-Zawisza, MD

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.



***“My goal as President is to continue building on our past successes, supporting our Board members to bring innovative ideas to the table, and further advancing NPA’s standing as a nationally renowned perinatal organization.”***

I am honored and privileged to be the President of the National Perinatal Association this year. Over the years, my time with NPA has been filled with inspiring peo-

ple, humbling lessons, and aligning NPA’s projects with the modern challenges within healthcare. My goal as President is to continue building on our past successes, supporting our Board members to bring innovative ideas to the table, and further advancing NPA’s standing as a nationally renowned perinatal organization.

I had a very traditional academic path, knowing I wanted to become a physician in high school. I attended Brandeis University, followed by the University of Massachusetts Medical School. I chose UMass because of its highly ranked program focusing on primary care and underserved populations. I already had a fire within me for social justice, fueled by my time at Brandeis, a school named for Justice Louis D. Brandeis, a staunch advocate for equality and justice for all. At UMass, I further developed my interest in serving the most vulnerable people in the community through my clinical rotations at community health centers where medical practice must take place within the confines of limited access on every level. I immediately fell in love with obstetrics and gynecology during my rotations, drawn to the unique combination of women’s primary care and surgery within the same specialty. I completed my residency training at SUNY Stony Brook on Long Island. I had the luck to work as a co-resident with Jerry Ballas, the immediate Past President of NPA, and Susan Altman, a midwife in the academic practice.

After I graduated, I returned to Massachusetts to begin my work as an attending at a large multispecialty group practice. I stayed in touch with all my former residency colleagues, so I was thrilled when Susan reached out to recruit me to join NPA’s Board. At my first Board meeting, I was struck by the diversity of experience in the room. It was so exciting to be talking about the perinatal issues I was so passionate about not only with other physicians but with advocates, parents, lawyers, and psychologists who brought their own unique lived and professional experiences. This breadth and depth of knowledge made our conversations rich with complexity, and I knew I had so much to learn from every person in the room. This played out critically when we recently crafted a joint statement on Covid policies regarding NICU parent visitation. The physicians and parents contributing to the statement had points of convergence and divergence. As a physician and a parent, some consider-

ations had not occurred to me since I have not had the experience of having an infant in the NICU. The collaborative spirit underlying the effort led to a well-considered and inclusive statement that acknowledged the real challenges that NICU providers face to keep themselves and their patients safe during the pandemic yet balanced that with the equally critical need for parents to be physically near their hospitalized babies. That project was a shining example of the power of convening for which NPA is so well-known.

***“The fire for social justice was still burning inside, and now I hungered to understand the languages of business and health policy that dictated how healthcare was being delivered, especially for people who were not privileged. I decided to go back to school and earned an MBA and Master of Science in global health policy to be empowered with the knowledge I needed to understand how and why healthcare in the United States was so broken and what I could do to help repair it.”***

As I progressed in my career as a full-time



clinician, I was becoming more aware of how decisions being made in boardrooms were impacting my day-to-day practice and, ultimately my patients' experience receiving care. The fire for social justice was still burning inside, and now I hungered to understand the languages of business and health policy that dictated how healthcare was being delivered, especially for people who were not privileged. I decided to go back to school and earned an MBA and Master of Science in global health policy to be empowered with the knowledge I needed to understand how and why healthcare in the United States was so broken and what I could do to help repair it. I was privileged to join MassHealth, the Massachusetts state Medicaid agency, as a medical director. I work on policy directly related to innovation in healthcare reform within the state. I have also helped advance policy related to maternal health and health equity. I have been lucky to have a seat at such a powerful table and to craft meaningful policy to better serve the most vulnerable people in the community. I have also been able to bring that expertise to my work at NPA, helping to push our advocacy for health equity, paid family leave, and addressing racism in healthcare. This year, I look forward to my work as NPA's President, pushing the organization to even greater heights with all our initiatives and partnerships, navigating the next phases of the Covid pandemic, and ultimately strengthening our position as a national resource for anyone with a passion for perinatal health.

---

*“I have also been able to bring that expertise to my work at NPA, helping to push our advocacy for health equity, paid family leave, and addressing racism in healthcare. This year, I look forward to my work as NPA’s President, pushing the organization to even greater heights with all our initiatives and partnerships, navigating the next phases of the Covid pandemic, and ultimately strengthening our position as a national resource for anyone with a passion for perinatal health.”*

---

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

NT

Corresponding Author



Viveka Prakash-Zawisza, MD, FACOG  
President, National Perinatal Association  
Email: [viveka.zawisza@gmail.com](mailto:viveka.zawisza@gmail.com)

New subscribers are always welcome!

NEONATOLOGY TODAY

To sign up for free monthly subscription, just click on this box to go directly to our subscription page

Postpartum Revolution

@ANGELINASPICER



CONGENITAL  
CARDIOLOGY  
TODAY

The only worldwide monthly publication exclusively serving Pediatric and Adult Cardiologists that focus on Congenital/Structural Heart Disease (CHD), and Cardiothoracic Surgeons.

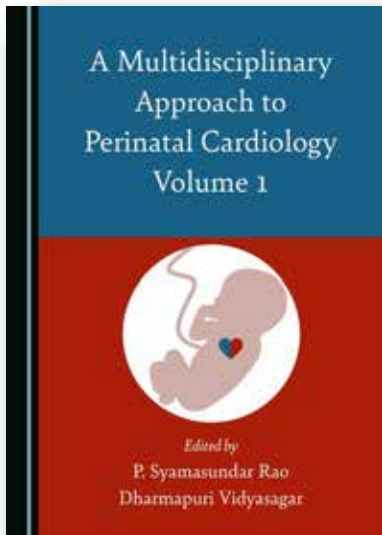


Subscribe Electronically  
Free on the Home Page

[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)

# A Multidisciplinary Approach to Perinatal Cardiology Volume 1

*Edited by P. Syamasundar Rao and Dharmapuri Vidyasagar*



## Hardback

### ISBN-13:

978-1-5275-6722-1

### ISBN-10:

1-5275-6722-2

### Date of Publication:

24/04/2021

### Pages / Size:

794 / A5

### Price:

£99.99

---

## 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](#).



# Online L&D Staff Education Program

## Caring for Pregnant Patients & Their Families: Providing Psychosocial Support During Pregnancy, Labor and Delivery

[WWW.MYPERINATALNETWORK.ORG](http://WWW.MYPERINATALNETWORK.ORG)



Continuing education credits provided by





# About the Program

- **WHO SHOULD TAKE THE PROGRAM?** This program is designed for both office and hospital staff in all disciplines that interact with pregnant patients and their families. A key focus is recognizing risk factors for perinatal mood and anxiety disorders, and mitigating their impact through provision of trauma-informed care.
- **WHY TAKE THE PROGRAM?** Families will benefit when staff have improved skills, through enhanced parental resilience and better mental health, and improved parent-baby bonding leading to better developmental outcomes for babies. Benefits to staff include improved skills in communicating with patients; improved teamwork, engagement and staff morale; reduced burnout, and reduced staff turnover.
- **HOW DOES THE PROGRAM ACHIEVE ITS GOALS?** Program content is representative of best practices, engaging and story-driven, resource-rich, and developed by a unique interprofessional collaboration of obstetric and neonatal professionals and patients. The program presents practical tips and an abundance of clinical information that together provide solutions to the emotional needs of expectant and new parents.
- **HOW WAS THE PROGRAM DEVELOPED?** This program was developed through collaboration among three organizations: a multidisciplinary group of professionals from the National Perinatal Association and Patient + Family Care, and parents from the NICU Parent Network. The six courses represent the different stages of pregnancy (antepartum, intrapartum, postpartum), as well as perinatal mood and anxiety disorders, communication techniques, and staff support.

## Program Objectives

- Describe principles of trauma-informed care as standards underlying all communication during provision of maternity care in both inpatient and outpatient settings.
- Identify risk factors, signs, and symptoms of perinatal mood and anxiety disorders; describe treatment options.
- Define ways to support pregnant patients with high-risk conditions during the antepartum period.
- Describe obstetric violence, including ways that providers may contribute to a patient's experience of maternity care as being traumatic; equally describe ways providers can mitigate obstetric trauma.
- Describe the importance of providing psychosocial support to women and their families in times of pregnancy loss and fetal and infant death.
- Define the Fourth Trimester, and identify the key areas for providing psychosocial support to women during the postpartum period.
- Identify signs and symptoms of burnout as well as their ill effects, and describe both individual and systemic methods for reducing burnout in maternity care staff.

Continuing education credits will be provided for physicians, clinic and bedside nurses, social workers, psychologists, and licensed marriage and family therapists. CEUs will be provided by Perinatal Advisory Council: Leadership, Advocacy, and Consultation.

# PROGRAM CONTENT



## COMMUNICATION SKILLS CEUs offered: 1

Learn principles of trauma-informed care, use of universal precautions, how to support LGBTQ patients, obtaining informed consent, engaging in joint decision-making, delivering bad news, dealing with challenging patients.

Faculty: Amina White, MD, MA, Clinical Associate Professor, Department of OB/Gyn, University of North Carolina, Chapel Hill, NC; Sue Hall, MD, MSW, FAAP, St. John's Regional Medical Center, Oxnard, CA; Karen Saxer, CNM, MSN, University of North Carolina Maternal-Fetal Medicine, UNC Women's Hospital, Chapel Hill, NC; Tracy Pella, Co-Founder & President, Connected Forever, Tecumseh, NE.



## PERINATAL MOOD AND ANXIETY DISORDERS CEUs offered: 1

Identify risk factors for and differential diagnosis of PMADs (perinatal mood and anxiety disorders), particularly perinatal depression and/or anxiety and posttraumatic stress syndrome. Learn the adverse effects of maternal depression on infant and child development, and the importance of screening for and treating PMADs.

Faculty: Linda Baker, PsyD, psychologist at Unstuck Therapy, LLC, Denver, CO; Sue Hall, MD, MSW, FAAP, neonatologist at St. John's Regional Medical Center, Oxnard, CA; Angela Davids, Founder of Keep 'Em Cookin', Baltimore, MD; Brittany Boet, Founder of Bryce's NICU Project, San Antonio, TX.



## PROVIDING ANTEPARTUM SUPPORT CEUs offered: 1

Identify psychosocial challenges facing high risk OB patients, and define how to provide support for them, whether they are inpatient or outpatient. Recognize when palliative care is a reasonable option to present to pregnant patients and their families.

Faculty: Amina White, MD, MA, Clinical Associate Professor, Department of OB/Gyn, University of North Carolina, Chapel Hill, NC; Sue Hall, MD, MSW, FAAP, neonatologist at St. John's Regional Medical Center, Oxnard, CA; Angela Davids, Founder of Keep 'Em Cookin', Baltimore, MD; Erin Thatcher, BA, Founder and Executive Director of The PPRM 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 PPRM 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 PPRM Foundation, Denver, CO

---

## Cost

- RNs: \$10/CEU; \$60 for the full program
- Physicians, licensed clinical social workers (LCSWs), licensed marriage and family therapists (LMFTs): \$35/CEU; \$210 for the full program
- Although PACLAC cannot award CEs for certified nurse midwives, they can submit certificates to their own professional organization to request credit. \$35/CEU; \$210 for the full program

Contact [help@myperinatalnetwork.org](mailto:help@myperinatalnetwork.org) to learn more.

# Faculty

**Linda Baker, PsyD**

Psychologist at Unstuck Therapy, LLC, Denver, CO.

**Jerasimos (Jerry) Ballas, MD, MPH**

Associate Clinical Professor, UCSD Health System, Maternal-Fetal Medicine, Department of Obstetrics, Gynecology and Reproductive Sciences, University of California at San Diego, San Diego, CA.

**Amanda Brown, CNM, MSN, MPH**

University of North Carolina-Chapel Hill Hospitals, Chapel Hill, NC.

**Sara Detlefs, MD**

Fellow in Maternal-Fetal Medicine, Baylor College of Medicine, Houston, TX.

**Sue L. Hall, MD, MSW, FAAP**

Neonatologist, Ventura, CA.

**Claire Hartman, RN, IBCLC**

Labor & Delivery, University of North Carolina Hospital, Chapel Hill, NC.

**MaryLou Martin, MSN, RNC-NIC, CKC**

Women's and Children's Services Nurse Educator, McLeod Regional Medical Center, McLeod, SC.

**Cheryl Milford, EdS.**

Former NICU and Developmental psychologist, in memoriam.

**Karen Saxer, CNM, MSN**

University of North Carolina Maternal-Fetal Medicine, UNC Women's Hospital, Chapel Hill, NC.

**Amina White, MD, MA**

Clinical Associate Professor, Department of Obstetrics and Gynecology, University of North Carolina, Chapel Hill, NC.

**Parent/Patient Contributors:****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](mailto:help@myperinatalnetwork.com) and individually approved.
- For Institutional Subscribers:
  - After we are in possession of a signed contract by an authorized agent of the hospital and the program fees have been paid, a 50% refund of the amount paid will be given if we are in receipt of a written request to cancel at least 14 (fourteen) days prior to the scheduled start date for your hospital's online program.
  - Refunds will not be given for staff members who neglect to start the program. Also, no refunds for those who start the program, but do not complete all 6 courses within the time frame allotted.

For Physicians: This activity has been planned and implemented in accordance with the Institute for Medical Quality and the California Medical Association's CME Accreditation Standards (IMQ/CMA) through the Joint Provisership 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)™*. Physicians should only claim credit commensurate with the extent of their participation in the activity. This credit may also be applied to the *CMA Certification in Continuing Medical Education*.

For Nurses: The Perinatal Advisory Council: Leadership, Advocacy and Consultation (PAC/LAC) is an approved provider by the California Board of Registered Nursing Provider CEP 5862. When taken as a whole, this program is approved for 7 contact hours of continuing education credit.

For CAMFT: Perinatal Advisory Council: Leadership, Advocacy, and Consultation (PAC/LAC) is approved by the California Association of Marriage and Family Therapists to sponsor continuing education for LMFTs and LCSWs. CE Provider #128542. PAC/LAC maintains responsibility for the program and its content. Program meets the qualifications for 6 hours of continuing education credit for LMFTs and LCSWs as required by the California Board of Behavioral Sciences. You can reach us at [help@myperinatalnetwork.org](mailto:help@myperinatalnetwork.org).

Follow us online at @MyNICUNetwork

[www.myperinatalnetwork.org](http://www.myperinatalnetwork.org) Phone: 805-372-1730



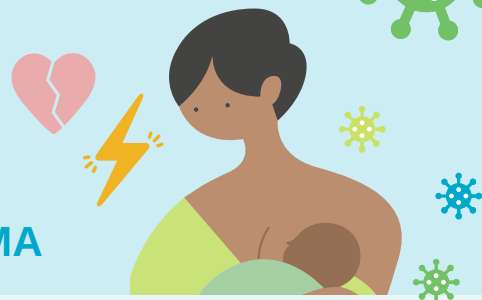
# SHARED DECISION-MAKING PROTECTS MOTHERS + INFANTS

DURING COVID-19

## KEEPING MOTHERS + INFANTS TOGETHER

Means balancing  
the risks of...

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



## EVIDENCE

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



## PARTNERSHIP

What is the best  
for this unique dyad?

### SHARED DECISION-MAKING

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



## TRAUMA-INFORMED

Both parents and providers  
are confronting significant...

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

## LONGITUDINAL DATA

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

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



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

Partnering for patient-centered care  
when it matters most.

[nann.org](http://nann.org) [nationalperinatal.org](http://nationalperinatal.org)



National  
Association of  
Neonatal  
Nurses



# Coping with COVID-19



A viral pandemic

A racial pandemic within a viral pandemic



Will mental illness be the next inevitable pandemic?

[WWW.MYNICUNETWORK.ORG](http://WWW.MYNICUNETWORK.ORG)



COVID-19

## National Network of NICU Psychologists FREE for our NICU COMMUNITY

- Helping Children and Families Cope
- Bonding with Your Baby
- Caregivers Need Care Too



Download at [www.nationalperinatal.org/psychologists](http://www.nationalperinatal.org/psychologists)

newly  
validated

## Caring for Babies and their Families: Providing Psychosocial Support to NICU Parents

7- Module Online Course in NICU Staff Education



## National Perinatal Association PERINATAL SUBSTANCE USE

[nationalperinatal.org/position](http://nationalperinatal.org/position)  
[www.nationalperinatal.org/Substance\\_Use](http://www.nationalperinatal.org/Substance_Use)



Educate. Advocate. Integrate.



Readers can also follow

**NEONATOLOGY TODAY**

via our Twitter Feed

@NEOTODAY

## The National Urea Cycle Disorders Foundation



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.

[www.nucdf.org](http://www.nucdf.org) | Phone: (626) 578-0833

# Linking Cash Aid and Children's Brain Development

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

The Alliance for Patient Access ([allianceforpatientaccess.org](http://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.



***“Babies of low-income mothers who received a large, unrestricted cash gift each month had more brain activity than babies of mothers who received a nominal payment, so reports the Baby’s First Years study.”***

Can a cash subsidy to parents improve their babies’ brain development? Possibly so, according to [new research](#). (1)

## **More Money, More Brain Activity**

Babies of low-income mothers who received a large, unrestricted cash gift each month had more brain activity than babies of mothers who received a nominal payment, so reports the Baby’s First Years study.

It remains to be seen whether the brain activity patterns of the first group of babies will lead to stronger cognitive skills like problem-solving, thinking, and planning. However, other studies have shown them to be associated. Conversely, poverty in early child-

hood has been linked with lower school achievement and educational attainment, as well as poor health outcomes and reduced earnings as an adult.

“If I was a policymaker,” noted one consultant to the study, “I’d pay attention to this.”

## **Reviving the Expanded Child Tax Credit**

News of this study and the potential benefit of an unrestricted cash payment has already made its way to Capitol Hill. There, White House officials and members of Congress continue to debate the [Build Back Better Act](#), (2) which includes several provisions aimed at improving infant and [maternal health](#). (3) President Joe Biden is also pushing to revive the temporarily expanded child tax credit, which expired December 15, 2021.

Under the more robust program, child tax credits that previously had been distributed as part of the annual tax refund process were converted to monthly payments. Eligibility was also expanded, and the maximum benefit was increased. Families could receive up to \$3,600 annually per child younger than age six and up to \$3,000 annually per child six and older.

## **Safety Net Policies and Children’s Health**

Additional research is necessary, but the suggestion that an increased family income could improve long-term outcomes across children’s lifespan is worth considering. However, it may not be a reason to jump at extending near-universal subsidies for children. The total investment for the expanded child tax credit was more than \$100 billion for one year.

***“The payments in the Baby’s First Years study will continue until the children reach age 4, and researchers plan to continue testing the effects of the additional income. They also plan to look more closely at how parents spend the unrestricted money.”***

The payments in the Baby’s First Years study will continue until the children reach age 4, and researchers plan to continue testing the effects of the additional income. They also plan to look more closely at how parents spend the unrestricted money.

The debate over poverty and policy solutions isn’t going away, but these data are intriguing to the conversation.

## **References:**

1. <https://www.pnas.org/content/119/5/e2115649119>
2. <https://www.congress.gov/bill/117th-congress/house-bill/5376/text>
3. <https://www.kff.org/policy-watch/maternal-health-in-the->

Michelle Winokur, DrPH, is the Executive Director of the Institute for Patient Access.

Disclosures: Michelle Winokur, DrPH, is the Policy Communications Director for the Alliance for Patient Access.

NT

Corresponding Author



Michelle Winokur, DrPH,  
Policy Communications Director  
Alliance for Patient Access (AfPA) Government Affairs Team  
1275 Pennsylvania Ave. NW, Suite 1100A Washington, DC  
20004-2417  
202-499-4114  
Email: [info@allianceforpatientaccess.org](mailto:info@allianceforpatientaccess.org)

**SHARED DECISION-MAKING**  
PROTECTS PARENTS + BABIES COVID-19

**INFORMED PROVIDERS**

- Seek participation
- Help explore options
- Assess preferences
- Reach a decision
- Evaluate the decision

CARE DELIVERY REQUIRES **PARTNERSHIP**

NPA  
NANN

[nationalperinatal.org/NPAandNANN](http://nationalperinatal.org/NPAandNANN)

Readers can also follow  
**NEONATOLOGY TODAY**  
via our Twitter Feed  
**@NEOTODAY**

# Still a Premie?

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

But that's not every preemie's story.

## Born between 34 and 36 weeks' gestation?



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



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



## Born preterm at a "normal" weight?



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

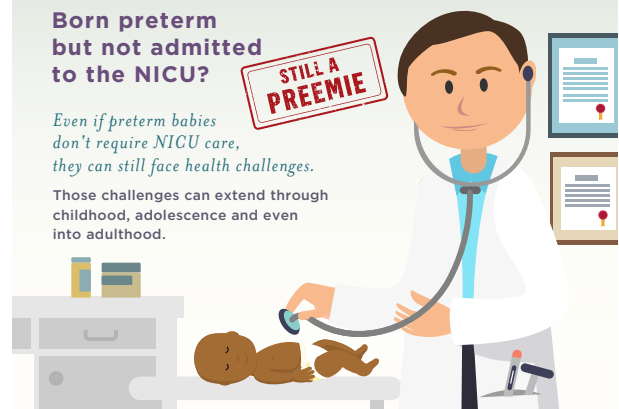
But because some health plans determine coverage based on a preemie's weight, families of babies that weigh more may face access barriers and unmanageable medical bills.

## Born preterm but not admitted to the NICU?



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

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



### Some Premies

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

### All Premies

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





DID YOU KNOW?  
Postpartum  
depression  
affects  
**10%**  
of fathers

Join  NPA

[www.nationalperinatal.org/mental\\_health](http://www.nationalperinatal.org/mental_health)



CONGENITAL  
CARDIOLOGY  
TODAY

The only worldwide monthly publication exclusively serving Pediatric and Adult Cardiologists that focus on Congenital/Structural Heart Disease (CHD), and Cardiothoracic Surgeons.



**Subscribe Electronically**  
Free on the Home Page

[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)

# 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](http://www.nationalperinatal.org/COVID-19)



## 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](http://www.infanthealth.org)

# I CAN Digitally Involved (I CANDI): International Children's Advisory Network

Amy Ohmer



*“February often brings forth the excitement of planning for many various annual projects. At the International Children's Advisory Network, through the expertise of our youth members, we are delighted to be a support to many organizations around the world.”*

February often brings forth the excitement of planning for many various annual projects. At the International Children's Advisory Network, through the expertise of our youth members, we are delighted to be a support to many organizations around the world.

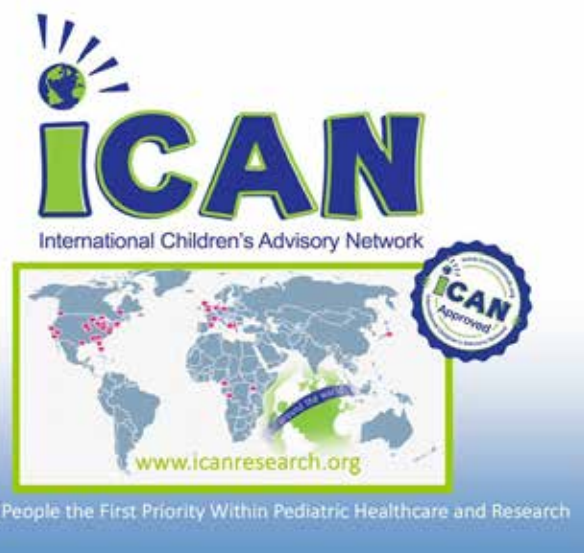
This month, iCAN completed the establishment of the [iCAN Young Adult Professionals](https://www.icanresearch.org/ican-youth-adult-professionals) group. (1) This group is for young adults (ages 18-25) who want to remain connected to iCAN to continue participating in leadership activities, mentoring, and internships—special congratulations to the newly elected Young Adult Professional Chair, Rhiannon Perry. Rhiannon will be supporting many new initiatives and helping to guide the founding year of the group. To learn more about Rhiannon, please visit this link at <https://www.icanresearch.org/ican-youth-adult-professionals>. (1)

Most recently, iCAN completed a collaboration between MRCT and our iCAN Youth Members worldwide in a special three-part video series. To watch the [first iCAN video of young people sharing their experiences within clinical research](https://youtu.be/zDUTUiOhBs4), please click on this link at <https://youtu.be/zDUTUiOhBs4>. (2) To learn more about the great work from MRCT in supporting children and young people, please visit the iCAN website at:

<https://www.icanresearch.org/post/ican-youth-members-share-their-voices-in-mrct-center-s-conference-series>. (3)

Throughout the next few months, iCAN will be working with Pediatric Trials Network (PTN.org) to support a new anthology created by iCAN Youth Members to share their creative work of participating within clinical research trials. Using the prompt: “If you could go back in time to tell yourself what you know now about research, what would you say?” iCAN Youth Members will be submitting ideas using short stories, poems, illustrations, electronic art, and original photographs to be included in a book to be shared at the 2022 iCAN Summit. To see all of the [projects and opportunities](https://www.icanresearch.org/open-projects) available for kids to participate in, visit this link at <https://www.icanresearch.org/open-projects>. (4)

*“Throughout the next few months, iCAN will be working with Pediatric Trials Network (PTN.org) to support a new anthology created by iCAN Youth Members to share their creative work of participating within clinical research trials. Using the prompt: “If you could go back in time to tell yourself what you know now about research, what would you say?” iCAN Youth Members will be submitting ideas using short stories, poems, illustrations, electronic art, and original photographs to be included in a book to be shared at the 2022 iCAN Summit.”*



# 2022 SUMMIT



## SAVE THE DATE

July 13th through July 17th, 2022

To be held in-person at the University of Lyon, France  
Hosted by iCAN KIDS France

Registration Opens May 15th, 2022



Sign up for for updates at  
[www.iCANResearch.org](http://www.iCANResearch.org)





# BASEBALL FOR KIDS FUNDRAISER

TICKETS ONLY \$8 EACH

Additionally, iCAN collaborated with the eYPAGNet and iCAN Chapters in the US and Barcelona to create the [Top 10 Important Points to Engage Young People in Drug Development Activities](#). (5)

To view the video and share it with colleagues and other stakeholders, visit the link at <https://youtu.be/DOGnDMA-2rc>. (5)

## SAVE THE DATE:

- iCAN's own unique youth series, 'Ask the Experts,' has a new session on Leadership planned for **February 19th, 2022, at 10:00 a.m. EST**. To join this fun and free event, please register at [www.icanresearch.org/events](http://www.icanresearch.org/events). (6) 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.
- **Join iCAN on June 4th, 2022, at the New Britain Bees Baseball Game** through registering at [www.icanresearch.org/events](http://www.icanresearch.org/events). (6) This is a fundraiser event, and you do not need to be there to participate; donate by purchasing tickets, and iCAN will give the tickets to a local child that may not have been able to attend a game. For

every \$8.00 ticket, iCAN earns \$5.00 in donation. All are welcome, and we hope to make this a very successful event. Thank you to Dr. Sharon Smith for helping us to support this effort. If you would like to donate or support iCAN, please contact Amy Ohmer at [amyohmer@icanresearch.org](mailto:amyohmer@icanresearch.org).

- iCAN will be hosting the **iCAN Summit from June 11th - June 15th, 2022**, in Lyon, France. To learn more about joining, please watch our [2022 Summit video](#) to understand better what iCAN is all about. (7) Registration opens on March 15th, 2022, at [www.icanresearch.org](http://www.icanresearch.org). (8)  
[Get ready for the iCAN 2022 Summit Lyon, France!](#) (7)
- **Join iCAN and the American Academy of Pediatrics National Conference and Exhibition from October 7th - 11th, 2022**, at the Anaheim Convention Center, Anaheim, California.

## Reference:

1. <https://www.icanresearch.org/ican-young-adult-professionals>
2. <https://youtu.be/zDUTUiOhBs4>

## CALLING ALL WRITERS:

If you could go back in time and tell yourself what you know now about research, what would you say?

Submit ideas to:

Amy Ohmer

[amyohmer@icanresearch.org](mailto:amyohmer@icanresearch.org)

Submit any of the following to be considered for inclusion in an iCAN/Pediatric Trials Network (PTN) published book:

- Personal essays (Maximum length: 10,000 words)
- No minimum length
- Short stories
- Poems
- Illustrations
- Electronic art
- Photographs

More details to come later!



3. <https://www.icanresearch.org/post/ican-youth-members-share-their-voices-in-mrct-center-s-conference-series>
4. <https://www.icanresearch.org/open-projects>
5. <https://youtu.be/DOGnDMA-2rc>
6. <http://www.icanresearch.org/events>
7. <https://youtu.be/EFzxxk0zTw3Y>
8. <http://www.icanresearch.org/>

*Disclosure: The author has no conflicts of interests to disclose.*

**NT**

Readers can also follow  
**NEONATOLOGY TODAY**  
via our Twitter Feed  
**@NEOTODAY**

Corresponding Author



Amy Ohmer

Director, International Children's Advisory Network

Website: [www.icanresearch.org](http://www.icanresearch.org)

Phone: (+1)734-545-2831

Email: [amyohmer@icanresearch.org](mailto:amyohmer@icanresearch.org)



Respiratory Syncytial Virus is a

# Really Serious Virus

Here's what you need to watch for this RSV season

Coughing that gets worse and worse



Breathing that causes their ribcage to "cave-in"

Rapid breathing and wheezing



Bluish skin, lips, or fingertips

RSV can be deadly. If your baby has these symptoms, don't wait.

Call your doctor and meet them at the hospital.

If your baby isn't breathing call 911.



Thick yellow, green, or grey mucus



that clogs their nose and lungs, making it hard to breathe

Fever that is higher than 101° Fahrenheit



which is especially dangerous for babies younger than 3 months

 National Perinatal Association

[www.nationalperinatal.org/rsv](http://www.nationalperinatal.org/rsv)

PROTECT YOUR FAMILY FROM RESPIRATORY VIRUSES

flu

coronavirus

pertussis

RSV



SOAP

**WASH YOUR HANDS**

often with soap and warm water.

**GET VACCINATED**

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



**COVER COUGHS AND SNEEZES.**

Sneeze and cough into your elbow.

**USE AN ALCOHOL-BASED HAND SANITIZER.**



**STAY AWAY FROM SICK PEOPLE**

Avoid crowds. Protect vulnerable babies and children.

[www.nationalperinatal.org](http://www.nationalperinatal.org)

 National Perinatal Association

*Education.  
Anytime, Anywhere.*

*Academy of Neonatal Care*



**The Academy of Neonatal Care serves to educate Respiratory Therapists, Nurses, and Doctors in current and best practices in Neonatal ICU care. We prepare RT's new to NICU to fully function as a bedside NICU RT. Our goal is to enrich NICU care at all levels. Beginner to Advanced Practice, there is something for you at:**

**[www.AcademyofNeonatalCare.org](http://www.AcademyofNeonatalCare.org)**



# SHARED DECISION-MAKING PROTECTS MOTHERS + INFANTS

DURING COVID-19

## KEEPING MOTHERS + INFANTS TOGETHER

Means balancing the risks of...

- HORIZONTAL INFECTION
- SEPARATION AND TRAUMA



## EVIDENCE

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



## PARTNERSHIP

What is the best for this unique dyad?

### SHARED DECISION-MAKING

- SEEK PARTICIPATION
- HELP EXPLORE OPTIONS
- ASSESS PREFERENCES
- REACH A DECISION
- EVALUATE THE DECISION



## TRAUMA-INFORMED

Both parents and providers are confronting significant...

- FEAR
- GRIEF
- UNCERTAINTY



## LONGITUDINAL DATA

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

- MENTAL HEALTH
- POSTPARTUM CARE DELIVERY



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

Partnering for patient-centered care when it matters most.

nann.org nationalperinatal.org



# The PREGNANT MOM'S Guide To Staying SAFE DURING COVID-19



Maintain at least A 30-DAY SUPPLY OF YOUR MEDICATIONS.



Keep prenatal APPOINTMENTS.



Talk to your health care provider about STAYING SAFE DURING COVID-19.

LEARN MORE >



NCFIH National Coalition for Infant Health  
Protecting, Nurturing and Promoting Infants Through Age Two

newly validated

## Caring for Babies and their Families: Providing Psychosocial Support to NICU Parents

7- Module Online Course in NICU Staff Education



National Perinatal Association and NICU Parent Network  
mynicunetwork.org

# PROTECT YOUR FAMILY FROM RESPIRATORY VIRUSES

flu coronavirus

pertussis RSV



**WASH YOUR HANDS**  
often with soap and warm water.

SOAP

**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.

[www.nationalperinatal.org](http://www.nationalperinatal.org)

National Perinatal Association

## FREE RESOURCES FOR YOUR NICU

# Coping During COVID-19



Targeted interventions to improve the mental health of parents, infants, families, and providers

## BONDING WITH YOUR BABY



## HELPING CHILDREN AND FAMILIES COPE

## CAREGIVERS NEED CARE TOO



National Network of NICU Psychologists

[nationalperinatal.org/psychologists](http://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](http://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



\*See the NPA's evidence-based guidelines at [www.nationalperinatal.org/rsv](http://www.nationalperinatal.org/rsv)

## Survey Says: RSV

RESPIRATORY SYNCYTIAL VIRUS, or RSV, is a dangerous virus that can lead to:

- Hospitalization
- Lifelong health complications
- Death

for infants and young children



ACCORDING TO A NATIONAL SURVEY,

Specialty Health Care Providers say:

80% They treat RSV as a priority, "often" or "always" evaluating their patients

77% RSV is the "most serious and dangerous" illness for children under four

77% Barriers to access and denials from insurance companies limit patients' ability to get preventive RSV treatment



But Parents are Unprepared.

18% Only 18% know "a lot" about RSV

22% Only 22% consider themselves "very well" prepared to prevent RSV



RSV EDUCATION & AWARENESS CAN HELP

After parents learned more about RSV, they were:

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



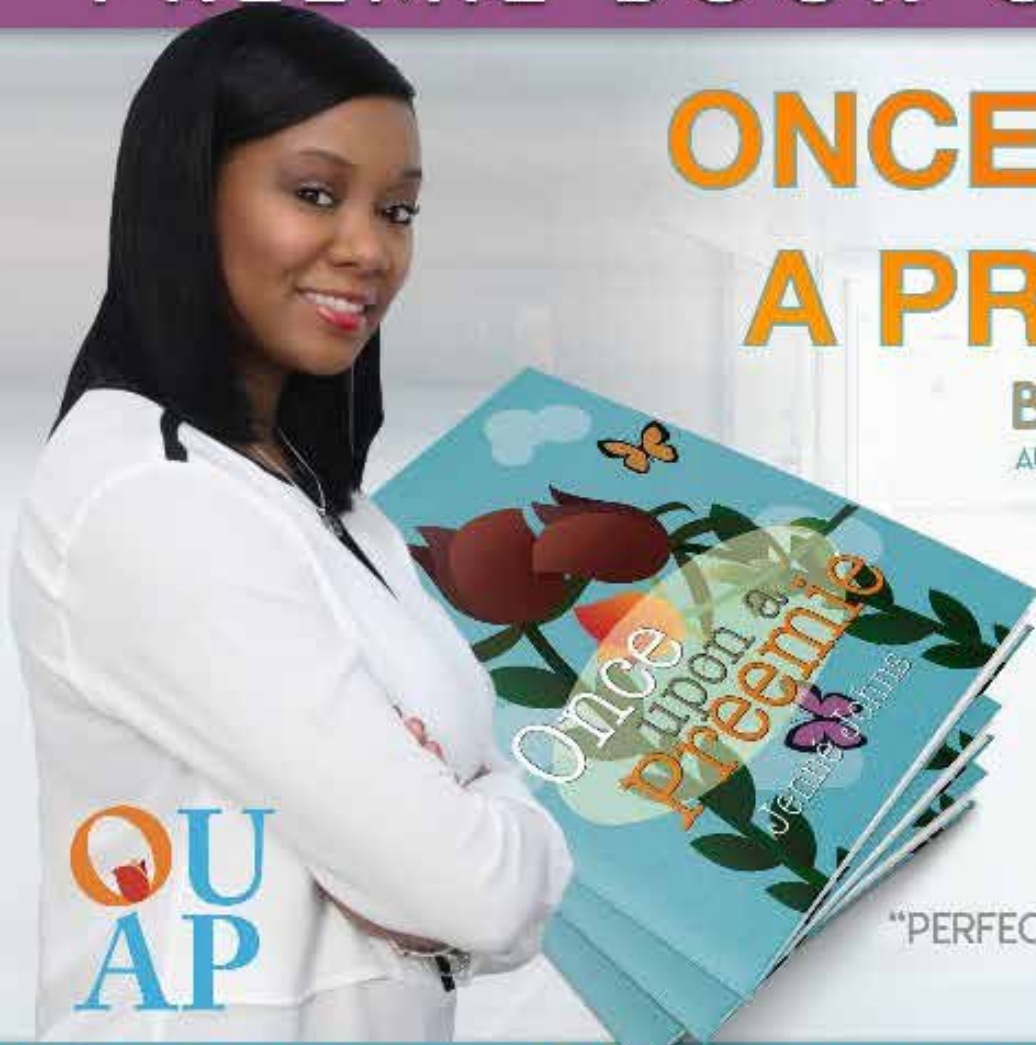
NCJIH National Coalition for Infant Health  
Preventing RSV in Preterm Infants through Age Five

Learn More about RSV at [www.infanthealth.org/rsv](http://www.infanthealth.org/rsv)

# PREEMIE BOOK ON SALE

## ONCE UPON A PREEMIE

BY JENNÉ JOHNS  
AUTHOR | SPEAKER | ADVOCATE



OU  
AP

“ONE OF A KIND”  
“PERFECT FOR PREEMIE FAMILIES”  
“ENCOURAGING”

@ONCEUPONAPREEMIE    @ONCEAPREEMIE    EMAIL: HI@ONCEUPONAPREEMIE

ONCE UPON A PREEMIE IS A BEAUTIFUL NEW WAY TO LOOK AT THE LIFE OF A PREEMIE BABY. IT EXPLORES THE PARENT AND CHILD NEONATAL INTENSIVE CARE UNIT (NICU) JOURNEY IN A UNIQUE AND UPLIFTING WAY.

### SPEAKING ENGAGEMENTS

- PREEMIE PARENT ALLIANCE SUMMIT
- NATIONAL ASSOCIATION OF PERINATAL SOCIAL WORKERS
- CONGRESSIONAL BLACK CAUCUS ANNUAL LEGISLATIVE CONFERENCE
- NATIONAL MEDICAL ASSOCIATION ANNUAL CONFERENCE
- HUDSON VALLEY PERINATAL PUBLIC HEALTH CONFERENCE
- MATERNITY CARE COALITION ADVOCACY DAY

### MEDIA APPEARANCES

Premie Family



HEALTH & WELLNESS GUIDE  
**heart&soul**

TARAJI P. HENSON  
A GLIMPSE INTO TARAJI P. HENSON'S HEART & SOUL

HOLIDAY PARTIES MADE SIMPLE

THE ONCE UPON A PREEMIE STORY



**PEBBLES of Hope**  
Using the world's smallest babies to lighten lives

**WDAS**  
105.3 FM

**CBSRADIO**




**wgts 91.9**  
Washington, D.C.

**MAJIC**  
102.3 92.7  
The Real Sound of the DMV

AVAILABLE FOR \$12.99 ON AMAZON OR ONCEUPONAPREEMIE.COM

## Survey Says: RSV

**RESPIRATORY SYNCYTIAL VIRUS, or RSV,** is a dangerous virus that can lead to:

-  **Hospitalization**
  -  **Lifelong health complications**
  -  **Death**
- for infants and young children.



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

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



*But Parents are Unprepared.*

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



### RSV EDUCATION & AWARENESS CAN HELP

*After parents learned more about RSV, they were:*

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



**NCJH** National Coalition for Infant Health  
Promoting Access to Perinatal Tobacco through Age Two

Learn More about RSV at  
[www.infanthealth.org/RSV](http://www.infanthealth.org/RSV)

Online survey conducted September 2018. Included 174 specialty health care providers and 600 parents of children 4 and under.

## OPIOIDS and NAS

When reporting on mothers, babies, and substance use

## LANGUAGE MATTERS



### I am not an addict.

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



### I was exposed to opioids.

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



### NAS is a temporary and treatable condition.

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



### My mother may have a SUD.

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

### My potential is limitless.

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



Learn more about  
Neonatal Abstinence Syndrome  
at [www.nationalperinatal.org](http://www.nationalperinatal.org)

**National Perinatal Association**



# Nurses: parents trust you.

You can help reduce the risk of Sudden Infant Death Syndrome (SIDS), the leading cause of death among infants between 1 month and 1 year of age. Take our **free continuing education (CE) activity** to stay up to date on the latest safe infant sleep recommendations. Approved for 1.5 contact hours.

Learn more about the free online activity at <https://nichd.nih.gov/SafeSleepCE>.

The CE activity explains safe infant sleep recommendations from the American Academy of Pediatrics and is approved by the Maryland Nurses Association, an accredited approver of the American Nurses Credentialing Center's Commission on Accreditation.



Eunice Kennedy Shriver National Institute  
of Child Health and Human Development



# Medical News, Products & Information

Compiled and Reviewed by David Vasconcellos, MS IV

## 2022 VIRGINIA APGAR AWARD IN NEONATAL - PERINATAL MEDICINE

### CALL FOR NOMINATIONS

Deadline: March 1, 2022

The American Academy of Pediatrics' Section on Neonatal-Perinatal Medicine is now accepting nominations for the 2022 Virginia Apgar Award. This award is given annually to an individual whose career has had a continuing influence on the well being of newborn infants.

All AAP fellows interested in Neonatal - Perinatal Medicine are invited to submit nominations. The nominee need not be a member of the AAP. The nomination should include a cover letter and a curriculum vitae of the nominee. A second letter in support of the nomination is required and up to four support letters will be accepted. Candidates who have been previously nominated but not selected may be re-nominated by a letter indicating renewal of their prior nomination. It is not necessary to resubmit all the paperwork if the original nomination package was complete.

The nominations must be received by March 1, 2022. Please send all nominations to:

Jim Couto, MA

Director, Hospital & Surgical Subspecialties

American Academy of Pediatrics

345 Park Blvd

Itasca, IL 60143

[jcoutho@aap.org](mailto:jcoutho@aap.org)

630/626-6656

The Apgar Award is sponsored by a grant from Abbott Nutrition and will be presented at the meeting of the Neonatal – Perinatal Medicine Section during the 2022 National Conference & Exhibition of the American Academy of Pediatrics in Anaheim.

**NT**

Readers can also follow  
**NEONATOLOGY TODAY**  
via our Twitter Feed  
**@NEOTODAY**

## 2022 AVROY FANAROFF NEONATAL EDUCATION AWARD

### CALL FOR NOMINATIONS

Deadline: March 1, 2022

The AAP is now accepting nominations for the Section on Neonatal - Perinatal Medicine Avroy Fanaroff Neonatology Education Award. This award will be given annually to an individual who has made outstanding contributions to education in neonatal-perinatal medicine.

The candidate's contribution may be one of innovative education technique; original concept; seminal event; an exemplary, effective, high impact program; or a substantial long-term contribution to the highest ideals of education. Preference will be made to educational efforts that have had a demonstrable effect on clinical care.

The recipient is chosen by the SONPM Executive Committee each year at the SONPM Perinatal Spring Workshop. Final AAP Board of Directors approval will be granted in June of 2022 and the recipient will be notified at that time.

If you wish to nominate an individual, or yourself, please submit:

- A letter of interest including justification as to why this individual should receive the award.
- The candidate's curriculum vitae.
- Two supporting letters from two members of the Section on Neonatal-Perinatal Medicine.

