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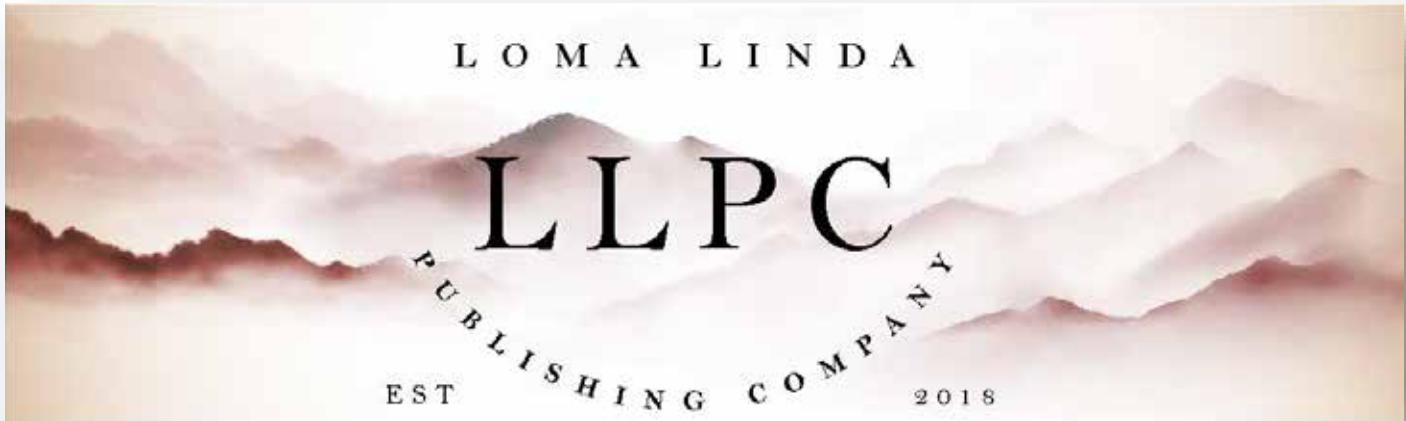
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An Interview with Chat Generative Pre-Training Transformer (Chat GPT): How Can Artificial Intelligence (AI) Change our Practice?

Munaf Kadri, MD, Shaina Lodhi, MD, Farha Vora, MD, Mitchell Goldstein, MD, MBA, CML, Hun-Seng Chao, MD

For the past several years, Chat GPT has been increasing in popularity. The abuses of AI to generate answers to college essays have been widely reported in the news, especially when these essays are flawed with imperfect information. Indeed, there are even programs that detect the use of AI when the authorship is suspect. Others extol its virtue in creating new answers to perplexing questions. However, is there a role for AI in the practice of Neonatology? We decided to interview OpenAI's Chat GPT (<https://openai.com/about>) to see if Chat GPT could find a useful place in our practices.

"I am ChatGPT, a language model developed by OpenAI. I came into being as a part of the GPT-3.5 model, which is based on the GPT-3 architecture. My training data goes up until September 2021, and I was released in June 2020. My purpose is to assist users in generating human-like text based on the prompts and questions I receive."

Chat-GPT, who are you and when did you come into being?

I am ChatGPT, a language model developed by OpenAI. I came into being as a part of the GPT-3.5 model, which is based on the GPT-3 architecture. My training data goes up until September 2021, and I was released in June 2020. My purpose is to assist users in generating human-like text based on the prompts and questions I receive. How can I assist you today?

Should I rely on questions that I ask you to make medical decisions about the clinical care of neonates?

No, you should not rely on the questions you ask me, ChatGPT, to make medical decisions about the clinical care of neonates or any other individuals. While I strive to provide accurate and helpful information, I am an AI language model and my responses should not be considered medical advice.

When it comes to medical decisions, especially for the care

of neonates, it is crucial to consult with qualified healthcare professionals such as doctors, pediatricians, or neonatologists. They have the necessary expertise, knowledge, and access to specific medical information to provide appropriate and personalized advice based on your specific situation.

If you have any concerns or questions regarding the clinical care of neonates, it is always best to consult a healthcare professional who can provide you with reliable and accurate information based on their clinical experience and the latest medical guidelines.

"No, you should not rely on the questions you ask me, ChatGPT, to make medical decisions about the clinical care of neonates or any other individuals. While I strive to provide accurate and helpful information, I am an AI language model and my responses should not be considered medical advice. When it comes to medical decisions, especially for the care of neonates, it is crucial to consult with qualified healthcare professionals such as doctors, pediatricians, or neonatologists. They have the necessary expertise, knowledge, and access to specific medical information to provide appropriate and personalized advice based on your specific situation."

Can you reliably search research manuscripts in the field of Neonatology?

As an AI language model, I don't have direct access to my training data or the ability to browse the internet. I cannot search research manuscripts or access specific sources such as subscription-based databases, proprietary journals, or paywalled articles.

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

However, I have been trained on a diverse range of data, including books, websites, and scientific literature, up until September 2021. So, I can provide general information and answer questions to the best of my knowledge based on the training I have received. If you have specific questions about neonatology, I'll do my best to assist you based on the information available to me. Remember to consult primary and peer-reviewed sources, as well as healthcare professionals, for specialized and up-to-date medical information.

“As an AI language model, I don’t have direct access to my training data or the ability to browse the internet. I cannot search research manuscripts or access specific sources such as subscription-based databases, proprietary journals, or paywalled articles. However, I have been trained on a diverse range of data, including books, websites, and scientific literature, up until September 2021. So, I can provide general information and answer questions to the best of my knowledge based on the training I have received. If you have specific questions about neonatology, I’ll do my best to assist you based on the information available to me.”

Can I do things to make your responses better for me and others who might ask questions?

Absolutely! There are several things you can do to help improve the quality of responses and make the most out of your interactions with me and other users. Here are a few suggestions:

Be clear and specific: Providing clear and specific questions or prompts can help me understand what you’re looking for and provide more relevant and accurate responses.

Ask for clarification if needed: If a response is unclear or you require more information, feel free to ask for clarification. I’ll do my best to provide further details or elaborate on a particular topic.

Provide context: If your question or prompt relates to a specific situation or context, providing relevant details can help me generate more tailored and useful responses.

Fact-check and consult multiple sources: While I strive to provide accurate information, it’s always a good practice to fact-check the information and consult multiple reliable sources. This can help ensure the information is up-to-date and accurate.

Keep conversations appropriate and respectful: Maintaining a respectful and appropriate conversation helps create a positive and productive environment for everyone. Avoid sharing personal

or sensitive information during the conversation.

Remember that while I can provide general information and suggestions, it’s important to consult professionals or trusted sources for specific or critical matters, such as medical advice or legal issues.

By following these guidelines, you can help improve the overall experience and obtain more valuable responses.

“Fact-check and consult multiple sources: While I strive to provide accurate information, it’s always a good practice to fact-check the information and consult multiple reliable sources. This can help ensure the information is up-to-date and accurate.”

Are you able to suggest ways that a neonatologist can practice neonatology better?

As an AI language model, I can certainly offer some general suggestions that may help neonatologists enhance their practice. However, please note that these suggestions are not meant to replace professional experience or personalized advice. Neonatology is a specialized medical field, and specific recommendations may vary depending on individual circumstances and patient needs. Here are a few general ideas:

1. **Continual education:** Staying up-to-date with the latest advancements, research, and guidelines in neonatology is essential. Participate in conferences, workshops, and online courses, and engage in self-directed learning to expand knowledge and skills.
2. **Collaboration and networking:** Foster collaborations with other neonatologists, pediatricians, and interdisciplinary teams. Engage in professional networks and communities to exchange knowledge, share experiences, and stay connected with the broader neonatology community.
3. **Patient-centered care:** Focus on providing holistic and patient-centered care. Consider the physical, emotional, and developmental needs of neonates and their families. Involve parents in the decision-making process and provide clear and compassionate communication.
4. **Research and evidence-based practice:** Contribute to the field of neonatology through research, clinical trials, or quality improvement projects. Strive to incorporate evidence-based practices into clinical care and critically evaluate new interventions or technologies.
5. **Teamwork and communication:** Effective teamwork and communication are crucial in neonatology. Foster a supportive and collaborative environment among colleagues, nurses, respiratory therapists, and other healthcare professionals to ensure optimal patient outcomes.
6. **Continuous quality improvement:** Regularly evaluate clinical practices, outcomes, and protocols. Engage in quality improvement initiatives to enhance patient safety, reduce

errors, and optimize care processes.