## The National Urea Cycle Disorders Foundation



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.

[www.nucdf.org](http://www.nucdf.org) | Phone: (626) 578-0833

If you are interested in re-nominating an individual, please contact Jim Couto before submitting any materials.

ALL INFORMATION MUST BE COMPLETE BEFORE MAILING IN YOUR NOMINATION. Please send all materials no later than March 1, 2022 to:

Jim Couto, MA

Director, Hospital & Surgical Subspecialties

American Academy of Pediatrics

345 Park Blvd

Itasca, IL 60143

[jcouto@aap.org](mailto:jcouto@aap.org)

630/626-6656

The Avroy Fanaroff Neonatal Education Award is sponsored by a grant from Mead Johnson Nutrition and will be presented at the meeting of the Section on Neonatal - Perinatal Medicine during the 2022 National Conference & Exhibition of the American Academy of Pediatrics in Anaheim.

**NT**

---

## 2020 NEONATAL LANDMARK AWARD

---

Call for Nominations

Deadline: March 1, 2022

Nominations are now accepted for the Section on Neonatal-Perinatal Medicine Landmark Award. This award will be presented at the 2022 AAP National Conference & Exhibition in Anaheim and is awarded for a seminal contribution, which has had a major impact on Neonatal-Perinatal practice. Not necessarily the original description or publication but recipient could be the individual responsible for dissemination and acceptance within/by the professional and/or lay community. To be eligible the "event" must have occurred at least 15 years ago, and the nominee must not have received the Virginia Apgar Award. The award can be awarded posthumously.

The recipient is chosen each year at the Perinatal Spring Workshop. Final AAP Board of Directors approval will be granted in June of 2022 and the recipient will be notified at that time.

If you wish to nominate an individual, or yourself, please submit:

- A letter of interest including justification as to why this individual should receive the award.
- The candidate's curriculum vitae.
- Two supporting letters from two members of the Section on Neonatal-Perinatal Medicine.

ALL INFORMATION MUST BE COMPLETE BEFORE MAILING IN YOUR NOMINATION. Please send all materials no later than March 1, 2022 to:

Jim Couto, MA

Director, Hospital & Surgical Subspecialties

American Academy of Pediatrics

345 Park Blvd

Itasca, IL 60143

### Supporting NICU Staff so they can support families



Providing online education that is...

- Story-Driven
- Trauma-Informed
- Evidence-Based

 National  
Perinatal  
Association

 NPN  
NICU PARENT NETWORK

The preeminent provider of compelling perinatal education on psychosocial support created through interprofessional collaboration

[www.mynicunetwork.org](http://www.mynicunetwork.org)



Phone: 630/626-6656

FAX 847/434-8000

[jcouto@aap.org](mailto:jcouto@aap.org)

The Landmark Award is supported by Mead Johnson Nutrition.

NT

---

## American Academy of Pediatrics, Section on Advancement in Therapeutics and Technology

---

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

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

- Connect with other AAP members who share your interests in improving effective drug therapies and devices in children.
- Receive the SOATT newsletter containing AAP and Section news.
- Access the Section's Website and Collaboration page – with current happenings and opportunities to get involved.
- Network with other pediatricians, pharmacists, and other health care providers to be stronger advocates for children.
- Invitation for special programming by the Section at the AAP's National Conference.

- Access to and ability to submit research abstracts related to advancing child health through innovations in pediatric drugs, devices, research, clinical trials and information technology; abstracts are published in Pediatrics.

AAP members can join SOATT for free. To activate your SOATT membership as an AAP member, please complete a short application at <http://membership.aap.org/Application/AddSectionChapterCouncil>.

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

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

Christopher Rizzo, MD, FAAP, Chair, [crizzo624@gmail.com](mailto:crizzo624@gmail.com)

Mitchell Goldstein, MD, FAAP, Immediate Past Chair, [MGoldstein@llu.edu](mailto:MGoldstein@llu.edu) and

Jackie Burke

Sections Manager

AAP Division of Pediatric Practice

Department of Primary Care and Subspecialty Pediatrics

630.626.6759

[jburke@aap.org](mailto:jburke@aap.org)

Dedicated to the Health of All Children

###

*The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-*

*being of infants, children, adolescents and young adults. For more information, visit [www.aap.org](http://www.aap.org). Reporters can access the meeting program and other relevant meeting information through the AAP meeting website at <http://www.aapexperience.org/>*

NT

---

## CDC, AAP update developmental milestones for developmental surveillance program

---

February 8, 2022

The Centers for Disease Control and Prevention (CDC) and the AAP have revised developmental milestones in the [Learn the Signs. Act Early.](#) program, which helps parents identify autism and developmental delays in their children.

The CDC asked the AAP to convene a group of experts to revise several developmental milestone checklists, which use 50th percentile, or average-age, milestones. Using this approach means only half of children can be expected to achieve that milestone by that age. Clinicians reported that following the guideline often was not helpful to families who had concerns about their child's development. In some cases, clinicians and families chose a wait-and-see approach, leading to a delay in diagnosis.

The revised developmental milestones are written in family-friendly language and identify the behaviors that 75% or more of children can be expected to exhibit at a certain age based on data, developmental resources and clinician experience.

The process behind the revised milestones is detailed in an article titled "[Evidence-Informed Milestones for Developmental Surveillance Tools](#)" published in *Pediat-*

**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](mailto:LomaLindaPublishingCompany@gmail.com)

rics Tuesday.

Paul H. Lipkin, M.D., FAAP, a member of the AAP Section on Developmental and Behavioral Pediatrics and Council on Children with Disabilities, assisted with the revisions. He also provides clinical services at Kennedy Krieger Institute's Center for Development and Learning.

"The earlier a child is identified with a developmental delay the better, as treatment as well as learning interventions can begin," Dr. Lipkin said in a press release. "At the same time, we don't want to cause unnecessary confusion for families or professionals. Revising the guidelines with expertise and data from clinicians in the field accomplishes these goals. Review of a child's development with these milestones also opens up a continuous dialogue between a parent and the health care provider about their child's present and future development."

Changes to the guidance include:

- Adding checklists for ages 15 and 30 months; now there is a checklist for every well-child visit from 2 months to 5 years.
- Identifying additional social and emotional milestones (e.g., Smiles on their own to get your attention, age 4 months).
- Removing vague language like "may" or "begins" when referring to certain milestones.
- Removing duplicate milestones.
- Providing new, open-ended questions to use in discussion with families (e.g., Is there anything that your child does or does not do that concerns you?).
- Revising and expanding tips and activities for developmental promotion and early relational health.

The CDC presented the revised milestones to parents and caregivers of different educational backgrounds, income levels and racial groups to determine how easy they were to understand and follow.

Since 2005, Learn the Signs. Act Early. has provided free resources to families, health

care providers, early childhood educators and others to support early identification of children with developmental delays and disabilities.

#### Resources

- [CDC's Learn the Signs. Act Early. program](#)
- [Information for parents from HealthyChildren.org on assessing developmental delays](#)

Contact information for AAP headquarters

Steve Schering, Staff Writer

American Academy of Pediatrics

345 Park Blvd, Itasca, IL 60143

New AAP main number: 630-626-6000

NT

---

## Clubfoot Treatment with Ponseti Method Relies on Teamwork, Family Support

---

January 31, 2022

The Ponseti method is now considered the gold standard of care for the treatment of idiopathic congenital clubfoot, the most common serious musculoskeletal birth defect in the world.

In the U.S., about one in 1,000 infants is born with an idiopathic clubfoot (or clubfeet, as approximately 40% are bilateral). A true idiopathic clubfoot is quite stiff. It should not be confused with foot and lower leg deformities resulting from intrauterine crowding, which are flexible, often self-correcting and much more common.

Prior to the general acceptance of the Ponseti technique, orthopedic surgeons had been frustrated by the long-term outcomes of clubfoot treatment. Previous surgical and nonsurgical treatments and combinations of the two often looked promising in the short term, only to be followed by

current deformity with pain and stiffness as the child reached skeletal maturity.

A new AAP clinical report can guide medical practitioners in caring for these children. The report, Diagnosis and Treatment of Idiopathic Congenital Clubfoot, from the Section on Orthopaedics, is available at <https://doi.org/10.1542/peds.2021-055555> and will be published in the February issue of Pediatrics.

Treatment regimen

The Ponseti method is named for Ignacio Ponseti, M.D. (1914-2009), who was born in Spain, immigrated to the U.S. and became a professor of orthopedic surgery at the University of Iowa. There, he perfected his three-phase method over many years.

Phase 1 is a specific casting technique that should be started soon after the baby leaves the newborn nursery around 1-3 weeks of age. The casts are changed weekly until all elements of the deformity are corrected except for a tight Achilles tendon.

Phase 2, required in 90% of cases, is an Achilles tenotomy done under local anesthesia followed by a final cast for three weeks.

Phase 3 is a prolonged period of bracing full time for three months following casting and then night time only until the child is 4 to 5 years old. The brace is a bar with shoes or splints attached at shoulder width. The shoe or splint is turned out 60-70 degrees on the clubfoot side and 30-40 degrees on the normal side.

Phases 1 and 2 should be performed by a physician experienced with the technique, often a pediatric orthopedic surgeon. If no local physician is experienced with the Ponseti technique, the family should travel for care.

Phase 3 is most important because without prolonged night-time bracing until age 4 to 5, the clubfoot deformity will recur.

Compliance, teamwork, communication

It is not easy for a family to keep a child in a brace every night for four years, especially when the foot looks and functions normally. Fortunately, significant improve-





Perinatal Advisory Council:  
Leadership, Advocacy and Consultation

## CONTINUING MEDICAL EDUCATION

The Continuing Education Department at PAC/LAC is pleased to consider requests to be a joint provider of your CME activity. PAC/LAC is actively involved in direct and joint-providership of multiple continuing education activities and programs and works with our partners to ensure the highest standards of content and design. PAC/LAC is the recipient of the 2018 Cultural & Linguistic Competency Award. This award recognizes a CME provider that exemplifies the goal of integrating cultural and linguistic competency into overall program and individual activities and/or a physician who provides leadership, mentorship, vision, and commitment to reducing health care disparities

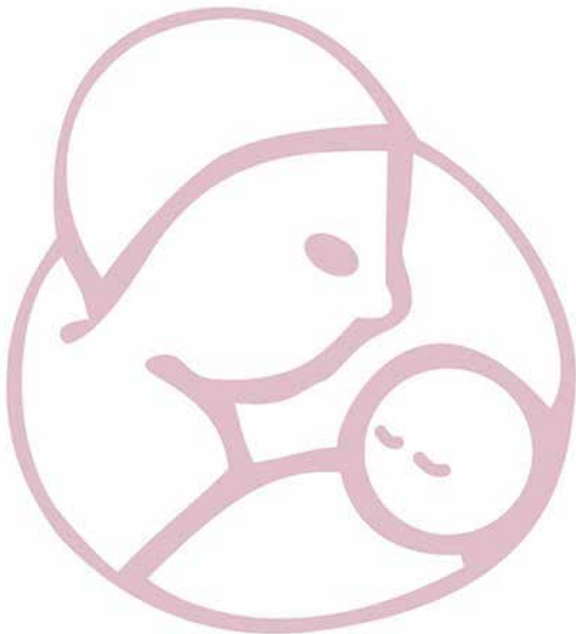
PAC/LAC is an accredited provider of continuing education by Accreditation Council for Continuing Medical Education / Institute for Medical Quality, the California Board of Registered Nursing, the California Association of Marriage and Family Therapists, the National Commission for Health Education Credentialing, and the American Association for Respiratory Care.

To inquire about Continuing Education Joint-Providership opportunities for your event please visit our website and complete the online request form.

PAC/LAC offers continuing education for:

- Continuing Medical Education (CME)
- California Registered Nurses (CEU)
- Licensed Clinical Social Workers (LCSW)
- Licensed Marriage and Family Therapists (LMFT)
- Licensed Professional Clinical Counselors (LPCC)
- Licensed Educational Psychologists (LEP)
- Certified Health Education Specialists (CHES)
- Continuing Respiratory Care Education (CRCE)

[www.paclac.org](http://www.paclac.org)



**PAC/LAC's core values** for improving maternal and child health have remained constant for over 30 years – a promise to lead, advocate and consult with others.

### **Leadership**

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.

**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](mailto:LomaLindaPublishingCompany@gmail.com)

ments in brace design have made them much easier for parents to apply and for children to tolerate. The old stiff shoes that were rigidly fixed to the bar have been replaced by detachable shoes or splints with soft linings.

The child's pediatrician and pediatric orthopedic surgeon need to work as a team in helping families comply with the bracing phase.

Barriers to compliance should be explored and corrected. However, even with perfect compliance, the clubfoot deformity may recur. When this happens, casting is repeated and bracing resumed.

In a small percentage of cases, the deformity recurs again despite repeated casting and bracing. When this happens, the pediatric orthopedic surgeon may recommend an anterior tibial tendon transfer, which is part of the Ponseti technique. It is different from the joint release surgeries done in the past. It should be extremely rare for a child treated with the Ponseti method to require joint release surgery.

Clubfoot deformity may be discovered during prenatal ultrasonography usually at 20 weeks' gestation. Although no prenatal treatment is available, appropriate prenatal counseling is important. Pediatric orthopedic surgeons often are willing to meet with parents in the prenatal period to review the ultrasound findings and discuss treatment options.

It is important for parents to know that idiopathic clubfoot is an isolated finding, and children who undergo Ponseti treatment and are successful with bracing can be expected to wear normal shoes, participate in sports and have every opportunity for a happy and productive life.

Eighty percent of babies born with clubfoot live in countries with limited resources where adults with untreated clubfoot face a life of poverty and isolation. The Ponseti method requires minimal resources and can be performed by physician extenders taught the method by Ponseti experts. Ponseti programs have been started in many countries with limited resources with

the goal of eliminating from the world the disability caused by untreated clubfoot.

Drs. Cady, Hennessey and Schwend are lead authors of the report. Dr. Cady is a former member and Dr. Schwend is a former chair of the AAP Section on Orthopaedics Executive Committee.

#### Resources

- [Ponseti International](#)
- [Global Help offers a guide for health care professionals in multiple languages](#)
- [Global Clubfoot Initiative](#)

Contact information for AAP headquarters

Robert B. Cady, M.D., Theresa A. Hennessey, M.D., and Richard M. Schwend, M.D., FAAP

American Academy of Pediatrics

345 Park Blvd, Itasca, IL 60143

New AAP main number: 630-626-6000

NT

---

## COVID-19 Vaccination Does Not Reduce Chances of Conception, Study Suggests

---

Thursday, January 20, 2022

*NIH-funded research shows infection can affect male fertility.*

COVID-19 vaccination does not affect the chances of conceiving a child, according to a study of more than 2,000 couples that was funded by the National Institutes of

New subscribers are always welcome!

NEONATOLOGY TODAY

To sign up for a free monthly subscription, just click on this box to go directly to our subscription page

Health. Researchers found no differences in the chances of conception if either male or female partner had been vaccinated, compared to unvaccinated couples. However, couples had a slightly lower chance of conception if the male partner had been infected with SARS-CoV-2 within 60 days before a menstrual cycle, suggesting that COVID-19 could temporarily reduce male fertility. The study was conducted by Amelia K. Wesselink, Ph.D., of Boston University, and colleagues. It appears in the *American Journal of Epidemiology*.

"The findings provide reassurance that vaccination for couples seeking pregnancy does not appear to impair fertility," said Diana Bianchi, M.D., director of NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development, which funded the study. "They also provide information for physicians who counsel patients hoping to conceive."

Researchers analyzed data from the [Pregnancy Study Online \(PRESTO\)](#) (link is external), an internet-based prospective cohort study of U.S. and Canadian couples trying to conceive without fertility treatment. PRESTO is led by Lauren A. Wise, Sc.D., of Boston University.

Study participants identified as female and were 21 to 45 years old. They completed a questionnaire on their income and education levels, lifestyle, and reproductive and medical histories, including whether or not they were vaccinated against COVID-19 and whether they or their partners had ever tested positive for SARS-CoV-2. They also invited their male partners aged 21 or older to complete a similar questionnaire. Female partners completed follow-up questionnaires every eight weeks until they became pregnant, or up to 12 months



CONGENITAL  
CARDIOLOGY  
TODAY

The only worldwide monthly publication exclusively serving Pediatric and Adult Cardiologists that focus on Congenital/Structural Heart Disease (CHD), and Cardiothoracic Surgeons.



Subscribe Electronically  
Free on the Home Page

[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)

if they did not.

The investigators found no major differences in conception rates per menstrual cycle between unvaccinated and vaccinated couples in which at least one partner had received at least one dose of the vaccine.

Results were similar when the investigators looked at factors that could potentially influence the results, such as whether study participants or their partners received one or two doses of a vaccine, the type of vaccine they received, how recently they were vaccinated, whether they were American or Canadian, whether they were health care workers, or they were couples without a history of infertility.

Overall, testing positive for SARS-CoV-2 infection was not associated with a difference in conception. However, couples in which the male partner had tested positive within 60 days of a given cycle were 18% less likely to conceive in that cycle. There was no difference in conception rates for couples in which the male partner had tested positive more than 60 days before a cycle, compared to couples in which the

male partner had not tested positive.

Fever, known to reduce sperm count and motility, is common during SARS-CoV-2 infection and so could explain the temporary decline in fertility the researchers observed in couples in which the male partner had a recent infection. Other possible reasons for a decline in fertility among male partners who recently tested positive could be inflammation in the testes and nearby tissues and erectile dysfunction, all common after SARS-CoV-2 infection. The researchers noted that this short-term decline in male fertility could potentially be avoided by vaccination.

The researchers concluded that their results suggest that vaccination against COVID-19 had no harmful association with fertility. Vaccination against COVID-19 also could help avert the risks that SARS-CoV-2 infection poses for maternal and fetal health.

**About the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD):** NICHD leads research and training to understand human development, improve reproduc-

tive health, enhance the lives of children and adolescents, and optimize abilities for all. For more information, visit <https://www.nichd.nih.gov>.

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

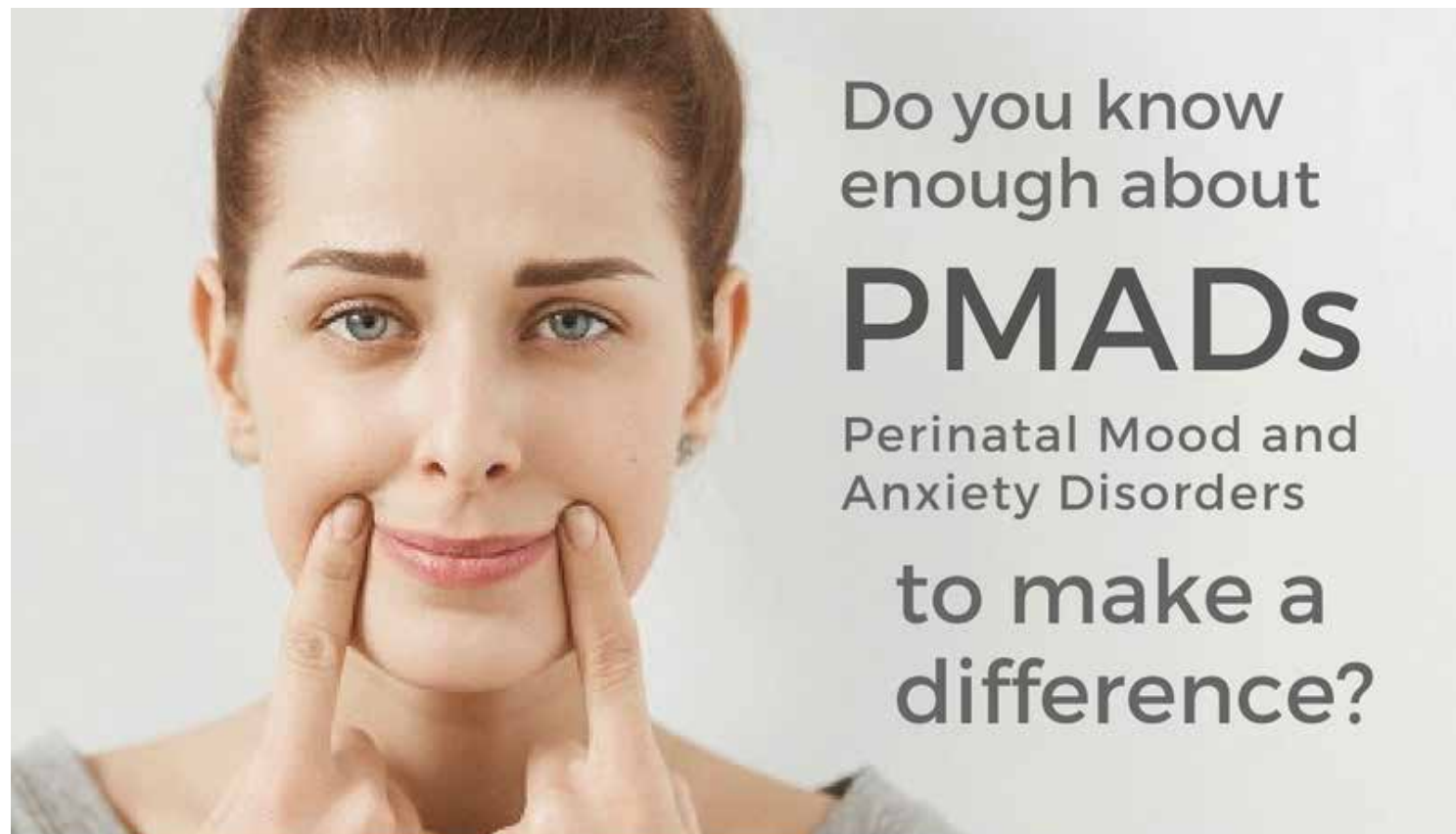
*NIH...Turning Discovery Into Health®*

#### References

Wesselink AK, et al. A prospective cohort study of COVID-19 vaccination, SARS-CoV-2 infection, and fertility. *American Journal of Epidemiology*. 2022. <http://doi.org/10.1093/aje/kwac011>

Institute/Center

[Eunice Kennedy Shriver National Insti-](#)



Do you know enough about

# PMADs

Perinatal Mood and Anxiety Disorders

to make a difference?

Join  NPA

[nationalperinatal.org/mental\\_health](http://nationalperinatal.org/mental_health)

NT

## SARS-CoV-2 May Cause Fetal Inflammation Even In the Absence of Placental Infection

Tuesday, January 18, 2022

*Small NIH study contributes to understanding of COVID-19 during pregnancy.*

What

SARS-CoV-2 infection during pregnancy may cause inflammatory immune responses in the fetus, even if the virus does not infect the placenta, according to a small National Institutes of Health study. Researchers describe unique maternal, fetal, and placental immune responses among pregnant women with COVID-19 in a study led by NIH's *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD). The findings detail changes in antibodies, immune cell types and inflammatory markers in maternal blood, umbilical cord blood and placental tissues. The study is published in the journal *Nature Communications*.

People who are pregnant are at a [higher risk for severe illness from COVID-19\(link is external\)](#) compared to people who are not pregnant. COVID-19 during pregnancy also increases the risk for preterm birth, stillbirth and preeclampsia. Therefore, understanding COVID-19 infection during pregnancy is important to help healthcare providers optimize the health and safety of their patients during the pandemic.

The study evaluated 23 pregnant women. Twelve were positive for SARS-CoV-2, and of these, eight were asymptomatic, one had mild symptoms and three had severe COVID-19. After delivery, the researchers compared immune responses between mothers and their newborns by comparing maternal blood and umbilical cord blood. Inflammatory immune responses triggered by the virus were observed in women, their neonates and placental tissues regardless of whether the mothers had symptoms. The study team described the following observations:

- Pregnant women with SARS-CoV-2 had a reduction in an immune cell type called T-cells, which helps drive antiviral responses.
- Mothers with SARS-CoV-2 infection developed antibodies against the virus whether or not they had symptoms, and some of these antibodies were found in the umbilical cord blood.
- Infected mothers had a higher level of immune activity markers (i.e., cytokines) in blood regardless of symptoms. The elevated cytokines are interleukin-8, interleukin-15 and interleukin-10.
- Infants born to infected mothers, even if the mother had no symptoms, had an inflammatory response reflected by higher levels of interleukin-8. This elevation was observed even though the fetus presumably did not have COVID-19.
- While SARS-CoV-2 virus was absent in placentas, the placentas from infected mothers had altered ratios of immune cell types. The researchers also found altered immune activity

(measured by changes in RNA transcripts) in the placenta and cord blood of infants born to infected mothers. These findings indicate that the neonatal immune system is affected by maternal infection by SARS-CoV-2 even if the virus is not detected in the placenta.

Overall, the findings will help researchers better understand COVID-19 during pregnancy. The authors note that the key observation is that maternal infection with SARS-CoV-2 induces a fetal immune response even in the absence of placental infection or symptoms in the newborn. Therefore, the potential long-term effects of this inflammatory process on infants requires further study.

Who

Study authors Nardhy Gomez-Lopez, M.Sc., Ph.D., and Roberto Romero, M.D., D.Med.Sci, of the NICHD Perinatology Research Branch are available for interviews.

Reference

Garcia-Flores V *et al.*, Maternal-fetal immune responses in pregnant women infected with SARS-CoV-2. [Nature Communications DOI: 10.1038/s41467-021-27745-z \(2022\)\(link is external\)](#)

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

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

**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](mailto:LomaLindaPublishingCompany@gmail.com)**

visit <https://www.nih.gov>.

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

Institute/Center

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

Contact

[Robert Bock or Linda Huynh \(link sends e-mail\)](#)

301-496-5133

NIH...Turning Discovery Into Health®

###

NT

---

## Vaccine for Children Under 5 Delayed So FDA Can Review Data on 3rd Dose

---

February 8, 2022

**Editor's note:** For the latest news on COVID-19, visit <http://bit.ly/AAPNewsCOVID19>.

The Food and Drug Administration (FDA) on Friday postponed a Feb. 15 meeting of its Vaccines and Related Biological Products Advisory Committee to discuss the Pfizer-BioNTech COVID-19 vaccine for children ages 6 months to 5 years and said the meeting likely will occur later this spring.

FDA officials said the delay will allow more time to review data on a third dose and help decide whether three doses should be considered as part of its decision on emergency use authorization (EUA).

In a [press release](#) issued today, Pfizer said its Independent Data Monitoring Committee (DMC) for the study supports the continuation of the trial according to the protocol and believe that the data collected to date indicate the vaccine is well-tolerated and support a potential three-dose regimen.

In December, Pfizer and BioNTech said their two-dose series with a 3-microgram (µg) dosage did not meet non-inferiority criteria for those ages 2-4 years, leading the company to begin studying a third dose for all young children that would be given eight weeks after the second dose. At the FDA's request, however, the company submitted an application for an EUA for the first two doses on Feb. 1, with hopes vaccinations could begin sooner.

"Since the early days of the pandemic, we've always followed the science in this everchanging situation," Peter Marks, M.D., Ph.D., director of the FDA's Center for Biologics Evaluation and Research, said during a press conference. "Data has come in so rapidly and we need to be able to look through the data. It makes sense for us to wait until we have the data from the evaluation of a third dose before taking action."

Three-dose protection data are expected to be available by early April, Pfizer said. Dr. Marks said the FDA is committed to moving "rapidly" once the Pfizer submits a request for EUA.

"We know many families are eager to offer this protection to their children and feel frustrated by the need for additional study," said AAP President Moira A. Szilagyi, M.D., Ph.D., FAAP. "A careful, robust and transparent process to evaluate the evidence for the vaccine in this age group is essential in order for parents to have confidence in offering the vaccine to their children, and AAP is committed to a thorough review of the data."

Dr. Marks agreed.

"We take our responsibility for reviewing these vaccines very seriously because we're parents as well, and in looking over the data, I think parents can feel reassured that we have set the standard by which we feel that if something does not meet that standard, we can't proceed forward," Dr. Marks said.

In the meantime, the AAP encourages families to continue to mask, including at school, and to vaccinate everyone who is

eligible now.

"This virus is still infecting children, and there's a need to make sure all children are protected, including the youngest children who are still unable to be vaccinated," said Dr. Szilagyi. "This is a challenging time for families who hear different messages about COVID-19 risks in the media or from public officials. Parents should seek advice from their pediatrician about what's best for their child."

### Resources

- [AAP resources on becoming a vaccinator, preparing a pediatric practice for COVID-19 vaccination and getting paid](#)
- [CDC clinical considerations for administering COVID-19 vaccines](#)
- [Information from the FDA about the Pfizer-BioNTech COVID-19 vaccine](#)
- [Information from HealthyChildren.org on preparing children for a COVID-19 vaccine](#)

Contact information for AAP headquarters

Steve Schering, Staff Writer

American Academy of Pediatrics

345 Park Blvd, Itasca, IL 60143

New AAP main number: 630-626-6000

NT

---

## NIH-funded study suggests COVID-19 increases risk of pregnancy complications

---

Monday, February 7, 2022

Pregnant women with COVID-19 appear to be at greater risk for common pregnancy complications — in addition to health risks from the virus — than pregnant women without COVID-19, suggests a study funded by the National Institutes of Health.

The study, which included nearly 2,400 pregnant women infected with SARS-CoV-2, found that those with moderate to severe infection were more likely to have a cesarean delivery, to deliver preterm, to die around the time of birth, or to ex-

perience serious illness from hypertensive disorders of pregnancy, postpartum hemorrhage, or from infection other than SARS-CoV-2. They were also more likely to lose the pregnancy or to have an infant die during the newborn period. Mild or asymptomatic infection was not associated with increased pregnancy risks.

“The findings underscore the need for women of child-bearing age and pregnant individuals to be vaccinated and to take other precautions against becoming infected with SARS-CoV-2,” said Diana Bianchi, M.D., director of NIH’s *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), which funded the study. “This is the best way to protect pregnant women and their babies.”

The study was conducted by Torri D. Metz, M.D., of the University of Utah, Salt Lake City, and colleagues in the NICHD Maternal-Fetal Medicine Units Network. It appears in the *Journal of the American Medical Association*. Additional funding was provided by NIH’s National Center for Advancing Translational Sciences.

The study included more than 13,000 pregnant individuals from 17 U.S. hospitals, approximately 2,400 of whom were infected with SARS-CoV-2. Participants delivered between March 1 and December 31 2020, before SARS-CoV-2 vaccination was available. The researchers compared outcomes among those with COVID-19 to those from uninfected patients, and tabulated the study results as a primary outcome — whether the patient had died from any cause or had a serious illness or condition related to common obstetric complications. They also evaluated the results in terms of several secondary outcomes, including cesarean delivery, preterm birth,

and fetal and newborn death.

Compared to uninfected patients, those with moderate to severe COVID-19 were more likely to experience the primary outcome, (26.1 vs 9.2%). They were also more likely to deliver by cesarean (45.4 vs 32.4%) or preterm (26.9 vs 14.1%) or to have a fetal or newborn death (3.5 vs 1.8%). Mild or asymptomatic COVID-19 was not associated with any of adverse outcomes.

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

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

*NIH...Turning Discovery Into Health®*

#### References

Metz TD, et al. [Association of SARS-CoV-2 infection with serious maternal morbidity and mortality from obstetric complications\(link is external\)](#). *Journal of the American Medical Association*. 2022.

###

Institute/Center

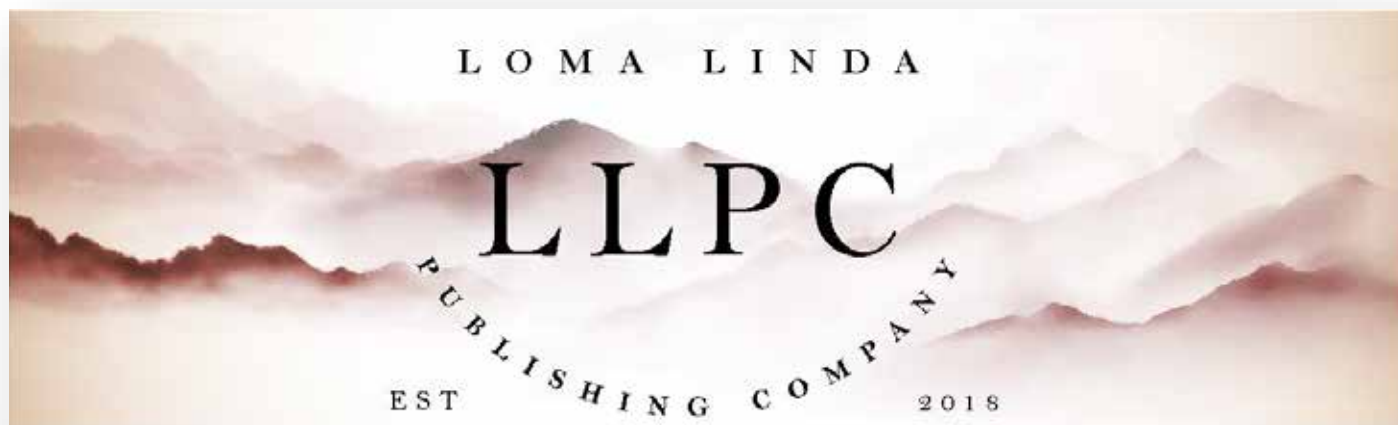
[Eunice Kennedy Shriver National Institute of Child Health and Human Development \(NICHD\)](#)

Contact


[Linda Huynh or Robert Bock\(link sends e-mail\)](#)

301-496-5133

NT







“Even in the middle of taking this course, I could see myself changing the way that I spoke to parents. After taking this course, I am much better at emotionally supporting our NICU families.”

COURSE PARTICIPANT

Learn How Now

validated online NICU staff education

[WWW.MYNICUNETWORK.ORG](http://WWW.MYNICUNETWORK.ORG)

My NICU Network  
My Perinatal Network



National Perinatal  
Association



NICU Parent  
Network

**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](mailto:LomaLindaPublishingCompany@gmail.com)

# 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](http://www.nationalperinatal.org/COVID-19)

 National  
Perinatal  
Association

## PROTECT YOUR FAMILY FROM RESPIRATORY VIRUSES

flu

coronavirus

pertussis

RSV



### WASH YOUR HANDS

often with soap and warm water.

### GET VACCINATED

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



### COVER COUGHS AND SNEEZES.

Sneeze and cough into your elbow.

### USE AN ALCOHOL-BASED HAND SANITIZER.



### STAY AWAY FROM SICK PEOPLE

Avoid crowds. Protect vulnerable babies and children.

[www.nationalperinatal.org](http://www.nationalperinatal.org)

 National  
Perinatal  
Association

# Genetics Corner: Alpha Thalassemia X-Linked Intellectual Disability Syndrome in an Infant with Developmental Delay and DYS Recurrent Respiratory Failure Confirmed by Whole-Exome Sequencing

Carolina Olavarry, MD, Jason W. Tate, MS, Ashleigh Hansen, CGC, MS, Hua Wang, MD, Robin D. Clark, MD

## Case Summary

A 13-month old boy with global developmental delay and dysmorphic features was admitted for increased work of breathing. He was born at 37 weeks gestation to a mother, G2P2, via emergency C-section for partial *abruptio placentae*. Other prenatal history was noncontributory. Maternal prenatal labs were negative. The prenatal US was normal. Mother had gestational diabetes that was controlled. She endorsed difficulty conceiving but denied miscarriage. He was admitted to the NICU for one week at an outside hospital due to respiratory difficulty requiring HFNC and feeding difficulties. At six months of age, he had developmental delay and hypotonia. He was referred for a developmental assessment, but his mother did not follow up.

***“He was admitted to the NICU for one week at an outside hospital due to respiratory difficulty requiring HFNC and feeding difficulties. At six months of age, he had developmental delay and hypotonia. He was referred for a developmental assessment, but his mother did not follow up.”***

During this admission, his problems included esotropia, gastroesophageal reflux, dysphagia to thin liquids, malnutrition, left undescended testis and left inguinal hernia, microcytic anemia, and chronic constipation. A genetics consultation was requested. Following his discharge, he has three more hospitalizations for acute respiratory failure due to viral illness, requiring PICU admission and intubation on one of those occasions.

***“A genetics consultation was requested. Following his discharge, he has three more hospitalizations for acute respiratory failure due to viral illness, requiring PICU admission and intubation on one of those occasions.”***

## Family History

The maternal family history was significant for several males with neurodevelopmental disorders. She reported a male first cousin, the son of her maternal aunt, with a diagnosis of spinal muscular atrophy. She also reported two brothers who were maternal uncles to the patient, who had severe developmental delay, both of whom died during childhood.

The patient has one healthy brother. The patient’s father has three healthy children (female and male) from previous relationships. Mother is 30 years old, and the father is 46 years old; both are healthy (Fig 1. the family pedigree). Parents are of Hispanic ancestry from Mexico. Consanguinity was denied.

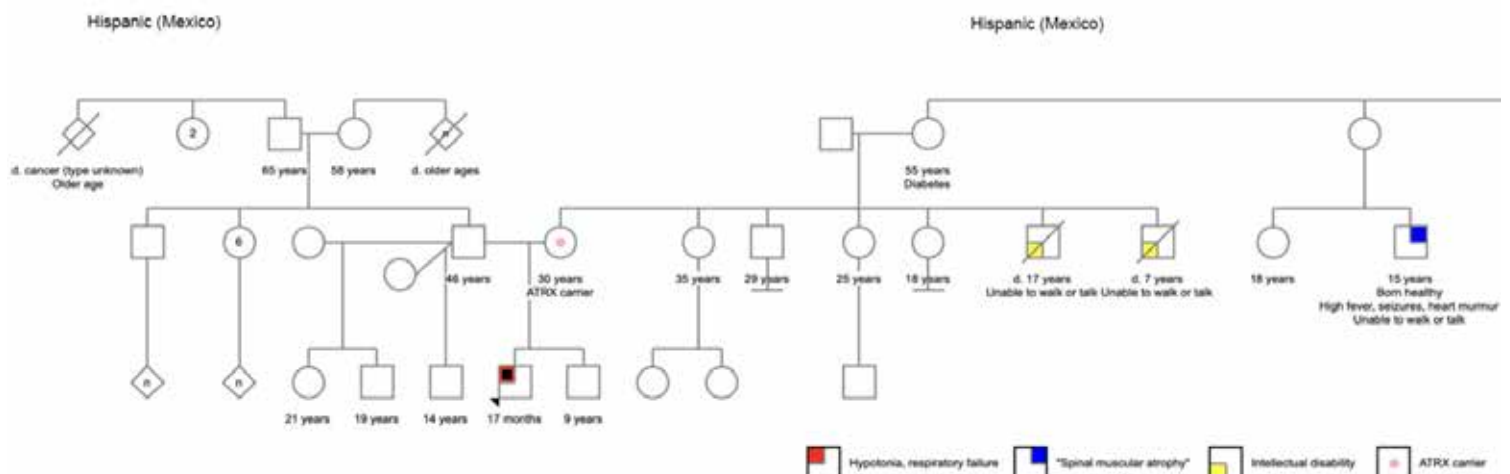
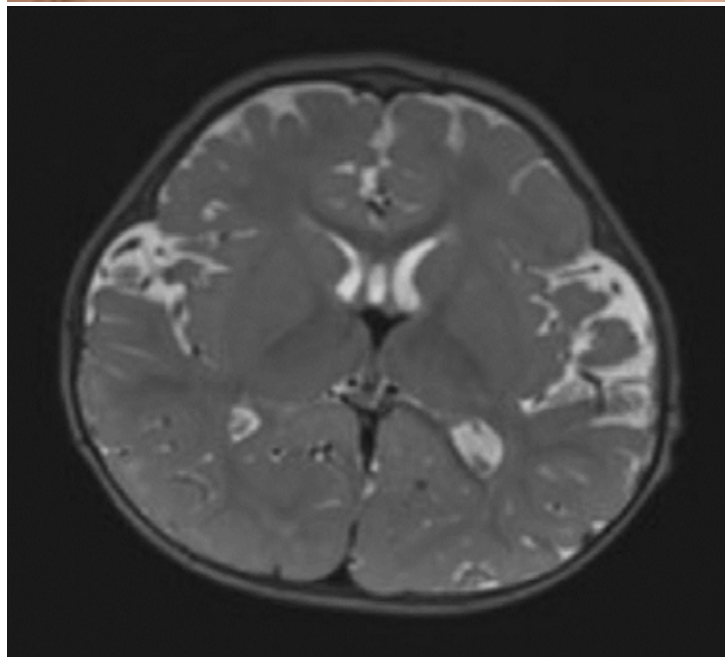


Figure 1. The pedigree demonstrates an X-linked pattern of affected males related through females.

## Physical examination

The geneticist noted dysmorphic facial features, microcephaly, hypotonia, pectus ex cavatum, global developmental delay, and failure to thrive with acute respiratory insufficiency. Head circumference and weight parameters were significantly below the 3<sup>rd</sup> %ile: weight Z-score -2.76, head circumference Z-score -2.76, length Z-score -0.70. The face was round with a flat profile, faint eyebrows, telecanthus, bilateral intermittent esotropia, short nasal bridge, upturned nasal tip, tented upper lip, and open mouth. He was mildly hypotonic with truncal instability but adequate head support. Mild genital anomalies were appreciated: undescended L testis and L inguinal hernia. Figure 2. illustrates the facial features during his acute illness at 13 months and a follow-up visit at 17 months. Brain MRI revealed brachycephaly but was otherwise essentially normal.



***“Alpha thalassemia X-linked intellectual disability syndrome (ATR-X) is a rare condition. Whole exome sequencing is a powerful tool for diagnosing such rare disorders.”***

a) 13 months old    b) 17 months old    c) MRI of the brain (13 months)

Fig 2. Facial features and MRI of the brain.



CONGENITAL  
CARDIOLOGY  
TODAY

The only worldwide monthly publication exclusively serving Pediatric and Adult Cardiologists that focus on Congenital/Structural Heart Disease (CHD), and Cardiothoracic Surgeons.



**Subscribe Electronically**  
Free on the Home Page

[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)

ATRX syndrome (Alpha thalassemia X-linked intellectual disability syndrome, ATR-X) was suspected clinically based on the X-linked pattern of affected males in the family history and the child's characteristic facial features in the context of microcephaly, genital anomalies, and hypotonia.

### Laboratory testing

Chromosome microarray and conventional metaphase chromosome analysis were normal. A whole-exome trio revealed a hemizygous pathogenic variant in *ATRX*: c.736C>T (p. Arg246Cys) (NM\_000489.4). The mother was a heterozygous carrier for the same variant. This variant has been reported many times as causative for ATRX syndrome.

This confirmed Alpha thalassemia X-linked intellectual disability syndrome (OMIM 301040).

---

*“A whole-exome trio revealed a hemizygous pathogenic variant in *ATRX*: c.736C>T (p. Arg246Cys) (NM\_000489.4). The mother was a heterozygous carrier for the same variant. This variant has been reported many times as causative for ATRX syndrome.”*

---

### Discussion

#### Clinical features of ATR-X

ATR-X syndrome is an X-linked intellectual disability disorder that almost exclusively presents in males. Affected males have variable intellectual disability, from mild to profound, and delayed development in speech and ambulation. Typically there is a characteristic pattern of facial features, microcephaly, and short stature. Most individuals also have hypotonia, gastrointestinal dysfunction, and under masculinized genitalia ranging from undescended testes to hypospadias, or normal-appearing female genitalia. Seizures occur in 30-40%. The Alpha-thalassemia for which the syndrome is named is present in about 75% of affected individuals - it is mild and typically does not require treatment. Osteosarcoma has been reported in 4 children with germline pathogenic variants, but the association with tumor predisposition has not been well defined. Other findings can include a characteristic neurobehavioral phenotype, minor skeletal anomalies, and less commonly ocular coloboma, cleft palate, cardiac defects, inguinal hernia, heterotaxy, and asplenia. Phenotypic variability in individuals with ATR-X syndrome is broad, even within the same family. This family's phenotypic variability might have obscured the X-linked inheritance

pattern had we not considered that all affected males in the maternal lineage were more likely to have the same diagnosis: the diagnosis attributed to the mother's cousin, spinal cord muscular atrophy is only rarely X-linked.