7. Embrace technology: Stay informed about advancements in neonatal technology and utilize appropriate tools and systems to improve patient monitoring, data management, and treatment options.

Remember, these are general suggestions, and neonatology is a complex field that requires specialized expertise. It's always important for neonatologists to rely on their own clinical judgment, consult with colleagues, and adhere to professional guidelines and best practices.

“As an AI language model, I can certainly offer some general suggestions that may help neonatologists enhance their practice. 1. Continual education, 2. Collaboration and networking, 3. Patient-centered care, 4. Research and evidence-based practice, 5. Teamwork and communication, 6. Continuous quality improvement, 7. Embrace technology”

What's the best time to do skin to skin with mothers after birth of a preterm baby?

Skin-to-skin contact, also known as kangaroo care, is beneficial for both preterm babies and their mothers. It helps promote bonding, regulate the baby's body temperature, stabilize heart rate and breathing, and support breastfeeding initiation. The timing of skin-to-skin care may vary depending on the baby's condition and the practices of the specific neonatal unit. Here are some general guidelines:

Immediate skin-to-skin contact: In many cases, immediate skin-to-skin contact is encouraged, as long as the baby is medically stable. This can occur as soon as the baby is born, after a quick assessment and necessary medical interventions.

Adaptation to the neonatal unit: In some cases, particularly when the baby requires immediate medical attention or stabilization, skin-to-skin care may be initiated once the baby is stable and has been transferred to the neonatal unit.

Gradual progression: If immediate skin-to-skin contact is not possible due to the baby's medical condition, the healthcare team may guide parents on gradually increasing the duration and frequency of skin-to-skin care as the baby's condition improves.

It's important to note that individual circumstances may influence the timing of skin-to-skin care. The healthcare team, including neonatologists, nurses, and other specialists, will assess the baby's medical stability and guide parents on the appropriate timing and duration of skin-to-skin contact.

Additionally, it's recommended that parents consult with the neonatal care team to understand the specific protocols and guidelines of the neonatal unit where their preterm baby is being cared for. They will be able to provide tailored recommendations based on the baby's condition and individual needs.

“It's important to note that individual circumstances may influence the timing of skin-to-skin care. The healthcare team, including neonatologists, nurses, and other specialists, will assess the baby's medical stability and guide parents on the appropriate timing and duration of skin-to-skin contact.”

When is the best time to close a patent ductus arteriosus?

1. **Symptomatic PDAs:** If a PDA is causing significant symptoms such as respiratory distress, poor feeding, or heart failure, intervention to close the PDA may be considered earlier. The specific timing will depend on the baby's condition and the judgment of the healthcare team.
2. **Hemodynamically significant PDAs:** A PDA that is causing significant hemodynamic instability, such as persistent pulmonary hypertension or compromised systemic blood flow, may require earlier intervention.
3. **Conservative management:** In some cases, a “watchful waiting” approach may be adopted, especially if the PDA is small, asymptomatic, and the baby is clinically stable. The PDA may spontaneously close over time without intervention.
4. **Timing and method of closure:** When intervention is deemed necessary, the specific timing and method of closure can vary. Different strategies include medical therapy with cyclooxygenase inhibitors (such as indomethacin or ibuprofen), surgical ligation, or transcatheter interventions. The choice of method depends on various factors, including the baby's gestational age, size, clinical condition, and the expertise available at the healthcare facility.

It's important to note that the decision to close a PDA requires careful assessment by a neonatologist or a pediatric cardiologist who will evaluate the individual baby's condition and make an informed decision based on the available evidence, guidelines, and their clinical expertise.