### Test strategy

Targeted genetic testing and chromosomal microarray are diagnostic in 15.3–52% of patients with microcephaly, while whole-exome sequencing (WES) has been shown to provide an underlying explanation in 29% of previously evaluated and undiagnosed patients (1). Genetic testing is a common next step in patients with developmental delay and intellectual disability.

Data from the Human Gene Mutation Database suggests that more than ninety percent of variants reported in *ATRX* are detectable through sequence analysis, though some gross deletions and duplications have been reported (2). ATR-X syndrome has also been linked to a unique and highly specific methylation signature (3). The clinician can determine which testing route is most appropriate based on the clinical circumstances. Although ATR-X was suspected, WES was chosen as the best testing option considering that there might not be other opportunities for testing after discharge.

His feeding problems and respiratory issues in the newborn period were likely attributed to sequelae of a difficult delivery due to abruptio placentae. In retrospect, these problems may have been the earliest expression of his neurodevelopmental delay. Nevertheless, such nonspecific signs were not sufficient to raise suspicion for an underlying disorder, and it is unlikely that the family history had been documented in the record at that time. This would be a difficult diagnosis to make in the newborn period or anytime prior to recognizing developmental delay at age six months.

---

*“His feeding problems and respiratory issues in the newborn period were likely attributed to sequelae of a difficult delivery due to abruptio placentae. In retrospect, these problems may have been the earliest expression of his neurodevelopmental delay.”*

---

### Differential Diagnosis

Genes of interest in the differential diagnosis of ATR-X syndrome, especially when alpha thalassemia is identified, include *HBA1* and *HBA2*, *MECP2*, other genes in the Xq28 region, and *RPS6KA3*. *HBA1* and *HBA2* are genes associated with hemoglobin H disease

**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](mailto:LomaLindaPublishingCompany@gmail.com)**

(HbH). HbH is an autosomal recessive condition that is not associated with intellectual disability. Unlike HbH, patients with ATR-X syndrome are expected to have a normal alpha-globin genotype. *MECP2* duplication syndrome is an X-linked neurodevelopmental disorder that causes profound intellectual disability, developmental delay, infantile hypotonia, and other symptoms also seen in ATR-X syndrome. However, while microcephaly occurs in 75-85% of patients with ATR-X syndrome, it is not a consistent feature of *MECP2* duplication syndrome. Coffin-Lowry syndrome (CLS), an X-linked intellectual disability syndrome caused by pathogenic variants in *RPS6KA3*, has phenotypic overlap with ATR-X, including some of the dysmorphic facial features: a large open mouth, prominent lips, short stature, microcephaly, and musculoskeletal anomalies. Other CLS signs not present in ATR-X syndrome include short, soft hands with wide, tapered fingers, hyperextensible skin and fingers, and stimulus-induced drop attacks (4).

### Molecular Genetics

*ATRX* encodes a transcription factor that functions in the binding and separating of double-stranded DNA during transcription. *ATRX* protein may be involved in chromatin remodeling and the regulation of gene expression during development. Mutations in *ATRX* have also been shown to cause changes in DNA methylation (3). Changes in *ATRX* may disrupt the transcription and chromatin structure of other genes. Pathogenic variants involving the zinc finger domain are associated with more severe genital anomalies and psychomotor delay, while those affecting the helicase domain correlate with a milder phenotype (6). Pathogenic variants in *ATRX* cause downregulation of alpha-globin expression, leading to alpha thalassemia in patients with ATR-X syndrome. *ATRX* is also thought to play a critical role in brain development and sex differentiation (7,8).

### Inheritance

The condition is inherited in an X-linked manner. As a carrier of the *ATRX* pathogenic variant, the mother has a 50% chance of transmitting this allele to her offspring each pregnancy. Males who inherit the pathogenic variant will be affected but will not reproduce. Females who inherit the pathogenic variant will be carriers, and although rarely clinically affected, they will be able to pass this on to their children. This underscores the importance of making the diagnosis as early as possible. Genetic counseling should be offered to all affected families.

---

**“Four months after discharge, he returned for a follow-up evaluation. He was responding to physical and occupational therapy with improvement in gross and fine motor domains. He continued to have slow weight gain and feeding difficulties. He was referred for feeding therapy and an evaluation with a gastroenterologist to consider gastrostomy-tube placement.”**

---

### Postscript –Follow up at 17 months

Four months after discharge, he returned for a follow-up evaluation. He was responding to physical and occupational therapy with improvement in gross and fine motor domains. He continued to have slow weight gain and feeding difficulties. He was referred for feeding therapy and an evaluation with a gastroenterologist to consider gastrostomy-tube placement. He had a left orchidopexy and hernioplasty. Corrective lenses had been prescribed for esotropia.

### Practical Applications

1. Pay attention to the family history. The pattern of affected males provided an essential clue to the diagnosis. The X-linked pattern of affected males in the maternal lineage framed and narrowed the differential diagnosis and led us to focus on X-linked disorders that caused dysmorphic features and intellectual disability.
2. Use the pattern of anomalies to narrow the differential diagnosis further. ATR-X is one of the few X-linked disorders in which dysmorphic features, microcephaly, and genital anomalies coexist.
3. Consider an underlying genetic problem when a term newborn has unexplained feeding problems. A genetics evaluation can help identify the underlying etiology, and sometimes a common presenting problem, like poor feeding, can be the first sign of a rare syndrome.
4. Consider a genetic disorder in any of these situations: a positive family history of intellectual disability or developmental delay, esp more than one affected male is noted in the maternal lineage; dysmorphic features in a newborn with other anomalies, even minor anomalies (undescended testis), and whenever there is unexplained poor feeding in an otherwise healthy term infant.
5. Finally, be willing to consider trio whole-exome sequencing when a genetic disorder is suspected. It is a powerful tool for the diagnosis of rare disorders.

### References

1. Hanzlik E, Gigante J. Microcephaly. *Children (Basel)*. 2017;4(6):47. Published 2017 Jun 9. doi:10.3390/children4060047
2. Stenson PD, Mort M, Ball EV, et al. The Human Gene Mutation Database: towards a comprehensive repository of inherited mutation data for medical research, genetic diagnosis and next-generation sequencing studies. *Hum Genet*. 2017;136(6):665-677. doi:10.1007/s00439-017-1779-6
3. Schenkel LC, Kernohan KD, McBride A, et al. Identification of epigenetic signature associated with alpha thalassemia/mental retardation X-linked syndrome. *Epigenetics Chromatin*. 2017;10:10. Published 2017 Mar 10. doi:10.1186/s13072-017-0118-4
4. Hahn JS, Hanauer A. Stimulus-induced drop episodes in Coffin-Lowry syndrome. *Eur J Med Genet*. 2012;55(5):335-337. doi:10.1016/j.ejmg.2012.03.004
5. Uhlén M, Fagerberg L, Hallström BM, et al. Proteomics. Tissue-based map of the human proteome. *Science*. 2015;347(6220):1260419. doi:10.1126/science.1260419
6. Badens C, Lacoste C, Philip N, et al. Mutations in PHD-like

domain of the ATRX gene correlate with severe psychomotor impairment and severe urogenital abnormalities in patients with ATRX syndrome. *Clin Genet.* 2006;70(1):57-62. doi:10.1111/j.1399-0004.2006.00641.x

7. Timpano S, Picketts DJ. Neurodevelopmental Disorders Caused by Defective Chromatin Remodeling: Phenotypic Complexity Is Highlighted by a Review of ATRX Function. *Front Genet.* 2020;11:885. Published 2020 Aug 11. doi:10.3389/fgene.2020.00885
8. Tang P, Park DJ, Marshall Graves JA, Harley VR. ATRX and sex differentiation. *Trends Endocrinol Metab.* 2004;15(7):339-344. doi:10.1016/j.tem.2004.07.006

Disclosures: The authors have no relevant disclosures.

**NT**



Ashleigh Hansen, BSc, MSc, LCGC, CCGC  
Pediatric Genetic Counselor  
Loma Linda University School of Medicine  
Division of Genetics  
Department of Pediatrics  
Email: [ahansen@llu.edu](mailto:ahansen@llu.edu)



Carolina Olavarry, MD  
Pediatric Resident, PGY2  
Loma Linda University School of Medicine  
Loma Linda, CA



Hua Wang, MD  
Assistant Professor, Pediatrics  
Loma Linda University School of Medicine  
Division of Genetics  
Department of Pediatrics



Jason W. Tate, MS  
Master of Science in Human Genetics and Genetic Counseling (MSGC)  
Keck Graduate Institute  
Claremont, CA



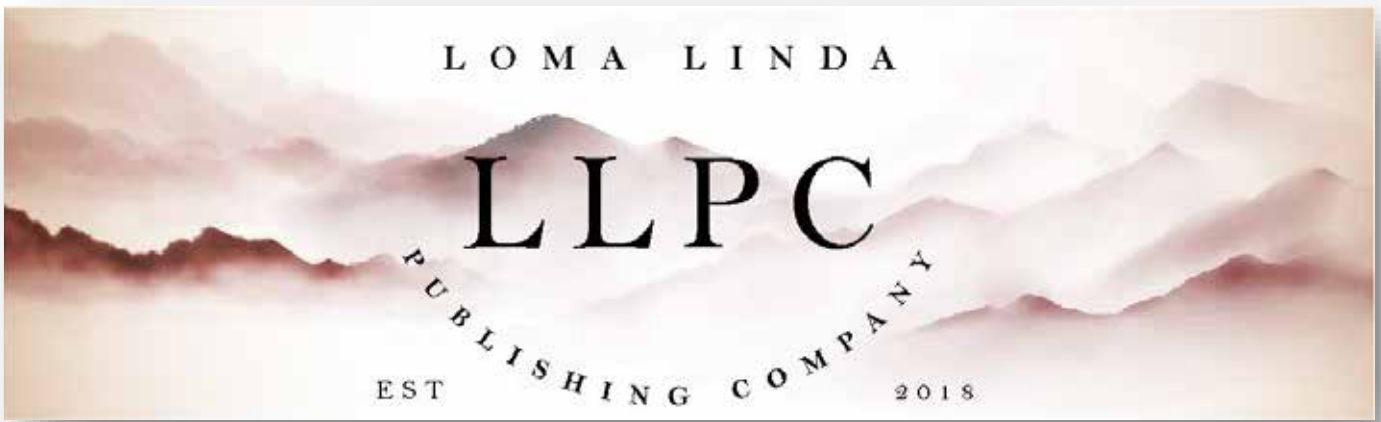
**Corresponding Author**

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

# 99nicu

Sign up for free membership at 99nicu, the Internet community for professionals in neonatal medicine. Discussion Forums, Image Library, Virtual NICU, and more..."

[www.99nicu.org](http://www.99nicu.org)



READ

NPA's statement: **BLACK LIVES MATTER**



Education that is...

- Story-Driven
- Trauma-Informed
- Evidence-Based



Visit us at [www.mynicunetwork.org](http://www.mynicunetwork.org)



The preeminent provider of compelling perinatal education on psychosocial support created through interprofessional collaboration



Take our **"Coping with COVID-19"** program for **FREE**





# From the National Perinatal Information Center: Cardiovascular Awareness Month: Exploration of Hypertension on Maternal Health and Outcomes

Elizabeth Rochin, PhD, RN, NE-BC

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

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



*“In 2021, the American Heart Association published a new scientific statement that brought attention to the growing concerns of maternal morbidity and mortality directly related to cardiovascular disease and risk factors that elevate a woman’s risk of heart disease after pregnancy and later in life (1).”*

In 2021, the American Heart Association published a new scientific statement that brought attention to the growing concerns of maternal morbidity and mortality directly related to cardiovascular disease and risk factors that elevate a woman’s risk of heart disease after pregnancy and later in life (1). One of the most described conditions within this statement is hypertension. Cardiovascular disease (CVD) is the leading cause of maternal death, with a higher prevalence when including hypertensive disease (2).

An overview of pregnancy-related deaths during the years 2007 – 2016 by the United States Department of Health and Human Services, in conjunction with the Centers for Disease Control (3) found that cardiovascular conditions were the leading cause of death, with higher rates of hypertension among Black women than any other demographic. Additional studies related to disparities include similar findings of increased risk of CVD in Black women (4,5). Research and studies have begun to focus on women’s health not only during childbearing years but also later in life. Benschop and colleagues (6) describe the risk associated with hypertensive disorders in pregnancy and the risk associated with CVD later in life, including a twofold risk compared with women with no history of hypertensive disease.

*“Benschop and colleagues (6) describe the risk associated with hypertensive disorders in pregnancy and the risk associated with CVD later in life, including a twofold risk compared with women with no history of hypertensive disease.”*

Each February, many healthcare and professional organizations recognize American Heart Month, a month dedicated to the intentional focus on cardiovascular health and issues impacting heart health. In 2018, the American Heart Association declared CVD the primary cause of death in women (7). Conditions such as hypertension, stroke, and heart disease have taken on greater emphasis with COVID-19 as case studies and papers continue to document lingering and significant cardiovascular conditions associated with COVID-19 sequelae and long-COVID-19 (8).

To further explore cardiovascular conditions in pregnancy, the National Perinatal Information Center (NPIC) reviewed outcomes data from 2017 – 2021, focusing on hypertensive disease, as hypertensive disease has a higher prevalence in later CVD in women in later life (2). NPIC provides multiple levels of comparison for every metric reported, including individual hospital, subgroup, 5-year trended database, and overall NPIC database, including comparison with other national benchmarks. During the development of hospital-level data, national algorithms are incorporated, includ-

**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](mailto:LomaLindaPublishingCompany@gmail.com)

ing All Patient Refined Diagnosis Related Groups (APR-DRGs) version 37.1, APR-DRG Severity of Illness or Risk of Mortality Subclass, Major Diagnostic Category (MDC), and International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) codes. ICD-10-CM diagnosis codes O10, O11, O13, O140, O141, O142, O149, O15, and O16.

The following NPIC cohorts were used for this exploration, which includes total deliveries during the years 2017 – 2020:

NPIC Total Deliveries CY 2017 – 2020				
	2017	2018	2019	2020
Total Deliveries	329,856	296,775	308,760	299,609

Table 1. NPIC Total Deliveries CY 2017 – 2020

Hypertension continues to drive postpartum readmissions within the NPIC database and is the primary reason for readmission within 42 days of discharge. 55.7% of reasons for readmission were coded to Hypertension diagnoses in 2020, up from 40.1% in 2017. The reasons for this rate increase are multifactorial and important to track and trend. Continuing to reinforce education about signs and symptoms of emergencies and urgency for care must continue, as well as the accuracy of diagnosis coding at discharge

and upon return to care.

***“Hypertension continues to drive postpartum readmissions within the NPIC database and is the primary reason for readmission within 42 days of discharge. 55.7% of reasons for readmission were coded to Hypertension diagnoses in 2020, up from 40.1% in 2017.”***

At the beginning of the COVID-19 pandemic, there were emerging case studies and concerns regarding comorbidities having a significant impact on the severity of SARS-CoV-2 disease. In response to those concerns, NPIC ran comorbidity reports for member hospitals and a database evaluation of comorbidities, including asthma, obesity, hypertension, and diabetes, during calendar years 2018 – 2019. Upon reviewing these comorbidities, there

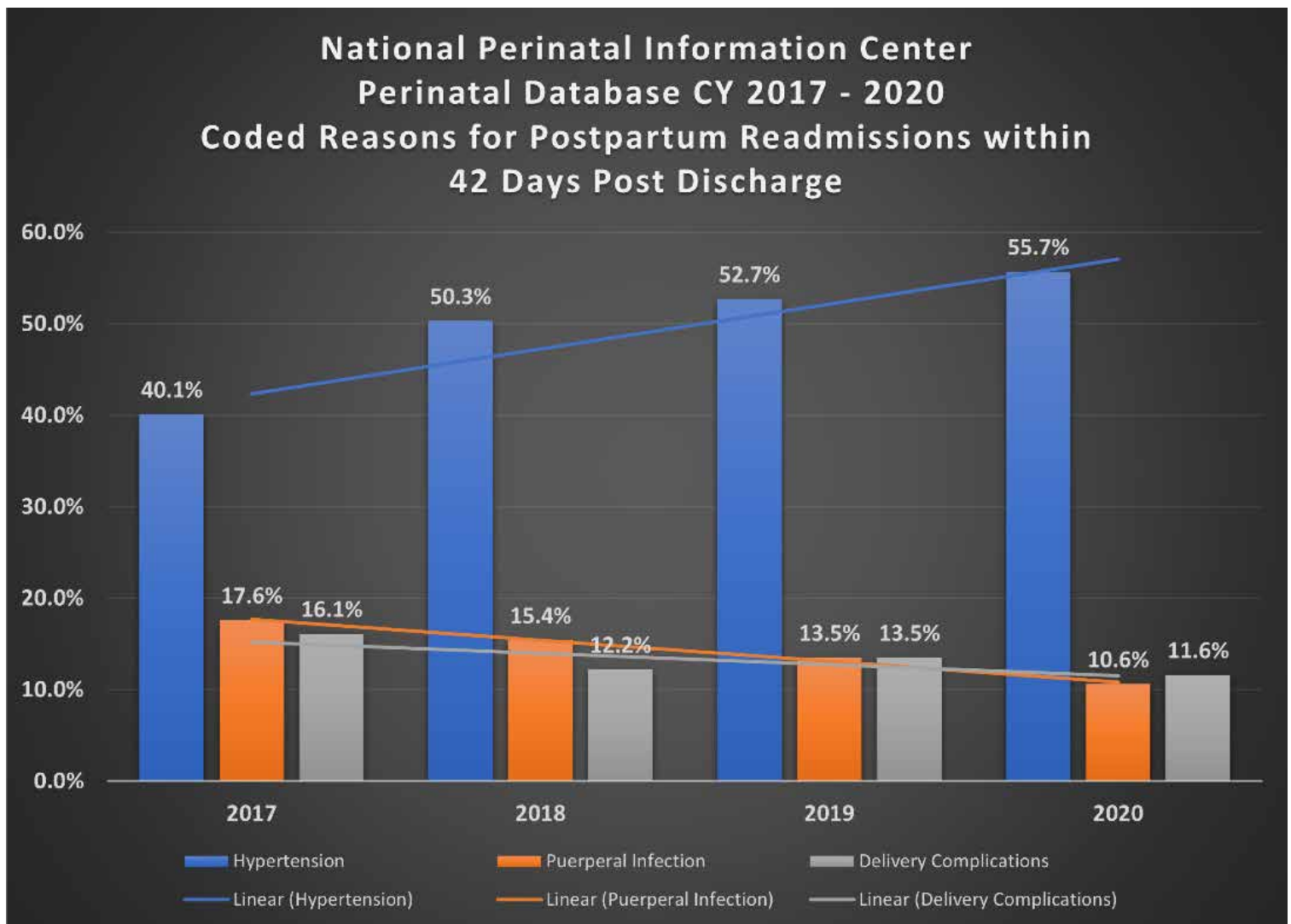
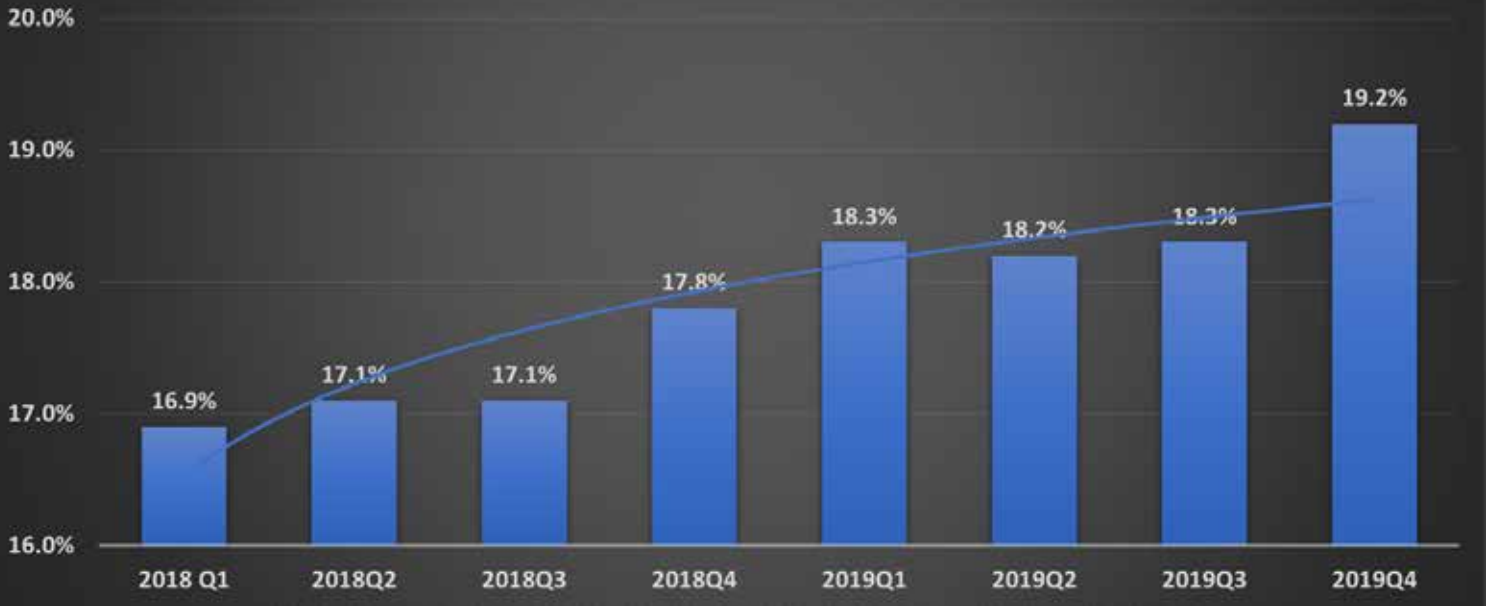


Figure 1. NPIC Perinatal Database CY 2017 – 2020 Coded Reasons for Postpartum Readmissions within 42 Days: Hypertension, Puerperal Infection and Delivery Complications (Deliveries)

National Perinatal Information Center Perinatal Database  
Comorbidities of the Maternal Patient Population:  
Percent of Obstetric Cases Coded with Hypertension  
CY 2018 - 2019



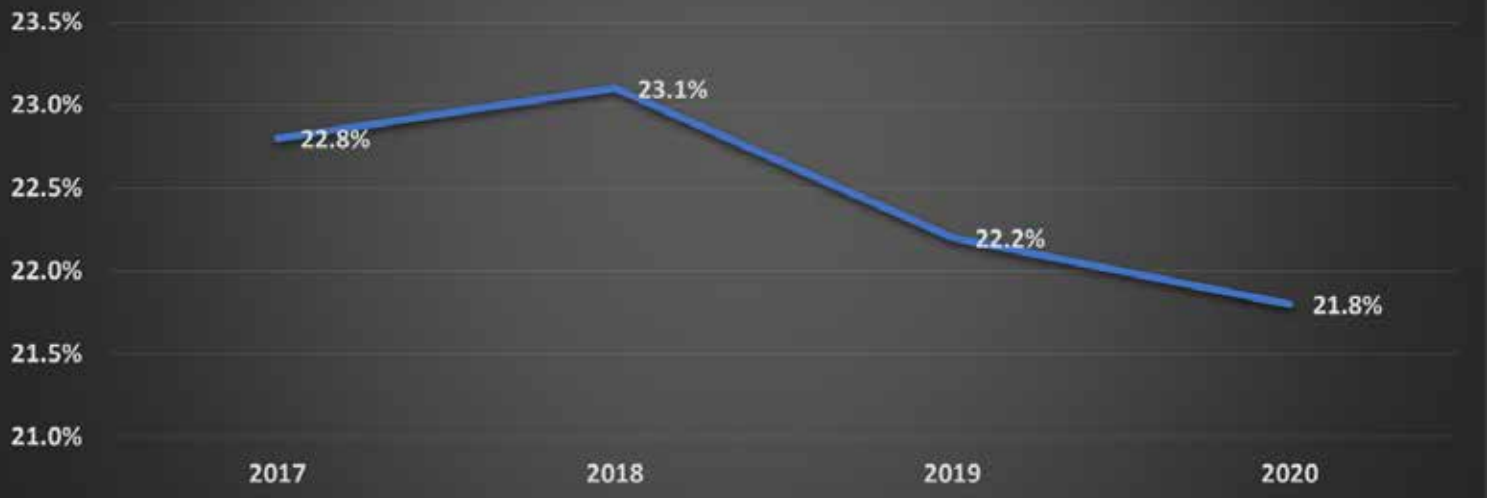
**Figure 2.** NPIC Perinatal Database Comorbidities of the Maternal Patient Population, Percent of Obstetric Cases with Hypertension CY 2018 – 2019 (Deliveries)

appeared to be an increase in cases coded with hypertension. There could be many potential reasons for this, including better coding practices, better recognition of hypertensive disease, or increasing rates of hypertension among women in childbearing years. Regardless, this trend will be important to follow nationally to inform national practices and policy development to support

cardiovascular health programs for childbearing women.

Over this 4-year period, there has been a decline in coded maternal conditions with neonatal special care admissions associated with a hypertension diagnosis. While the rate of patients with hypertension diagnosis codes is increasing year-over-year

National Perinatal Information Center  
Perinatal Database CY 2017 - 2020  
Coded Maternal Conditions with Neonatal Special Care Admission:  
Hypertension



**Figure 3.** NPIC Perinatal Database CY 2017 – 2020 Coded Maternal Conditions with Neonatal Special Care Admission: Hypertension (Deliveries)

within the NPIC database, this is one area that will continue to receive attention, particularly for those hospitals associated with or routinely transfer to NICU-level care. Effective multidisciplinary collaborations, current transfer agreements, and sharing of data trends that impact NICU care are essential.

**“These reports also include the 21 SMM Indicators, including cardiovascular impacts, which can create additional conversations on individual and population-level priorities. NPIC is committed to stratifying additional metrics by race and ethnicity to continue building upon health disparities efforts across the United States.”**

## Discussion

Cardiovascular disease continues to be an area of intense focus within obstetrics and neonatology. More women are diagnosed with hypertension every year. Among adults who are 20 and older, 31.1 percent of white non-Hispanic women and 44.8% of Black non-Hispanic women have hypertension (9). The disparities within cardiovascular outcomes, particularly for Black women, must continue to be a priority for healthcare teams and communities. NPIC provides maternal and neonatal outcome metrics stratified by race and ethnicity, including Severe Maternal Morbidity (SMM) metrics (overall, preeclampsia, and hemorrhage). These reports also include the 21 SMM Indicators, including cardiovascular impacts, which can create additional conversations on individual and population-level priorities. NPIC is committed to stratifying additional metrics by race and ethnicity to continue building upon health disparities efforts across the United States. Continued emphasis on CVD and its impact on maternal health, including childbearing years and health later in life, must be a daily priority and continue beyond February and American Heart Month.

## References:

1. Parikh NI, Gonzalez JM, Anderson CAM, et al. Adverse Pregnancy Outcomes and Cardiovascular Disease Risk: Unique Opportunities for Cardiovascular Disease Prevention in Women: A Scientific Statement From the American Heart Association. *Circulation*. 2021;143(18):e902-e916. doi:[10.1161/CIR.0000000000000961](https://doi.org/10.1161/CIR.0000000000000961)
2. Ramlakhan KP, Johnson MR, Roos-Hesselink JW. Pregnancy and cardiovascular disease. *Nat Rev Cardiol*. 2020;17(11):718-731. doi:[10.1038/s41569-020-0390-z](https://doi.org/10.1038/s41569-020-0390-z)
3. Petersen EE, Davis NL, Goodman D, et al. Racial/Ethnic Disparities in Pregnancy-Related Deaths — United States, 2007–2016. *MMWR Morb Mortal Wkly Rep*. 2019;68(35):762-765. doi:[10.15585/mmwr.mm6835a3](https://doi.org/10.15585/mmwr.mm6835a3)
4. Grandi SM, Fillion KB, Yoon S, et al. Cardiovascular Disease-Related Morbidity and Mortality in Women With a History of Pregnancy Complications. *Circulation*. 2019;139(8):1069-1079. doi:[10.1161/CIRCULATIONAHA.118.036748](https://doi.org/10.1161/CIRCULATIONAHA.118.036748)
5. Gad MM, Elgendy IY, Mahmoud AN, et al. Disparities in Car-

diovascular Disease Outcomes Among Pregnant and Postpartum Women. *Journal of the American Heart Association*. 2021;10(1):e017832. doi:[10.1161/JAHA.120.017832](https://doi.org/10.1161/JAHA.120.017832)

6. Benschop L, Duvekot JJ, Lennep JER van. Future risk of cardiovascular disease risk factors and events in women after a hypertensive disorder of pregnancy. *Heart*. 2019;105(16):1273-1278. doi:[10.1136/heartjnl-2018-313453](https://doi.org/10.1136/heartjnl-2018-313453)
7. Heart Disease and Stroke Statistics—2018 Update: A Report From the American Heart Association. doi:[10.1161/CIR.0000000000000558](https://doi.org/10.1161/CIR.0000000000000558)
8. Xie Y, Xu E, Bowe B, Al-Aly Z. Long-term cardiovascular outcomes of COVID-19. *Nat Med*. Published online February 7, 2022:1-8. doi:[10.1038/s41591-022-01689-3](https://doi.org/10.1038/s41591-022-01689-3)
9. CDC. Facts About Hypertension | [cdc.gov](https://www.cdc.gov/bloodpressure/facts.htm). Centers for Disease Control and Prevention. Published September 27, 2021. Accessed February 7, 2022. <https://www.cdc.gov/bloodpressure/facts.htm>

The author has no conflicts of interests to disclose.

**NT**

Corresponding Author:



Elizabeth Rochin, PhD, RN, NE-BC  
President  
National Perinatal Information Center  
225 Chapman St. Suite 200  
Providence, RI 02905  
401-274-0650  
Email: [inquiry@npic.org](mailto:inquiry@npic.org)





To every NICU nurse who has cared for these precious babies we say.....  
"Thank you."

Did you know that premature and low birth weight babies have a 4x greater risk for SIDS?

At First Candle we're educating parents, grandparents and caregivers about safer sleep to make sure all babies reach their first birthday. Learn more at [firstcandle.org](http://firstcandle.org)

"Even in the middle of taking this course, I could see myself changing the way that I spoke to parents. After taking this course, I am much better at emotionally supporting our NICU families."

COURSE PARTICIPANT

Learn How Now

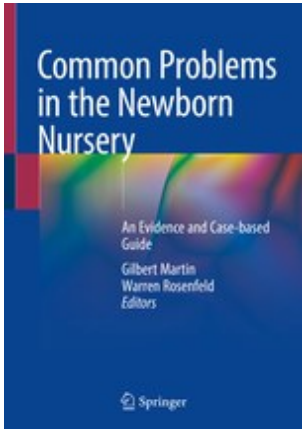
validated online NICU staff education

[WWW.MYNICUNETWORK.ORG](http://WWW.MYNICUNETWORK.ORG)

My NICU Network  
My Perinatal Network



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



## Common Problems in the Newborn Nursery An Evidence and Case-based Guide

- Provides practical, state of the art management guidance for common clinical problems in the newborn nursery
- Written by experts in the field in a clear, easy-to-use format
- Utilizes a case-based approach

This comprehensive book thoroughly addresses common clinical challenges in newborns, providing an evidence-based, step-by-step approach for their diagnosis and management. *Common Problems in the Newborn Nursery* is an easy-to-use, practical guide, covering a full range of clinical dilemmas: bacterial and viral infections, jaundice, hypoglycemia, hypotonia, nursery arrhythmia, developmental dysplasia of the hips, newborn feeding, cardiac problems, late preterm infants, dermatology, anemia, birth injuries, ocular issues, and hearing assessments in the newborn.

Written by experts in their fields, each chapter begins with a clinical case presentation, followed by a discussion of potential treatment and management decisions and various differential diagnosis. Correct responses will then be explained and supported by evidence-based literature, teaching readers how to make decisions concerning diagnosis encountered on a daily basis.

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

**ORDER NOW!**

Price: \$109.99

Common Problems in Newborn Nursery

**Softcover Edition**

978-3-319-95671-8

Please send me \_\_\_\_\_ copies

**YOU WILL BE SENT A SECURE LINK FOR YOUR CREDIT CARD INFORMATION**

Please email orders to:  
[Holly.Klokis@springer.com](mailto:Holly.Klokis@springer.com)

**FREE  
SHIPPING  
IN THE U.S.**

Please note that sales tax will be added into your final invoice. Outside the US and Canada add \$7.00 for first book, \$5.00 for each additional book. All orders are processed upon publication of title.

Name \_\_\_\_\_

Address (we cannot deliver to PO Boxes) : \_\_\_\_\_

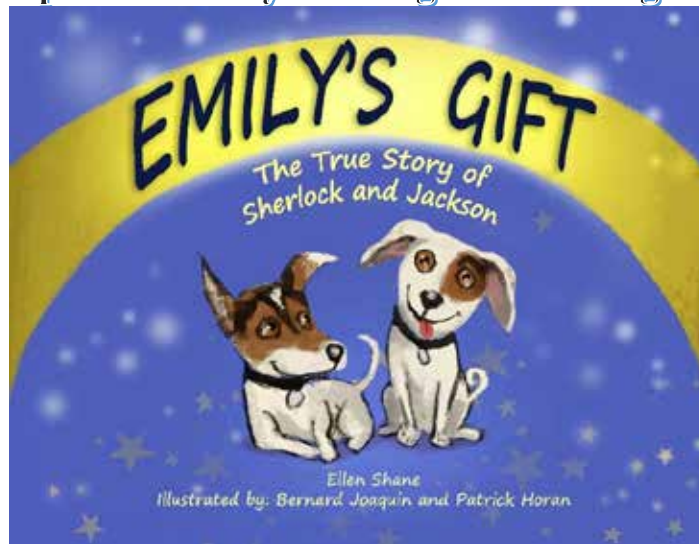
City/State/Zip \_\_\_\_\_

Country \_\_\_\_\_ Telephone \_\_\_\_\_

Email \_\_\_\_\_

Signature \_\_\_\_\_

**“Emily’s Gift” can be purchased by clicking on the image of the cover below.**



Purchases of this engaging **true story** provide disadvantaged middle school students, risking academic failure, the opportunity to attain their best personal and academic potential.

Purchasing options include a limited quantity of signed and numbered books specifically to support the SEA Program, an ebook, soft and hardcover versions, and the option to donate one or more books to support organizations supporting young children.

**You can provide both reading entertainment for younger children, and make a difference in the lives of the disadvantaged middle schoolers we support.**

Sales support our nonprofit charity's SEA Program. You can make a difference for these children!

[Emily's Gift-Click Here to Buy](#)

[Direct SEA Support-Click Here](#)



*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](http://emilyshane.org).

# Infant Health Matters: Knocking Down Pneumococcal Disease

Susan Hepworth, Mitchell Goldstein, MD, MBA, CML



*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.*

Infants and children may soon have another line of protection against potentially life-threatening infections.

## Protecting Against Pneumococcal Disease

The Food and Drug Administration recently gave [priority review to a vaccine](#) that can protect against [invasive pneumococcal disease](#). (1,2) The new vaccine is specifically targeted for children aged six weeks through 17 years.

***“The new vaccine for invasive pneumococcal disease, for example, is anticipated to receive approval in April. Then, it would be ideal for the committee to take up that vaccine for a vote during the regularly scheduled June meeting. (3)”***

Pneumococcal bacteria spread through respiratory fluids like saliva and mucus. The bacteria can travel to different parts of the body. It's called invasive pneumococcal disease when it gets into “sterile sites” such as blood or certain body fluids, including those in the spine or joints.





The first vaccines against invasive pneumococcal disease were introduced more than 15 years ago. Nevertheless, it continues to be a leading cause of illness and death among children, prompting calls for new, more effective options.

The most recent vaccine in review targets 15 pneumococcal strains that contribute to a substantial portion of disease in young children.

While the development and priority review of a new vaccine is worth celebrating, it is just the first step of many that must be completed before children can benefit from its protection.

### Getting on the Vaccine Schedule

After earning federal approval from the Food and Drug Administration, vaccines are reviewed by the [Advisory Committee on Immunization Practices](#). (3) The committee, made of medical and public health experts, recommends the vaccine schedule for children and adults.

Before making its decisions, the committee considers immense information, including safety and effectiveness data. Every vaccine for every age group requires a detailed review. These experts have had a tremendous workload vetting coronavirus vaccines very quickly. They should be commended for their expeditious reviews throughout the public health emergency.

The ongoing pandemic does not negate that patients are still falling ill from other severe and life-threatening respiratory conditions. So, the committee must continue to complete timely reviews of other vaccines once they earn FDA approval.

The new vaccine for invasive pneumococcal disease, for example, is anticipated to receive approval in April. Then, it would be ideal for the committee to take up that vaccine for a vote during the [regularly scheduled June meeting](#). (3)

Even with ongoing pandemic-related demands, children's advocates are hopefully optimistic that the committee will take up its review of the vaccine for invasive pneumococcal disease without unnecessary delay.

### References:

1. <https://www.merck.com/news/u-s-fda-accepts-for-priority-review-the-supplemental-biologics-license-application-for-mercks-vaxneuvance-pneumococcal-15-valent-conjugate-vaccine-for-use-in-infants-and-children/>
2. <https://ep.bmj.com/content/96/5/183>
3. <https://www.cdc.gov/vaccines/acip/index.html>

Disclosure: No relevant disclosures noted

NT



### Corresponding Author



Susan Hepworth  
Director  
National Coalition for Infant Health  
1275 Pennsylvania Ave. NW, Suite 1100A  
Washington, DC 20004  
Email: [info@infanthealth.org](mailto:info@infanthealth.org)



Mitchell Goldstein, MD, MBA, CML  
Professor of Pediatrics  
Loma Linda University School of Medicine  
Division of Neonatology  
Department of Pediatrics  
Email: [mgoldstein@llu.edu](mailto:mgoldstein@llu.edu)

### 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.

Readers can also follow

NEONATOLOGY TODAY

via our Twitter Feed

@NEOTODAY

# The Premie Parent's SURVIVAL GUIDE to the NICU

By

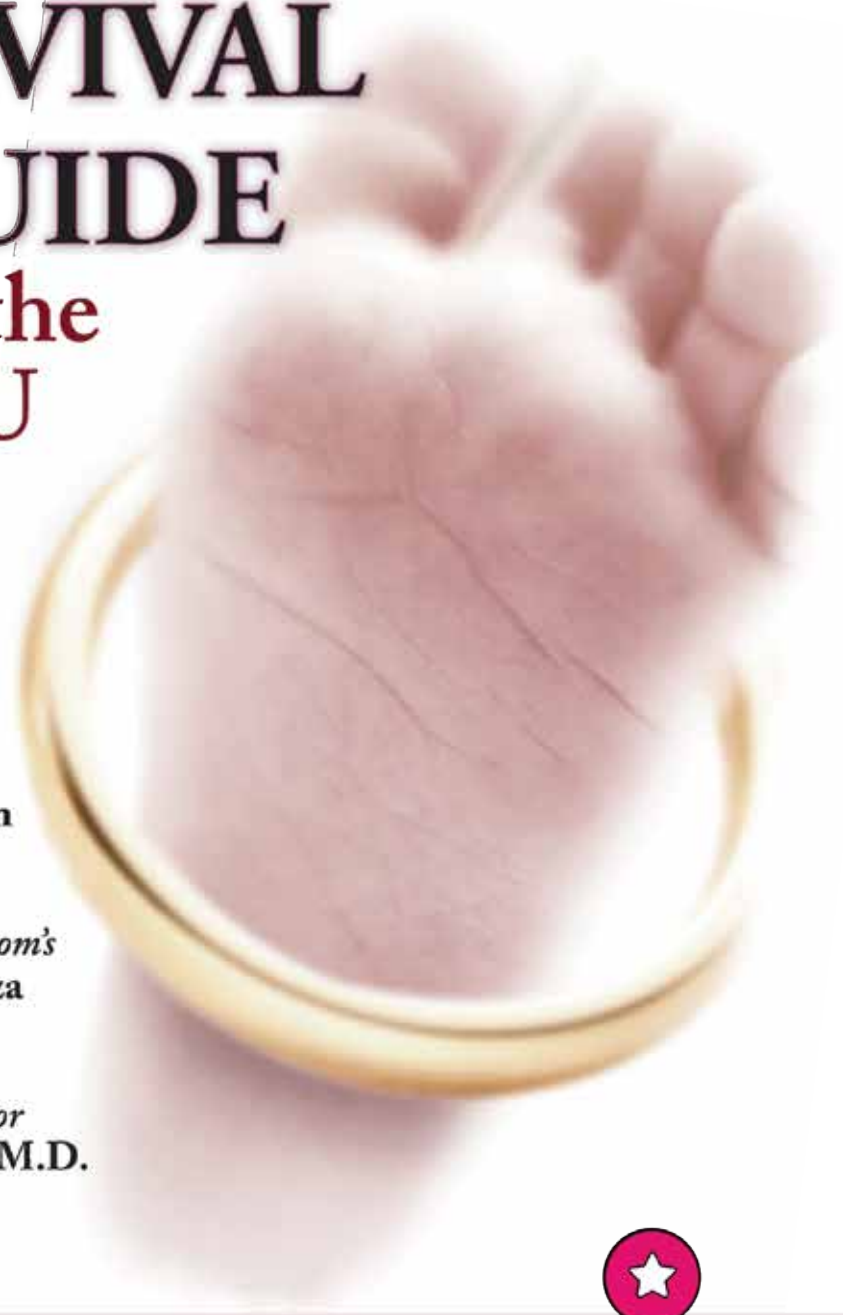
*little man's*  
Nicole Conn

&

*PremieWorld.com's*  
Deb Discenza

with

*Medical Editor*  
Alan R. Spitzer, M.D.



HOW TO  
MAINTAIN YOUR SANITY  
& CREATE A NEW NORMAL

second edition

# 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.*



# National Perinatal Association PERINATAL SUBSTANCE USE

[nationalperinatal.org/position](http://nationalperinatal.org/position)  
[www.nationalperinatal.org/Substance\\_Use](http://www.nationalperinatal.org/Substance_Use)



We know  
that there are  
barriers that  
keep pregnant  
people from  
accessing care.  
We believe  
that perinatal  
providers  
have a duty to  
help remove  
those barriers.

Educate. Advocate. Integrate.



CONGENITAL  
CARDIOLOGY  
TODAY

The only worldwide monthly publication exclusively serving Pediatric and Adult Cardiologists that focus on Congenital/Structural Heart Disease (CHD), and Cardiothoracic Surgeons.