Parents should consult with the healthcare team caring for their baby to understand the specific considerations and treatment plan for their baby's PDA.

What is the best humidity for a preterm patient in an isolette?

Maintaining appropriate humidity levels in the environment of a preterm patient, such as an incubator or isolette, is important for their well-being and respiratory comfort. The optimal humidity range can vary depending on the gestational age, overall health, and individual needs of the baby. However, the general guideline for humidity in the isolette is around 40-60%. Here are some considerations:

1. **Gestational age:** The humidity requirements may vary based on the baby's gestational age. Extremely preterm infants may benefit from higher humidity levels initially, as they have more delicate and immature skin, higher transepidermal water loss, and increased risk of

dehydration.

2. Respiratory status: Infants with respiratory issues, such as respiratory distress syndrome, may benefit from slightly higher humidity levels to help reduce airway dryness and facilitate easier breathing. However, excessive humidity should be avoided to prevent skin maceration and fungal growth.
3. Individualized care: Each baby's needs may differ, and healthcare providers will assess the baby's clinical condition and adjust the humidity levels accordingly. They will monitor the baby's skin integrity, respiratory status, and response to the humidity levels to determine the appropriate range.

It's important to note that the specific target humidity range and adjustments should be determined by the neonatal care team in consultation with a neonatologist, taking into account the individual baby's needs and clinical factors.

Parents should discuss the humidity requirements and management plan for their preterm baby with the healthcare team providing care for their child. The healthcare professionals can provide specific guidance and monitor the baby's response to ensure optimal care.

“Maintaining appropriate humidity levels in the environment of a preterm patient, such as an incubator or isolette, is important for their well-being and respiratory comfort. The optimal humidity range can vary depending on the gestational age, overall health, and individual needs of the baby. However, the general guideline for humidity in the isolette is around 40-60%.”

Tell me about how to minimize lung damage in a preterm neonate

Minimizing lung damage in preterm neonates is a crucial aspect of their care to support optimal respiratory function and long-term health outcomes. Here are some strategies commonly employed in neonatal intensive care units (NICUs) to help minimize lung damage in preterm neonates:

1. Antenatal corticosteroids: Administering antenatal corticosteroids to pregnant mothers at risk of preterm birth can significantly improve lung maturity in the fetus. This reduces the risk of respiratory distress syndrome and other lung complications.
2. Surfactant replacement therapy: For neonates with respiratory distress syndrome, surfactant replacement therapy is often provided to restore the surfactant levels in the lungs. Surfactant helps reduce surface tension and keeps the alveoli open, preventing lung collapse.
3. Respiratory support: Various forms of respiratory support may be employed, such as nasal continuous positive airway pressure

(nCPAP) or mechanical ventilation. These interventions help support adequate oxygenation and ventilation, preventing lung injury due to respiratory failure.

4. Gentle ventilation strategies: To minimize lung injury from mechanical ventilation, strategies like lung protective ventilation are employed. These techniques involve using lower tidal volumes, optimizing positive end-expiratory pressure (PEEP), and monitoring lung mechanics to avoid excessive lung stretch and barotrauma.
5. Oxygen therapy: Maintaining appropriate oxygen levels is crucial. Oxygen therapy is titrated to avoid both hypoxia and excessive oxygen exposure, which can lead to oxygen toxicity and lung injury. Close monitoring and adjustment of oxygen levels are essential.
6. Temperature regulation: Maintaining a stable body temperature is important as temperature instability can stress the respiratory system. Preterm infants are susceptible to hypothermia, which can lead to increased oxygen demand and respiratory distress. Incubators or radiant warmers are used to maintain a neutral thermal environment.
7. Infection prevention: Infections can exacerbate lung damage in preterm neonates. Strict infection control measures, including hand hygiene, aseptic techniques, and appropriate use of antibiotics, are implemented to minimize the risk of respiratory infections.
8. Nutrition: Adequate nutrition, including optimal provision of fluids, calories, and essential nutrients, is crucial for supporting lung development and overall growth. Breast milk is preferred when possible due to its protective effects.