**Subscribe Electronically**  
Free on the Home Page

[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)



CDH  
International

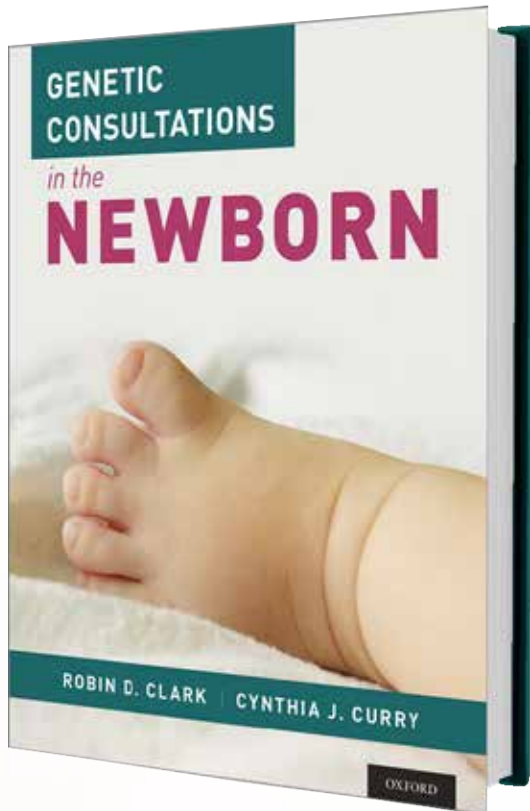
*A global initiative  
to stop Congenital  
Diaphragmatic Hernia*

*“The definitive work in genetic evaluation of newborns”  
- Judith G. Hall*

## GENETIC CONSULTATIONS

# in the **NEWBORN**

\$99.95  
Hardcover



### **Robin D. Clark | Cynthia J. Curry**

- A streamlined diagnostic manual for neonatologists, clinical geneticists, and pediatricians - any clinician who cares for newborns
- Organized by symptom and system, enriched with more than 250 photography and clinical pearls derived from authors' decades of clinical practice
- Includes “Syndromes You Should Know” appendix, distilling the most frequently encountered syndromes and chromosomal abnormalities in newborns
- OMIM numbers for each condition situate authors' practical guidance in the broader genetics literature, connecting readers to the most up-to-date references

Comprising of more than 60 chapters organized by system and symptom, *Genetic Consultations in the Newborn* facilitates fast, expert navigation from recognition to management in syndromes that manifest during the newborn period. Richly illustrated and packed with pearls of practical wisdom from the authors' decades of practice, it empowers readers to recognize the outward signs and symptoms crucial for an effective diagnosis.

**Order now by clicking here.**

**OXFORD**

# Clinical Pearl: Nutritional Management of a Micro-preemie without the need of a PICC line: A Case Report and Review of Literature

Mohammad Adnan MD, FAAP, Andrea Coons NNP, Prashant Malviya MD FAAP, Sana Afroz MD

## Abstract

More micro-preemie infants born with birth weight (BW) under 750 grams are surviving with advances in neonatal care. However, their management is challenging, often unclear, and fraught with wide variations in clinical practice. Nutritional care of these infants born at the edge of viability is a complex, multi-faceted issue. Their early nutritional status has short and long-term implications. For extended periods, the need for central access and dependence on parenteral nutrition (PN) places the preterm infant at risk for numerous complications. This case report discusses the nutritional management of a micro-preemie infant with a BW of 400 grams who did not require a peripherally inserted central catheter (PICC) for nutrition. This infant tolerated enteral nutritional advancement and was weaned off of PN by eight days of life.

**Keywords:** Extreme prematurity, Micro-preemie, Neonatal Nutrition, Nutrition/Growth Necrotizing enterocolitis, Small for gestational age

*“This case report discusses the nutritional management of a micro-preemie infant with a BW of 400 grams who did not require a peripherally inserted central catheter (PICC) for nutrition. This infant tolerated enteral nutritional advancement and was weaned off of PN by eight days of life.”*

## Introduction

The birth of an extremely low birth weight (ELBW) infant, born at a BW under 1000 grams, is considered a nutritional emergency. Their nutritional management is one of the most complex issues encountered during neonatal intensive care unit (NICU) courses. A better nutritional status has improved survival and long-term outcomes for this patient population (1). Limited fetal reserve coupled with higher

metabolic demands supports the idea of early initiation and preferably rapid advancement of enteral feeds. The prolonged use of PN has been shown to increase the risk of sepsis, cholestasis, persistent gut immaturity, and complications related to the PICC line (2). Multiple studies have supported early initiation and rapid advancements of enteral feed. These studies have also provided evidence that this feeding regimen is safe and leads to a better outcome in preterm infants (3). However, in clinical practice, adherence to these guidelines is quite inconsistent, traditionally for concerns of feeding intolerance and necrotizing enterocolitis (NEC).

Moreover, the criteria and significance of feeding intolerance are also unclear, resulting in frequent feeding interruptions (4). Ultimately, this culminates in prolonged use of PN through a PICC line once umbilical venous (UV) catheters are removed around one week. Most of the trials supporting early and rapid feeding advancements have studied infants with a birth weight of more than 750 grams. Evidence on the safety and efficacy of this feeding regimen in micro-preemies is quite scarce. In this case report, we discuss the feeding management of an infant with BW of 400 grams who attained full enteral feeds by the eighth day of life and did not require a PICC line to continue PN.

## Case Presentation

A 23-year-old white G2P1 pregnant mother presented at 24 weeks and two days to labor and delivery by direct transport from an outlying facility for decreased fetal movement, fetal bradycardic episodes, and anhydramnios. The pregnancy was also complicated by severe intrauterine growth restriction with an estimated fetal weight of only 280 grams. Pertinent maternal serologies were negative. Before transport, she was given one dose of betamethasone and placed on magnesium sulfate for fetal neuroprotection. Aside from prenatal vitamins, the mother was on no other medications. At 24 weeks and three days, an abnormal fetal heart tracing led to the emergent cesarian delivery of a 400 gram female infant. Apgar scores were 4, 6, and 7 at one, five, and ten minutes of life, respectively.

*“At 24 weeks and three days, an abnormal fetal heart tracing led to the emergent cesarian delivery of a 400 gram female infant.”*

**NEONATOLOGY TODAY** is interested in publishing manuscripts from Neonatologists, Fellows, NNP's 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](mailto:LomaLindaPublishingCompany@gmail.com)

The infant was intubated with a 2.0 ETT in the delivery room due to the absence of respiratory efforts and later received a dose of surfactant. She was stabilized and transported to the NICU on conventional pressure control ventilation. She remained hemodynamically stable and did not require any inotropic support. Umbilical arterial and UV catheters were placed shortly after, and stock PN with added calcium was started through the UV catheter. Trophic feedings (20ml/kg/day) of expressed breast milk (EBM) were initiated the following day at 24 hours of age. Feeding volumes of EBM/Donor breast milk (DBM) were advanced gradually by 20 ml/kg/day while her PN was tailored to manage her dyselectrolytemia. On the day of life seven, enteral feedings of EBM/DBM were fortified to 24 kcal/ounce while she was receiving 100ml/kg of feeds. On day eight, enteral feedings of 120 ml/kg/day were achieved without complication, and parenteral nutrition was discontinued. On the day of life nine, the UVL was removed, and enteral feedings increased to 140 ml/kg/day with added liquid protein. Feeding duration was gradually increased to two hours from 30-minute bolus feeds for occasional emesis of undigested feeds. There were no short-term feeding-related complications encountered with this feeding regimen, and we were able to avoid a PICC line placement. The requirement of significant ventilatory support complicated her NICU course, but she tolerated her feedings well with adequate growth. By three weeks of life, caloric density was increased to 27 kcal/ounce to meet her growing needs, and she continued to tolerate it well. At the time of writing this case report, she is 12 weeks old, weighing 1800 grams. She remains on non-invasive ventilatory support because of her Chronic lung disease.

---

***“Optimal feeding practice in extremely preterm infants has remained a gray zone area. Previous studies had shown an increased risk of NEC in infants where feedings were advanced rapidly (5). However, the etiology of NEC, as we know, is multifactorial and results from a combination of factors like prematurity, sepsis, gut inflammation, and feedings (6).”***

---

## **Discussion**

Optimal feeding practice in extremely preterm infants has remained a gray zone area. Previous studies had shown an increased risk of NEC in infants where feedings were advanced rapidly (5). However, the etiology of NEC, as we know, is multifactorial and results from a combination of factors like prematurity, sepsis, gut inflammation, and feedings (6). Exclusively breast milk has been one intervention proven to reduce the risk of NEC (7,8). Breast milk contains secretory immunoglobulin A, lysozyme, lactoferrin, growth factors, cytokines, and several antioxidant enzymes, which are all believed to protect infants against NEC (9). There are situations in NICU where infants often do not have maternal breast milk available. In these situations, donor breast milk (DBM) has been increasingly used in NICUs. Studies have shown

that the use of DBM reduces the rates of NEC compared with cow's milk formula (10). Probiotic is another promising tool shown to reduce NEC incidence (11). The protective effect of probiotics is believed to be through a reduction in Toll-like receptor-4 activation and subsequent inflammatory cascade (12). However, their use for the prevention of NEC is still limited. Moreover, the optimal method of probiotic administration, the strain, dose, timing, and durations are not clear.

Among various proposed causes of NEC, enteral feeding is the only modifiable factor. As such, wide variations in feeding protocols exist across different institutions (13). Most NICUs would start enteral feedings at 10-30 ml/kg/d within the first few days of life and gradually advance by 10-30 ml/kg/d. Most previous studies that linked rapid feeding advancements with NEC were not randomized control trials (RCT) and merely compared outcomes with historical controls. As we know, the etiology of NEC is multifactorial, and some of these factors could not be controlled when compared with controls from different study periods.

---

***“Recent Cochrane reviews based on 14 RCT concluded that rapid advancements of enteral feeds do not increase the risk of NEC, death, or feeding intolerance (3). Moreover, initiating feeds early versus late decreases the risk of sepsis by 50% without increasing the risk of NEC (14).”***

---

Recent Cochrane reviews based on 14 RCT concluded that rapid advancements of enteral feeds do not increase the risk of NEC, death, or feeding intolerance (3). Moreover, initiating feeds early versus late decreases the risk of sepsis by 50% without increasing the risk of NEC (14). Early feeding establishment also results in a shorter duration of PN, length of NICU stay, reduced rate of cholestatic jaundice, and better growth (2). Infants for whom prolonged PN is needed often require a PICC line. This procedure has numerous complications, including infection, malposition, extravasation into the pleural, pericardial, or peritoneal space, arrhythmia, and line fracture with embolization (15). Preterm infants have an increased risk of postnatal growth failure and poor neurodevelopmental outcomes (16). This risk may be decreased by the early introduction of enteral feeds (17). Despite this growing evidence, very conservative feeding practices are prevalent in many institutions.

Most early and rapid feeding trials included infants with BW of more than 750 grams. Very little data is available on the safety and efficacy of early and rapid feeding advancements in infants under 500grams of BW. Intra-uterine growth restricted (IUGR) preterm infants also deserve a special mention. These infants are born with an abnormal superior mesenteric artery blood flow velocity, associated with an increased risk of NEC (18). This observation and the noted feeding difficulties during the early introduction of enteral nutrition in the IUGR infants lead many NICUs to withhold enteral feeds for the first 24 to 48 hours of life (19). However, this practice is not evidence-based as no conclusive data supports the view that this strategy prevents NEC. Moreover, the most recent

metanalysis has failed to associate an increased risk of NEC with early and rapid feeding regimens in this group of infants (3,20).

When it comes to feeding an infant under 500 gram BW, even observational studies and case series are lacking. Most institutions are even more conservative on the feeding approaches in this group. However, this is not because of reluctance to follow evidence-based practice but because clear evidence to support early and rapid feeding regimens are lacking. Since most micro-preemies have similar physiology as their slightly mature counterparts, extrapolating results of other groups of preemies may not be inappropriate, especially when there is no good evidence to delay initiation and slowly advance enteral feedings in this group. Being a micro-preemie IUGR infant, our case may serve as an essential piece of evidence to support early initiation and advancement of enteral feeds without increasing the risk of feeding intolerance or NEC. With a target of attaining full feeds by 7-8 days of life, most of these infants could be saved from PICC line insertions and their potential complications as well as complications of extended PN.

---

***“Being a micro-preemie IUGR infant, our case may serve as an essential piece of evidence to support early initiation and advancement of enteral feeds without increasing the risk of feeding intolerance or NEC. With a target of attaining full feeds by 7-8 days of life, most of these infants could be saved from PICC line insertions and their potential complications as well as complications of extended PN.”***

---

### Conclusions

Nutritional management of micro-preemie infants is often a challenging task. In the absence of clear evidence supporting early initiation and rapid/steady advancement in this group, consensus on optimal feeding management is lacking. Our case report may help boost the confidence of clinicians willing to adopt this feeding regimen. More RCTs are needed to evaluate the safety and effectiveness of early initiation and rapid/steady advancements of feeds in this group.

### Established Facts:

- Early initiation and rapid advancement of enteral feeds do not increase NEC risk in preterm infants weighing more than 750 grams at birth.
- There exist wide variations in feeding protocols across different institutions.

### Novel Insights:

- This case highlights that early initiation and steady advancement of enteral feeds is well tolerated even by an SGA Micro preemie infant.

- Early initiation and rapid advancement can help avoid a PICC line and its associated complications.

### References:

1. Ong KK, Kennedy K, Castaneda-Gutierrez E, et al.: *Post-natal growth in preterm infants and later health outcomes: a systematic review*. *Acta Paediatr*. 2010;97:974-986. [10.1111/apa.13128](https://doi.org/10.1111/apa.13128)
2. Weinberger B, Watorek K, Strauss R, Witz G, Hiatt M, Hegyi T: *Association of lipid peroxidation with hepatocellular injury in preterm infants*. *Crit Care*. 2002, 6:521-5. [10.1186/cc1547](https://doi.org/10.1186/cc1547)
3. Oddie SJ, Young L, McGuire W: *Slow advancement of enteral feed volumes to prevent necrotising enterocolitis in very low birth weight infants*. *Cochrane Database Syst Rev*. 2021;2021:CD001241. [10.1002/14651858.CD001241.pub8](https://doi.org/10.1002/14651858.CD001241.pub8)
4. Li YF, Lin HC, Torrazza RM, Parker L, Talaga E, Neu J: *Gastric residual evaluation in preterm neonates: a useful monitoring technique or a hindrance?* *Pediatr Neonatol*. 2014, 55:335-340. [10.1016/j.pedneo.2014.02.008](https://doi.org/10.1016/j.pedneo.2014.02.008)
5. Berseth CL, Bisquera JA, Paje VU: *Prolonging small feeding volumes early in life decreases the incidence of necrotizing enterocolitis in very low birth weight infants*. *Pediatrics*. 2003, 111:529-34. [10.1542/peds.111.3.529](https://doi.org/10.1542/peds.111.3.529)
6. Schnabl KL, Van Aerde JE, Thomson AB, Clandinin MT: *Necrotizing enterocolitis: a multifactorial disease with no cure*. *World J Gastroenterol*. 2008, 14:2142-2161. [10.3748/wjg.14.2142](https://doi.org/10.3748/wjg.14.2142)
7. Sullivan S, Schanler RJ, Kim JH, et al.: *An exclusively human milk-based diet is associated with a lower rate of necrotizing enterocolitis than a diet of human milk and bovine milk-based products*. *J Pediatr*. 2010, 156:562-567. [10.1016/j.jpeds.2009.10.040](https://doi.org/10.1016/j.jpeds.2009.10.040)
8. Lucas A, Cole TJ: *Breast milk and neonatal necrotising enterocolitis*. *Lancet*. 1990, 336:1519-1523. [10.1016/0140-6736\(90\)93304-8](https://doi.org/10.1016/0140-6736(90)93304-8)
9. Hanson L, Silfverdal SA, Stromback L, et al.: *The immunological role of breast feeding*. *Pediatr Allergy Immunol*. 2001, 12:15-19. [10.1034/j.1399-3038.2001.121404.x](https://doi.org/10.1034/j.1399-3038.2001.121404.x)
10. Quigley M, McGuire W: *Formula versus donor breast milk for feeding preterm or low birth weight infants*. *Cochrane Database Syst Rev*. 2014, 002971. [10.1002/14651858.CD002971.pub4](https://doi.org/10.1002/14651858.CD002971.pub4)
11. AlFaleh K, Anabrees J: *Probiotics for prevention of necrotizing enterocolitis in preterm infants*. *Cochrane Database Syst Rev*. 2014, 005496. [10.1002/14651858.CD005496.pub4](https://doi.org/10.1002/14651858.CD005496.pub4)
12. Patel RM, Underwood MA: *Probiotics and necrotizing enterocolitis*. *Semin Pediatr Surg*. 2018, 27:39-46. [10.1053/j.sempedsurg.2017.11.008](https://doi.org/10.1053/j.sempedsurg.2017.11.008)
13. Klingenberg C, Embleton ND, Jacobs SE, O'Connell LA, Kuschel CA: *Enteral feeding practices in very preterm infants: an international survey*. *Arch Dis Child Fetal Neonatal Ed*. 2012, 97:56-61. [10.1136/adc.2010.204123](https://doi.org/10.1136/adc.2010.204123)
14. Flidel-Rimon O, Friedman S, Lev E, Juster-Reicher A, Amitay M, Shinwell ES: *Early enteral feeding and nosocomial sepsis in very low birthweight infants*. *Arch Dis Child Fetal Neonatal Ed*. 2004, 89:289-292. [10.1136/adc.2002.021923](https://doi.org/10.1136/adc.2002.021923)
15. Colacchio K, Deng Y, Northrup V, Bizzarro MJ: *Complications associated with central and non-central venous catheters in a neonatal intensive care unit*. *J Perinatol*. 2012, 32:941-6. [10.1038/jp.2012.7](https://doi.org/10.1038/jp.2012.7)
16. Ehrenkranz RA, Dusick AM, Vohr BR, Wright LL, Wrage



LA, Poole WK: Growth in the neonatal intensive care unit influences neurodevelopmental and growth outcomes of extremely low birth weight infants. *Pediatrics*. 2006, 117:1253-1261. [10.1542/peds.2005-1368](#)

17. Unger A, Goetzman BW, Chan C, Lyons AB III, Miller MF: Nutritional practices and outcome of extremely premature infants. *Am J Dis Child*. 1986, 140:1027-1033. [10.1001/archpedi.1986.02140240073029](#)
18. Malcolm G, Ellwood D, Devonald K, et al.: Absent or reversed end diastolic flow velocity in the umbilical artery and necrotizing enterocolitis. *Arch Dis Child*. 66:805-807. [10.1136/adc.66.7.spec.no.805](#)
19. McDonnell M, Serra V, Gaffney G, et al.: Neonatal outcome after pregnancy complicated by abnormal velocity waveforms in the umbilical artery. *Arch Dis Child*. 70:84. [10.1136/fn.70.2.f84](#)
20. Salas AA, Li P, Parks K, Lal CV, Martin CR, Carlo WA: Early progressive feeding in extremely preterm infants: a randomized trial. *Am J Clin Nutr*. 2018, 107:365-370. [10.1093/ajcn/nqy012](#)

**Authors Contribution:** Mohammad Adnan conceptualized this case report and drafted the initial manuscript. Andrea Coons, Prashant Malviya, and Sana Afroz revised and edited the manuscript for intellectual contents.

**Ethics:** Informed consent was obtained from the mother of the infant for publication. However, no personal identifier has been used in this case report.

**Conflict of Interest:** All of the authors declare no conflict of interest.

**Funding:** Authors declare that no funding for this project was received in any form.

**Disclosures:** The authors have no disclosures

**NT**



Andrea Coons NNP  
IU Health Ball Memorial Hospital  
Muncie, Indiana



Prashant Malviya MD FAAP  
IU Health Ball Memorial Hospital  
Muncie, Indiana

#### Corresponding Author



Mohammad Adnan MD, FAAP  
Adjunct Assistant Clinical Professor of Pediatrics  
Vice-Chair Dept. of Pediatrics  
Attending Neonatologist  
IU Health Ball Memorial Hospital  
Muncie, Indiana  
Email: [madnan@iuhealth.org](mailto:madnan@iuhealth.org)



Sana Afroz MD  
Adjunct Clinical Assistant Professor of Medicine  
IU Health Ball Memorial Hospital  
Muncie, Indiana

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](mailto:jhageman@peds.bsd.uchicago.edu)



Readers can also follow  
**NEONATOLOGY TODAY**  
 via our Twitter Feed  
 @NEOTODAY

## 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 guidelines limit their access to RSV preventative treatment, increasing these babies' risk.



COVID-19

### FREE for our NICU COMMUNITY

- Helping Children and Families Cope
- Bonding with Your Baby
- Caregivers Need Care Too



## OPIOIDS and NAS

When reporting on mothers, babies, and substance use

# LANGUAGE MATTERS



### I am not an addict.

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



### I was exposed to opioids.

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



### NAS is a temporary and treatable condition.

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



### My mother may have a SUD.

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

### My potential is limitless.

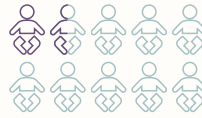
I am so much more than my NAS diagnosis. My drug exposure will not determine my long-term outcomes. But how you treat me will. When you invest in my family's health and wellbeing by supporting Medicaid and Early Childhood Education you can expect that I will do as well as any of my peers!



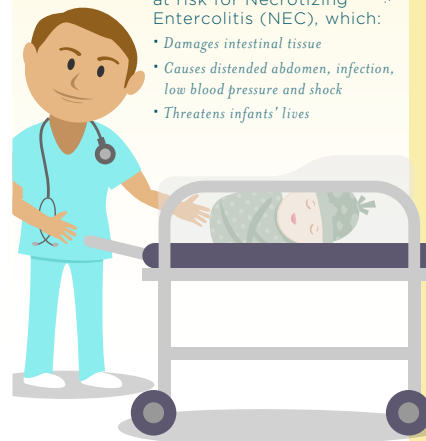
Learn more about Neonatal Abstinence Syndrome at [www.nationalperinatal.org](http://www.nationalperinatal.org)



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



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

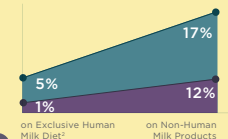


**MICRO PREMIES** are at risk for Necrotizing Enterocolitis (NEC), which:

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

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

When that happens:



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

## HOW TO HELP PREVENT NEC: EXCLUSIVE HUMAN MILK DIET

What is an Exclusive Human Milk Diet?



NO cow's milk



NO sheep's milk



NO goat's milk



NO formula



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

### Why Is An Exclusive Human Milk Diet Important?

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

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



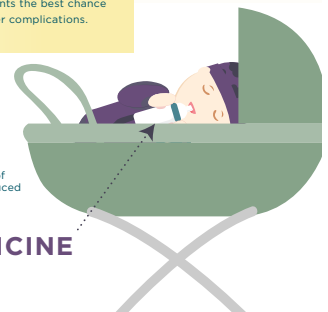
Mortality is reduced by **75%**\*



Feeding intolerance decreases\*



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



HUMAN MILK = **MEDICINE**

LEARN MORE ▶

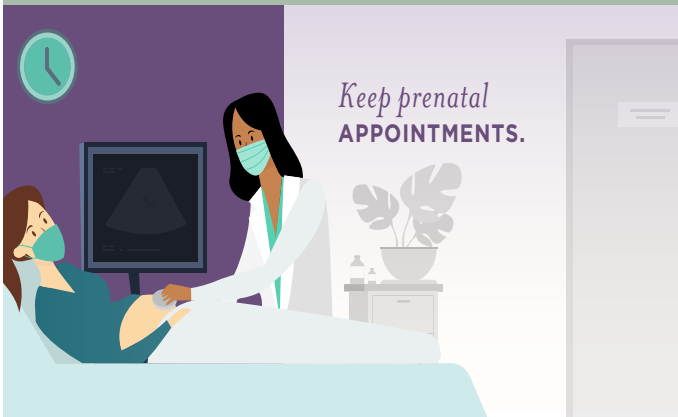
**NCFIH** National Coalition for Infant Health  
Promoting the best for Preterm Infants Through Age 100

\* Hair AB, et al. "Beyond Necrotizing Enterocolitis Prevention: Improving Outcomes with an Exclusive Human Milk-Based Diet." *Breastfeeding Medicine* 2015; 10:106-116. DOI: 10.1089/bfm.2015.0124  
 † Abrams SA, et al. "Greater Mortality and Morbidity in Extremely Preterm Infants Fed a Diet Containing Cow Milk Protein Products." *Breastfeeding Medicine* July/August 2014; 9(6): 281-285  
 \* Hall SA, et al. "Mortality and management of surgical necrotizing enterocolitis in very low birth weight neonates: a prospective cohort study." *J Am Coll Surg*. 2014 Jun;218(6):1148-55.  
 \* Assad M, Elliott MJ and Abraham JH. "Decreased cost and improved feeding tolerance in VLBW infants fed an exclusive human milk diet." *Journal of Perinatology* advance online publication 12 November 2015; DOI: 10.1097/jp.2015.1169

## The PREGNANT MOM'S Guide To Staying SAFE DURING COVID-19



Maintain at least  
**A 30-DAY SUPPLY**  
OF YOUR MEDICATIONS.



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

## 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](http://nicuparentnetwork.org)  
[nationalperinatal.org/skin-to-skin](http://nationalperinatal.org/skin-to-skin)

**NPN**  
NICU PARENT NETWORK

New subscribers are always welcome!

## NEONATOLOGY TODAY

To sign up for free monthly subscription, just click on this box to go directly to our subscription page

Readers can also follow

## NEONATOLOGY TODAY

via our Twitter Feed

@NEOTODAY

MedEd On The Go® presents

3 Accredited Education Programs in Short-Form Video Format  
Available for CME/CNE Credits

# The Role of Nutrition & Exclusive Human Milk for Very Low Birth Weight Infants



### Preventing Bronchopulmonary Dysplasia

1.75 credit hours

WATCH NOW



[www.MedEdOTG.com/video/program/599](http://www.MedEdOTG.com/video/program/599)

### Preventing Neonatal Sepsis

0.5 credit hours

WATCH NOW



[www.MedEdOTG.com/video/program/609](http://www.MedEdOTG.com/video/program/609)

### Preventing Retinopathy of Prematurity

1.0 credit hour

WATCH NOW



[www.MedEdOTG.com/video/program/608](http://www.MedEdOTG.com/video/program/608)



**Stephen E. Welty, MD**

Clinical Professor of Pediatrics  
University of Washington  
School of Medicine  
Seattle, WA



**Dan L. Stewart, MD**

Professor of Pediatrics & International Pediatrics  
University of Louisville School of Medicine  
Co-Director of NICU & ECMO  
Norton Children's Hospital  
Louisville, KY



**Jonathan R. Swanson, MD, MSc**

Associate Professor of Pediatrics  
University of Virginia  
Children's Hospital  
Charlottesville, VA

# eLearning Courses

Health and Racial in the NICU

## Meet Our Faculty



+ Jenné Johns, MPH  
Once Upon A Premie Academy



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



+ Dawn Godbolt, Ph.D.  
National Birth Equity Collaborative



+ Dalia Feltman, MD, MA, FAAP  
Univ. of Chicago Pritzker School of Medicine



+ Chavis A. Patterson, Ph.D.  
Children's Hospital of Philadelphia



+ Terri Major- Kincade, MD, MPH  
Pediatrician and Neonatologist



+ Shanté Nixon  
Connect2NICU



+ Ashley Randolph  
Glo Premies



**REGISTER TODAY**

[OnceUponAPremieAcademy.com](https://OnceUponAPremieAcademy.com)

## Health and Racial Equity + On-Demand Continuing Education

The first and only virtual training academy focused on delivering health and racial equity educational programs for perinatal and neonatal healthcare professionals. Our purpose is to raise awareness and offer real-time solutions for addressing health and racial equity.

# Abstracts from the California Association of Neonatologists Cool Topics in Neonatology 27<sup>th</sup> Annual Conference

John Cleary, MD

The Poster Abstracts Table of Contents from the 26<sup>th</sup> Annual



## Cool Topics in Neonatology

27th Annual Conference  
*A Virtual Educational Conference*

Friday, Saturday & Sunday  
March 5 - 7, 2021

Conference are presented below:

- |              |   |
|--------------|---|
| Abstract # 1 | Erase Post-op Pain, a Quality Improvement Project   |
| Abstract # 2 | Changes in The Microbiome and Metabolome of Milk Feeds and Stool from Preterm Infants with a Maternal History of Asthma                             |
| Abstract # 3 | Providing Consistent Developmentally Appropriate Sensory Experiences in a Community Level 3 NICU  |
| Abstract # 4 | “Please Don’t Break Up With Us”! How to Stay Connected to Parents Post Discharge  |
| Abstract # 5 | Standardized Clinical Approach for the Management of Abnormal Cord Blood Gases In Neonates at Risk for Hypoxic-ischemic Encephalopathy              |
| Abstract # 6 | Erythropoietin is not a risk factor for severe retinopathy of prematurity among high risk preterm infants   |
| Abstract # 7 | Erase the Pain: Improving Neonatal Post-Operative Pain Management   |
| Abstract # 8 | Bifidobacterium longum Subspecies infants EVC001 Improves Intestinal Enterocyte Proliferation and Permeability in Premature Infants in Vitro Models |
| Abstract # 9 | Neonatal COVID-19 Infections Associated with Maternal Contact in the Perinatal  |



	Period	Abstract # 23	Impact of activated Bifidobacterium longum subsp. infantis EVC001 probiotic feeding on preterm patient outcomes
Abstract # 10	Racial and Ethnic differences in Neonatal and Maternal COVID-19 Infection in the Perinatal Period		
		Abstract # 24	Neuroprotective Guidelines (NPGs) for the Prevention of Intraventricular Hemorrhage (IVH) in Extremely Pre-mature Infants
Abstract # 11	Implementation of a Dextrose-Gel Algorithm for Hypoglycemia in a Large Birth Center with a Level III NICU		
		Abstract # 25	The Neuroprotection of Oral Enjoyment by Offering Milk Drops
Abstract # 12	RSVH and BH in Children with Higher-Risk CHD Aged ≤24 Months		
		Abstract # 26	Multidisciplinary Project to Establish and Maintain a Centralized Milk Preparation Room in a Neonatal Intensive Care Unit
Abstract # 13	Patent foramen ovale versus atrial septal defect in extremely low birth-weight infants: can they be differentiated?		
		Abstract # 27	Use of Human Milk-Based Diet in the Late Preterm and Term Infant in the Neonatal Intensive Care Unit: A Pilot Randomized Controlled Trial
Abstract # 14	Thriving in NICU and at 1 Year Post-Discharge		
		Abstract # 28	BRAVE SPACE: A Diversity, Equity, Inclusion (DEI) initiative in the Intensive Care Nursery (ICN); Perspectives from the bedside
Abstract # 15	Multi-Omics Approach Suggests a Novel Molecular Mechanism of Necrotizing Enterocolitis in the Preterm Infant Gut Microbiome		
		Abstract # 29	Decreasing the Incidence of Intravenous Infiltration Via Quality Improvement Measures
Abstract # 16	Biologic Potential of Human Umbilical Cord Mesenchymal Stem Cells Exposed to Antenatal Marijuana		
		Abstract # 30	Correlation between Total Serum Bilirubin and Transcutaneous bilirubin levels in extremely preterm infants less than 30 weeks gestation
Abstract # 17	A rare anomaly – Duodenal Dieulafoy's lesion in a preterm baby		
		Abstract # 31	Transcutaneous bilirubin levels compared to Total Serum Bilirubin levels in extremely preterm infants less than 30 weeks gestation
Abstract # 18	Clinical outcome of newborns born to mothers infected with SARS-CoV-2 during pregnancy: A Prospective cohort study		
		Abstract # 32	Decreasing Unnecessary Mother-Baby Separation at Birth by Assigning a Designated Location for the Pediatric Provider at Mother's Bedside
Abstract # 19	Improving Placental Transfusion Rates at UCSD		
		Abstract # 33	B. infantis EVC001 Feeding in VLBW Infants is Associated with Significant Reduction in Rates of NEC
Abstract # 20	Trends in Risk of Respiratory Syncytial Virus Hospitalizations in Preterm Infants Over a 10-Year Period		
Abstract # 21	COVID-19 UPDATE		
Abstract # 22	Preventing Bronchopulmonary Dysplasia (BPD): Evidence-Based Bundle and Multidisciplinary Team Approach		

**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](mailto:LomaLindaPublishingCompany@gmail.com)**



- Abstract # 34      CAN 2021 Abstract: Perturbed Gut Microbes and Circulating Cytokines Herald Growth Failure in Preterm Infants
- Abstract # 35      Reinforcement of Preventive Bundle Led to Low Incidence in Severe Retinopathy of Prematurity in High Risk Premature Infants: A Quality Improvement Study
- Abstract # 36      Improving NICU Nurse's Recognition of Normal and Abnormal Patterns on aEEG Monitoring
- Abstract # 37      Quality improvement initiative to reduce antibiotic exposure of asymptomatic infants born to mothers with intraamniotic infection
- Abstract # 38      Association Between Umbilical Cord Management and 5 Minute Peripheral Oxygenation In Preterm Infants

**Abstract #1**

**Erase Post-op Pain, a Quality Improvement Project**

Irfan Ahmad MD, Melissa Powell NNP, Beverly Walti CNS, Vivian Anaya RN and Grant Shafer MD. CHOC Children's Hospital, Orange County, California.

Background: Unrelieved post-operative (op) pain in infants undergoing surgery can adversely affect recovery.

Smart Aim: To decrease the proportion of pain control failures in NICU infants undergoing non-cardiac surgery from baseline of 20.6% (January to May 2019) to below 10% by December 2020.

Setting: This QI project was carried out at the Surgical NICU at CHOC Children's Hospital in collaboration with Children's Hospitals Neonatal Consortium (CHNC) as a multiple NICU collaborative project.

Drivers of Change: Accuracy of post-op pain assessment, standardization of pain management, timely availability of pain medications and family engagement as shown in figure 1.

Methods: Multidisciplinary team set up and monthly meetings were held with other CHNC teams. Initial intervention was nursing education to accurately assess and document pain scores. Standardized pain management guideline was then developed. Pain management was made part of our structured pre- and post-op huddles. Pain medication were ordered prior to surgery for immediate post-op availability. Partnership was developed with families. Data were entered on shared Institute for Healthcare Improvement (IHI) extranet site. Multiple Plan-Do- Study-Act cycles were run in accordance with IHI Model for Improvement.

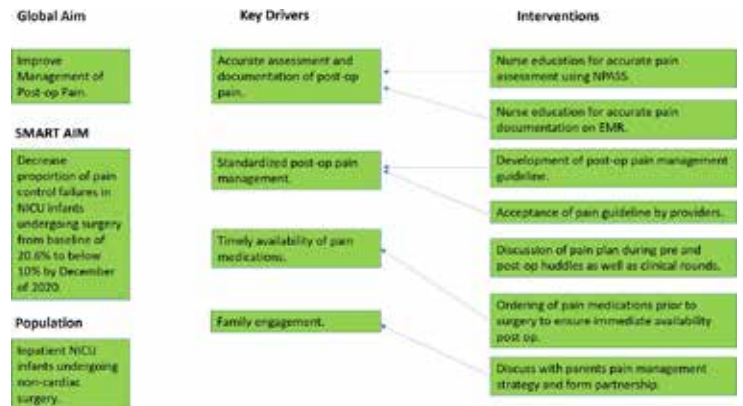
Measures: Post op pain scores utilizing Neonatal Pain, Agitation and Sedation Scale (NPASS) were recorded over 24 hours from time of return of infant to NICU. Pain control failure was defined as any two consecutive NPASS scores  $\geq 4$  (over 30-60 minutes) during this period.

Results: Data recorded during the first five months of 2019 served as baseline. With adoption of improvement strategies, there was a significant shift in mean from 20.6% (baseline) to 7.6% failures and a narrowing of control limits as shown in control chart (figure 2). We were able to meet our goal of <10% pain control failures for most months following April 2020.

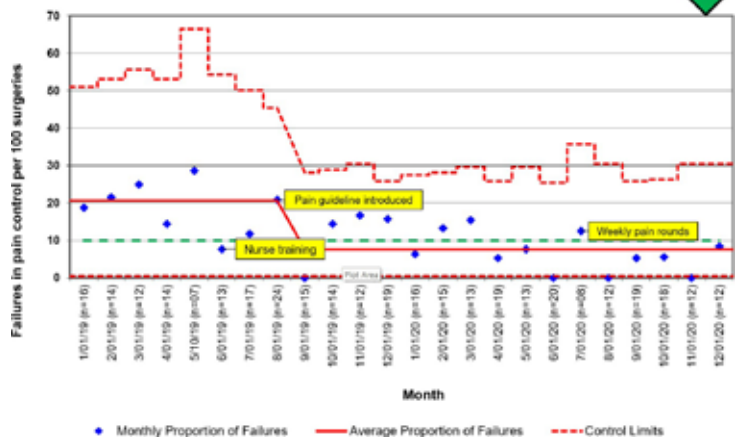
Discussion: A structured post-op pain management quality improvement program can lead to better pain control in NICU infants undergoing surgery. We benefitted from collaborating with multiple teams dealing with similar problems. Multidisciplinary approach with focus on nurse training for accurate pain assessment and use of standardized pain management guidelines were key strategies that led to improvements.

Our next steps would be to solidify the implementation of these strategies to sustain our gains over the next one year.

**Figure 1: Key driver diagram for Erase Pain project.**



**Figure 2: Erase Pain Control P Chart**



**Abstract # 2**

Changes in The Microbiome and Metabolome of Milk Feeds and Stool from Preterm Infants with a Maternal History of Asthma

Shiyu Bai-Tong<sup>1\*</sup>, Kelly Weldon<sup>2</sup>, Shalisa Hansen<sup>2</sup>, Diba Motaza-

California Association of Neonatologists (CAN) and  
AAP District IX Section on Neonatal-Perinatal Medicine

# Cool Topics in Neonatology

**27th Annual Conference**  
*A Virtual Educational Conference*

**Friday, Saturday & Sunday**  
**March 5 - 7, 2021**



vi<sup>3</sup>, Jessica Kitsen<sup>3</sup>, Bob Geng<sup>3</sup>, Se Jin Song<sup>2</sup>, Jack Gilbert<sup>2</sup>, Pieter Dorrestein<sup>2</sup>, Rob Knight<sup>2</sup>, Sydney A. Leibel<sup>3</sup>, Sandra L. Leibel<sup>1</sup>

1 Division of Neonatology, University of California, San Diego, Rady Children's Hospital

2 Center for Microbiome Innovation, University of California San Diego

3 Division of Allergy and Immunology, University of California, San Diego, Rady Children's Hospital

### Background:

Preterm infants are independently at risk for asthma and atopy with lifelong consequences. Studies have shown that in term infants, atopic disease risk is increased based on type of milk feeds, species of gut flora and maternal history of atopy. The impact of milk feeds and species of gut flora in the setting of maternal atopy in the preterm infant has not been defined.

### Objective:

We hypothesized that the breastmilk from mothers with a history of asthma, as well as the stool from their preterm infants, will have different microbiome and metabolome profiles, compared to mothers without a history of asthma.

### Method:

Preterm infants 34 weeks gestational age from a single neonatal intensive care unit in San Diego were enrolled in the MAP (Microbiome, Atopic disease, and Prematurity) Study. Nine infants of mothers with a history of asthma and 9 infants of mothers without a history of asthma (control) were included in the study. Sample size was chosen based on the power calculations for alpha diversity in the stool microbiome. Meconium samples were collected at birth and milk feeds and stool samples were collected at 2 weeks (babies on full NG feeds) and 6 weeks (babies starting to PO feed) of age. Samples were analyzed for microbiome and metabolomic profiles. Metabolites were analyzed by untargeted gas chromatography-mass spectrometry and Kruskal-Wallis H test was used for statistical analysis. Bacterial compositions are currently being analyzed by 16S rRNA gene sequencing.

### Result:

Average gestational age between the control and maternal asthma groups were 29.6 weeks vs. 29.7 weeks with birth weights 1381 grams vs. 1242 grams, respectively. Metabolite analysis of the stool showed significant differences between the control and maternal asthma groups at 6 weeks postnatal age ( $p = 0.027$  and pseudo-F = 2.33) regardless of feeding methods (gavage vs. oral), respiratory support, and antibiotic use. Metabolite analysis of milk samples demonstrated significant difference between the control and maternal asthma group ( $p = 0.016$ , pseudo-F = 2.35587) that appeared to be driven by the dipeptide Leucine-Proline and potentially other dipeptides in the same network.

### Conclusion:

Our preliminary results demonstrate novel significant differences in fecal and breastmilk metabolites between preterm infants born to mothers with and without a history of asthma. These findings will be correlated with the microbiome data analysis of the same samples currently in progress.

### Abstract # 3

**Title: Providing Consistent Developmentally Appropriate Sensory Experiences in a Community Level 3 NICU**

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

**Background:** Premature infants experience procedural touch/handling, movement, strong smells, sounds, lights, frequent nociceptive pain, and disruption of sleep during their critical sensory development stage in Neonatal Intensive Care Unit (NICU). The mismatch of underdevelopment and intense NICU environment may cause physiologic instability, affect growth and development, and ultimately impact long term neurodevelopmental outcomes. Providing appropriate positive sensory experiences can potentially optimize brain development and reverse the morbidity among high risk infants.

**Design:** Family Centered Care team implemented quality improvement focus on three sensory interventions using SMART aim. **Tactile** with early Skin to Skin Care (SSC) and longer Out of the Box (OOTB) time. Baseline data was collected. An educational board with instructions and pictures on how to safely transfer infants was displayed in NICU. Informational handout and a "First Hold Certificate" for parents were created. Nurses and RTs were trained on safe transfer of intubated infants. **Taste** with early colostrum. During prenatal consultation neonatologists emphasized on early colostrum and provided video on how to perform Hand Expression (HE). Aim was to improve maternal milk supply by expressing colostrum shortly after delivery. A nursing team of champions was formed in Labor and Delivery, NICU and post-partum unit and trained by lactation consultants. Nurses in all units completed the competency with champions to disseminate a consistent message. **Auditory** with positive vocal exposure by reading for 30 mins/day by parents or staff. Reach Out and Read team created parent brochure, staff information, and crib card reminder. To encourage reading after discharge a book bag was designed with a grant from El Camino Health Foundation.

**Results:** First SSC for  $\leq 30$  weeks decreased from 174 to 65 hours of life (HOL) and for 30-35 weeks decreased from 27 to 12 (Fig 1&2). OOTB time improved from 89 to 153 minutes per day (Fig 3). First oral colostrum interval was reduced from 22 HOL to 8 (Figure 4). Reading time increased to 17 minutes for all and 23 (Fig 5) for babies stayed longer.

**Conclusion:** Our results are limited by the small number of very low birth weight infants in our cohort but improved in all three sensory interventions. Future focus will be on reducing pain using positive touch and noise reduction.

Figure 1

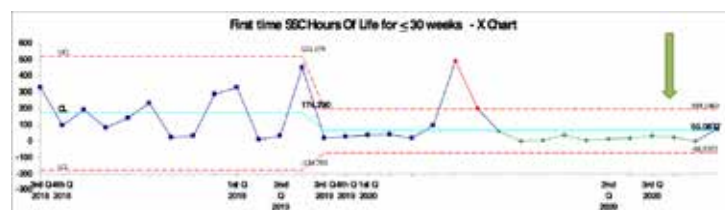


Figure 2



Figure 3

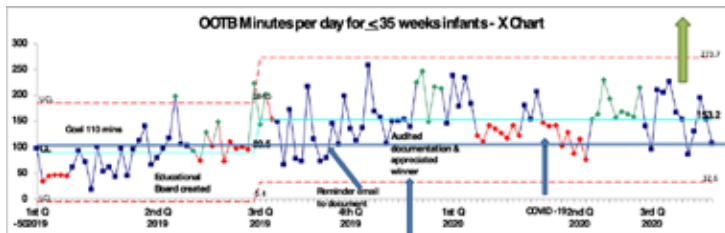


Figure 4



Figure 5



**Abstract # 4**

**Title:** “Please Don’t Break Up With Us”! How to Stay Connected to Parents PostDischarge.

**Authors:** \*\*Malathi Balaşundaram, MD<sup>1, 2</sup>, Melinda Porter, RN, CNS, NNP-BC, C-NNIC<sup>2</sup> Nona Mateo, RN<sup>2</sup>, Julie Plank, BSN, RN<sup>2</sup>, Judy Baldwin, MSN, RNC-NIC<sup>2</sup>, Dharshi Sivakumar MD<sup>1, 2</sup>, Pediatrics, Neonatology, Stanford University School of Medicine, Stanford, CA<sup>1</sup>, and El Camino Hospital NICU, Mountain View, CA<sup>2</sup>.