“Minimizing lung damage in preterm neonates is a crucial aspect of their care to support optimal respiratory function and long-term health outcomes. Here are some strategies commonly employed in neonatal intensive care units (NICUs) to help minimize lung damage in preterm neonates: 1. Antenatal corticosteroids, 2. Surfactant replacement therapy, 3. Respiratory support, 4. Gentle ventilation strategies, 5. Maintaining appropriate oxygen levels, 6. Temperature regulation, 7. Infection prevention, 8. Nutrition, 9. Minimizing stress and providing a supportive developmental environment for preterm neonates.”

9. Developmental care: Minimizing stress and providing a supportive developmental environment for preterm neonates is important. Techniques such as minimizing handling, promoting kangaroo

care (skin-to-skin contact), and reducing environmental stimuli can help reduce lung stress and improve outcomes.

It's important to note that the specific management and interventions will depend on the baby's individual needs and condition. Neonatal care teams, including neonatologists, nurses, and respiratory therapists, provide individualized care plans based on the best available evidence and clinical expertise.

Parents should consult with the healthcare team caring for their preterm baby to understand the specific strategies and interventions being employed to minimize lung damage and support their baby's respiratory health.

“Minimizing interruptions and creating a restful environment for patients in the neonatal intensive care unit (NICU) is important for their well-being and recovery...multiple interventions are combined to minimize disruptions.

1. Creating a calm and soothing environment , 2. Promote developmental care, 3. Coordinate care activities, 4. Encouraging parental involvement, 5. Monitor noise levels, 6. Staff education and awareness, 7. Use technology effectively.”

How to minimize interruptions and allow the patient to rest in the NICU?

Minimizing interruptions and creating a restful environment for patients in the neonatal intensive care unit (NICU) is important for their well-being and recovery. Here are some strategies that can help achieve this goal:

1. **Implement care bundles:** Care bundles are sets of evidence-based practices that aim to improve patient care. NICUs often utilize care bundles specifically designed to minimize interruptions and promote restful periods for infants. These bundles typically include synchronized care approaches and cluster care techniques, where multiple interventions are combined to minimize disruptions.
2. **Quiet and dim environment:** Creating a calm and soothing environment can contribute to improved rest and sleep for neonates. Maintain a quiet atmosphere in the NICU by reducing unnecessary noise, such as alarms and conversations. Ensure that lighting is dim and avoid excessive exposure to bright lights during rest periods.
3. **Promote developmental care:** Developmental care principles focus on providing a nurturing environment that supports the developmental needs of preterm infants. This includes techniques such as swaddling, providing gentle touch, and promoting kangaroo care (skin-to-skin contact) when appropriate. These interventions can help soothe the baby

and facilitate better rest.

4. **Coordinate care activities:** Communication and coordination among the healthcare team are crucial in minimizing interruptions. Implementing scheduled care routines and coordinating interventions such as vital sign assessments, medication administration, and diaper changes can help cluster activities and reduce disturbances during rest periods.
5. **Parental involvement:** Encouraging parental involvement in the care of their baby can contribute to improved rest. When feasible and appropriate, parents can participate in activities such as kangaroo care, feeding, and comforting their baby. This not only supports bonding but also helps the baby feel secure and calm.
6. **Monitor noise levels:** Regularly monitoring and assessing noise levels in the NICU can help identify sources of disturbance. Implementing strategies like noise reduction protocols, using noise monitoring devices, and providing staff education on noise management can help maintain a quieter environment.
7. **Staff education and awareness:** Educating NICU staff about the importance of minimizing interruptions and creating a restful environment is essential. Training programs can focus on strategies for optimizing care delivery, reducing noise, and coordinating activities to ensure a patient-centered approach.
8. **Use technology effectively:** Utilize technology solutions to streamline processes and reduce unnecessary interruptions. Electronic medical records, bedside monitors, and communication tools can help facilitate efficient and coordinated care, minimizing the need for frequent interruptions.

It's important to note that individual patient needs may vary, and healthcare providers in the NICU will adapt their care strategies accordingly. Parents can communicate their preferences for their baby's rest periods and collaborate with the healthcare team to promote a restful environment.