**Background:** One of the six components of comprehensive family support in the Newborn Intensive Care Unit (NICU) is Post Discharge Follow Up. The importance of continuity of care for the baby and parents after discharge has long been recognized. Telephone Follow Up (TFU) calls are frequently cited as a cost-effective method to reduce readmission rate and enhance communication with patients and families after discharge. Our 20 bed community level 3 NICU implemented Family Centered Care Program (FCCP) in 2016. Ever since we have implemented staff education and support, family centered developmental care, and parent buddy program. Members of our Family Advisory Board (FAB) suggested TFU project to maintain connectedness with families and to understand their NICU experience and home transition.

**Design:** During the planning period we considered three decision points to make this project successful. Who should make the call? Which information is essential? What is the optimal timing, frequency and duration of TFU calls. We recruited three nurses, and developed a script with relevant questions. TFU calls were made between one and four weeks after discharge and lasted 15-30 min. During these calls we asked for feed back on our discharge preparation process, quality of the lactation visit in NICU, and home transition. Families were also briefed on the importance of returning the patient satisfaction survey. After an year, we added questions related to their emotional journey and the factors which

helped cope with their stress.

**Results:** This project was offered to all infants discharged from the unit. Our “Patient Satisfaction Survey” return rate of 17% in 2018 improved to 21% (above national average) after initiating TFU. We connected with more families through TFU calls compared to the hospital survey response. We also learned about our discharge process and the results are shown in the flow diagram and demographic data in a table. On the quality of the lactation visit in the NICU 95% (156/164) rated 4 or 5.

**Conclusion:** Parents often express how much they appreciate the follow up. Reaching out with a simple phone call communicates to them, that their NICU journey was important to us. We were able to learn more about our strengths and weaknesses through TFU calls because of parents’ insightful candor. This information, when shared with the NICU Care Team, created a catalyst for change and improvements to better serve future families.

Table 2: Verbatim comments from our phone calls:

<p>Discharge process regarding tablet-based education:</p> <p>It is very good informative material and it answered most of our questions. Appreciated the simplicity of the iPad.</p> <p>Very convenient refresher for experienced parents. Smooth, easy-to-navigate, and self-paced.</p>
<p>Emotional/ coping mechanism:</p> <p>Open communication from staff and physicians helped us to cope. Knowing that we can visit anytime of the day helped us cope.</p> <p>Enjoyed follow up phone call, felt very special and connected to NICU team. Daily updates were helpful and reassuring.</p> <p>It was lot of unknown, explained what to expect helped us, answering all the questions helped a lot.</p>
<p>Things that could be improved:</p> <p>Providing accommodations for NICU parents.</p> <p>Moving the baby from space to space was upsetting, hard to adjust to new environment each time.</p> <p>Lactation nurse was very theoretical, not at all hands on.</p> <p>Differing opinion about their babies progress</p> <p>iPad education should be tailored to first and 2nd time parents.</p>

**New subscribers are always welcome!**

**NEONATOLOGY TODAY**

**To sign up for a free monthly subscription, just click on this box to go directly to our subscription page**

Flow diagram :

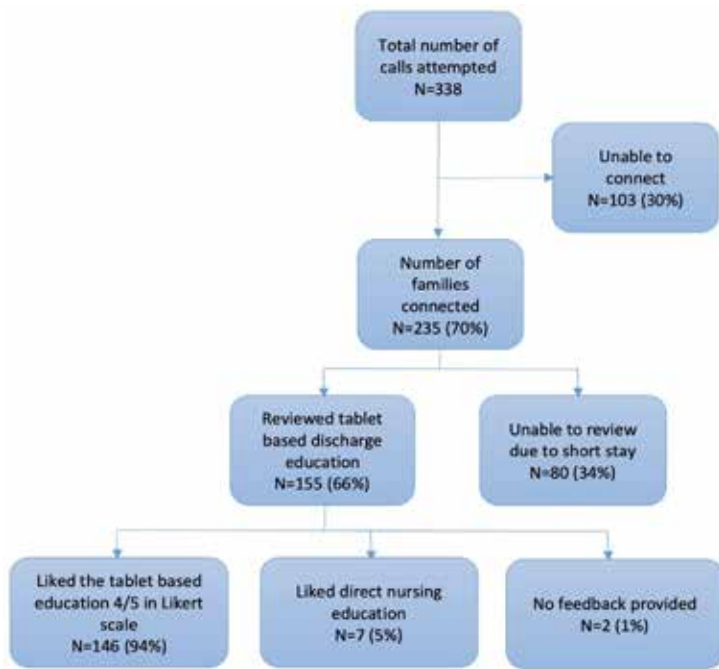


Table 1: Demographics:

	Intervention
Time	April 2019 - Sep 2020
Total call attempted	338
Number of families connected	235 (70%)
Gestational Age	26 3/7 – 41 5/7 median (364/7)
Length of Stay	2-121 days (median 8 days)

#### Abstract # 5

Standardized Clinical Approach for the Management of Abnormal Cord Blood Gases In Neonates at Risk for Hypoxic-ischemic Encephalopathy

Elizabeth Blecharczyk<sup>\*1</sup>, Lucy Lee<sup>\*2</sup>, Krista Birnie<sup>3</sup>, Arun Gupta<sup>1</sup>, Alexis Davis<sup>1</sup>, Krisa Van Meurs<sup>1</sup>, Sonia Bonifacio<sup>1</sup>, Adam Frymoyer<sup>1</sup>

<sup>1</sup>Pediatrics, Stanford University, Palo Alto, CA; <sup>2</sup>Pediatrics, Palo

Alto Medical Foundation, Palo Alto, CA; <sup>3</sup>Pediatrics, University of Washington, Seattle, WA

#### Introduction:

Infants that have abnormal cord blood gases are at risk for hypoxic-ischemic encephalopathy (HIE) and may benefit from neuroprotective cooling. Both the cord gas and the clinical exam together are essential for diagnosis and determining eligibility for cooling. Our specific aim was to develop a standardized clinical care protocol to screen infants with abnormal cord blood gases to ensure timely identification and evaluation of neonates at risk for HIE.

#### Methods:

Within a QI framework, a standardized clinical care approach for inborn neonates  $\geq 36$  weeks gestation with 'abnormal' cord blood gases was implemented in January 2016 at our institution. Abnormal cord blood gases, defined as pH  $\leq 7.0$  or base deficit (BD)  $\geq 10$ , resulted in a direct call-back from the laboratory to the in-house neonatal hospitalist. The hospitalist then followed an algorithm that centered on the modified Sarnat neurological exam, postnatal blood gas testing, and standardized documentation. Each hospitalist received education on HIE, the benefits of cooling, and how to perform a Sarnat exam. The percentage of direct lab-to-physician call notification of any abnormal cord gases and the percentage of infants with an abnormal cord gas that had a documented Sarnat exam and postnatal infant gas were examined for the six months before and 35 months after QI implementation.

#### Results:

Of the 203 infants who had abnormal cord gases in the post-QI period, the laboratory made direct contact with the neonatal hospitalist to confirm the abnormal value in 186 cases (92%). In the post-QI period, 190 (93.5%) infants had a documented Sarnat exam, and 191 (94%) infants had a postnatal blood gas drawn compared to 16% of infants who had a documented Sarnat exam and 11% of infants with a postnatal gas in the pre-QI period. Throughout the entire post-QI period, 15 (7.4%) infants were cooled. Of those cooled, 13 (87%) were already in the NICU, but 2 (13%) were identified in the newborn nursery and subsequently admitted to the NICU for neuroprotective cooling. A standardized screening approach in neonates with 'abnormal' cord blood gases led to timely identification and evaluation of neonates at risk for HIE.

#### Abstract #6

**Title:** Erythropoietin is not a risk factor for severe retinopathy of prematurity among high risk preterm infants.

Kim Chi T. Bui\*, Afshan Abbasi, Maria-Fe Villosis, Marielle Nguyen, Huy Truong, Tameka Watson, Joanna Buchanan, Naomi Ellenhorn, Qiaoling Chen. Department of Pediatrics-Neonatology, Kaiser Permanente Los Angeles, Downey, Panorama City, Orange County, Fontana, Department of Ophthalmology, Kaiser Permanente Los Angeles and Department of Research and Evaluation, Pasadena, CA.

#### Background:

Retinopathy of prematurity (ROP) is a developmental retinal vasoproliferative disease and a leading cause of blindness in children. Early gestational age at birth, low birth weight, and oxygen exposure are the main known risk factors for the development of ROP.

Recombinant erythropoietin (EPO) has been used for over two decades in the treatment of anemia in preterm infants to lessen

the need for blood transfusions. There is increasing evidence of its positive effects in neuroprotection and in reducing the rate of bronchopulmonary dysplasia in these infants. However, there are conflicting reports of a possible association between EPO use and an increased risk for the development of ROP.

**Objective:**

To determine whether erythropoietin is an independent risk factor for the development of severe ROP among preterm infants with a gestational age of 23 to 32 weeks and a birth weight of 1500 grams or less.

**Methods:**

We performed a retrospective study on a cohort of 1762 premature infants born between 2009 and 2014 in the Kaiser Permanente hospitals in Southern California. 902 of these patients received EPO. To examine the association between treated ROP and EPO, a propensity score (PS) analysis was performed using the inverse probability of treatment weighted (IPTW) approach.

**Results:**

In our study, the incidence of treated ROP was 7.3 % (129/1762). A univariate regression analysis showed that EPO use, intrauterine growth restriction, multiple gestation, and chorioamnionitis were not significant risk factors for severe ROP. Low gestational age, low birthweight, neonatal infections, necrotizing enterocolitis, grade 3 and 4 intraventricular hemorrhage, patent ductus arteriosus, oxygen or respiratory support, and blood transfusions were associated with an increased risk for severe ROP requiring treatment.

The PS analysis did not show an association between EPO treatment and ROP in either the whole population or in the subgroup of babies born at 23 to 28 weeks gestation, in whom the incidence of ROP was the highest.

**Conclusion:**

Based on our analysis, EPO treatment in preterm infants is not associated with the development of severe ROP.

**Abstract # 7**

Title: Erase the Pain: Improving Neonatal Post-Operative Pain Management

Author: Rebecca Carter\*, Dannielle Heath, Gale Romanowski, Gloria Hwang, Clay Stanley, David Lazar, Hariharan Thangarajah, Jeanne Carroll, Mark Speziale, Laurel Moyer

**Background:**

Untreated and under-treated pain in neonates has been linked to both short- and long-term physiologic and neurodevelopmental consequences. Opioids are a mainstay of pharmacologic analgesia, but long-term use is associated with prolonged mechanical ventilation, delayed enteral feeds, increased risk of opioid withdrawal, and increased neurologic morbidity. The use of pain and sedation guidelines is recommended by the American Academy of Pediatrics and has been associated with improved clinical outcomes. We conducted a quality improvement project to improve post-operative pain management and reduce opioid exposure in

our level IV NICU.

Objective: Decrease the number of patients with unrelieved pain (defined as consecutive N-PASS scores  $\geq 4$ ) in the first 24 hours post-operatively, from a baseline of 15% to 10%, by June 2020.

Setting: Our center is a level IV NICU with an average of 20 neonates undergoing surgery each month. There is no standardized pharmacologic approach to pain management.

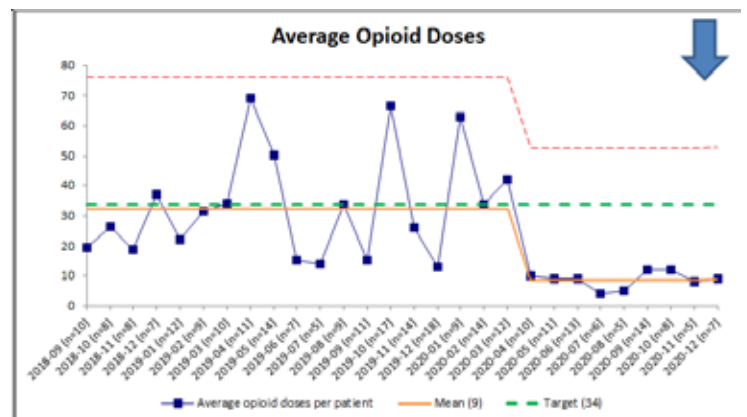
Intervention: A multidisciplinary team was established, and monthly meetings were held to discuss strategies for change. N-PASS scores during the first 24 hours were tracked as a primary outcome measure. Total opioid doses during hospitalization were tracked as a balancing measure.

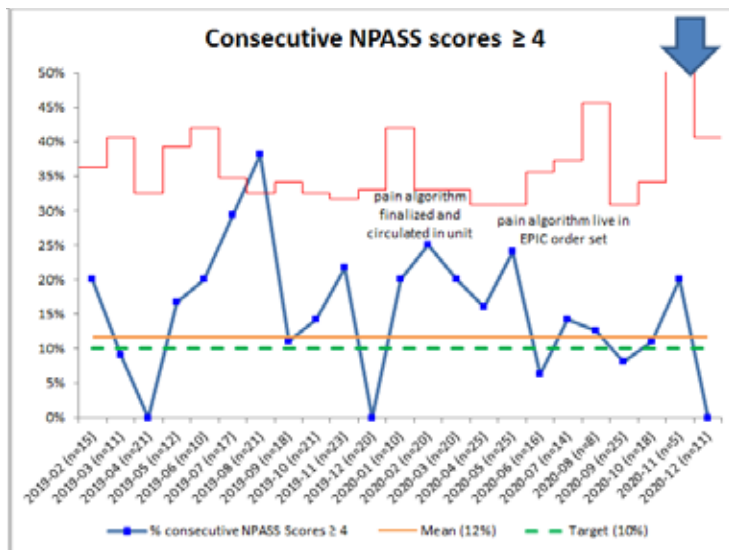
- 1) Create a multidisciplinary team
- 2) Implement a standardized pharmacologic guideline for post-op pain management
- 3) Re-educate staff on pharmacologic and non-pharmacologic pain management strategies
- 4) Discuss pain assessments on rounds
- 5) Survey families on post-op pain management

Results: In the baseline period (February to July 2019), 15% of patients had consecutive N-PASS scores  $\geq 4$  in the first 24 hours post-op. Baseline opioid exposure was 31 doses per patient. In the intervention period (August 2019 – present), opioid exposure was reduced to an average of 9 doses per patient. This was associated with a centerline shift corresponding with the implementation of a standardized pharmacologic guideline. The percent of post-op patients with consecutive N-PASS scores  $\geq 4$  remained at 15% in the intervention period.

**Conclusions and Future Directions:**

Through this QI effort, we established a multidisciplinary team to improve post-operative pain management in neonates. We standardized our approach to post-operative pain management and reduced opioid exposure in our surgical population by over 50%. We improved documentation of pain scores and enhanced discussion of pain management amongst medical providers, bedside staff, and families.





### Abstract # 8

*Bifidobacterium longum* Subspecies *infantis* EVC001 Improves Intestinal Enterocyte Proliferation and Permeability in Premature Infants *in Vitro* Models

Authors: \*S. Chew<sup>1</sup>, T. Guo-Zhong<sup>2</sup>, A. Ehrlich<sup>3</sup>, J. Prombs<sup>1</sup>, K. Sylvester<sup>2</sup> and B. Henrick<sup>1</sup>

*Evolve Biosystems, Stanford University, Københavns Universite*

#### Introduction

Interventions such as C-section delivery, antibiotics, and formula feeding can foster early dysbiosis of the preterm infant gut microbiome, significantly altering the concentrations of bacterial metabolites available for cellular function. This can lead to a cascade of adverse effects to which premature infants are particularly vulnerable. Previous research shows a significant increase in overall total organic acids produced in *B. infantis* EVC001-fed infants, specifically with an increase in acetate and lactate and a decrease in formate and butyrate. This study investigated the effect of *B. infantis* EVC001 metabolites on intestinal proliferation and integrity in premature intestinal epithelial cell models.

#### Methods

Pooled fecal water (FW) from infants colonized with *B. infantis* EVC001 (EVC001) or those who were not (control), as well as major bacterial metabolites (acetate, lactate, butyrate, and formate) at physiological concentrations were added to premature human IECs and organoids and analyzed to assess proliferation, membrane integrity, and cytotoxicity.

#### Results

Intestinal and colonic primary proliferating and differentiated cells exposed to EVC001 fecal water significantly increased enterocyte proliferation as shown by real-time ATP expression compared to medium alone and control FW ( $P < 0.01$ ). Furthermore, intestinal cells exposed to EVC001 FW significantly increased ATP production as compared to control FW, suggesting impaired ATP production in control infants ( $P < 0.0001$ ). EVC001 FW treatment significantly decreased the release of lactate dehydrogenase, a biomarker of damaged cell membrane integrity, indicating a protective effect of EVC001-derived metabolites for enterocytes ( $P < 0.05$ ). Physiological concentrations of acetate and lactate from EVC001-fed infants significantly increased intestinal epithelial cell

integrity compared to the lower levels found in control infants ( $P < 0.01$ ). This study provides evidence that EVC001 FW and specific bacterial metabolites, lactate, and acetate, significantly increased ATP production and lowered LDH concentrations, while control FW negatively affected cell growth, suggesting that metabolites produced by EVC001 promote enterocyte growth and improve intestinal integrity in premature infants.

### Abstract # 9

#### Title:

Neonatal COVID-19 Infections Associated with Maternal Contact in the Perinatal Period

#### Authors:

Kacey Cox\*, MD, FAAP, IBCLC, Neonatal Hospitalist, MemorialCare Miller Children's & Women's Hospital Long Beach

Shari Kelly, MSN/MSHCA, RN, NE-BC, C-ONQS, RNC-OB, Executive Director, Women's and Neonatal Services, MemorialCare Miller Children's & Women's Hospital Long Beach

Antione Soliman, MD, FAAP, NICU Medical Director, MemorialCare Miller Children's & Women's Hospital Long Beach

#### Introduction:

The COVID-19 pandemic has affected more than 57 thousand pregnant women in the United States, but more research is needed to understand transmission and infection in the perinatal period. In the early phase of the pandemic, the Centers for Disease Control and Prevention (CDC) recommended the temporary separation of neonatal-maternal dyads to decrease the risk of transmission. However, early studies indicated low rates of postnatal acquisition if infection control precautions were implemented. In August 2020, the CDC revised contact recommendations to include rooming-in as an option. Risk factors for maternal transmission and neonatal infection remain unclear, but current data suggests that the risk of neonatal infection is the same for infants who are separated compared to those that room in with their mothers after birth.

#### Methods:

A retrospective electronic health record chart review was completed to compare COVID-19 infection in neonates separated to neonates who roomed in with their mothers. Neonatal symptomatology and readmission within 30 days were collected. This study was conducted at MemorialCare Miller Children's & Women's Hospital Long Beach, which is a large academic birth care center and children's hospital. Data was collected from deliveries that occurred from March 2020 through December 2020. All mothers admitted for delivery were universally tested with one or two COVID-19 PCR tests. Neonates born to COVID-19 infected mothers were tested at 24 and 48 hours of life. Neonates were separated from their mothers from March 2020 to August 2020. Infants roomed in with their mothers, using an isolette as a physical barrier, from August 2020 to December 2020.

#### Results:

Out of 68 babies born to mothers with documented COVID-19 infection at delivery, five (7.4%) neonates were diagnosed with asymptomatic COVID-19 infection by 48 hours of life. None of the

infants who were separated from their mothers at birth were infected. All five of the COVID-19 infected infants had roomed-in with their mothers. None of the infants infected with COVID-19 were symptomatic or readmitted within 30 days of discharge. While the rate of neonatal COVID-19 infection was higher in the rooming-in group, the number of babies displaying symptoms and requiring readmission remained low.

#### **Conclusion:**

Newborns who roomed in with COVID-19 infected mothers had a higher rate of COVID-19 infection but did not have an increase in symptoms or 30-day readmissions. Early close contact between neonates and mothers has been shown to be extremely beneficial for bonding and breastfeeding and should continue to be encouraged, even if maternal COVID-19 infection is present. Research on the long-term consequences of neonatal COVID-19 infection will be useful in further addressing the recommendations for neonatal-maternal contact in the perinatal period.

#### **Abstract # 10**

##### **Title:**

Racial and Ethnic Differences in Neonatal and Maternal COVID-19 Infection in the Perinatal Period

##### **Authors:**

Kacey Cox\*, MD, FAAP, IBCLC, Neonatal Hospitalist, MemorialCare Miller Children's & Women's Hospital Long Beach

Shari Kelly, MSN/MSHCA, RN, NE-BC, C-ONQS, RNC-OB, Executive Director, Women's and Neonatal Services, MemorialCare Miller Children's & Women's Hospital Long Beach

Antione Soliman, MD, FAAP, NICU Medical Director, MemorialCare Miller Children's & Women's Hospital Long Beach

##### **Introduction:**

More than 24 million cases of COVID-19 have been documented in the United States with increasing evidence that minority communities bear disproportionately higher burdens of infection relative to their representation in the population. The purpose of this study is to examine the racial and ethnic differences in rates of neonatal and maternal COVID-19 infection during the perinatal period.

##### **Methods:**

A retrospective electronic health record review was performed to identify a cohort of neonates and mothers who were diagnosed with COVID-19 infections in the perinatal period. This was a single center study conducted at MemorialCare Miller Children's & Women's Hospital Long Beach, which is a large academic birth care center and children's hospital. Data was collected about deliveries that occurred from March 2020 through December 2020.

##### **Results:**

The racial and ethnic distribution of neonates and mothers during the study period included 55.3% Hispanic/Latino, 15.9% non-Hispanic White, 12.8% non-Hispanic Black, 13.8% Asian or Pacific Islander, and 2.2% other/unknown. Of the five babies who were diagnosed with COVID-19 infection in the first 48 hours of

life, 80% (4) were Hispanic/Latino and 20% (1) were non-Hispanic Black. Of 67 mothers who were diagnosed with a COVID-19 infection at the time of delivery, 62.7% (42) were Hispanic/Latino, 7.5% (5) were non-Hispanic White, 9% (6) were non-Hispanic Black, 10.4% (7) were Asian or Pacific Islander, and 10.4% (7) were other/unknown.

#### **Conclusion:**

Racial and ethnic disparities exist in many different types of health conditions, but few studies have investigated the rate of COVID-19 infections found in different minority groups during the perinatal period. This study indicates that Hispanic neonates and mothers are more likely to have a COVID-19 infection in the perinatal period compared to other racial and ethnic groups. Understanding the relationship between perinatal COVID-19 infection and race and ethnicity is an important research priority to direct future clinical care and public health measures.

#### **Abstract # 11**

**Title:** Implementation of a Dextrose-Gel Algorithm for Hypoglycemia in a Large Birth Center with a Level III NICU

##### **Author Information:**

Charles Egesdal\*, MD, PGY-4, UC Irvine Neonatology Fellow

Kacey Cox, MD, Neonatal Hospitalist, Miller Children's Hospital

Jennifer Sanchez, MD, PGY-1, UC Irvine Pediatric Resident

Cathy Villareal, BSN, RNC-MNN, Miller Children's Hospital

Ching Tay, MS, CNS, RNC-NIC, C-ONQS, Miller Children's Hospital

Ting-Yi Lin, MD, Attending Neonatologist, Miller Children's Hospital

Antoine Soliman, MD, Attending Neonatologist, NICU Medical Director, Miller Children's Hospital

**Introduction:** Hypoglycemia is a common reason for admission to the NICU. Literature (Harris 2013) has shown that the use of a dextrose gel along with breastfeeding is more effective than feeds alone and can be used as a first-line treatment for neonatal hypoglycemia. There is also no difference between glucose gel and placebo with respect to developmental outcomes at two years of age (Harris 2016). Based on this literature, in 2018, we set out to develop a quality improvement project to implement a dextrose-gel-based algorithm to guide the management of hypoglycemia and determine the need for NICU admission. Prior to this, no protocol for hypoglycemia management existed at our institution. The specific aims of our project were to reduce NICU admissions for hypoglycemia, reduce the need for IV dextrose, decrease maternal-infant dyad separation, and increase exclusive breastfeeding rates.

**Methods:** In August 2018, our protocol was implemented. Education was given to the nursing staff in labor and delivery, postpartum, and the NICU. Neonatologists from the practice group and community pediatricians also received an education. Infants at risk for hypoglycemia (SGA, LGA, IDM, LPTI, and infants with an Apgar less than 7) were screened. Asymptomatic hypoglycemic infants with a gestational age greater than 34 weeks were managed with the protocol. Hypoglycemia was defined as blood glucose less than 40mg/dL. Infants with blood glucoses of 25mg/dL-40mg/dL that were asymptomatic were treated with a buccal



dextrose gel (0.2 g glucose/kg) and fed breastmilk or formula with breastmilk prioritized. This was repeated up to 3 times as long as blood sugar remained in range. Infants requiring more than three dextrose gels were exited from the protocol and admitted to the NICU. Infants deemed symptomatic were automatically admitted to the NICU. Infants with blood glucose less than 25 were also automatically admitted to the NICU. A total of 5 Plan-Do-Study-Act cycles were completed.

**Results:** 217 infants admitted to the NICU for hypoglycemia from 1/2017-8/2018 were compared to 412 infants admitted to the NICU for hypoglycemia from 8/2018-3/2020. Following the implementation of our protocol, the average number of hypoglycemia admissions per quarter increased from 33.4 to 59.7 ( $p=0.0016$ ). The proportion of infants admitted to our NICU for hypoglycemia who had documented hypothermia increased from 5.5% to 13.3% ( $p=0.06$ ). The proportion of infants admitted for symptomatic compared to asymptomatic hypoglycemia increased from 59% to 66.7% ( $p=0.057$ ). We also saw no change in exclusive breastfeeding rates.

#### Abstract # 12

### RSVH and BH in Children with Higher-Risk CHD Aged $\leq 24$ Months

Jaime Fergie, MD<sup>1\*</sup>; Tara Gonzales, MD<sup>2</sup>; Mina Suh, MPH<sup>3</sup>; Xiaohui Jiang, MS<sup>3</sup>; Jon Fryzek, PhD, MPH<sup>3</sup>; Naushin Hooda, PharmD<sup>3</sup>; Ashley Howard, DO<sup>4</sup>; Adam Bloomfield, MD<sup>2</sup>

\*presenting author

#### Affiliations:

<sup>1</sup>Driscoll Children's Hospital, Corpus Christi, TX, USA; <sup>2</sup>Sobi, Inc., Waltham, MA, USA; <sup>3</sup>EpidStrategies, Rockville, MD, USA; <sup>4</sup>Yale School of Medicine, New Haven, CT, USA.

**Introduction:** In 2014, the American Academy of Pediatrics (AAP) revised the recommendations for respiratory syncytial virus (RSV) immunoprophylaxis. Palivizumab was no longer recommended for children with hemodynamically significant congenital heart disease (hs-CHD) in the second year of life (12-24 months) at the start of the RSV season. Herein, we describe a historical, observational cohort study that was conducted to investigate the impact of the 2014 AAP revised guidance on the contemporary burden of RSV hospitalizations (RSVH) and bronchiolitis hospitalizations (BH) in this population.

**Methods:** Using encounter data from 51 US children's hospitals that comprise the Pediatric Health Information System (PHIS), we studied children with higher-risk CHD aged  $\leq 24$  months at the start of the RSV season (assumed November 1) and hospitalized for RSV infection or bronchiolitis from 2010 to 2017 (November-March). Chi-squared tests were used to compare groups before and after the 2014 policy using a p-value to examine statistical significance. Poisson regression models and SAS macro %NLEstimate were used to test the difference in the difference of rates in hospitalizations to quantitatively describe changes in hospitalization rates pre- and post-2014.

**Results:** The overall cohort of children aged  $\leq 24$  months at RSV season start included 104,687 RSVH and 164,055 BH; among RSVH, 3.6% ( $n=3790$ ) were identified as higher-risk CHD. The RSVH proportion for all children with higher-risk CHD aged  $\leq 24$  months increased by 17.5% after the 2014 guidance change (3364

per 100,000 before and 3954 per 100,000 after;  $P<0.0001$ ). Stratified analyses by chronologic age demonstrated increases for children with higher-risk CHD aged  $\leq 11$  months (2818 per 100,000 before and 3180 per 100,000 after;  $P=0.001$ ; 12.8% increase) as well as those aged 12 to 24 months (545 per 100,000 before and 774 per 100,000 after;  $P<0.0001$ ; 42.0% increase). The percentage increase was significantly greater in the 12-24 months group than in the  $\leq 11$  months group (42% vs. 12.8%;  $P=0.0126$ ). Higher-risk CHD children aged 12-24 months with RSVH also had increased intensive care unit admission rates after 2014 (191 per 100,000 before and 339 per 100,000 after;  $P<0.0001$ ). A similar pattern of results was observed for BH.

**Conclusions:** This analysis highlights the increase in RSVH, BH, and associated disease severity among children with higher-risk CHD within PHIS after the AAP revised its policy recommendations for palivizumab immunoprophylaxis in this group in 2014.

#### Funding:

Sobi, Inc., Waltham, MA, USA

#### Abstract # 13

Patent foramen ovale versus atrial septal defect in extremely low birthweight infants: can they be differentiated?

\*Sheema Gaffar, MD, MS<sup>1</sup>, Bijan Siassi, MD<sup>1</sup>, Mahmood Ebrahimi, RDCS<sup>1</sup>, Merujan Uzunyan, MD<sup>2</sup>, Rowena Cayabyab, MD, MPH<sup>1</sup>, Rangasamy Ramanathan, MD<sup>1</sup>.

<sup>1</sup>Division of Neonatology, Department of Pediatrics, LAC+USC Medical Center, Keck School of Medicine of USC, Los Angeles, CA, USA.

<sup>2</sup>Division of Cardiology, Department of Pediatrics, LAC+USC Medical Center, Keck School of Medicine of USC, Los Angeles, CA, USA.

#### Introduction:

Foramen ovale is a fetal channel that allows large right-to-left (R-L) shunting throughout gestation. It is covered by a flap valve on the left side, which is a remnant of the septum primum that functions to prevent left-to-right (L-R) shunting. After birth, some term infants have minor incompetence of the flap valve, allowing a small L-R shunt which usually resolves by 18 days of postnatal life. The incidence and degree of L-R atrial shunt in extremely low birth weight (ELBW) infants is not well known.

#### Objectives:

(1) To evaluate the change in size of patent foramen ovale (PFO) with rapid growth of the heart and (2) to differentiate between PFO and atrial septal defect (ASD) in ELBW infants.

#### Methods:

All ELBW infants born at LAC+USC Medical Center from February 2016 to March 2020 who survived to discharge and did not have any other congenital cardiac defects were included in this

retrospective study. Thirty-eight total infants with serial bedside transthoracic echocardiograms (ECHO) were reviewed. Specifically, initial ECHO obtained in the first few days of life and final ECHO obtained just prior to discharge were evaluated. The size of valve-incompetent PFO was determined by measuring the width of L-R color doppler flow in coronal posterior and sagittal subcostal views; the largest measurement was taken as PFO diameter. Infants were divided into two groups according to size of their initial PFO.

#### Results:

Thirty-five infants (mean gestational age 26 weeks, range 23-30; mean birth weight 748 grams (g), range 500-900) had initial PFO diameter of 1.7mm (0.0-2.7) and final PFO diameter of 1.9mm (0.0-3.8) at postmenstrual age (PMA) 38 weeks (34-51) and weight 2520g (1680-5500). In contrast, three ELBW infants born at 24 weeks (24-25) and 713g (644-760) had initial PFO diameter of 3.5mm (3.1-4.0) that grew into a 6.6mm (6.0-7.5) ASD by 40 weeks (36-45) PMA and weight 3112g (2045-4300).

#### Conclusion:

In ELBW infants, a PFO with less than 3mm diameter does not change significantly during postnatal growth to term gestation, while a PFO of greater than 3mm diameter shortly after birth suggests presence of ASD and increases in size with advancing postnatal age. This study also suggests that the incidence of secundum ASD may be increased in ELBW infants. However, study of a larger population of ELBW infants is needed to confirm this finding.

#### Abstract # 14

##### Thriving in NICU and at 1 Year Post-Discharge

Authors and affiliations: Mandhir Gupta MD\*, Jean French RD, CNSC, Prathiba Nanjundiah MD, Linda Wynsma CNS, Kaiser Permanente Downey Medical center

**Background:** Premature babies are prone to suffer from growth failure due to inadequate nutrition. The specific nutritional needs are still unknown even though a lot of progress has been made in the last few years. We have a robust home health program that allows for early and safe discharge home of these babies where they continue to thrive.

**Objectives:** Monitor growth at discharge; and at one year of age for babies born <1500 grams in a large community NICU, in an integrated health care system.

**Design:** Retrospective, cohort, observational study of 507 babies <1500 gm at birth. The study period was from 2014 to 2019.

#### Interventions and measurements:

We implemented improved nutrition guidelines in 2017-18, which includes aggressive parenteral (higher proteins, fats, and calories) and enteral nutrition (early and higher fortification to 26 calories before full feeds).

At discharge: Parents are educated with a personalized nutritional plan that includes 22 or 24 calories of breast milk or preterm discharge formula. They are followed by home health, nutrition clinic, and Pediatrics Gastroenterologist with an interest in infant nutrition. This has been our practice since 2016. They are also monitored for readmissions.

#### Results:

There was a clear separation of growth pre and post interventions.

**Growth at discharge:** In 2014, adequate growth was 39% for all babies and 26% for <1000 grams. In 2019, it increased to 69% for all babies and 61% for <1000 grams.

**Growth at 1-year post-discharge:** Adequate growth was 84% for all babies and 81% for <1000 grams for the birth year 2015. It increased to 92% for all babies and 90% for <1000 gm for the birth year 2018.

The readmission rates remain less than 3 % at 1-month post-discharge.

#### Limitations:

Few babies <5% lost to follow up

#### Conclusions

Our Quality improvement project shows that even in a busy large NICU (>100 of <1500 gram babies per year) with multiple physicians and the lowest socio-economic group (SPA 6 of Los Angeles County), adequate growth can be achieved with extensive collaboration with Parents, MDs, Nurses, and Nutrition. We also propose that empowering dieticians in the unit helps remove barriers and provides a consistent message across specialties. As a secondary outcome, babies who are severely growth restricted at birth and stay the same at discharge are at high risk for growth failure at one year of age.

**Implications:** Consistent discharge plan that includes outpatient nutrition and GI follow-up improves growth.

#### Abstract # 15

##### Multi-Omics Approach Suggests a Novel Molecular Mechanism of Necrotizing Enterocolitis in the Preterm Infant Gut Microbiome

G. Casaburi<sup>1</sup>, S. Kazi<sup>1</sup>, G-Z. Tao<sup>2</sup>, B. Henrick<sup>1,3,\*</sup>, S. Frese<sup>1,3</sup>, K. Sylvester<sup>2</sup>

1. Evolve Biosystems, Inc, Davis, CA, United States.
2. Department of Surgery, Stanford University, Stanford, California, United States of America
3. Department of Food Science and Technology, University of Nebraska, Lincoln, NE, United States.

**Background:** Necrotizing enterocolitis (NEC) is an intestinal disease that primarily affects premature infants, causing an inflammatory process that can lead to intestinal tissue damage and death. NEC is a leading cause of overall infant mortality in the United States, affecting 0.1% of newborns per year in North America while reaching treatment costs of up to \$200,000 per patient. Although outcomes related to prematurity illness have remarkably improved, the mortality rate for NEC has remained constant at up to 50% or more depending on severity. While the pathogenesis of NEC remains obscure, clinical features are consistent, including intestinal immaturity, increased inflammation and gut dysbiosis.

**Objective:** The major limitation in NEC prevention dwells in the inability to predict which subset of premature infants is at risk for developing NEC. Recently, gut dysbiosis has emerged as a major trigger in NEC, particularly supported by the fact that NEC cannot be produced in germ-free animals. Here, we present a multi-omics approach combining metagenomics and metabolomics, with functional *in vivo* and *in vitro* assessment of a leading novel molecular

mechanism defining NEC.

**Methods:** 1,647 publicly available metagenomics datasets were analyzed (NEC=245; healthy =1,402) using artificial intelligence. Metabolomics was used to quantify the concentration of fecal metabolites at NEC onset, during recovery (n=8), and in age matched controls (n=10). Functional toxicity assays of discovered metabolites were performed in vivo in mice and in vitro in human intestinal epithelial cells.

**Results:** Multi-omics showed significant differences in pyruvate fermentation pathways and associated intermediates. Particularly, formate was elevated in the stool of NEC patients at disease onset compared to recovery (P=0.02) and controls (P=0.005), and was positively correlated with degree of intestinal injury (r<sup>2</sup>=0.86). *In vitro*, formate caused enterocyte cytotoxicity in human cells through necroptosis (P<0.01). *In vivo*, luminal formate caused significant dose and age dependent NEC-like injury. *Enterobacter cloacae*, *Escherichia coli* and *Klebsiella pneumoniae* were the most discriminatory taxa related to dysbiosis and increased formate production.

**Conclusions:** Multi-omics data suggests a novel mechanism of NEC through the production of abnormal enteric fermentation products. Ongoing efforts to prevent NEC should focus on reducing newborn gut dysbiosis including the reduction of specific risk-associated taxa and providing possible biomarkers for determining the effectiveness of interventions including early-life targeted probiotic feeding.

**Keywords:** NEC, Microbiome, Metagenomics, Artificial Intelligence

## Abstract # 16

**TITLE:** Biologic Potential of Human Umbilical Cord Mesenchymal Stem Cells Exposed to Antenatal Marijuana

**AUTHORS (LAST NAME, FIRST NAME):** Adnan Ismail MD\*<sup>1</sup>; Yona Nicolau MD<sup>1</sup>; Cherry Uy MD<sup>1</sup>; Fayezy Bany-Mohammed<sup>1</sup>; Muhammad Aslam MD<sup>1</sup>

**INSTITUTIONS:** 1. Pediatrics-Neonatology, UC Irvine School of Medicine, Orange, CA, United States.

**Background:** Human umbilical cord derived mesenchymal stem cells (MSCs) have been extensively studied with therapeutic efficacy in several injury models. Our work has shown therapeutic efficacy of MSCs and their secreted factors in experimental neonatal chronic lung disease and pulmonary hypertension models. Maternal antenatal drugs and disease states can affect the efficacy of MSCs. At present, very limited data are available on maternal marijuana use during pregnancy affecting the MSC biologic potential.

**Objective:** We hypothesized that human umbilical cord Wharton's jelly MSCs harvested from marijuana exposed cords will lack biologic potential compared with non-exposed cords. Our aims were:

1. To generate human umbilical cord MSCs from marijuana exposed and non-exposed cords.
2. To determine in vitro properties and secreted factors be-

tween the two groups.

**Design/Methods:** Human umbilical cord Wharton's jelly MSCs from marijuana exposed and non-exposed umbilical cords were isolated and cultured according to our modified protocols. Marijuana exposure was considered positive if mothers have smoked marijuana within the prior two weeks before delivery with a positive urine drug test. In vitro growth, differentiation, and secreted factors were analyzed utilizing duplication time, Western immunoblot, and proteomics analysis.

**Results:** MSCs were harvested from 6 pooled marijuana exposed cords with 6 non-exposed cords as control. Marijuana exposed MSCs had much shorter duplication (8 vs. 11 days) and differentiation time (17 vs. 21) compared to non-exposed MSCs. Proteomic analysis showed marijuana exposed MSCs had lower concentrations of several biologic markers involved in lung injury and repair, including VEGF, Osteopontin, M-CSF1 and KGF.

**Conclusion(s):** Marijuana exposure during pregnancy leads to a reduction in biologic potential of human umbilical cord MSCs. Further in vitro and in vivo studies are underway to determine the extent of this relationship.

## Abstract # 17

**Abstract Title:** A rare anomaly – Duodenal Dieulafoy's lesion in a preterm baby

**Authors:** \***Dr. Devendrasing V. Jadhav**<sup>1</sup> Fellowship in Neonatology, MD pediatrics; **Dr. Anees Siddiqui**<sup>1</sup>, Advance training Neurogastroenterology, Fellowship in pediatric Gastroenterology; **Dr. Dalwinder Singh**<sup>1</sup>, Fellowship in Neonatology, MD pediatrics; **Dr. Shiva Shankar**<sup>1</sup>, CCT Neonatology, CCT Pediatrics, FRCPCH, MRCPCH. **Dr. Abid Qazi**<sup>1</sup>, Consultant, Pediatric surgery, FRCS Pediatric Surgery, FRCS Pediatric surgery. **1:** Al Jalila Children's speciality hospital, Dubai, UAE

### Introduction:

Dieulafoy's lesion is the presence of a histologically normal artery with large diameter which protrude into the gastric lumen through a small mucosal defect. Rupture can result in massive haemorrhage that can be fatal. Dieulafoy's lesions are rare in the neonatal population. Duodenum is an uncommon site. We report a case of duodenal Dieulafoy's lesion in preterm baby who presented with hematemesis and melena. The lesion was successfully treated with endoscopic intervention.

### Case:

Baby born at 29 weeks of gestation with weight of 1.2 Kg, delivered by caesarean section in view of preeclampsia to 26 years old primigravida mother with negative serology. His birth was uneventful and received vitamin K. He reached to full feeds by day 18 of life. He developed sepsis with meningitis on day 20 with elevated C-reactive protein (167 mg/L) and 500 WBCs in cerebrospinal fluid (CSF). Blood culture grew *Serratia marcescens*, however, CSF culture was negative. He received antibiotics for 21 days.

Four weeks onwards had repeated episodes of melena and blood-stained aspirates in the orogastric tube. The haemoglobin dropped to 5 g/dl requiring normal saline bolus and packed red blood cell transfusion. His coagulation profile and platelet counts were normal. He was treated conservatively for necrotizing enterocolitis and transfer to our hospital for further evaluation.

His Sepsis screen was normal. X ray abdomen showed distension of bowel loops and abdominal ultrasound was normal. Upper Gastrointestinal endoscopy revealed duodenal ulcer with pulsatile artery protruding into the lumen of 1<sup>st</sup> part of duodenum. Epinephrine was injected locally which reduced the acute bleeding. Underwent second endoscopy with Argon Plasma coagulation (APC). No recurrence of gastrointestinal bleed occurred. Baby was transferred back to the referring hospital on full feeds, in room air within a week.

### Discussion:

Dieulafoy's lesion accounts for 0.3% to 6.7% of the upper gastrointestinal (GI) tract bleeding cases in adults. The prevalence in paediatric population is unknown with very few cases reported in the literature. It typically presents as sudden massive haemorrhage which is often recurrent. Differential diagnosis for gastrointestinal bleed includes necrotizing enterocolitis, vitamin K deficiency, deranged coagulation, Meckel's diverticulum, volvulus, intraoral or intranasal injury and gastric perforation. Dieulafoy's lesion should be considered in the differential diagnosis of gastrointestinal bleed.

Dieulafoy's lesions are managed with endoscopic interventions, with high success rates reported with various modalities such as thermocoagulation, band ligation, administration of sclerosants and hemoclip application, thereby limiting the need for surgical intervention.

### Abstract # 18

Clinical outcome of newborns born to mothers infected with SARS-CoV-2 during pregnancy: A Prospective cohort study

Authors: \*Jegatheesan, Priya; Narasimhan, Sudha Rani; Huang, Angela; Flores, Claudia V.; Rai, Daljeet; Anderson, Christina; Misra, Sonya; Stemmler, Monica; Cortes, Maria E.; McAuley, Jennifer; Patel, Rupalee; Menge, Elona; Arain, Yassar H.; Song, Dongli.

Introduction: At the beginning of the COVID-19 pandemic in March 2020, we developed a standardized clinical care guideline for newborns exposed to SARS-CoV-2 based on CDC, AAP, and WHO recommendations.

Objective: To describe the clinical outcomes of newborns born to mothers positive for Sars-Cov-2 during this pregnancy.

Methods: This is a prospective study of newborns born between April and December 2020 to mothers who had recent and resolved (<2 weeks and >2 weeks before delivery) SARS-CoV-2 infection during pregnancy.

The standardized mother-baby care for recent infection included pre-delivery counselling on the risk and benefits of mother and baby rooming in together and breastfeeding vs. separating mother and baby; delayed cord clamping; skin to skin in delivery room with maternal hand hygiene and wearing a mask. The mother-

baby dyad roomed in together in a post-partum room with airborne isolation precautions and the newborn stayed in an isolette. A Neonatal nasopharyngeal swab for SARS-CoV-2 was performed at 24 hours of life. Post-discharge follow-up included phone calls, surveys, and in-person clinic visits.

Mothers were instructed to wear a mask when breastfeeding or holding the newborn during her self-isolation period. Routine standard of care was followed for newborns when mothers had resolved infection. Screening laboratory tests were done (CBC, LFT, Panel 7, CRP) for all enrolled newborns during the first 6 months of the pandemic. The demographics and neonatal outcomes are summarized for the recent vs. resolved maternal infection.

Results: 120 newborns were born to 118 mothers with SARS-CoV-2 infection (Table 1, 2). Only one 31-weeks premature infant was positive for SARS-CoV-2. This infant had a typical NICU course for the gestational age. Twelve newborns were admitted to the NICU (4- prematurity, 1-jejunal atresia, 7-respiratory distress). One term infant had unexplained diarrhea in the first week of life but tested negative for SARS-CoV-2 at 24 and 72 hours. Six newborns were readmitted within 2-weeks post-discharge, and all retested negative for SARS-CoV-2.

Conclusion: In our cohort, the majority of the mothers were not severely ill, and their newborns had a stable clinical course in the first 2-weeks of life. The positive rate of SARS-CoV-2 in neonates was 1%.

Table 1: Maternal Demographics

	Overall Cohort	Maternal SARS-CoV 2 Infection < 2w prior to delivery	Maternal SARS-CoV 2 Infection > 2w prior to delivery
<i>Maternal Demographics</i>	N=118	N=72	N=46
Mother symptomatic at the time of diagnosis, %	47	25	83
Symptomatic at the time of delivery, %	14	24	0
Asymptomatic, %	51	72	17
Mild to moderate symptomatic, %	44	26	72
Severe symptomatic, %	5	1	11
Maternal age, years, median (range)	26.5 (16, 42)	27 (17, 42)	25.5 (16, 37)
Gravida, median (range)	3 (1, 12)	3 (1, 12)	2 (1, 6)
Para, median (range)	1 (0, 9)	2 (0, 9)	1 (0, 5)
Hispanic, %	92	92	91
Race, %			
White	94	94	93
Black	2	3	0
Asian	4	3	7
C/Section, %	31	28	35
Multiple pregnancies, %	2	3	0
Maternal Diabetes, %	20	18	24
Maternal Hypertension, %	22	18	28
Maternal obesity, %	26	24	30

Table 2: Neonatal Demographics and Outcomes

	Overall Cohort	Maternal SARS-CoV-2 Infection < 2w prior to delivery	Maternal SARS-CoV-2 Infection > 2w prior to delivery
Neonatal Demographics	N=120	N=74	N=46
Gestational Age, (Median, range)	39.1 (31.7, 41.6)	39.2 (31.7, 41.3)	39.1 (31.7, 41.6)
Birth weight, (Median, range)	3362 (1250, 4560)	3225 (1855, 4405)	3475 (1250, 4560)
Prematurity <37w, %	9	12	4
Male sex, %	45	42	50
Neonatal Outcomes			
Breastfeeding in the hospital, %	96	95	98
Exclusive breastfeeding in the hospital, %	58	54	65
Rooming in with mother, %	92	92	91
NICU admission, %	10	9	11
*WBC, median (range)	16520 (4150, 42100)	16065 (4150, 29890)	19160 (7810, 42100)
*Lymphocyte count, median (range)	4590 (1500, 9470)	4245 (1590, 9310)	5000 (1500, 9470)
*Neutrophil count, median (range)	10570 (1600, 26100)	10195 (1600, 16290)	12390 (2600, 26100)
*C reactive protein, mg/dL, median (range)	0.3 (0.1, 7.4)	0.5 (0.1, 7.4)	0.3 (0.1, 6.6)
*CRP >2, %	12	9	21
*Creatinine, mg/dL, median (range)	0.8 (0.4, 1)	0.8 (0.4, 1)	0.8 (0.5, 0.9)
*ALT, U/L, median (range)	16 (5, 37)	16 (5, 33)	17 (8, 37)
*AST, U/L, median (range)	70 (5, 125)	69 (33, 125)	73 (5, 111)
*Bicarbonate, mmol/L, median (range)	18 (13, 27)	19 (13, 27)	18 (15, 25)
**SARS-CoV-2 NP swab positive, %	1	1	0
Hospital length of stay, median range	2 (1, 29)	2 (1, 29)	2 (1, 10)
Readmission <2weeks, %	5	5	4

Abstract # 19

Title: Improving Placental Transfusion Rates at UCSD

Authors: Meghana Karmarkar, MD\*; Dora Melber, MD; Karen Perdion, MSN, CNM; Sharon McMahon, CNS RNC-NIC, Melissa Niman, MA MEd; Lani Lee, RN BSN; Shannon Beaupre, MSN RNC; Erika Fernandez, MD.

Introduction: Placental transfusion by delayed cord clamping (DCC) has significant benefits over immediate cord clamping in newborn infants. However, there is less information known about risks and benefits of cord milking. A recent study found an increased risk of intraventricular hemorrhage (IVH) in preterm infants who received cord milking. Due to the multidisciplinary involvement around placental transfusion, targeted actions to improve this metric without adverse events can be complex.

Objective: Our objectives are to increase the overall placental transfusion rates from 81% to 90% in all infants born at UCSD and to decrease cord milking in infants born <28 weeks from 46% to 10% at UCSD by June 2021.

Methods: A multidisciplinary QI team was developed at UCSD to increase the rate of DCC in all infants and to decrease the rate of cord milking in preterm infants <28 weeks. Multiple interdisciplinary meetings were held to design a hospital policy on DCC, which included inclusion criteria, methods of DCC, documentation requirements, and specific communication templates for the delivery room. Education was provided to NICU/Newborn/OB/L&D staff to ensure consistency in resuscitation care and to ensure accuracy in documentation in the electronic medical record. Balancing measures planned are frequency of phototherapy, exchange transfusion and IVH. The first PDSA cycle was initiated in January

2020 with the implementation of the first formal QI meeting and data from 2019 was analyzed. The committee finalized the policy in September 2020 after the policy was submitted for review by multiple disciplines.

Results: Baseline data from 2019 showed 81% of all infants born at UCSD received DCC; 51% in preterm infants and 84% in infants >36 weeks. Results from our PDSA cycles in 2020 showed increasing trends with an average DCC rate for all infants of 85%; 48% in preterm infants and 88% in infants >36 weeks (Fig 1-3). For infants <28 weeks, the percent cord milking decreased from 46% to 17% (Fig 4).

Conclusion: The rate of placental transfusion improved in infants overall while cord milking was reduced in infants <28 weeks just by implementing the first step of constructing a multidisciplinary committee to produce a well-aligned policy. No improvement in DCC rates for preterm infants was noted so far, although ongoing data collection is needed to determine any significance. The next step is to provide continued education to providers to further increase the rates of DCC in preterm infants.

Fig 1. Percent of all infants who received delayed cord clamping in 2020 (Average 85%).



Fig 2. Percent of all infants <36 weeks who received delayed cord clamping in 2020 (Average 48%).



Fig 3. Percent of all infants >36 weeks who received delayed cord clamping in 2020 (Average 88%). Note the increasing trend after implementation of the policy.



Fig 4. Percent of infants <28 weeks receiving cord milking in 2020 (Average 17%).



**Abstract # 20**

Title: Trends in Risk of Respiratory Syncytial Virus Hospitalizations in Preterm Infants Over a 10-Year Period

Authors: Amanda M. Kong, DrPh,<sup>1</sup> Isabelle H. Winer, MPH,<sup>1</sup> David Diakun, BS,<sup>1</sup> Adam Bloomfield, MD,<sup>2</sup> Tara Gonzales, MD<sup>2\*</sup>

Affiliations: 1. IBM Watson Health, Cambridge, MA, USA; 2. Sobi, Waltham, MA, USA

Disclosure: This work was previously presented at IDWeek 2020.

**Background:** The American Academy of Pediatrics (AAP) recommended respiratory syncytial virus (RSV) immunoprophylaxis (RSV-IP) to reduce the risk of severe RSV hospitalization (RSVH) for certain infants <35 weeks gestational age (wGA) until 2014, when the AAP no longer recommended use among infants born >29 wGA without other medical conditions. Studies have shown that RSV-IP subsequently decreased among these infants, as well as among infants born <29 wGA for whom RSV-IP is still currently recommended. We described RSVH rates among preterm (PT) infants <35 wGA compared to term infants from 2008-2019.

**Methods:** We identified infants born between 7/1/2008-7/30/2019 in the MarketScan® Commercial and Medicaid claims databases. Infants with a code for birth at <35 wGA were classified by wGA. Those with a code for full-term without major health problems were classified as term. Infants contributed follow-up time during the RSV season (November to March) while <6 months old, summarized as infant-seasons (days of follow-up during the RSV season divided by 151 [number of days in an RSV season]). Using diagnoses codes, we identified RSVH during each RSV season for infants <6 months. Unadjusted rate ratios (RR) comparing PT infants to term infants were calculated to account for seasonal variation in virus circulation. The RR for PT vs. term after the guidance change was divided by the RR for PT vs. term before the guidance change to assess the increase in risk for PT infants relative to term.

**Results:** Over 1 million infants were identified in each database. There were 796 RSVH among Commercial PT infants, 6,486 RSVH among Commercial term infants, 2,501 RSVH among Medicaid PT infants, and 13,962 RSVH among Medicaid term infants during the 10 seasons in the databases. RSVH rates for PT infants tended to increase over time. RR comparing PT to term infants increased after the guidance change. The risk for 29-34 wGA infants compared to term infants approximately doubled in the 5 years after the guidance change (ratio of RR for PT vs. term

after vs. before the guidance change = 2.0 for Commercial and 2.2 for Medicaid). The magnitudes were smaller for <29 wGA infants but an increase was found (ratio of RR=1.7 for Commercial and 1.4 for Medicaid).

**Conclusions:** After the change in recommendations for RSV-IP, increases in RSVH rates for infants born at 29-34 wGA compared to term were found. This was also true for <29 wGA infants for whom RSV-IP is recommended.

**Abstract # 21**

**COVID-19 UPDATE**

1/17/2021

Hi All: As you'all know, I am a firm believer in the power of music and especially in a "song with great meaning". This past week will be etched in my memory ( and yours as well) forever for many reasons. Consider the following well known song written by Fredrick Lowe and Allan Lerner- The song is "ALMOST LIKE BEING IN LOVE"- I have modified the lyrics to keep current:

The song originally from the show Brigadoon on 1947.

A great rendition of this tune was delivered by Ella Fitzgerald, Gene Kelly, Natalie Cole and Diana Krall to name a few. I was hoping for a version from Menasha Skulnick (look him up if you must) but thus far.....none have appeared.

What a week this has been,  
 What a rare mood I'm in,  
 Is our Democracy Falling Apart?

The mob and the crowd,  
 Were often too loud,  
 Will we accept the new group when they start?

All the music of life seems to be,  
 Like an accordion that is bellowing to me.

**New subscribers are always welcome!**  
**NEONATOLOGY TODAY**  
 To sign up for a free monthly subscription, just click on this box to go directly to our subscription page

I will sing out a note,  
As Congress ponders the vote,

I would swear I was falling,  
I would swear I was falling,  
Its time to embrace this new start!

As the number of Covid cases escalates, there was more press concerning political issues rather than the need for testing, therapy and meaningful follow up. Tommy Lasorda looking down or up from his resting place and seeing lines around his beloved Dodger Stadium must be thinking: I bet the Bums are playing the Giants.

More cases. More hospitalizations. More deaths. And empty spaces where there was life. Our morgue is full. The joy of a new birth often mitigating bad news is stifled without grandparents and family. In spite of precautions and promises of fist-bumps instead of a hug and an affectionate pat on the back,

I cannot hold back consoling my colleagues and embrace anyway although it feels weird "wearing gloves". I have SOLASTALGIA – You probably do as well. LOOK UP THE WORD.

The following are the latest evidence-based factual material

1. It is important to remember that the two most utilized vaccines, The Pfizer-BioNTech vaccine ( 30 ug, 0.3ml) two doses, 21 days apart; and the Moderna vaccine ( 100ug, 0.5ml) 2 doses 28 days apart are not interchangeable with each other. In theory, since they are both formulated along the same lines, you would believe that they could be interchangeable. However, the safety and efficacy of a mixed-product series have not been evaluated.
2. It is interesting that the Moderna Vaccine uses three times as much dosage. Yet the results of the Moderna studies are no better than the Pfizer preparation as far as infectivity and protection.
3. There have however been several instances where different products were inadvertently administered. As of today, if this does occur with dose #1 and dose #2 administered with different products, no additional doses should be given of either vaccine. Further recommendations will be forthcoming as patients who received these products are being followed.
4. Recommendation: No other vaccines should be given 14 days before and 14 days after the vaccine is given. But.....that said..... if the benefits of another vaccine (Tetanus Toxoid for example in A WOUND MANAGEMENT PATIENT;, AN INFLUENZA VACCINE IN A LONG-TERM CARE FACILITY)) THIS IS A SITUATION WHERE THE BENEFITS OF THIS VACCINE OUTWEIGH THE POTENTIAL UNKNOWN RISKS.
5. The need for "booster" doses is not known at this time. Stay Tuned.
6. The vaccine should be given to individuals who have

evidence of a prior SARS-CoV-2 infection whether symptomatic or asymptomatic.

7. Vaccination of an individual who currently has the Covid-19 infection should be deferred until the patient has recovered from the illness and criteria have been met to discontinue isolation. Current evidence suggest that reinfection is uncommon in the 90 days after the initial infection. It therefore is best to wait until these 90 periods is completed before receiving the vaccine. However, I believe that we will know much more about antibody levels and protective levels in the next several months and therefore, the above guidance may change.
8. If a vaccinated person subsequently develops Covid-19, treatment decision regarding monoclonal antibodies, convalescent plasma, other antiviral therapies or steroid administration should remain the same.
9. Using the same 90-day deferral plan is the most prudent course in those patients who have received monoclonal antibodies for example.
10. If a person is exposed for example today, the mean incubation period is 5-6 days and therefore giving a first dose of the vaccine would not provide an adequate immune response within this incubation period. These individuals who have been exposed should not seek vaccination until the quarantine period ( 14 days) has passed to avoid exposing others, especially healthcare personnel to Covid during the vaccination visit.
11. MASKING: If the viral inoculum matters in determining the severity of the COVID-19 infection then masking is appropriate for the mask will filter out some virus-containing droplets and will make these patients less symptomatic. Countries that have adopted population-wide masking have less severe Covid infection, less hospitalizations, and fewer deaths.
12. In patients with autoimmune disease, who have not had any previous contraindication to vaccination may receive the m-RNA vaccine.
13. Pregnancy and breast feeding is not a contraindication for getting the vaccine. Since Covid does lead to a higher incidence of preterm birth, it is prudent to administer the vaccine to women that are pregnant. There have been no concerns regarding teratogenicity in women receiving the vaccine early in pregnancy. Do not forget, these vaccines (Pfizer and Moderna) are not live virus vaccines.
14. What are the contraindications:
  - Anaphylaxis after a previous dose of the mRNA Vaccine.
  - Immediate allergic reaction of any severity to a previous dose of the vaccine or any of its components (especially propylene glycol)
  - If any of the above are present, the vaccine should be given in a setting where advanced medical care is available.
  - If a vasovagal reaction has occurred previously (sudden drop in heart rate, blood pressure and even fainting) the vaccine can be given but in a more controlled environment.
15. In an individual has a history of a previous infection with Covid-19, reinfection is rare at the end of 90 days following the infection, the patient should defer vaccination until at least the 90 day period has passed.

16. Allergies to food, pets, environment, peanuts, latex, eggs or gelatin is not a contraindication for getting the vaccine. If a patient has a history of allergic reactions, giving an antihistamine is not recommended as their use may mask cutaneous symptoms which can lead to a delay in the diagnosis and treatment of anaphylaxis.
17. Current antibody tests assess immunoglobins IgM and IgG. A positive tests indicates either a previous infection or vaccination. The antibodies are produced in reaction to either the "spike protein" or the "nucleocapsid" protein. Currently, antibody testing is not recommended to assess immunity.
18. If the Pfizer vaccine is given there are protective antibodies produced 12 days after the first dose and 7 days after the second dose. If the Moderna vaccine is used, there is protection 90 days after the second dose.
19. I am asked often, how does the vaccine work to prevent infection and especially if infection occurs to produce a milder illness. When exposed to covid-19, our body produces white blood cells which basically fight infection. There are three types of white blood cells:
- Macrophages- These are white blood cells that ingest the virus and leave behind parts of the cell called "antigens". The body believes these antigens are dangerous and produces substances ( called antibodies) to attack these antigens.
  - B-Lymphocytes- consider these "defensive" white blood cells which produce antibodies which are left behind by the macrophages.
  - T-Lymphocytes- this is another type of white blood cell which attack the cells in the body that have already been infected. These T-lymphocytes are also called "memory cells" that go into action quickly if the body once-again is exposed to the virus. These cells (memory cells" remember what it has learned previously. THE QUESTION: How long does this protection last?
20. Remember, it takes a few weeks for the body to produce enough B and T Lymphocytes after vaccination. An individual can become infected and sick if there is not enough time to produce antibody protection.
21. Handwashing- an integral part of the preventive process. Since often times after sneezing we touch our face, nose and the virus can be inhaled an infect the respiratory tract. The recommendation is to wet your hands, use soap and washing actively for 20 seconds. HOW AND WHY DOES THIS HANDWASHING WORK AND WHY IS 20 SECONDS RECOMMENDED?????
22. In soap lather, the molecules from the soap and water form into bubble like structures, called "micelles" These micelles trap viral matter and other material (grease, dirt etc.). The soaps we use contain a class of compounds called "surfactants" which neutralize the outer membrane of the coronavirus which is made of lipid particles. The 20 seconds (measured in laboratory studies) allows these molecules to interact with water and also allows the surfactant in the micelles to carry viral debris away from out hands. Soap and water washing for 20 seconds is preferable to using a hand-sanitizer (must have at last 60% alcohol) for rubbing your hand with a sanitizer does not get to all the surface area. Since 20 seconds is the ideal time, use a timer for the process. Or..... you might try singing Happy Birthday twice, or your ABCs- It takes about 20 seconds.
23. There has now been some meaningful data regarding long term consequences of patients who have had Covid-19 and were hospitalized. At 6 months, 33-40% of this large group (1733 patients) complained about fatigue, muscle aches and pains, and a perceived decrement in mental health. Women were affected more than men and also complained about alopecia (loss of hair). In addition, there were persistent pulmonary diffusion abnormalities.
24. Now that restrictions may be easing all over the world in in some parts of the United States as well, there is concern again about air travel. These concerns are real for the CDC has opined that there is genomic evidence of in-flight transmission of SARS-CoV-2 despite predeparture testing. Remember that 15- 20% of negative tests are false negatives and in fact these individuals are truly positive. So therefore, the best we can do is to follow accepted guidelines (MSWAC- masks, sanitizing, washing, avoid crowds)
25. I have spent a great deal of time discussing the Pfizer and Moderna Vaccines. However, the other important vaccine is the Oxford-AstraZeneca Vaccine (see previous updates concerning details on this vaccine). However, briefly, the other vaccines store the instructions concerning the spike protein in single-stranded RNS (hence m-RNA). The Oxford vaccine uses double-stranded DNA. Simply, the gene for the coronavirus spike protein is added to another virus ( the adenovirus-responsible for the common cold) . The Oxford virus uses a modified version of the chimpanzee adenovirus (ChAdOx1). This combination enters the cell but can't replicate. This technique is not new and it has been used for Eboli and now for HIV and Zika virus.
26. There are many advantages to this vaccine as DNA is not as fragile as RNA and the adenovirus virus it is combined with has a protein coat that protects the genetic material inside. In addition, it does not need to be frozen.
27. So.....The vaccine is injected.....the adenovirus latch onto the protein of your cells on the outer surface.....the cell engulfs the virus into a type of bubble.....this bubble is pulled inside the cell.....the adenovirus escapes from the bubble ( a lot like the movie- the great Escape)..... the adenovirus travels to the nucleus where the DNA is stored.....this combination (spike protein and adenovirus) is read by the cell and.....messenger RNA (mRNA) is produced.....the mRNA stimulates production of the

**New subscribers are always welcome!**

**NEONATOLOGY TODAY**

**To sign up for a free monthly subscription,  
just click on this box to go directly to our  
subscription page**



immune system. This appears to be a stronger signal to the immune system since the adenovirus is included ( see # 19 of this update)

28. We continually are bombarded with the terms, mutation, variant and strain." Mutation" refers to the actual change in sequence of the amino acids. With Covid, the mutation is a change in the sequence of the amino acids where there is an aspartic-acid-to-glycine substitution at position 614 of the spike glycoprotein ( I apologize for the organic chemistry additions but I am trying to be complete). The term "variant" is used to describe these genomes which differ in the sequence I have described. Variants can differ by one mutation or many mutations). If this variant presents a difference in transmission or virulence it is called a "strain"
29. The variant we are talking about is labeled B.1.1.7 (also called 501Y.V1). It has achieved dominance outcompeting the many other variants.
30. I had commented in an earlier update about Vitamin D and the thoughts that higher levels of Vitamin D offered a greater amount of protection. Remember your biology and realize that Vitamin D is provided from sunlight and various foods (milk, orange juice, fish, breakfast cereals) Suggested intake is 600-1000IU/day) A multivitamin daily along with good nutrition will provide enough Vit D. But Vitamin D pundits are saying that with the lockdown we do not venture outside enough and lose the benefit of the beneficial effects of sunlight. So.....bottom line.....If you are living in Greenland, during its no sunlight gray period, or in Santa Monica with the sky overcast from the ash from the fires or prefer the curtains drawn all the time----- keep taking your Vitamin D.....BUT NOT TOO MUCH. Stay away from too much ZINC as well.
31. I finally need to comment regarding my thoughts on re-opening schools as many states remained closed to in person instruction. We all understand that in person teaching is certainly the best type of education. In addition to the educational benefits, the social aspects remain essential. So.....what to do? I am in favor of re-opening schools when it is safe in your community. That is for some reason, if your small area is a particular "hot spot" then wait until numbers decrease. I am not as concerned for the children as much as I am the effect on teachers and ancillary staff. A New ACRONYM for you .....and get used to it.....OLS ( On-Line-Society). An on-line Zoom call provides family togetherness and is adequate (not ideal) for meetings and conferences.....but.....in my opinion this type of education is better than nothing.....but still not ideal.

REMEMBER PLEASE:

MSWAC: MASKING

SANITIZING

WASHING HANDS

AVOIDING CROWDS

GIL MARTIN

## Abstract # 22

### Preventing Bronchopulmonary Dysplasia (BPD): Evidence-Based Bundle and Multidisciplinary Team Approach

Annie Denslow MMSc PA-C\*; Nichole Adiletta MD; Kushal Y. Bhakta MD; Renee Martinez MSN, NNP-BC; David R. Tirol RRT-NPS; Jennifer K. Truong RNC-NIC; Beverly Walti MSN CPNP CNS; Pernilla Fridolfsson RNC-NIC; Kimberly Sessler RRT-NPS; Sam Chambers RRT-NPS; Lisa M. Miller RRT-NPS; Derek Madrid RRT-NPS; Krystle Lemly RNC-NIC; Julie Riedel RNC-NIC; Afton Reeder RNC-NIC; Lauren Dempsey RNC-NIC; Shelbie Parsley RNC-NIC; Michel Mikhael MD

Affiliation: Children's Hospital of Orange County, Orange, CA

**Background:** BPD is the most common complication of prematurity with short and long-term consequences. A review of 3 years' baseline data revealed areas for improvement in adherence to evidence-based practices known to reduce BPD.

**Objective:** We set a global aim to decrease BPD rate in infants born < 30 weeks gestational age (GA) admitted to our NICU within the first 28 days of life (DOL). Project SMART aims and drivers of change addressed five areas for improvement as detailed in the key driver diagram (Fig 1): to improve compliance with the "Golden Hour" goals of care, to administer surfactant within 2 hours of life for patients intubated in the delivery room, to implement the newly developed algorithm for less invasive surfactant administration (LISA) for eligible patients, to improve compliance with a risk-stratified postnatal steroid administration algorithm for evolving BPD, and to perform an oxygen challenge test at 36 weeks postmenstrual age.

**Patients and Setting:** Infants <30 weeks GA admitted <28 DOL to a level IV NICU in a free-standing children's hospital.

**Interventions:** The team operationalized evidence-based interventions focusing on revising current processes, establishing new guidelines with illustrative bedside decision aids, enhanced education with video and simulation training, monitoring compliance, and encouraging multidisciplinary engagement (Fig 1).

**Results:** So far, 63 patients were included starting January 2020. In comparison to historical baseline data, there were no differences in birth weight, GA, sex, or age upon admission to the NICU (Table 1). Measures for each SMART aim are monitored and analyzed using statistical process control. Overall compliance with the bundle reached the target with special cause found for surfactant administration time, which decreased from 120 minutes to 36 minutes (Fig 2). AnyBPD rate decreased by one third from 44% to 32%, and severe BPD rates remained the same at 19% (Fig 3).

**Conclusion:** We have improved the delivery of evidence-based practice to decrease BPD in a busy Level 4 referral NICU. This was possible with a multi-prong bundle implementation and multidisciplinary team approach, to spread changes that would improve short and long-term outcomes of the very preterm infants. BPD rate was reduced by one third as compared to baseline data. We anticipate this will reach statistical significance soon as the team continues to utilize PDSA methodology to identify areas for continuous learning and improvement.

Figure 1

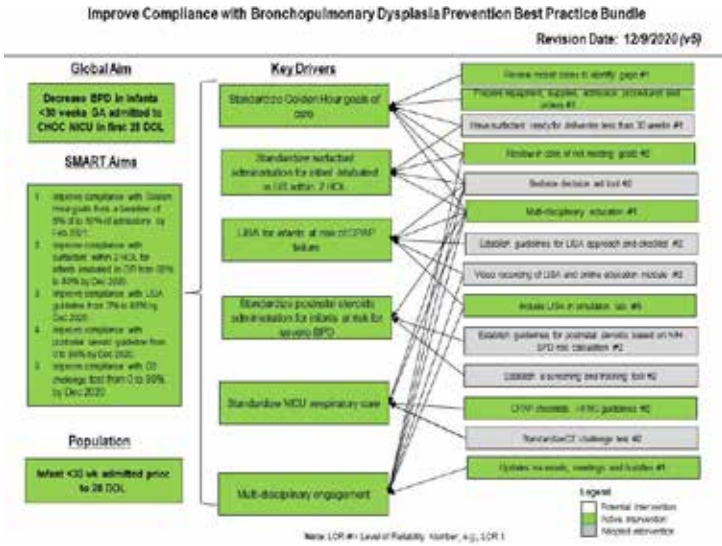
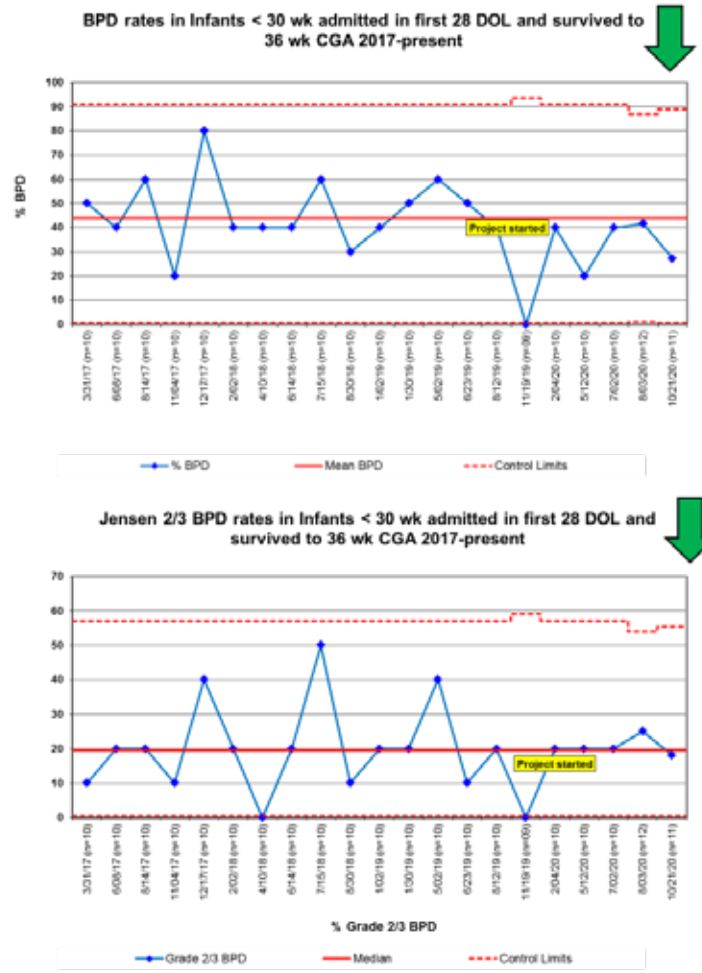


Table 1

	Baseline (N = 159) 2017-2019	BPD bundle (N=63) 2020-present	p-value
Birth weight, mean ± SD (g)	1015±290	956±267	0.16
Gestational age, mean ± SD (weeks)	26.7 ± 1.8	26.7± 2	0.7
Male sex, n (%)	83 (52)	37 (58)	0.3
Age at admission, mean ± SD (days)	5 ± 7	4 ± 7	0.26
Admitted immediately after birth, n (%)	103 (65)	43 (68)	0.6

Figure 3



Abstract # 23

Impact of activated *Bifidobacterium longum* subsp. *infantis* EVC001 probiotic feeding on preterm patient outcomes

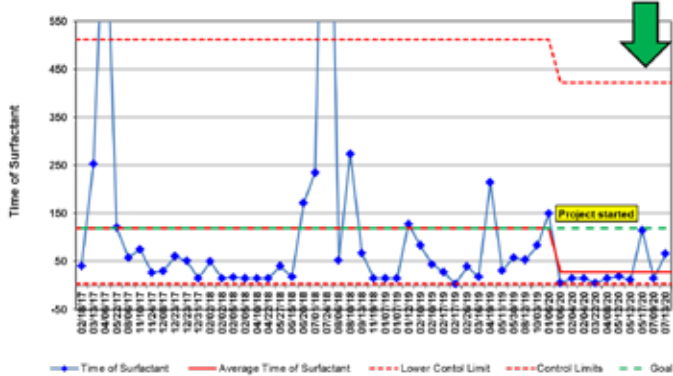
M. Nguyen<sup>1,†</sup>; H Holdbrooks<sup>1</sup>; PK Mishra<sup>1</sup>; and MA Abrantes<sup>1</sup>

1. Division of Neonatology, Kaiser Permanente Southern California-Orange County

**Background:** Recent literature shows that preterm infants are rapidly colonized by nosocomial bacteria that are often pathogenic. These bacteria are associated with negative impacts on neonatal growth and development, and an increased risk of serious infection, including necrotizing enterocolitis (NEC) and late onset sepsis (LOS). Here we evaluate the use of a single strain probiotic containing either activated *Bifidobacterium longum* subsp. *infantis* EVC001 (EVC001) in medium chain triglyceride oil or *L. reuteri* DSM17938 (DSM17938) on NEC and LOS incidence compared to infants not fed probiotics in a neonatal intensive care unit (NICU) setting. We hypothesized that the ability of EVC001 to utilize human milk oligosaccharides, colonize the infant gut, and resolve dysbiosis would be associated with improved clinical outcomes.

**Methods:** Deidentified medical records were examined from premature infants (n = 971) born in NICUs within a single health

Time of Surfactant Inborn Infants < 30 wk Intubated in DR 2017-present



care system in Southern California from three consecutive time periods, including (1) a period where no probiotics were used, (2) DSM17938 was used, or (3) EVC001 was used. Data were analyzed using a mixed modelling approach to disentangle potentially influential clinical variables (e.g. gestational age, antibiotic use, probiotic feeding, delivery mode, race, length of stay adjusted weight gain, antibiotic days) to determine if probiotic feeding affected NEC and LOS incidence.

**Results:** Among infants born at less than 32 weeks gestational age, those fed EVC001 had significantly lower risk of NEC incidence (69% lower) compared to infants not fed a probiotic ( $P = 0.015$ ; OR 0.31, 95% CI 0.122, 0.804). Conversely, feeding DSM17938 did not significantly reduce NEC incidence compared to infants not fed a probiotic. Similarly, no significant reduction in LOS was observed with DSM17938 usage; however, a significant reduction in LOS was observed after feeding protocols were changed to include EVC001 ( $P < 0.05$ ; OR 0.52, 95% CI 0.027, 0.99).

**Conclusion:** This mixed model analysis showed significantly reduced NEC and LOS incidence in a preterm population fed *B. infantis* EVC001. Conversely, these data showed feeding *L. reuteri* DSM17938 did not significantly reduce NEC or LOS incidence. Future analyses evaluating other outcomes, including length of stay and changes in anthropometric measures will provide additional insight into the impact EVC001 has on improving preterm infant health during their NICU stay.

#### Abstract # 24

##### Neuroprotective Guidelines (NPGs) for the Prevention of Intraventricular Hemorrhage (IVH) in Extremely Premature Infants

Nina Nosavan, MD\* and Guadalupe Padilla MD, Harbor UCLA Medical Center (HUMC), David Geffen School of Medicine, University of California, Los Angeles.

**Background:** Extremely premature infants account for a substantial portion of perinatal morbidity and mortality. Survival of these infants has dramatically increased over the past two decades, but 20-25% develop IVH. The Neonatal Intensive Care QI Collaborative (2003) developed 10 potentially better practices (PBPs) for prevention of IVH in very low birth weight infants. These PBPs stimulated the development of our NPGs at HUMC.

**Objective:** Maintain a low incidence of IVH and achieve 85% compliance with NPGs

**Design:** Data were obtained from the medical record of eligible infants. Using the PDSA model, we measured compliance to NPGs.

**Setting:** HUMC

**Patients:** Infants  $\leq 28$  weeks gestation and  $\leq 7$  days old

**Interventions:** NPGs were developed, staff champions identified, multidisciplinary learning sessions held on 06/11 and 6/18 2019 and placards with NPGs placed on isolettes of eligible infants. New "NICU  $\leq 28$  weeks Admit" order set incorporated the NPGs. NPGs were later amended to include 2-person handling for intubated infants only.

**Measurement:** Patient information included: gestational age, birth weight, sex, birth hospital, IVH grade, during day of life 3-7, time in neutral head position, head of bed (HOB) elevated, 2-person

handling and procedures (lab draws, central catheter (PICC), lumbar puncture), number of times, infant was weighed, suctioned, bathed, and abdominal girth were measured.

**Results:** Pre- [1/2018-6/2019 (N=17)] and post- [7/2019-5/2020 (N=12)] intervention data were collected. Pre vs post-intervention results were: severe IVH rate: 17.6% (3/17) vs 9.1% (1/11), time in neutral head position: 61.4% vs 97.5%, time HOB elevated 100% (both), number of weights: 4.8 vs 1.1, abdominal girths: 6.2 vs 1.9, baths: 1.6 vs 0 and times suctioned: 12.9 vs 9.3, PICC line insertion before first 7 days: 12 vs 6. Despite excluding 2 outliers on insulin drips, the average number of labs in the first 7 days increased: 17.8 vs 25 (heel sticks: 11.5 vs 13.1). One infant had lumbar puncture pre-intervention, none post-intervention. Two-person handling was inconsistently documented, which increased from 81.4% to 91%.

**Limitations:** Inconsistent documentation and lower census associated with the pandemic posed challenges during Cycle 1.

**Conclusion:** The low incidence of IVH was maintained and improvement in all parameters with the exception of lab draws reflected compliance with NPGs. We elected to begin Cycle 2, the sustainability phase, June- December 2020, however, the number of extremely preterm infants has remained low, therefore cycle 2 has been extended for an additional 6 months.

#### Abstract # 25

##### The Neuroprotection of Oral Enjoyment by Offering Milk Drops

Barbara O'Rourke RN, Lucinda Butler RN MSN

**Introduction:** Medical advances have resulted in a survival rate of greater than 85% of very premature infants. Although outcomes continue to improve, approximately 80% of premature infants will have difficulty with oral feeding. A major reason for this increased risk is the structural differentiation of the brain is occurring rapidly between 23-32 weeks. As the brain is developing and making connections, the necessity of normal NICU care which includes suctioning, insertion of tubes, taping, and even oral care may have a negative effect on the infant's ability and desire to eat. The transition from gavage feedings is often challenging, with many infants staying longer in the NICU to achieve oral feeding competence.

**Research question:** "Would premature infants who received milk drops with gavage feedings have a shorter length of stay (LOS) than infants who did not receive milk drops?"

**Methods:** A literature review, using multiple databases including CINAHL and MEDLINE, provided evidence that giving milk drops to premature infants was not only safe but also produced a positive immune response. No research was found regarding offering milk drops orally with the purpose of providing enjoyable oral enjoyment.

The Unity Point Health Institutional Review Board, of Des Moines, IA, approved the quasi-experimental design study which included 99 convenience subject premature infants born at 24 to 33+6 weeks' gestation and admitted to their Level III 42 NICU. The subject infants received the intervention of offering milk drops orally with gavage feedings from the 3<sup>rd</sup> day of life to full oral feeding. The subjects were matched on gender and gestational age alone with 99 control premature infants who did not receive milk drops

orally with gavage feedings. Both sets of infants received standard NICU care.

**Results:** The average LOS for the subject infants was 44.11 days versus 49.30 days for the control infants. The most significant difference in LOS was seen in the 24-30 weeks gestational age infants. Assessed hospital savings was over \$663,000.00 on these 99 infants.

## Abstract # 26

### Multidisciplinary Project to Establish and Maintain a Centralized Milk Preparation Room in a Neonatal Intensive Care Unit

Latisha Picard, April Grady, Laura Berritto, Angela Huang, Dongli Song, Priya Jegatheesan, Sudha Rani Narasimhan

#### Rationale/Background

A centralized milk preparation room creates an aseptic environment that allows dedicated staff to prepare infant feedings. Centralized milk preparation has been shown to optimize patient safety and reduce feeding errors.

#### SMART Aim

100% of NICU infant feedings, including fortified human breast milk and formula, will be aseptically prepared in a centralized milk preparation room by March 2020.

#### Setting

AAP level 4 Regional NICU in a public hospital.

#### Design/Methods

Multidisciplinary collaboration between providers, nurse champions, lactation consultants, dietary technicians, infection control manager, facilities department, environmental services, clerks and supply coordinators set the groundwork for the Milk Room. Milk Room policy, procedures, and workflow were standardized after PDSA cycles. Dietary technicians and nurse champions underwent training and education on aseptic milk handling and mixing. An unused patient care area of the unit was transformed into the designated milk preparation room. The Milk Room Coordinator determined equipment and supply needs.

#### Methods

All infant feedings, including formula and fortified donor and maternal milk (human based milk fortifier or formula-based fortifier), were aseptically mixed in the Milk Room. Prepared feedings were recorded in logbooks and feeding orders were gathered from electronic medical record system. Data was collected from October to December 2019 to establish baseline, and through June 2020 to monitor process, outcome, and sustainability.

#### Measures

Outcome: Percentage of fortified NICU infant feedings mixed in Milk Room

Process: Mixing time per feeding in the milk room

Balancing: Milk wastage due to expiration or incorrect mixings

#### Results

The percentage of feedings prepared in the milk room increased from 50% in October-December 2019 to 100% in March 2020 and sustained throughout 2020. The amount of time to mix feeding

for each patient decreased from an average of 36.5 minutes by nurses to of 17.6 minutes of by dietary technicians.

## Discussion

100% of infant feedings are aseptically mixed in the Milk Room. Milk preparation time per patient was reduced. Implementing a Milk Room increased supply needs, demand for workspace, dietary technician staffing, and decreased feeding preparation time per patient, and nursing time requirements with cost saving benefits.

Additional challenges faced included initial nursing resistance and supply issues related to an increase in demand and Covid-19 supply chain interruptions.

## Abstract # 27

**Title:** Use of Human Milk-Based Diet in the Late Preterm and Term Infant in the Neonatal Intensive Care Unit: A Pilot Randomized Controlled Trial

**Author Information:** Neema Pithia, MD\*, Meena Garg, MD, Uday Devaskar, MD, Kalpashri Kesavan, MD, Kara Calkins MD

**Intro:** Breast milk is the optimal nutrition for infants. In very low birth weight infants (VLBW), a human milk diet is associated with a decreased risk of sepsis and necrotizing enterocolitis and improved neurodevelopment. The American Academy of Pediatrics recommends that VLBW receive human milk (either mother's milk (MOM) or donor milk). In VLBW, donor milk is associated with higher breastfeeding (BF) rates. There is no research on donor milk in late preterm and term infants in the neonatal intensive care unit (NICU). Our overall research goal is to determine if providing donor milk to infants >34 weeks gestation (GA) for ≤7 days will increase MOM provisions and BF rates.

**Methods:** Inclusion criteria for this pilot, non-blinded, randomized control trial (RCT) includes GA >34 weeks, mother's intent to BF, and infants who are predicted to be in the NICU >72 hours. Exclusion criteria include infants with genetic disorders/syndromes, disorders known to affect growth, major congenital malformations, BF contraindications, intrauterine growth restriction, invasive respiratory or vasodilatory support, and futile care. Thirty-two subjects will be randomized to one of two diets: 1. MOM + formula (control arm) or 2. MOM + donor milk (interventional arm). This dietary intervention will last until NICU discharge or 7 days of age, whichever occurs first. The primary outcome is feasibility, which is defined as consent rate, adherence to study diet, and study completion rate. Secondary outcomes include the percentage of MOM consumed, BF rates, growth (change in weight, length, and head circumference z-scores) at NICU discharge and 6-8 weeks of age. An exploratory aim will investigate the intestinal microbiome using 16s RNA gene sequencing.

**Results:** I have obtained local IRB approval (19-002179). Recruitment began at two NICUs in November 2020. As of January 1, 2021, 5 infants have qualified, 4 have enrolled (GA range 34w0d-35w1d), and 0 have completed the study. NICU length of stay ranged from 6-19 days. Adherence to the study diet is 80%. I anticipate to complete recruitment and enrollment by June 2021.