Discussing these strategies with the NICU staff and seeking their guidance will ensure that the specific needs of the baby are considered and appropriate measures are taken to minimize interruptions and optimize rest in the NICU setting.

Can Chat GPT be incorporated into EMR while still maintaining HIPAA compliance?

Integrating Chat GPT or any AI system into an Electronic Medical Record (EMR) system while maintaining HIPAA compliance is a complex task that requires careful consideration of privacy and security measures. Here are some key points to keep in mind:

1. **Data privacy and security:** Protecting patient data is of utmost importance. Any integration of Chat GPT into an EMR system should adhere to strict data privacy and security protocols. This includes ensuring secure transmission of data, encrypting sensitive information, and implementing access controls to limit data access to authorized personnel.
2. **De-identification of data:** Patient data used for training or interacting with Chat GPT should be properly de-identified to remove any personally identifiable information. This helps maintain privacy and HIPAA compliance by preventing the disclosure of identifiable patient information.
3. **User authentication and access controls:** Implement robust user authentication mechanisms and access controls within the EMR system to ensure that only authorized healthcare

professionals can access patient data and interact with Chat GPT. This helps prevent unauthorized access and maintains the privacy of patient information.

4. **Audit logs and monitoring:** Implementing audit logs and monitoring mechanisms can help track system activity, detect and respond to any potential security breaches or unauthorized access attempts. Regular monitoring and review of these logs can help ensure compliance with HIPAA regulations.
5. **Business Associate Agreement (BAA):** If the integration involves a third-party AI provider, ensure that a Business Associate Agreement (BAA) is in place. A BAA establishes the legal requirements and responsibilities of the AI provider regarding the protection and handling of patient data.
6. **Regular security assessments:** Conduct regular security assessments, vulnerability testing, and risk assessments to identify and address any potential security vulnerabilities in the integrated system. This helps ensure ongoing compliance and protection of patient data.

It's important to note that while Chat GPT can provide valuable assistance in various healthcare contexts, it's crucial to consult with legal and compliance experts, as well as involve appropriate stakeholders within the healthcare organization, to ensure that the integration of Chat GPT into an EMR system meets the specific requirements of HIPAA compliance and local regulations.

“Integrating Chat GPT or any AI system into an Electronic Medical Record (EMR) system while maintaining HIPAA compliance is a complex task that requires careful consideration of privacy and security measures.”

Can Chat GPT be used to establish and improve contact with families for follow up?

Yes, Chat GPT can be used to establish and improve contact with families for follow-up purposes. Here are a few ways in which Chat GPT can be utilized:

1. **Automated messaging:** Chat GPT can be programmed to send automated messages to families, providing updates, reminders, and important information regarding follow-up appointments, test results, or medication schedules. These messages can be personalized based on the individual patient's needs.
2. **Answering common questions:** Chat GPT can be trained with a database of frequently asked questions related to follow-up care. This can help provide families with quick and accurate responses to common inquiries, saving time and improving communication efficiency.
3. **Appointment scheduling:** Chat GPT can assist families in scheduling follow-up appointments by offering available dates and times, guiding them through the process, and sending appointment reminders.
4. **Educational resources:** Chat GPT can provide families with educational materials and resources related to their child's

condition, treatment, or follow-up care. This can include articles, videos, and links to trusted sources, empowering families with information to support their understanding and decision-making.

5. **Monitoring and feedback:** Chat GPT can facilitate ongoing communication between healthcare providers and families by allowing families to provide updates on their child's progress, report any concerns or changes in symptoms, and receive appropriate guidance or recommendations from the healthcare team.

It's important to note that while Chat GPT can enhance communication and provide valuable support, it is not intended to replace direct interactions with healthcare professionals. It should be seen as a complementary tool to facilitate engagement and improve access to information and resources.

When implementing Chat GPT for follow-up communication with families, it's essential to ensure data privacy and security, comply with relevant regulations (such as HIPAA), and have mechanisms in place for families to escalate urgent concerns or access direct human support when needed.