**Conclusion:** To date, there is no research on the optimal diet for infants >34 weeks GA. This study's long term goal is to provide data to power a larger RCT that could change the paradigm of feeding late preterm and term infants. My goal is to produce preliminary data for my fellowship project, gain clinical research

experience, and pursue a career in academic neonatology.

### Abstract # 28

**BRAVE SPACE:** A Diversity, Equity, Inclusion (DEI) initiative in the Intensive Care Nursery (ICN); Perspectives from the bedside

M.J. Quilatan, MSN, PhM, T. Hatfield, MSN, RNC, N. Lare, MSN, RNC, Rebecca Chigas, MSN, Alissa Gumbs, MSN, Tanya Johnston, MSN, RNC

**Background:** Promoting diverse, equitable, and inclusive health care is paramount to providing high quality, ethical care to neonates and their families. Acknowledging baseline opinions of staff related to racism, equitable healthcare, and skills in responding to racism is essential to improving outcomes.

**Objective:** To ascertain the perceptions of staff on neonatal healthcare inequity and how implicit bias impacts care.

**Design:** A cross sectional survey was performed by sending an electronic questionnaire to the staff of the UCSF Benioff Children's Hospital Intensive Care Nursery (ICN). Qualitative and quantitative analysis were performed on the compiled responses.

**Setting:** This study was conducted in a Level 4 urban, academic, 58-bed intensive care nursery that serves as a regional center with a broad catchment area for a diverse population of neonates with complex and critical needs.

**Patients:** ICN patients range from 23 weeks to term gestation with acute and critical diagnoses. Staff are highly skilled and trained for this heterogeneous and complex population.

**Intervention:** Baseline survey was conducted in the initial phase of the initiative. Ongoing interventions included educational programs and trainings. An awareness campaign was created utilizing platforms including e-mails, bulletin boards, and a bimonthly "Brave Space" meeting, allowing participants to share and reflect on stories about racism, implicit bias, and inequitable care in the unit.

**Measurements:** The perception of nurses working in the ICN was attained within an Adult Learning Theory framework. The method effectively identified their specific learning needs in this context, demonstrating the utility of transformational learning as a part of a strategic needs analysis.

**Results:** 76 people completed the survey, representing a 40% response rate. Five themes emerged: "Speak up," "Hear something, say something," "Self-awareness," "Advocating and Education" stood out from staff perspectives. Targeted interventions for education, awareness, and further research were recognized as key steps to acknowledge and address racial inequities.

**Limitations:** Participation was voluntary, and no incentive was offered to staff. While diversity is present in the unit, the majority identify as white.

### Abstract # 29

Decreasing the Incidence of Intravenous Infiltration Via Quality Improvement Measures

Authors: \*Gladys Rojas, Michael Doti, Ting-Yi Lin, Ching Tay and Marie Suffi

**Introduction:** A quality improvement team at MemorialCare Miller Children & Women's Hospital developed and tested improvement strategies to reduce peripheral intravenous infiltration and extravasation (PIVIE) injuries in neonates. Intravenous infiltrations are common and the frequency of PIVIE requiring intervention was increasing, averaging 2 per week in 2019. This project aims to create a new practice guideline to prevent infiltration and extravasation events. We aimed to identify infiltration and extravasation injuries in neonates, to develop a protocol and to educate our NICU staff, physicians and nurses. Our SMART aim is to reduce the ratio of IVI requiring medical intervention to total patient IV days by 25% as of July of 2021.

**Methods:** A team was formed consisting of 3 physicians and 2 nurses where we identified the factors contributing to PIVIE from 12/2019 to 3/2020. Incidence at Miller Children's NICU tended to have a predominance of higher calcium/osmolality infusions. Therefore, our first PDSA aimed to reduce the calcium and osmolality content. We have a standardized method of measuring swelling, using the Cincinnati Children's measurement formula. The key driver was prevention, and the changes that we felt that could lead to improvement were: Keeping mOsm/mL to 800, the calcium concentration of 2mg/mL, RN reports to charge nurse or MD if patient required IV access more than 4 times in last 12 or 24 hours, and central line (CL) criteria for infants <1500g. The first PDSA cycle included prohibiting any IV infusions of fluid with a calcium of 2mg/ml or greater and osmolality of 900 mOsm/ml or greater and informing the staff.

**Results:** For outcome measures, we are measuring the rate of all PIVIEs and those that received hyaluronidase and were considered as severe. We are also looking at process measures such as osmolality and calcium concentration in certain subset of our patients such as 1250-1500g who did not have CL after removal of UVC at 7 days. Balancing measures such as CL utilization rate and CLABSI, growth parameters in the 1250-1500g group for ability to introduce higher protein through CL. We hope to significantly reduce the injury rate immediately following implementation of the clinical practice guideline.

**Conclusions:** Overall, we are hopeful this will lead to improvements in clinical practice inline with current evidence. Follow-up data analysis allowed us to identify that our next PDSA cycle should focus on creating a clinical practice guideline. Improvement activities included development of the Care and Management for Infiltration/ Extravasation from a Peripheral Intravascular Device in the NICU - Clinical Practice Guideline, and staff education. Our guideline defines 3 grades by signs and symptoms, nursing interventions and medical provider interventions and considerations. This has resulted in enhanced awareness of the risks associated with IV therapy, shared and widespread education among all staff and of measures to prevent an injury occurring in the NICU.

### Abstract # 30

**Title:** Correlation between Total Serum Bilirubin and Transcutaneous bilirubin levels in extremely preterm infants less than 30 weeks gestation

**Authors & Institutions :** CAN Research Committee Investigators

Sankar, Meera N<sup>1</sup>, Joe, Priscilla,<sup>2</sup> Bhatt, Dilip R<sup>3</sup>, Villosis, Maria-Fe,<sup>4</sup> Katheria, Anup C,<sup>5</sup> Biniwale, Manoj,<sup>6</sup> Paje, Virna Corazon,<sup>3</sup> Truong,

Huy A,<sup>3</sup> Tan, Rosemarie,<sup>7</sup> Nguyen, Marielle,<sup>8</sup> Arora, Vasudha N,<sup>9</sup> Cortes, Maria E,<sup>10</sup> Ramanathan, Rangasamy<sup>6</sup> Neonatology/Pediatrics, Stanford University, Palo Alto, CA,<sup>1</sup> Neonatology, UCSF Benioff Children's Hospital Oakland, Oakland, CA,<sup>2</sup> Neonatology, Kaiser Fontana Medical Center, Fontana, CA<sup>3</sup>Pediatrics-Neonatology, Kaiser Permanente, Panorama City, CA<sup>4</sup> Neonatal Research Institute, Sharp Mary Birch Hospital, San Diego, CA,<sup>5</sup>Pediatrics/Division of Neonatal Medicine, Keck School of medicine of USC, LAC+USC Medical Center, Los Angeles, CA,<sup>6</sup>Pediatrics, Neonatology/Pediatrics Miller Children's Hospital, Long Beach, CA<sup>7</sup>Neonatology, Kaiser Permanente Orange County, Anaheim, CA,<sup>8</sup> Pediatrics/Neonatology, Kaiser Permanente Southern California, Pasadena, CA<sup>9</sup>.Neonatology, Santa Clara Valley Medical Center, San Jose, CA<sup>10</sup>

**Introduction:** The utility of Transcutaneous bilirubin (TcB) measurements in the care of term and late preterm infants is well established. TcB has been shown to reduce the need for blood sampling, improve patient safety, decrease resource utilization and is painless. There are no clear recommendations on the use of TcB in extremely preterm (EP) infants.

**Objective:** The primary objective was to evaluate the correlation between total serum bilirubin (TSB) and TcB levels and determine the reliability of TcB for screening and monitoring jaundice in EP infants.

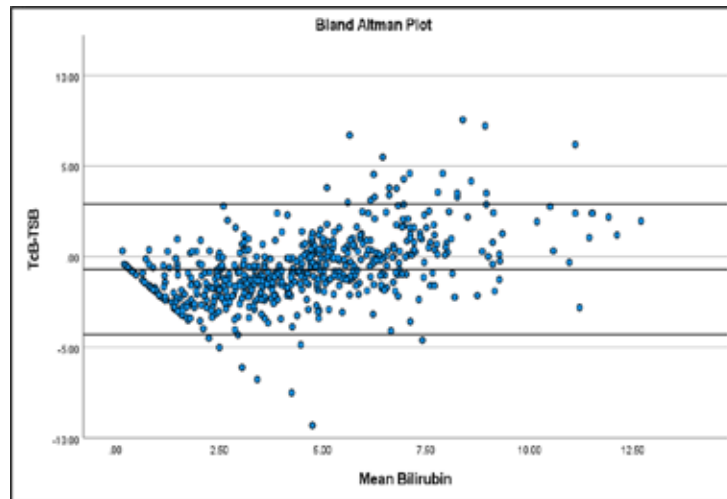
**Design/Methods:** This was a prospective multicenter study conducted at seven Level III and IV NICUs in California. EP infants between 22 and 30 weeks of gestation admitted to the NICU without congenital anomalies were included. TcB measurements were performed within 30-60 minutes of TSB measurements during the first 3 weeks of life. Trained NICU staff measured TcB levels by using Drager Jaundice (JM-103 and JM-105) transcutaneous bilirubinometer. Neonates with TSB readings in the phototherapy range received phototherapy as per the standard protocol. We examined the mean and difference between TcB and TSB values, gestational age, birth weight, maternal race/ethnicity and neonatal morbidities. Descriptive statistics were used for entire group using IBM SPSS statistical software version 27. Correlation between TSB and TcB levels was assessed with Pearson's correlation analyses. Bland-Altman analysis was used to show the differences between the mean values of the two methods.

**Results:** A total of 581 paired TcB and TSB measurements from 116 infants were analyzed. Median gestational age was 27 weeks (IQR 25-28) and postnatal age ranged from 1 to 18 days of life. TSB values ranged from 0 to 12.6 whereas TcB values ranged from 0 to 14.2. Pearson bivariate correlation testing revealed moderate level of correlation between TcB and TSB with a coefficient of 0.782 ( $p < 0.001$ ). Bland Altman analysis of data (Figure 1) showed a good agreement at 95 percent limits with mean difference between TcB and TSB was  $-0.71$  (SD  $\pm 1.84$ ). Regression equation predicted  $TSB = 2.52 + 0.55(TcB)$  with  $r$  squared of 0.61 suggesting moderate to strong correlation (Figure 2).

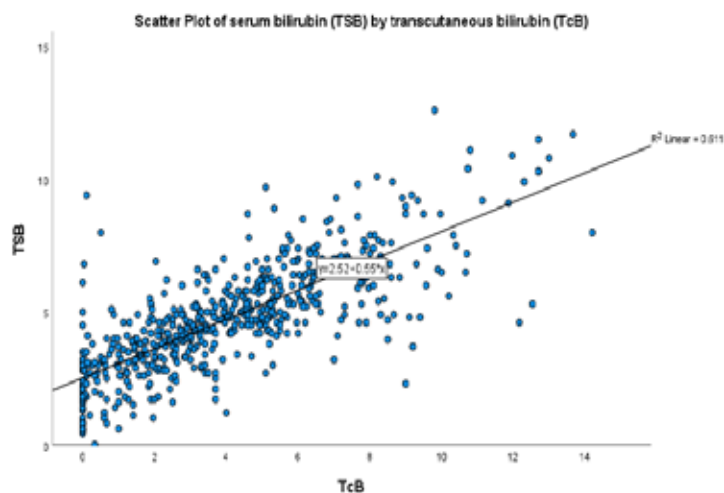
**Conclusions:** TcB levels correlated moderately with TSB levels in this ethnically diverse population of EP babies in California NICUs. TcB may be a useful screening tool for monitoring jaundice in EP newborns.

**Figure 1:** Bland-Altman plot depicting data showing the difference between Transcutaneous bilirubin (TcB) and Total serum bilirubin (TSB) measurements on Y-axis against the mean of TcB

and TSB on X-axis



**Figure 2:** Correlation Graph with R squared fit between Total serum Bilirubin (TSB) and Transcutaneous Bilirubin (TcB) values



### Abstract # 31

**Title:** Transcutaneous bilirubin levels compared to Total Serum Bilirubin levels in extremely preterm infants less than 30 weeks gestation

**Authors & Institutions:** CAN Research Committee Investigators

Sankar, Meera N<sup>\*1</sup>, Joe, Priscilla,<sup>2</sup> Cortes, Maria E<sup>3</sup>, Villosis, Maria-Fe,<sup>4</sup> Katheria, Anup C,<sup>5</sup> Biniwale, Manoj,<sup>6</sup> Bhatt, Dilip R<sup>7</sup>, Paje, Virna Corazon,<sup>7</sup> Truong, Huy A,<sup>7</sup> Tan, Rosemarie,<sup>8</sup> Nguyen, Marielle,<sup>9</sup> Arora, Vasudha N,<sup>10</sup> Ramanathan, Rangasamy<sup>6</sup> Neonatology/Pediatrics, Stanford University, Palo Alto, CA,<sup>1</sup> Neonatology, UCSF Benioff Children's Hospital Oakland, Oakland, CA,<sup>2</sup> Neonatology,

**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](mailto:LomaLindaPublishingCompany@gmail.com)

Santa Clara Valley Medical Center, San Jose, CA,<sup>3</sup> Pediatrics-Neonatology, Kaiser Permanente, Panorama City, CA,<sup>4</sup> Neonatal Research Institute, Sharp Mary Birch Hospital, San Diego, CA,<sup>5</sup> Pediatrics/Division of Neonatal Medicine, Keck School of medicine of USC, LAC+USC Medical Center, Los Angeles, CA,<sup>6</sup> Neonatology, Fontana Medical Center, Fontana, CA,<sup>7</sup> Neonatology/Pediatrics Miller Children's Hospital, Long Beach, CA,<sup>8</sup>

Neonatology, Kaiser Permanente Orange County, Anaheim, CA,<sup>9</sup> Pediatrics/Neonatology, Kaiser Permanente Southern California, Pasadena, CA.<sup>10</sup>

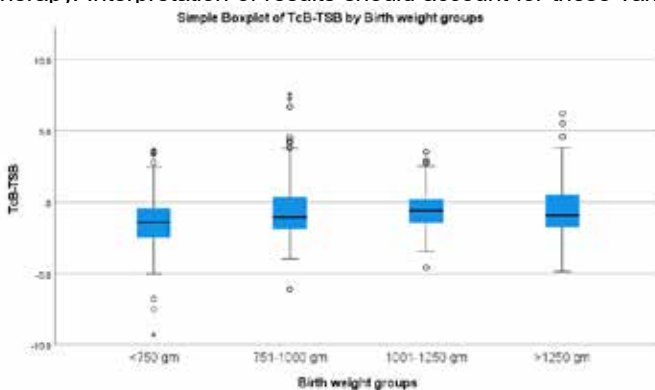
**Background:** Measurement of Transcutaneous bilirubin (TcB) level is a safe, noninvasive, cost-effective method for screening term infants with hyperbilirubinemia. There is limited data on TcB values in extremely preterm (EP) infants.

**Objective:** The primary objective was to determine the relationship between TcB levels compared to total serum bilirubin (TSB) in EP infants. In addition, a secondary analysis on variables that influenced over- and under-estimation were performed.

**Design/Methods:** A prospective multicenter study was conducted at eight Level III and IV NICUs in California. EP infants between 22-30 weeks of gestation admitted to the NICU without congenital anomalies were included. Trained NICU staff measured TcB levels by using Drager Jaundice (JM-103 or JM105) transcutaneous bilirubinometer or BiliChek bilirubinometer. Neonates with TSB readings in the phototherapy range received phototherapy as per the standard protocol. Difference between paired TcB and TSB values were compared to gestational age, birth weight, maternal race/ethnicity and chronological age. Descriptive statistics were performed using IBM SPSS (ver 27). Factors affecting the TcB and TSB correlation were compared using independent sample t test and ANOVA. Multivariate linear regression analysis was performed for significant factors.

**Results:** There were 755 paired samples from 140 infants. The BiliChek overestimated mean TcB values by 2.85 mg/dL than TSB values. The Drager JM 103 and JM 105 underestimated mean TcB values by 0.71 mg/dL than TSB ( $P < 0.001$ ). A subgroup analysis was done for 581 paired samples (116 infants) obtained using Drager JM103. Infants of 22-24 weeks gestation had TcB values significantly lower than TSB values (-1.15 vs -0.60,  $p = 0.008$ ) compared to older gestation infants. Infants less than 750 gm had mean TcB values 1.45 mg/dL lower than TSB levels compared to larger infants where mean difference was 0.52 ( $p < 0.001$ ) (Figure 1). TSB values were lower in infants > one week of age ( $p = 0.044$ ). TcB on phototherapy underestimated TSB by approximately 1 mg/dL compared to 0.5 mg/dL ( $p = 0.001$ ) off phototherapy. Regression analysis revealed birth weight, chronological age and phototherapy to be significant.

**Conclusions:** TcB levels could be affected by the type of bilirubinometer, gestational age, birth weight, chronological age and phototherapy. Interpretation of results should account for these variables.



## Abstract # 32

### Decreasing Unnecessary Mother-Baby Separation at Birth by Assigning a Designated Location for the Pediatric Provider at Mother's Bedside

Robin Saoud MD, Guadalupe Padilla MD, Virender Rehan MD

Department of Pediatrics and Division of Neonatology, Harbor-UCLA Medical Center(HUMC), David Geffen School of Medicine, University of California, Los Angeles.

**Background:** Neonatal Resuscitation Program (NRP) recommends that immediately after a baby's birth an assessment be performed to determine if the infant is term gestation, breathing/crying, and has good tone while delayed cord clamping (DCC) is in progress. If all three circumstances are present, then resuscitation continues on the mother; if not, the neonate is taken to the warmer for further assessment. In 08/2018 at HUMC, concern arose regarding the pediatrician's accuracy in assessing newly born infants by observing them a distance, standing at the warmer. This resulted in frequent requests to cease DCC prior to 30 sec and move the infant to the warmer for further evaluation.

**Objectives:** Reduction in the frequency of unnecessary mother-baby separation to  $\leq 20\%$  and decrease early cord clamping (ECC) by  $> 90\%$ .

**Design:** Using the PDSA (Plan-Do-Study-Act) model, we measured the impact of our interventions on unnecessary mother-baby separations and early cord clamping via medical record review of eligible infants.

**Setting:** Labor and Delivery at HUMC

**Patients:** Term infants born via spontaneous vaginal delivery with pediatric provider in attendance at time of birth.

**Interventions:** On 08/28/2018, a designated location was identified for the pediatric provider to perform hands-on assessment of newborn immediately after birth and during DCC. At that time, providers were individually educated and on 10/19/2018, pediatric residents participated in an NRP refresher course; medical record documentation was adjusted reflecting the goal of resuscitating baby on mother.

**Measurement:** Information gathered included: APGAR Scores, details of resuscitation beyond basic warming, drying, stimulating and bulb suctioning, duration of DCC and reason for separation from mother immediately after birth.

**Results:** Pre-[05/01/18-08/27/18 (N=71)] and post-[Cycle 1 : 08/28/18-10/18/18 (N=35), Cycle 2: 10/21/18-12/31/18 (N=48), Sustainability (Cycle 3): 08/01/19-10/31/19 (N=75)] intervention data were collected.

Pre-intervention data showed 35% of eligible infants were taken to the warmer despite 1 min APGAR  $\geq 7$  and requiring only basic resuscitation vs 26% (Cycle 1), 23% (Cycle 2) and 20% (Cycle 3). Pre-intervention data for ECC with 1 min APGAR  $\geq 7$  and basic resuscitation: 7% vs 3% (Cycle 1), 0% (Cycles 2 and 3). Balancing metric of 1min APGAR  $< 7$  with DCC  $> 30s$  was 0% in pre-intervention, 3% (Cycle 1), 3% (Cycle 2) and 1% (Cycle 3).

**Limitations:** Some details of the resuscitation were inconsistently documented.

**Conclusion:** Assigning a designated bedside location for the pediatric provider at vaginal deliveries decreases unnecessary mother-baby separation and ECC.

## Abstract # 33

### ***B. infantis* EVC001 Feeding in VLBW Infants is Associated with Significant Reduction in Rates of NEC**

B. Scottoline

OHSU, Portland, OR, United States

**Introduction:** Necrotizing enterocolitis (NEC) is a leading cause of preterm infant morbidity and mortality. Given the evidence for association of gut dysbiosis with NEC pathogenesis, we aimed to quantify the effects of feeding activated *B. infantis* EVC001 to very low birth weight (VLBW) infants in a single level IV NICU at Oregon Health & Science University (OHSU), particularly on NEC rates.

**Methods:** A retrospective chart review was used to evaluate two VLBW infant cohorts for demographics and NEC (Bell Stage 2 or above) at OHSU between Jan. 2014 and Oct. 2020. The comparison cohort (n=329) did not receive a probiotic, while EVC001 feeding was standard of care from June 2018 onward for the probiotic cohort (n=191).

**Results:** There were no differences between cohorts regarding major demographic characteristics. Both cohorts were fed a core diet including human milk and a period of trophic feeding; human milk-based fortification was introduced approximately 15 months prior to introduction of EVC001 without discernable effect on NEC. There were 32 cases of NEC (9.7%) in the comparison cohort. After EVC001 introduction, there were 10 cases of NEC, 5 of which had not received EVC001 prior to NEC diagnosis, and 1 whom had 1 serving just prior to NEC diagnosis. Thus, there were 4 cases of NEC in 191 VLBWs given more than one feed of EVC001 (2.1%). This decrease in NEC was significant (9.7% vs 2.1%, p=0.001), with a risk ratio (RR) of 0.215 (95% CI 0.077, 0.60) and a number needed to treat (NNT) of 13. There was no NEC-related mortality in infants who received EVC001 compared to a NEC mortality rate of 25% in the comparison cohort. Infants <1000g at birth (ELBW) given EVC001 also showed a significant reduction in NEC. No adverse effects were associated with EVC001 administration, including no cases of *B. infantis* infection. Analysis is ongoing for rates of late onset sepsis and other secondary outcomes.

**Conclusions:** *B. infantis* EVC001 feeding was associated with a significant reduction in NEC rate in a single center retrospective observational study of 520 VLBW infants. This magnitude of NEC prevention may not only reduce VLBW morbidity and mortality but may also provide significant savings due to avoided NEC-associated costs and importantly, reduced emotional impact of NEC on parents.

## Abstract # 34

### **CAN 2021 Abstract: Perturbed Gut Microbes and Circulating Cytokines Herald Growth Failure in Preterm Infants**

**By:** Katie M. Strobel M.D.<sup>1</sup>, Giorgia Del Vecchio Ph.D.<sup>1</sup>, Fan Li Ph.D.<sup>2</sup>, Nicole Tobin M.D.<sup>2</sup>, Grace Aldrovandi M.D.<sup>2</sup>, Sherin U. Devaskar M.D.<sup>1</sup>, and Kara L. Calkins M.D.<sup>1</sup>

1. Department of Pediatrics, Division of Neonatology and Perinatal Biology, University of California-Los Angeles
2. Department of Pediatrics, Division of Infectious Diseases, University of California-Los Angeles

**BACKGROUND:** Growth failure (GF) is a major problem in premature infants. Fifty percent of very low birth weight (LBW) infants have growth failure by discharge. GF has implications on neurodevelopment, and the mechanism is poorly understood and multifactorial. Intestinal microbes can activate host macrophages releasing cytokines causing poor growth.

The study's objective was to investigate the intestinal microbiome and its association with circulating cytokines in LBWs with GF.

**METHODS:** This prospective cohort study included infants with a birth weight <2,000 g who required parenteral nutrition >2 weeks. Stool and serum samples were obtained weekly. The cohort was divided between 1) GF, decline of weight or length z-score from discharge to birth >0.8 2) those without GF (CON). The gut microbiome was assessed by 16s rRNA sequencing, and analyses were done with QIIME2 and DESeq2 and adjusted p-values were calculated. Plasma cytokines were measured by a 2-multi-plexed immunometric assay.

**RESULTS:** 30 infants completed the study. Subject characteristics are displayed **Table 1**. There were no significant differences in Shannon and Bray-Curtis diversity indices. However, specific phyla changes were observed between groups (**Figures 1 and 2**). An increase in Clostridia was observed in GF vs CON in weeks 1-3 (log<sub>2</sub>-fold change in each week: 4.7, 5.5, 9.6, p<0.01 each). Firmicutes and Actinobacteria increased in GF in week 3 (7.3, 3.8, p<0.001 each), while Bacteroidetes decreased in GF in week 1 and 2 (-6.7, -5.7, p<0.001 each). In general, infants with GF had elevated cytokine levels compared to CON (Table 1.). When compared to CON, GF had a greater rate of change over time for IL-8 (3.4 pg/mL/day vs 1.9 pg/mL/day, p=0.02) and IL-1 $\beta$  (0.1 pg/mL/day vs 0.02 pg/mL/day, p=0.03) than CON. TNF $\alpha$  concentrations were associated with *Enterococcus* (r<sup>2</sup> 0.262, p=0.003) and *Enterobacteriaceae* log relative abundance (r<sup>2</sup> 0.093, p=0.03).

**CONCLUSION:** In this study, LBW infants with GF had a unique microbial and inflammatory signature. We suspect that pathogenic bacteria increase intestinal permeability and systemic inflammation, causing GF and other co-morbidities. Because higher amounts of Firmicutes and inflammation are associated with obesity, long-term follow-up may be warranted.

Supported by NIH-NIDDK T32DK007180 (KMS) and NIH HD41230 (SD) and HD089714 (SD)

**Table 1.** Subject characteristics. Continuous variables are expressed in median and IQR. Change in z-score is from birth to discharge.

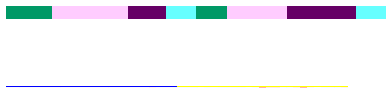
	CON (n=14)	GF (n=16)	p-value
<b>Gestational Age (weeks)</b>	29.6 (28.7-31.2)	29.0 (25.3-31.7)	0.53
<b>Sex - Male</b>	42%	50%	0.69
<b>Birth Weight (g)</b>	1278 (1021-1560)	1380 (760-1534)	0.49
<b>Birth Weight Z-score</b>	-0.08 (-0.89-0.38)	0.4 (-0.4-1)	0.13
<b>Birth Length Z-score</b>	-0.06 (-0.8-0.4)	0.5 (-0.7-0.94)	0.20
<b>Small for Gestational Age</b>	14%	19%	0.57
<b>Discharge Weight Z-score</b>	-0.42 (-1.5-0.2)	-1.2 (1.7)	0.47

Relative Abundance (%)



<b>Discharge Length Z-Score</b>	0 (-2.2-0.3)	-1.24 (-2.3- -0.3)	0.16
<b>Change in Weight Z-Score</b>	-0.60 (-1.1 – 0.03)	-1.26 (-2.0 - -0.8)	0.01
<b>Change in Length Z-Score</b>	-0.24 (-0.53- -0.04)	-1.58 (-2.1- -0.9)	<0.01
<b>Parenteral Nutrition Days</b>	11 (8-16)	25 (10.2-39)	0.02
<b>Late Onset Sepsis</b>	0%	38%	0.01
<b>Broncho-pulmonary Dysplasia</b>	7%	31%	0.07
<b>Retinopathy of prematurity</b>	7%	25%	0.18
<b>Necrotizing Enterocolitis</b>	7%	19%	0.35
<b>IL-10 (pg/mL)</b>	1.3 (0.9-2.0)	1.6 (1-4.2)	0.05
<b>IL-1B (pg/mL)</b>	0.9 (0.6-1.8)	1.9 (0.9-9.9)	0.001
<b>IL-6 (pg/mL)</b>	7.4 (3.2-15.3)	8.6 (5.2-20)	0.13
<b>IL-8 (pg/mL)</b>	34.8 (24.5-77.2)	112 (46.6-313)	<0.01
<b>TNF-α (pg/mL)</b>	15.9 (13-19.8)	18 (13.7-28.7)	0.06

**Figure 1.** Heat map of Clostridia, Firmicutes, Actinobacteria, and Bacteroidetes. First bar represents weeks (week 1 green, week 2 magenta, week 3 purple, week 4 cyan). Second bar represents cohorts, blue CON and yellow GF.



**Figure 2.** Mean relative abundance (%) of phyla for CON and GF cohorts by week of age. Phyla are represented as follows: Actinobacteria orange, Bacteroidetes green, Firmicutes blue, Proteobacteria purple, and others gray.

### Abstract # 35

#### Reinforcement of Preventive Bundle Led to Low Incidence in Severe Retinopathy of Prematurity in High Risk Premature Infants: A Quality Improvement Study

Maria-Fe Villosis, MD\*, Ma. Teresa Ambat, MD, Kambiz K. Rezaie, MD, Alexandra Diamond, DO, Karine Barseghyan, MD

Division of Neonatology, Neonatal Intensive Care Unit, Kaiser Foundation Hospital-Panorama City, CA, USA

#### Background:

Retinopathy of prematurity (ROP) is one of the leading causes of severe visual impairment in childhood. Severe ROP has been shown

to be a predictor of death and later neurosensory impairment.

Multicenter groups have reported a highly variable incidence of severe ROP about 3-36% among very low birth weight infants (VLBW) with increased survival of extremely preterm infants. Significant variations in severe ROP rates could be attributed to differences in clinical practices.

#### Objective:

- To determine the incidence of ROP in our medical center within an 11-year period (2009-2019).
- To evaluate the implementation of the intervention strategies to decrease ROP rate in our NICU.

#### Method:

Data collection on a cohort of 388 VLBW infants admitted to KFH-PC NICU between 2009-2019 utilizing Vermont Oxford Network (VON) and California Perinatal Quality Care Collaborative (CPQCC) databases was performed.

#### Results:

The incidence of ROP among VLBW infants in our NICU dropped significantly after implementation of a prevention care bundle that included optimal oxygen saturation target of 85-95%, minimization of oxygen toxicity, bronchopulmonary dysplasia prevention bundle, and exclusive human milk diet based feeding protocol.

The reinforcement of the ROP prevention bundle at KFH-PC NICU resulted in sustained low rate in severe ROP incidence dropping from baseline 3.6% in 2009 to 0% in 2019 with an average incidence of 3% (range 0-10.7% during the years 2009-2019). There were 259 infants with gestational age of less than 30 weeks with an overall ROP incidence of 4.2%.

The risk adjusted ROP rate for our center was 1.6% compared to CPQCC median adjusted risk of 5.7% in 401-1500-gram infants or infants born at 22-31 weeks gestation in 2017-2019.

The VON observed: expected ratio in the recent epoch (2017-2019) was 0.6 (5<sup>th</sup> and 95<sup>th</sup> confidence limits 0.2 and 1.1, respectively).

#### Conclusion:

We observed a significant decrease in severe ROP rates in VLBW infants that was associated with reinforcement of the preventive care bundle. The sustained low incidence could be attributed to consistent adherence to the bundle and continuous improvement of quality of care by the multidisciplinary team.

### Abstract # 36

**TITLE:** Improving NICU Nurse's Recognition of Normal and Abnormal Patterns on aEEG Monitoring.

**AUTHORS:** Diane Vande Pol, RN, CNS; \*Samantha Hewitt, RN; Angela Huang, RNC, MPH; Dongli Song, MD, PhD

**BACKGROUND:** aEEG is a useful bedside monitoring tool to evaluate the infants' neurological status and seizures. Training NICU clinical nurses in aEEG interpretation to recognize normal

and abnormal patterns will promote timely interventions in infants with brain injury, seizures, or other neurological abnormalities.

**OBJECTIVE:** To increase NICU nurses' proficiency in recognizing normal and abnormal aEEG patterns through staff education and training.

**SETTING:** 70 NICU clinical nurses in a 40-bed Level III regional NICU in a public hospital.

**METHODS:** Education was presented in a series of written modules, as our usual method of classroom training with several nurses at a time was not possible due to the COVID-19 social distancing policy. Five (5) printed modules were presented to the staff over 5 months, covering normal (Part 1), discontinuous (Part 2), burst suppression (Part 3), continuous low voltage and flat/inactive (**Part 4**) patterns, and seizures and artifact (Part 5). A pre-and post-assessment was conducted via an online Learning Management System, consisting of 27 questions covering these common patterns, various types of seizures, and artifacts. The results were summarized as the percentage of correct answers for each question in the pre- and post-assessment tests.

**RESULTS:** Sixty-nine (99%) participating nurses completed the pre- and post-assessments. There was an overall increase in the average percentage of correct answers in the post-assessment, 81% (range 51-96%) than the pre-assessment test 52% (range 22-77%). The average improvement in the scores for all 27 questions from pre- to post-assessment scores was 29% (range 13% to 43%). The three questions that had the most improvement in scores were identifying low voltage pattern, seizure recognition, and identifying artifacts.

**CONCLUSIONS:** The written module form of education is effective in improving the NICU nurses' proficiency in aEEG interpretation by recognizing normal and abnormal patterns. The high NICU acuity and census during the training period were major challenges, making it difficult for the nurses to complete the learning modules.

Table 1 Pre- Post-Test Results Analysis

QUESTION	PRE-TEST % CORRECT	POST-TEST % CORRECT	%Improvement
1. Upper margin (normal)	68	94	26
2. Lower margin (normal)	55	83	28
3. Identify background pattern (normal)	64	83	19
4. Based on pattern identified, what action should be taken (normal)	68	94	26
5. Identify background pattern (seizure)	52	94	42
6. Based on pattern identified, what action should be taken (seizure)	75	96	21

7. Identify background pattern (artifact)	25	65	40
8. Based on pattern identified, what action should be taken (artifact)	36	65	29
9. Upper margin (discontinuous)	29	52	23
10. Lower margin (discontinuous)	72	94	22
11. Identify background pattern (discontinuous)	29	51	22
12. Identify background pattern (seizure)	38	74	36
13. Based on pattern identified, what action should be taken (seizure)	54	86	32
14. Upper margin (low voltage)	54	74	20
15. Lower margin (low voltage)	77	96	19
16. Identify background pattern (low voltage)	39	78	39
17. Based on pattern identified, what action should be taken (low voltage)	39	83	44
18. Upper margin (inactive flat isoelectric)	59	91	32
19. Lower margin (inactive flat isoelectric)	61	93	32
20. Identify background pattern (inactive flat isoelectric)	46	75	29
21. Based on pattern identified, what action should be taken (inactive flat isoelectric)	57	87	30
22. Upper margin (burst suppression)	54	80	26

23.	Lower margin (burst suppression)	74	87	13
24.	Identify background pattern (burst suppression)	35	70	35
25.	Based on pattern identified, what action should be taken (burst suppression)	45	74	29
26.	Identify background pattern (seizure)	51	87	36
27.	Based on pattern identified, what action should be taken (seizure)	57	93	36

#### Abstract # 37

##### **Title: Quality improvement initiative to reduce antibiotic exposure of asymptomatic infants born to mothers with intraamniotic infection**

**Authors:** Katherine J Weiss, MD<sup>\*†</sup>; Richard S Song, MD<sup>†</sup>; Nikole M DeVries, MSN, MBA<sup>‡</sup>; Amy L McLean, BSN<sup>‡</sup>; Laurel B Moyer, MD, MPH<sup>†</sup>

<sup>\*</sup>Division of Neonatology, Department of Pediatrics, University of California, San Diego, La Jolla, California; <sup>†</sup>Rady Children's Hospital, San Diego, California; and <sup>‡</sup>Rancho Springs Medical Center, Southwest Healthcare System, Murrieta, California

**Introduction:** Infants born to mothers with intraamniotic infection (IAI) have received antibiotic treatment as per the Centers for Disease Control and Prevention and American Academy of Pediatrics guidelines in our neonatal intensive care unit (NICU) for early-onset bacterial sepsis evaluation. We conducted a quality improvement (QI) project to decrease antibiotic use and NICU admission in infants born to mothers with IAI. Our aim was to decrease antibiotic exposure rate from 100% to 20% for asymptomatic infants born to mothers with IAI in six months. **Methods:** Baseline data on these infants was obtained from January 2018-January 2019 with the intervention starting February 2019. New standardized guidelines to clinically monitor and follow labs on asymptomatic infants in couplet care were created with the help of a multidisciplinary team and implemented after provider education. The team reviewed data monthly and used PDSA cycles to make necessary changes, including updating order sets, more educational handouts, and real-time coaching to both nurses and physicians. **Results:** There was a dramatic decline (93% to 0%) in antibiotic exposure and NICU admission after implementing these guidelines. There was also a decrease in IAI diagnosis. No infants were readmitted for infection within 30 days of discharge and there were no positive blood cultures. **Conclusion:** Implementing best practices through standardized guidelines, testing and implementation of

processes, and education by a multidisciplinary team limited the antibiotic exposure and NICU admission for infants born to mothers with IAI with no known increase in readmissions.

#### Abstract # 38

##### **TITLE: Association Between Umbilical Cord Management and 5 Minute Peripheral Oxygenation In Preterm Infants**

**AUTHORS:** Yim, Rachel Kai-Xin; Wong, Shelby ; Poelter, Debra ; Rich, Wade D. ; Sanjay, Shashank ; Katheria, Anup C.

**Introduction:** Premature infants are subject to increased risk of death and injuries including intraventricular hemorrhage and hypoxic-ischemic encephalopathy. Therefore, cord treatments which promote placental transfusion, primarily delayed cord clamping (DCC), is recommended for all preterm newborns as it has been shown to reduce these morbidities. Umbilical cord milking (UCM) is another viable option; however, the effects of delaying resuscitation and oxygen administration in non-vigorous and non-breathing resuscitated preterm newborns are largely unknown. A recent post hoc exploratory analysis of the major TO2RPIDO trial done by Kei Lui et. al. found that infants with 80% or less 5-minute mean peripheral arterial oxygenation (SpO<sub>2</sub>) were more likely to die or have neurodevelopmental impairment. This study aims to determine if resuscitated preterm infants that received DCC had lower 5-minute SpO<sub>2</sub> levels compared to those with UCM or early cord clamping (ECC).

**Methods:** This was a retrospective review of 23 to 31 weeks of gestation resuscitated premature infants born between 2014-present receiving either ECC (N=20), DCC (N=178), or UCM (N=130). Data gathered included SpO<sub>2</sub> (measured by pulse oximetry), and various physiologic data including administered inspired fraction of oxygen (FiO<sub>2</sub>). Each treatment group's mean 5-minute SpO<sub>2</sub> and FiO<sub>2</sub> levels were compared with 2-sample t tests for continuous variables using a critical alpha level of 0.05.

**Results:** There were no statistically significant differences between the three groups using ANOVA for continuous measures and Chi square for categorical variables in maternal or neonatal demographics. Mean SpO<sub>2</sub> and FiO<sub>2</sub> at 5 minutes were compared. FiO<sub>2</sub> at 5 min was higher in ECC compared to UCM (p=0.031) and DCC (p=0.025), with no difference found between UCM and DCC. The 5-minute SpO<sub>2</sub> was higher in UCM compared to DCC (79.4% vs 74.8%, p= 0.028). There was no difference between mean 5-minute SpO<sub>2</sub> of ECC and UCM (P= 0.72) or DCC (p=0.16). ECC and UCM allow for resuscitation to occur quickly and may lead to improvements in oxygenation within 5 minutes of life. However, both have increased risk of mortality or intraventricular hemorrhage. Despite receiving similar amounts of supplemental oxygen, infants receiving DCC had a lower 5- min SpO<sub>2</sub> compared to UCM. Providing higher supplemental oxygen during DCC or immediately following clamping and cutting of the umbilical cord may improve 5-minute SpO<sub>2</sub> and neonatal outcomes.

NT

Corresponding Author



John P. Cleary, MD  
Neonatology  
Associate Director ECMO  
CHOC Children's |  
Email: [jcleary@choc.org](mailto:jcleary@choc.org)

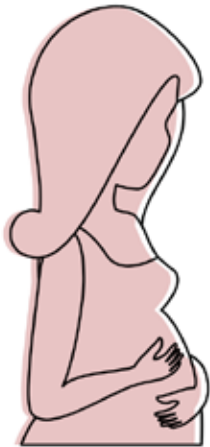
New subscribers are always welcome!

**NEONATOLOGY TODAY**

To sign up for free monthly subscription,  
just click on this box to go directly to our  
subscription page

NATIONAL PERINATAL ASSOCIATION

Update: **CORONAVIRUS**  
COVID-19



According to data  
published in The Lancet

Pregnancy  
and the risk of  
**VERTICAL  
TRANSMISSION**

**LOW**



[www.nationalperinatal.org](http://www.nationalperinatal.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



[nicuawareness.org](http://nicuawareness.org)  
[nationalperinatal.org/NICU\\_Awareness](http://nationalperinatal.org/NICU_Awareness)  
[projectsweetpeas.com](http://projectsweetpeas.com)  
[nationalperinatal.org/skin-to-skin](http://nationalperinatal.org/skin-to-skin)



## Why Pregnant and Nursing Women Need Clear Guidance on THE NET BENEFITS OF EATING FISH

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



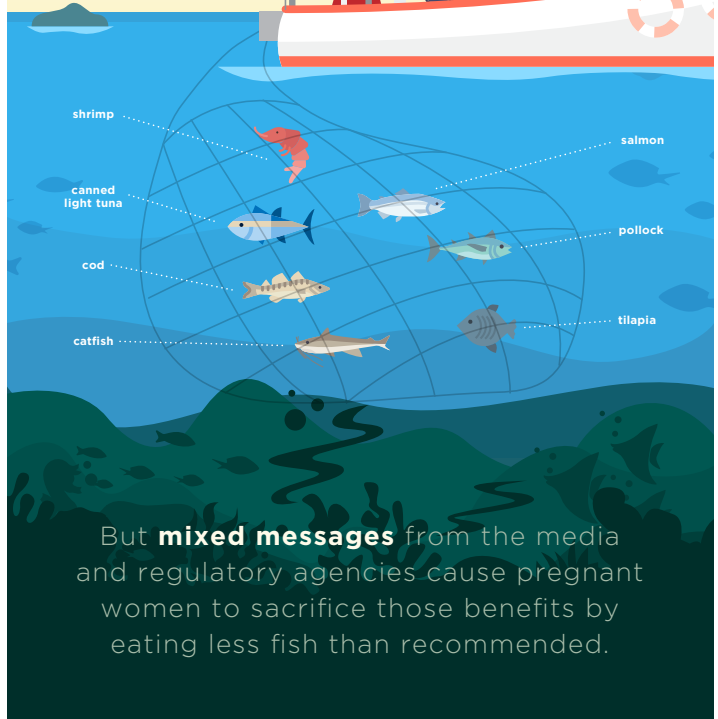
Iron



Omega 3 fatty acids



Earlier Milestones for Babies



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



Did you know that  
**PMAD**  
related suicides  
account for

**20%**

of Postpartum  
Maternal Deaths?

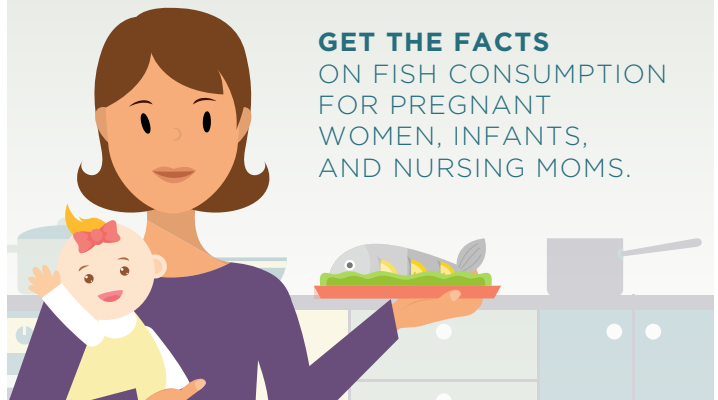
Join  **NPA**

[nationalperinatal.org/mental\\_health](http://nationalperinatal.org/mental_health)

**Support the  
Open Letter**



**Breastfeeding  
Innovations  
Team**



**GET THE FACTS**  
ON FISH CONSUMPTION  
FOR PREGNANT  
WOMEN, INFANTS,  
AND NURSING MOMS.

**NCfIH** National Coalition  
for Infant Health

Protecting Access for Premature Infants through Age Two

**LEARN MORE** ▶

# Letters to the Editor

## Need for Glucose Screening

### Letter to the Editor

Dear Sir

I would like to congratulate Professors Sims and Schifrin on the Briefly Legal case report "Need for glucose screening after fetal distress, a misadventure in the normal nursery." As a pediatric endocrinologist who has a special interest in hypoglycemia, they have hit the nail on the head with the warning to carefully assess newborns who have suffered fetal distress. So many times, I have seen cases like this, both working for the plaintiffs and the defense, and it is important that cases like this are published. I have also found that some of the important neonatal journals have in the past (less so in recent years) rejected papers regarding neonatal hypoglycemia on the basis that the reviewers disagree with the significance of neonatal hypoglycemia; therefore, this is why the submitted paper is relevant.

It is important to be aware of the etiological factors that predispose to perinatal stress hyperinsulinism (PSHI), also known as acquired hyperinsulinism, and why this is so dangerous to the neonate compared to the normal physiological transitional hypoglycemia of the newborn. We have tried to highlight some of these risk factors in the PES recommendations (1,2) but are not getting a lot of traction partially because of the definition of fetal distress or perinatal stress. In terms of perinatal stress hyperinsulinism, a recent review by Stanescu and Stanley (3) demonstrated that a lower glucose threshold for insulin release causes PSHI and that this occurs due to decreased trafficking of the ATP-sensitive potassium channel ( $K_{ATP}$ ) to the surface of the beta-cell plasma membrane. This is thought to occur due to activation of the hypoxia-inducible factor 1 $\alpha$  (HIF1A) pathway. In studies of the etiology of PSHI there are several common themes. These include the presence of clear hypoxia in the fetus, either short and transient or prolonged, the presence of altered blood flow dynamics to the fetus such as maternal hypertension and pre-eclampsia,

the evidence of fetal distress on fetal monitoring tracings, and in rare cases, there is no obvious explanation. (4) It is important to understand that the traditional teaching that if the 5 min Apgar is >7, there was no significant perinatal stress is not correct when it comes to the etiology of perinatal stress hyperinsulinism.

A recent publication describing prolonged neonatal transition by Bailey et al. (5) does not help understand the difference between the normal physiological transition of the newborn and PSHI. They described the classical features of PSHI but named it prolonged transitional neonatal hypoglycemia, which gives the sense to the reader that it is physiological, when in fact, as in the case described by Sims and Schifrin, it is not, and it is potentially dangerous if not adequately treated. I hope that organizations such as the AAP committee of the fetus and newborn will update screening guidelines to include babies born following a pregnancy complicated by perinatal stress.

### References:

1. Thornton PS, Stanley CA, De Leon D, Harris DL, Haymond M, Hussain K, et al. "Recommendations from the Pediatric Endocrine Society For Evaluation And Management Of Persistent Hypoglycemia In Neonates, Infants, And Children." *J Pediatr*; 2015;166:1520-5
2. Stanley CA, Rozance PJ, Thornton PS, De Leon DD, Harris D, Haymond MW et al. Re-Evaluating "Transitional Neonatal Hypoglycemia": Mechanism and Implications for Management. *J Pediatr*. 2015 Mar 25. pii: S0022-3476(15)00165-1. doi: 10.1016/j.jpeds.2015.02.045.
3. Stanescu DL, Stanley CA. Advances in Understanding the Mechanism of Transitional Neonatal Hypoglycemia and Implications for Management. *Clin Perinatol* (2021) <https://doi.org/10.1016/j.clp.2021.11.007>
4. Hoe FM, Thornton PS, Wanner LA, Steinkrauss L, Simmons RA, Stanley CA. Clinical features and insulin regulation in infants with a syndrome of prolonged neonatal hyperinsulinism. *J Pediatr*. 2006 Feb;148(2):207-12
5. Bailey MJ, Rout A, Harding JE et al. Prolonged transitional neonatal hypoglycaemia: characterization of a clinical syndrome *Journal of Perinatology*. <https://doi.org/10.1038/s41372-020-00891-w>

Paul S Thornton MD

Medical Director of Diabetes and Endocrinology

Director of the Congenital Hyperinsulinism Center

Cook Children's Medical Center

1500 Cooper Street, 2<sup>nd</sup> Floor

Fort Worth TX 76104

682 885 1700

[Paul.Thornton@cookchildrens.org](mailto:Paul.Thornton@cookchildrens.org)

[www.cookchildrens.org](http://www.cookchildrens.org)

Dr. Schifrin responds to Dr. Thornton

We thank Dr. Thornton for his comments. His letter focuses on issues related to neonatal hypoglycemia but also acknowledges barriers to assimilating the lessons to be learned from malpractice cases. Dr. Thornton's concerns underscore the notion that the newborn has a history of exposure to the hypoxic and mechanical forces of labor that may readily stress the fetus but may not be immediately obvious on the Apgar score at 5 minutes, as subjective as that might be. He correctly points out the **mythconception** (often used in legal cases) that if the 5 min



Apgar score is >7, the newborn could not have had significant perinatal stress or injury. Babies with Apgar scores of >7 may have significant base deficits (1), may have suffered a stroke in utero (2), and have significant risks of subdural and retinal hemorrhages and admission to the NICU, especially if there has been an operative delivery. (3)

Dr. Thornton, believing that a problem he encountered in a medico-legal case was worthy of dissemination, was dissuaded from offering the matter for publication to share his perspective with his colleagues. He has also found that some of the important neonatal journals have rejected his work. The reviewers disagree with the significance of neonatal hypoglycemia, likely contributing to the "lack of traction." The inference is that politics has played a role in publishing material that might influence the outcome of medico-legal encounters. A recent controversy in Australia, in which a medical article truthfully related the testimony of certain academicians in a "shaken baby" trial. Because the testimony was less than complimentary to the academic witnesses, the article was withdrawn due to academic pressure and the threat of a lawsuit against the journal.

Despite the aversion to malpractice from practitioners and academics alike, there is always something beneficial to be learned from the allegation, whether it is about a medical diagnosis, medical records, or the aspirations of the litigants. Patients who sue are not outliers; they are ordinary patients to whom something serious, something potentially preventable, has happened. They are not especially greedy or vengeful, but they would like an honest explanation of what happened and often go to a lawyer to deal with their caregivers' unsatisfactory (defensive) explanations. Medicine needs a better way of dealing with error.

In response to Dr. Thornton, we did not include the settlement amount and prefer to maintain this perspective in the future. The amount of the settlement, even the side prevailing, may have little relationship to the facts of the case or the lessons to be learned from the case. Some juries are parsimonious, others philanthropic; they are generally fair. In some verdicts, the juries reward the patient for serious injury; in others, they penalize the healthcare providers for lying.

We hope that these articles help expand the perspective of neonatologists to the presence of perinatal stress using the thoughtful analysis of the events of labor, the fetal heart rate patterns, and a proper assessment of the newborn.

#### References:

1. Sabol BA, Caughey AB. Acidemia in neonates with a 5-minute Apgar score of 7 or greater - What are the outcomes? *Am J Obstet Gynecol* 2016.
2. Gacio S, Munoz Giacomelli F, Klein F. Presumed perinatal ischemic stroke: A review. *Arch Argent Pediatr* 2015;113:449-55.
3. Rooks VJ, Eaton JP, Ruess L, Petermann GW, Kock-Wherley J, Pedersen RC. Prevalence and evolution of intracranial hemorrhage in asymptomatic term infants. *AJNR Am J Neuroradiol* 2008;29:1082-9.

Barry S, Schiffrin, MD  
9018 Balboa Blvd. #595  
Northridge, CA 91325

#### Dr. Goldstein responds:

Malpractice may be a difficult subject to discuss, but these issues are important academically. Publication of situations that are at risk for malpractice is an important avenue to improved vigilance, development of care pathways, guidelines, and the whole QA/QI process. Only through these frank and open discussions of best practice can we progress.

However, we must remember that even if we have the best guidelines, there is no substitute for good clinical decision making.(1) In as much as it is important for us to make progress towards improved outcomes through a thorough analysis of the data, the thought process itself must advance. We must be mindful of the risk as well as the responsibility.

#### References:

1. Ginsburg, William. *Personal Communication* 2005



Mitchell Goldstein, MD, MBA, CML

Editor in Chief

**NT** **NEONATOLOGY TODAY**

Loma Linda Publishing Company

A Delaware "not for profit" 501(c) 3 Corporation.

c/o Mitchell Goldstein, MD

11175 Campus Street, Suite #11121

Loma Linda, CA 92354

Tel: +1 (302) 313-9984

[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)

© 2006-2022 by Neonatology Today ISSN: 1932-7137 (online)

Published monthly.

All rights reserved.

[www.NeonatologyToday.net](http://www.NeonatologyToday.net)

Twitter: [www.Twitter.com/NeoToday](https://www.Twitter.com/NeoToday)

**NT**

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](mailto:LomaLindaPublishingCompany@gmail.com).

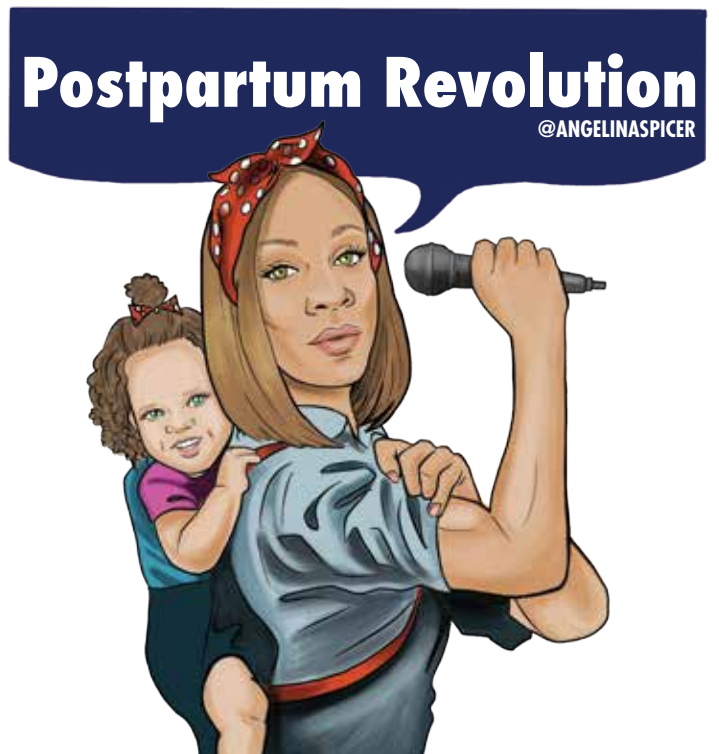
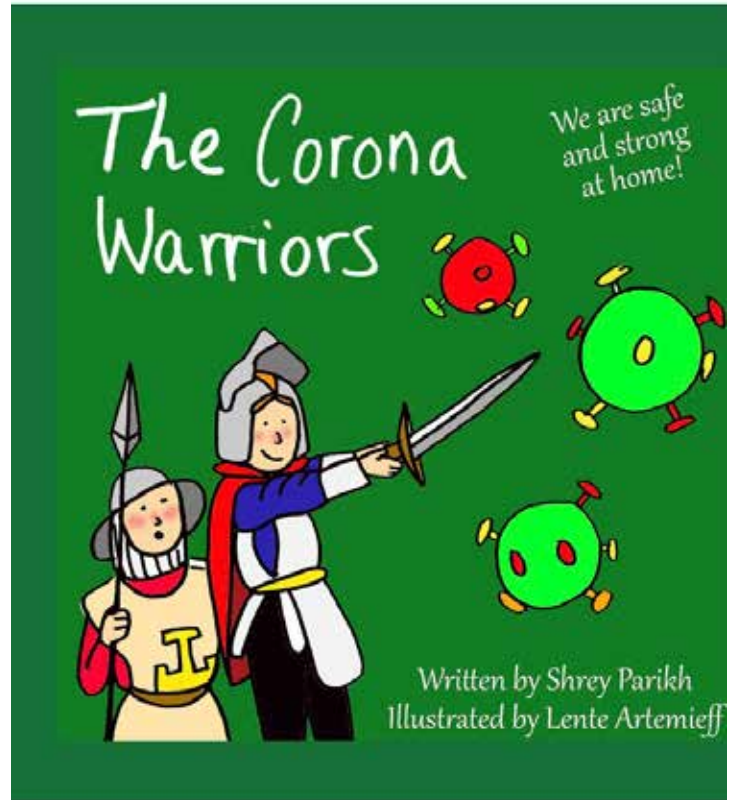
**NT**

**Erratum (Neonatology Today January 2022)**

Neonatology Today is not aware of any erratum affecting the January, 2022 edition.

Corrections can be sent directly to [LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com). The most recent edition of Neonatology Today including any previously identified erratum may be downloaded from [www.neonatologytoday.net](http://www.neonatologytoday.net).

NT



New subscribers are always welcome!

**NEONATOLOGY TODAY**

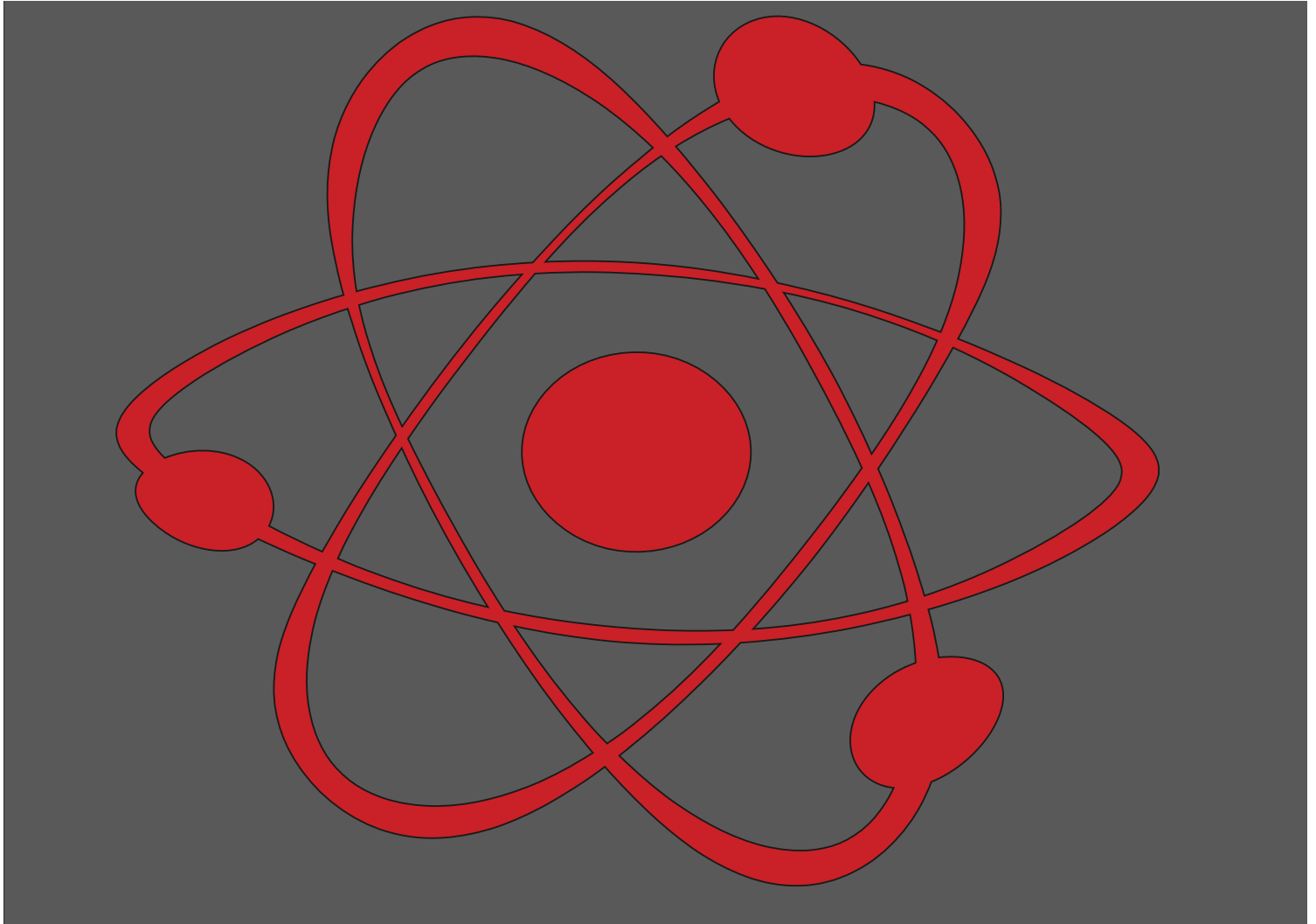
To sign up for a free monthly subscription, just click on this box to go directly to our subscription page

**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](mailto:LomaLindaPublishingCompany@gmail.com)



# Academic True Open Model (ATOM)



Loma Linda Publishing Company supports the Academic True Open Model (ATOM)

Journals listed support the following principles:

1. Free subscriptions (electronic or paper) to all.
2. Peer review of all submitted manuscripts
3. Timely review of manuscripts
4. Timely response to letters to the editor
5. Listing and correction of erratum
6. Appropriate disclosure of any related conflicts of interest in published manuscripts
7. No charge for submission of manuscripts
8. No charge for review of manuscripts
9. No charge for processing of artwork, color, layout, or length of manuscript
10. No charge for publication of manuscript in electronic or digital form.
11. A commitment to the ethical treatment of humans and animals in research.
12. Documentation of informed consent where indicated.

**NT**

Any journal that supports the ATOM principles can be listed here, along with their logo and a link back to their site, free of charge. Please contact Loma Linda Publishing Company at [LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com) for additional details.



Neonatology Today, a publication of Loma Linda Publishing Company.  
© 2006-2020 by Neonatology Today  
Published monthly. All rights reserved.  
ISSN: 1932-7137 (Online), 1932-7129 (Print)

**Readers can also follow**

**NEONATOLOGY TODAY**

**via our Twitter Feed**

**@NEOTODAY**

Will your **PRETERM INFANT** need **EARLY INTERVENTION** services?

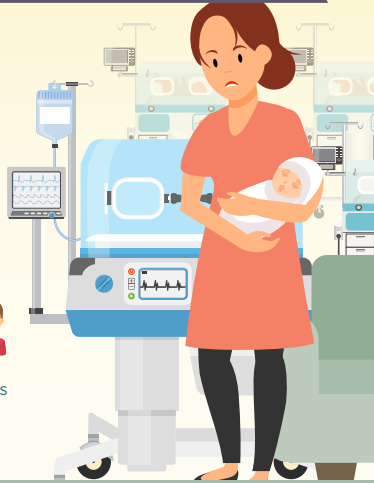
Preterm infants are:

**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



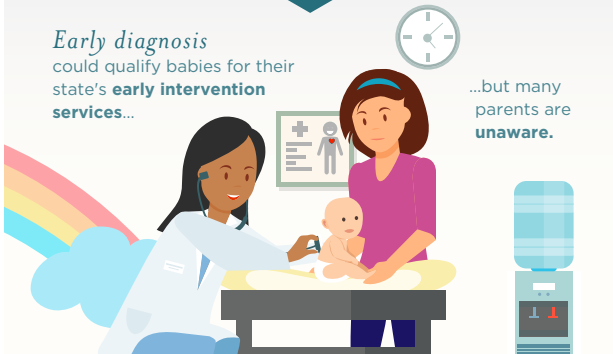
Address physical challenges



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](http://www.infanthealth.org)

Visit [CDC.gov](http://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*



Sin embargo, sólo el **15%** recibe tratamiento<sup>1</sup>

LA DEPRESIÓN POSPARTO **NO TRATADA PUEDE AFECTAR:**

El sueño, la alimentación y el comportamiento del bebé a medida que crece<sup>2</sup>



La salud de la madre

La capacidad para cuidar de un bebé y sus hermanos

PARA AYUDAR A LAS MADRES A ENFRENTAR LA DEPRESIÓN POSPARTO



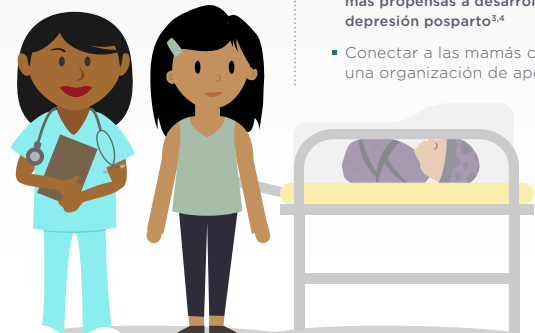
**LOS ENCARGADOS DE FORMULAR POLÍTICAS PUEDEN:**

- Financiar los esfuerzos de despistaje y diagnóstico
- Proteger el acceso al tratamiento



**LOS HOSPITALES PUEDEN:**

- Capacitar a los profesionales de la salud para proporcionar apoyo psicosocial a las familias... **Especialmente aquellas con bebés prematuros, que son 40% más propensas a desarrollar depresión posparto**<sup>3,4</sup>
- 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](http://www.infanthealth.org)

<sup>1</sup> American Psychological Association. Accessed on: <http://www.apa.org/women/resources/reports/postpartum-depression.aspx>

<sup>2</sup> National Institute of Mental Health. Accessed on: <http://www.nimh.nih.gov/health/publications/postpartum-depression-facts/index.shtml>

<sup>3</sup> Journal of Perinatology (2015) 35, 529–536. doi:10.1097/JP.0000000000000147

<sup>4</sup> Prevalence and risk factors for postpartum depression among women with problem and low-birth-weight infants: a systematic review. Vigod SN, Villages L, Dennis CL, Ross LE BJOG. 2010 Apr; 117(5):540-50.

CALL FOR  
POSTER SUBMISSIONS

2 0 2 2

# Perinatology

at the Intersection

of Health Equity

and Social Justice

NPA's 42<sup>nd</sup> ANNUAL INTERDISCIPLINARY CONFERENCE

DATES May 2 - 4



VENUE Hyatt Regency Aurora-Denver

## SEEKING POSTER ABSTRACTS

- Innovative Models of Care
- Applied or Basic Research
- Public Policies or Local Initiatives

STUDENT RESEARCHERS ARE ENCOURAGED TO SUBMIT.

[www.NPAconference.org](http://www.NPAconference.org)



## Upcoming Medical Meetings

Specialty Review in Neonatology  
March 1-6, 2022  
San Diego, CA  
[www.specialtyreview.com](http://www.specialtyreview.com)

NEO: The Conference for  
Neonatology  
March 2-4, 2022  
San Diego, CA  
[www.neoconference.com](http://www.neoconference.com)

28th Annual Cool Topics in  
Neonatology Conference  
Live In-Person & Live Virtual  
Learning  
Coronado Island Marriott Resort  
Coronado, California  
March 4-6, 2022  
[https://www.cme.ucla.edu/courses/  
event-description?registration\\_  
id=625585&client\\_view\\_p=f](https://www.cme.ucla.edu/courses/event-description?registration_id=625585&client_view_p=f)

35<sup>th</sup> Annual Gravens Conference on  
the Environment of Care for High  
Risk Infants  
Transformational Change: Making if  
Happen in the NICU  
March 9-12, 2022  
Sheraton Sand Key  
Clearwater Beach, FL  
Abstract call:  
[https://neonatologytoday.org/  
Gravens/Abstract/](https://neonatologytoday.org/Gravens/Abstract/)

38<sup>th</sup> Annual Advances in  
Therapeutics and Technology:  
Critical Care of Neonates, Children,  
and Adults  
March 29-April 2, 2022  
Snowbird, UT  
[https://paclac.org/advances-in-care-  
conference/](https://paclac.org/advances-in-care-conference/)

42<sup>nd</sup> Conference on Pediatric Health  
Care.  
Phase 1:  
March 10-13 (Orlando, FL)  
Phase 2:  
March 24-27 (Virtual)  
NAPNAP  
[https://www.napnap.org/national-  
conference/](https://www.napnap.org/national-conference/)

Pediatric Academic Society Meeting  
Denver, CO  
April 21-25, 2022  
[https://www.pas-meeting.org/pas-  
2022/](https://www.pas-meeting.org/pas-2022/)

2022 National Perinatal Association  
Perinatology at the Intersection of  
Health Equity and Social Justice  
Hyatt Regency Aurora-Denver  
Denver, CO  
May 2-4, 2022  
[www.NPAconference.org](http://www.NPAconference.org)

*For up to date Meeting  
Information, visit  
[NeonatologyToday.net](http://NeonatologyToday.net) and click  
on the events tab.*

## NEONATOLOGY TODAY

© 2022 by Neonatology Today  
ISSN: 1932-7137 (Online). ISSN: 1932-  
7129 (Print). Published monthly. All rights  
reserved.

### Publication

Mitchell Goldstein, MD  
Loma Linda Publishing Company  
11175 Campus Street  
Suite #11121  
Loma Linda, CA 92354  
[www.NeonatologyToday.net](http://www.NeonatologyToday.net)  
Tel: +1 (302) 313-9984  
[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)

### Editorial and Subscription

Mitchell Goldstein, MD  
Neonatology Today  
11175 Campus Street  
Suite #11121  
Loma Linda, CA 92354

### Sponsorships and Recruitment Advertising

For information on sponsorships or  
recruitment advertising call Andrea Schwartz  
Goodman at: +1 (302) 313-9984 or send  
an email to [andrea.schwartzgoodman@  
neonatologytoday.net](mailto:andrea.schwartzgoodman@neonatologytoday.net)

### FREE Subscription

Neonatology Today is available free to  
qualified individuals worldwide interested in  
neonatology and perinatology. International  
editions are available in electronic PDF file  
only; North American edition available in  
print once a year in February. To receive  
your free qualified subscription please click  
[here](#).

### Submit a Manuscript:

On case studies, clinical and bench  
research, hospital news, meeting  
announcements, book reviews, and "state of  
the art" meta analysis.  
Please submit your manuscript to:  
[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)  
We will respond promptly  
Twitter Account: @NeoToday



The only worldwide monthly publication  
exclusively serving Pediatric and Adult  
Cardiologists that focus on Congenital/  
Structural Heart Disease (CHD), and  
Cardiothoracic Surgeons.



**Subscribe Electronically**  
Free on the Home Page

[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)

# ***I want to learn to work in NICU... but how?***



Academy of Neonatal Care Spring Course and Workshop  
Thursday, Friday, and Saturday April 28, 29, 30  
Valley Presbyterian Hospital  
15107 Vanowen Street, Van Nuys 91405

***~7 CEU's Per Day Available~ 0900-1700 Daily***

## **SESSION 1**

Maternal  
Complications and  
High -Risk  
Pregnancies - Fetal  
Lung Development -  
Fetal Circulation -  
CBG'S, Cord Gases,  
and TCOM'S -  
Neonatal  
Assessment - NICU  
Ventilator Settings -  
HFNC in NICU -  
Surfactants -  
Infection Control-  
Hands-on workshop

## **SESSION 2**

Neonatal Pneumonia  
and Sepsis - Oscillator  
basics - Neonatal  
Chest X-Rays - HFNC  
vs. CPAP - Apneas and  
Bradycardias -  
Intraventricular  
Hemorrhage -  
Neonatal Respiratory  
Distress Syndrome-  
Non-Invasive  
Ventilation - Prove  
yourself as a NICU  
Newbie -and Hands  
on workshop

## **SESSION 3**

Ventilator  
waveforms - ECMO  
- iNO update - Jet  
ventilators -  
Infection Control  
in the NICU -  
Psych-social  
aspect of NICU  
Care - Transports  
- and Hands-on  
Workshop  
-And MORE!

Masks and Distancing enforced!



[AcademyofNeonatalCare.org/register](https://AcademyofNeonatalCare.org/register)  
1 Day: \$179 2 Days: \$349 All 3 Days: \$499  
CE provided via California BRN



# Nursing Opportunities

*Many Strengths. One Mission.*



GREAT  
NURSES.



GREAT  
MEDICINE.

## Neonatal Nurse Practitioner

- Collaborative work environment
- Care of high acuity NICU patients
- State of the art technology
- 24/7 coverage provided by NNP team and Fellows



EOE/AAE

## Who We Are

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.

## Contact Us

Please visit our website <http://careers.llu.edu> or contact Jeannine Sharkey, Director of Advanced Practice Services at [jsharkey@llu.edu](mailto:jsharkey@llu.edu) or (909) 558-4486.

If you are an individual who understands and embraces the mission and purpose of Loma Linda University and its entities as premier Seventh-day Adventist Christian institutions, please visit our website or call 1-800-722-2770. EOE/AA/M/F/D/V



LOMA LINDA  
UNIVERSITY  
HEALTH

# NEONATOLOGY TODAY

News and Information for BC/BE Neonatologists and Perinatologists



**We Can Help  
You Recruit  
from 1,045  
NICUs in the  
USA & Canada**

## **Your Recruitment Advertising Includes:**

- Full color Recruitment Ad in the issue(s)
- Your recruitment listing in the e-mail blast for the issue(s) with a hot link
- 3-Step Special Recruitment Opportunity Website Section on three (3) areas of the website
- *We can create your recruitment ad at no extra charge!*

**For more information, contact:**

**Andrea Schwartz Goodman**

+1 (302) 313-9984 or

[andrea.schwartzgoodman@neonatologytoday.net](mailto:andrea.schwartzgoodman@neonatologytoday.net)

# NEONATOLOGY TODAY

Peer Reviewed Research, News and Information in Neonatal and Perinatal Medicine  
Loma Linda Publishing Company | c/o Mitchell Goldstein, MD | 11175 Campus St, Ste. 11121 | Loma Linda, CA 92354 |  
[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)

© 2020 Neonatology Today | ISSN: 1932-7137 (digital). Published monthly. All rights reserved.

## Editorial Board



Mitchell Goldstein, MD - Editor-in-Chief  
[LomaLindaPublishingCompany@gmail.com](mailto:LomaLindaPublishingCompany@gmail.com)  
[MGoldstein@llu.edu](mailto: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](mailto: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



Larry Tinsley, MD - Senior Managing Editor  
[LTinsley@llu.edu](mailto:LTinsley@llu.edu)  
Associate Professor of Pediatrics  
Division of Neonatology-Perinatal Medicine  
Loma Linda University Children's Hospital



Elba Fayard, MD - Interim Fellowship Editor  
[Efayard@llu.edu](mailto:Efayard@llu.edu)  
Professor of Pediatrics  
Division Chair  
Division of Neonatology-Perinatal Medicine  
Loma Linda University Children's Hospital



Munaf Kadri, MD - International Editor  
[MKadri@llu.edu](mailto:MKadri@llu.edu)  
Executive Board  
UMMA Clinic  
Los Angeles, CA  
Assistant Professor Loma Linda  
Loma Linda University Children's Hospital



Michael Narvey, MD - Canada Editor  
[MNarvey@exchange.hsc.mb.ca](mailto:MNarvey@exchange.hsc.mb.ca)  
Section Head of Neonatology  
Children's Hospital Research Institute of Manitoba



Joseph R. Hageman, MD - Clinical Pearls Editor  
[jhageman@peds.bsd.uchicago.edu](mailto:jhageman@peds.bsd.uchicago.edu)  
Senior Clinician Educator  
Pritzker School of Medicine  
University of Chicago



Clara H. Song, MD - Social Media Editor  
[clara.h.song@kp.org](mailto:clara.h.song@kp.org)  
Southern California Permanente Medical Group



Thomas A Clarke, MD - Western Europe Editor  
[tclarke347@gmail.com](mailto:tclarke347@gmail.com)  
Emeritus Consultant in Neonatology  
The Rotunda Hospital,  
Dublin, Ireland



Jan Mazela, MD - Central Europe Editor  
[janco@pol-med.com.pl](mailto: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](mailto: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](mailto:francesco@99nicu.org)  
Consultant, Medical University of Vienna  
Department of Paediatrics and Adolescent Medicine  
Vienna, Austria



Arun Pramanick, MD - India Editor  
[aprama@lsuhsc.edu](mailto:aprama@lsuhsc.edu)  
Professor, Pediatrics,  
Louisiana State University School of Medicine,  
Shreveport, LA



Andrea Schwartz Goodman, MSW, MPH  
Senior Editorial Project Director  
[Andrea.SchwartzGoodman@NeonatologyToday.net](mailto:Andrea.SchwartzGoodman@NeonatologyToday.net)  
Washington, D.C.



Herbert Vasquez, MD - Arts Editor  
[VasquezH1@gmail.com](mailto:VasquezH1@gmail.com)  
Associate Neonatologist  
Citrus Valley Medical Center, Queen of the Valley  
Campus, West Covina, CA



Giang Truong, MD - QI/QA Editor  
[GTruong@llu.edu](mailto:GTruong@llu.edu)  
Associate Professor of Pediatrics  
Division of Neonatology-Perinatal Medicine  
Loma Linda University Children's Hospital

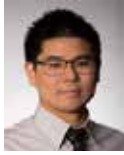


Jeramos Ballas, MD, MPH - Perinatology Editor  
[jballas@ucsd.edu](mailto:jballas@ucsd.edu)  
Associate Professor of Obstetrics and Gynecology  
University of California, San Diego





Maha Amr, MD - Academic Affairs Editor  
[maha.amr@neonatologytoday.net](mailto: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](mailto: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](mailto: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](mailto:KHillyer@llu.edu)  
 Neonatal Nurse Practitioner/ Neonatal Intensive Care  
 Loma Linda University Health Advanced Practice  
 Services

- Dilip R. Bhatt, MD - Kaiser Fontana, Fontana, CA  
 Barry D. Chandler, MD  
 Anthony C. Chang, MD - Children's Hospital of Orange County  
 K.K. Diwakar, MD - Malankara Orthodox Syrian Church Medical College  
 Willa H. Drummond, MD, MS (Informatics)  
 Philippe S. Friedlich, MD - Children's Hospital Los Angeles  
 Andrew Hopper, MD, Loma Linda University Children's Hospital  
 Lucky Jain, MD - Emory School of Medicine  
 Prakash Kabbur, MBBS, DCH (UK), MRCPCH (UK) - Kapiolani  
 Medical Center of Women & Children  
 Gail Levine, MD - Loma Linda University Children's Hospital  
 Lily Martorell, MD - Loma Linda University Children's Hospital  
 Patrick McNamara, MD - Sickkids, Toronto, ON  
 Rita Patel, NNP - Loma Linda University Children's Hospital  
 John W. Moore, MD - Rady Children's Hospital  
 Raylene Phillips, MD, Loma Linda University Children's Hospital  
 Michael A. Posencheg, MD - Children's Hospital of Philadelphia  
 DeWayne Pursley, MD, MPH - Boston Children's Hospital  
 Luis Rivera, MD - Loma Linda University Children's Hospital  
 Japmeet Sandhu, OMS III - 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

Readers can also follow

**NEONATOLOGY TODAY**

via our Twitter Feed

**@NEOTODAY**

## PROTECT YOUR FAMILY FROM RESPIRATORY VIRUSES

flu

coronavirus

pertussis

RSV



**WASH YOUR HANDS**  
often with soap and  
warm water.

**GET VACCINATED**  
for flu and pertussis.  
Ask about protective  
injections for RSV.



**COVER COUGHS  
AND SNEEZES.**  
Sneeze and cough  
into your elbow.

**USE AN  
ALCOHOL-BASED  
HAND SANITIZER.**



**STAY AWAY  
FROM SICK PEOPLE**  
Avoid crowds.  
Protect vulnerable  
babies and children.

[www.nationalperinatal.org](http://www.nationalperinatal.org)

 National  
Perinatal  
Association

## Neonatology Today's Policy on Animal and Human Research

Neonatology Today's policies ensure the protection and responsible use of animals and humans in all research articles under consideration. Authors are encouraged to follow the guidelines developed by the National Centre for the Replacement, Refinement & Reduction of Animals in Research (NC3R), International Committee of Medical Journal Editors, and the Guide for the Care and Use of Laboratory Animals and U.S. Public Health Service's Policy on Humane Care and Use of Laboratory Animals (PHS Policy). Authors are expected to demonstrate to their institutional review board or suitable proxy that ethical standards are met. If there is doubt whether research conducted was in accordance with ethical standards, then there must be verification that the institutional review body approved the uncertain aspects. Research not following these policies on participating animal and human subjects may be rejected. Researchers have a moral obligation towards the humane treatment of animals and ethical considerations for humans participating in research and are expected to consider their welfare when designing studies.

<https://www.nc3rs.org.uk/arrive-guidelines>

<http://www.icmje.org>

<https://olaw.nih.gov/policies-laws/phs-policy.htm>

NT

## Neonatology and the Arts

This section focuses on artistic work which is by those with an interest in Neonatology and Perinatology. The topics may be varied, but preference will be given to those works that focus on topics that are related to the fields of Neonatology, Pediatrics, and Perinatology. Contributions may include drawings, paintings, sketches, and other digital renderings. Photographs and video shorts may also be submitted. In order for the work to be considered, you must have the consent of any person whose photograph appears in the submission.

Works that have been published in another format are eligible for consideration as long as the contributor either owns the copyright or has secured copyright release prior to submission.

Logos and trademarks will usually not qualify for publication.

This month we continue to feature artistic works created by our readers on one page as well as photographs of birds on another. This month's original artwork is features Paula Whiteman, MD with a jumping fish. Your bird this month is from a shot that I took south of the border in Rosarito, a seagull in flight.

Herbert Vasquez, MD,



Associate Neonatologist, Queen of the Valley  
Campus  
Emanate Health, West Covina, CA  
[VasquezH1@gmail.com](mailto:VasquezH1@gmail.com)

NT

## Manuscript Submission: Instructions to Authors

1. Manuscripts are solicited by members of the Editorial Board or may be submitted by readers or other interested parties. Neonatology Today welcomes the submission of all academic manuscripts including randomized control trials, case reports, guidelines, best practice analysis, QI/QA, conference abstracts, and other important works. All content is subject to peer review.

2. All material should be emailed to: [LomaLindaPublishingCompany@gmail.com](mailto: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 7<sup>th</sup> 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.

NT

**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](mailto:LomaLindaPublishingCompany@gmail.com)



## 2022 Workshop on Neonatal-Perinatal Practice Strategies

March 25-27, 2022  
Scottsdale, AZ



Earn a Maximum of 21.00 *AMA PRA Category 1 Credits*™ and 10 MOC Part 2 Points

### Registration is open: Join us in Scottsdale!

The [2022 Workshop on Neonatal-Perinatal Practice Strategies](#) teaches attendees to better demonstrate effective leadership skills, resolve conflicts and motivate others in their practice setting to optimize team performance. Attendees will have networking opportunities to enhance career development. Based on evidence-based medicine, learners will recognize strategies for interpreting and integrating published research to make changes in clinical practice. Any pediatric professional caring for the fetus and newborn should attend.

#### Earn:

- Up to **14 *AMA PRA Category 1 Credit***™
- Up to **6.5 credits** with optional coding seminar (see more information below)
- **10 MOC Part 2 points** by successfully completing a post test

For the latest updates and to register, visit [shop.aap.org/perinatal2022](https://shop.aap.org/perinatal2022).

**Save \$150!**  
**Register by February 25, 2022 for early bird rates**

**REGISTER**

## Be sure to register for the Neonatal Coding Seminar!

### **S01: Coding Seminar** *(Separate Registration Required)*

**Friday, March 25, 2022**

**7:30AM-12:30PM**

**Scott Davis Duncan, MD, FAAP**

This session will update the audience on changes in neonatal coding practices, using didactic presentations and clinical scenarios. There will be time for questions and discussion with audience participation.

### **S02: Neonatal Coding: Afternoon Deep Dive\*** *(Must be registered for S01 Coding Seminar)*

**Friday, March 25, 2022**

**1:00PM-3:00PM**

**Scott Davis Duncan, MD, FAAP**

Join the Section on NPM Coding Trainers Committee immediately after lunch for an afternoon discussion exclusively devoted to issues and concerns relevant to your practices.

*\*Not designated for CME credit*

## Sessions Include:

- Challenged to Change: Confronting Structural Racism within the NICU Ecosystem
- Developing National Standards to Support Risk-Appropriate Neonatal Care
- Trauma Informed Clinical Care Practice: An Introduction Patient Revenue vs Patient Care
- The Credible Pediatrician Advocate
- Medical Improv for Fostering Wellness and Resilience in the Workplace (Half-Day Seminar)
- And more!

## Hotel Information



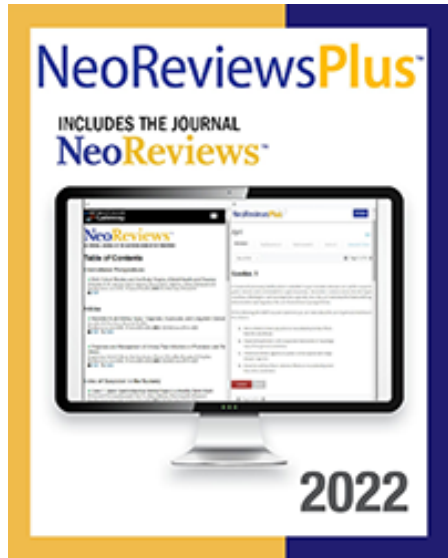
### **DoubleTree Resort by Hilton Hotel Paradise Valley - Scottsdale**

5401 North Scottsdale Road  
Scottsdale, Arizona 85250

Phone: 480/947-5400  
Toll-free: 800/222-8733

[Direct Hotel Booking Link](#)

## Special Offer for Course Registrants



### **SAVE Over \$100 off Retail Rates!**

Subscribe to 2022 NeoReviewsPlus for only \$200 if you purchase during course registration.\* NeoReviewsPlus is a comprehensive neonatology package bringing together case-based self-assessment questions, with full online access to the *NeoReviews*™ journal and valuable MOC and CME credit.

*NeoReviews*™ and NeoReviewsPlus™ are supported, in part, through an educational grant from **Abbott Nutrition**, a proud supporter of the American Academy of Pediatrics.

*\*Limited offer good only during course registration. Does not apply to renewals or previously purchased subscriptions and cannot be combined with any other offer. Discount savings is calculated off of non-member rates. All pricing and specifications subject to change without notice.*

---

**Due to Covid-19 restrictions, space at this course is limited.** The course may fill, registration may close, and hotel room blocks may sell out, even before the early bird deadline. Register early to avoid disappointment.

*The AAP cannot be responsible for expenses incurred by an individual who is not confirmed and for whom space is not available at the course. Costs incurred, such as airline and hotel penalties, are the responsibility of the individual.*

### **COVID-19 Safety Precautions**

As this course approaches, the AAP will seek guidance from local and national public health experts on implementing the necessary precautions to ensure the health and safety of all attendees, staff, and local community members.

**Proof of vaccination will be required for all registrants. Instructions for providing proof will be sent to registrants soon. Adults and children older than 2 years of age are required to wear a mask in all AAP course settings.**

---

**Save \$150!**  
**Register by February 25, 2022 for early bird rates**

**REGISTER**



# 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:



NICU PARENT NETWORK

## NICU Parent Network

Visit [nicuparentnetwork.org](http://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.

copyright © 2020 NICU Parent Network



@drpaulawhiteman