“Chat GPT can be used to establish and improve contact with families for follow-up purposes. Here are a few ways in which Chat GPT can be utilized: 1. Automated messaging, 2. Answering common questions, 3. Appointment scheduling, 4. Educational resources, 5. Monitoring and feedback.”

Can Chat GPT be used to improve compliance with taking meds and establishing follow up appointments?

Yes, Chat GPT can be used to improve compliance with taking medications and establishing follow-up appointments. Here are a few ways in which it can assist:

1. **Medication reminders:** Chat GPT can send personalized medication reminders to patients or caregivers via automated messages. These reminders can help individuals remember to take their medications at the prescribed times, improving medication adherence.
2. **Medication information:** Chat GPT can provide information about medications, including dosage instructions, potential side effects, and precautions. It can address common questions or concerns related to the medications, helping patients and caregivers make informed decisions and understand the importance of adherence.
3. **Tracking and monitoring:** Chat GPT can assist in tracking medication adherence by providing a platform for patients or caregivers to report medication intake. It can also remind patients to refill their prescriptions when needed, ensuring a continuous supply of medication.
4. **Follow-up appointment scheduling:** Chat GPT can assist in scheduling follow-up appointments by providing available

dates and times, helping patients or caregivers find suitable slots, and sending reminders prior to the appointments. This can improve compliance with follow-up visits and ensure continuity of care.

5. **Communication and feedback:** Chat GPT can serve as a communication channel between patients or caregivers and healthcare providers, allowing them to ask questions, provide updates on medication response or side effects, and receive guidance or adjustments to their treatment plan.

By using Chat GPT to improve compliance with medication regimens and follow-up appointments, healthcare providers can enhance patient engagement, provide timely support, and potentially improve health outcomes. However, it's important to note that Chat GPT should be seen as a supportive tool, and direct communication with healthcare professionals should still be encouraged for more complex or urgent concerns.

Additionally, privacy and security measures must be in place to protect patient information and comply with relevant regulations, such as HIPAA.

“Chat GPT can be used to improve compliance with taking medications and establishing follow-up appointments.

Here are a few ways in which it can assist: 1. Medication reminders, 2. Medication information, 3. Tracking and monitoring, 4. Follow-up appointment scheduling, 5. Communication and feedback.”

Can Chat GPT be used to improve adherence and compliance with protocols in inpatient setting?

Yes, Chat GPT can be used to improve adherence and compliance with protocols in an inpatient setting. Here are some ways in which it can be utilized:

1. **Protocol reminders:** Chat GPT can send reminders to healthcare providers regarding specific protocols or guidelines that need to be followed during patient care. These reminders can help reinforce adherence to established protocols and ensure consistency in practice.
2. **Access to protocols and guidelines:** Chat GPT can provide healthcare providers with easy access to protocols and guidelines at the point of care. This can assist in quickly referencing the appropriate protocols and ensuring they are followed correctly.
3. **Real-time guidance:** Chat GPT can offer real-time guidance and decision support to healthcare providers as they navigate complex protocols. It can help clarify any uncertainties or questions that arise during patient care, ensuring adherence to established guidelines.
4. **Training and education:** Chat GPT can serve as a training tool to educate healthcare providers on various protocols, procedures, and best practices. It can provide interactive

learning experiences and answer questions related to protocol adherence, promoting knowledge retention and application.

5. **Data tracking and analysis:** Chat GPT can assist in tracking adherence to protocols by collecting and analyzing data related to protocol compliance. It can generate reports and insights that can be used for quality improvement initiatives and identifying areas for targeted interventions.
6. **Collaboration and communication:** Chat GPT can facilitate communication and collaboration among healthcare providers by providing a platform for sharing experiences, discussing protocol-related challenges, and exchanging best practices. This can promote a culture of adherence and continuous learning.

While Chat GPT can be a valuable tool in promoting adherence and compliance with protocols, it's important to note that it should not replace clinical judgment or the expertise of healthcare providers. It should be seen as a supportive resource that enhances decision-making and promotes standardized care.

Additionally, the implementation of Chat GPT in the inpatient setting should consider the privacy and security of patient information, compliance with relevant regulations, and integration with existing healthcare systems to ensure seamless workflow and usability.

Can Chat GPT be used to alert the physicians of impending sepsis in a newborn based on vital sign data?

Chat GPT can be used as part of a system to alert physicians of potential signs of sepsis in a newborn based on vital sign data. However, it's important to note that as an AI language model, Chat GPT doesn't have direct access to real-time patient data or the ability to monitor vital signs in real-time. It relies on receiving information from external sources.

To implement a system using Chat GPT for sepsis alerts, the following steps can be considered:

1. **Data integration:** Integrate the vital sign monitoring system used in the neonatal intensive care unit (NICU) with the AI system. This integration allows real-time transmission of vital sign data to the system.
2. **Data analysis and interpretation:** Develop algorithms or models that analyze the incoming vital sign data to detect patterns or indicators associated with sepsis. This could involve machine learning techniques trained on historical data to identify potential signs of sepsis based on vital sign trends.
3. **Alert generation:** Once the AI system detects patterns or indicators suggestive of sepsis, it can generate an alert or notification. At this point, Chat GPT can be involved to communicate the alert to the physicians or healthcare providers. The model can provide additional information or guidance based on the specific alert to assist in clinical decision-making.
4. **Physician response and intervention:** Physicians would then review the alert provided by Chat GPT, assess the patient's condition, and initiate appropriate interventions based on clinical judgment and guidelines for sepsis management.

It's important to highlight that the design and implementation of such a system require collaboration with healthcare professionals, data scientists, and system developers. The system must undergo rigorous testing and validation to ensure accuracy, reliability, and safety. Additionally, compliance with privacy regulations and ethical considerations related to patient data handling should be a priority.

Overall, Chat GPT can play a role in alerting physicians to potential signs of sepsis in newborns based on vital sign data, but it should be integrated into a comprehensive system that combines real-time data monitoring, analysis algorithms, and physician intervention to effectively improve patient outcomes.

“Chat GPT can be used to improve adherence and compliance with protocols in an inpatient setting. Here are some ways in which it can be utilized: 1. Protocol reminders, 2. Access to protocols and guidelines, 3. Real-time guidance, 4. Training and education, 5. Data tracking and analysis, 6. Collaboration and communication. While Chat GPT can be a valuable tool in promoting adherence and compliance with protocols, it’s important to note that it should not replace clinical judgment or the expertise of healthcare providers. It should be seen as a supportive resource that enhances decision-making and promotes standardized care.”

Can Chat GPT be used to formulate a nutrition plan for a neonate based on ongoing co-morbidities?

Chat GPT can assist in formulating a nutrition plan for a neonate based on ongoing co-morbidities by providing general information and suggestions. However, it’s important to note that the information provided by Chat GPT should not replace the expertise and guidance of a healthcare professional, such as a neonatologist or a registered dietitian.

When creating a nutrition plan for a neonate with ongoing co-morbidities, it is crucial to consider several factors, including the specific medical condition, gestational age, weight, growth patterns, organ function, allergies, and any other individualized needs. These considerations require the expertise and clinical judgment of healthcare professionals who have a comprehensive understanding of the neonate’s medical history and current status.

While Chat GPT can offer general information on nutritional guidelines and considerations, it cannot take into account the unique circumstances and complexities of an individual neonate’s case. Therefore, it’s important to consult with the healthcare team and seek guidance from specialists who can provide tailored recommendations based on the neonate’s specific needs and co-morbidities.

Chat GPT can, however, provide general information on topics such as the nutritional requirements of preterm infants, guidelines for feeding and fortification of breast milk or formula, introduction

of solid foods, considerations for specific co-morbidities, and potential nutritional challenges that may arise.

In summary, while Chat GPT can provide general information on neonatal nutrition, it should not be solely relied upon for formulating a nutrition plan for a neonate with ongoing co-morbidities. Collaborating with healthcare professionals who specialize in neonatal nutrition and following their guidance is crucial to ensure the best outcomes for the neonate’s nutritional needs.

“Chat GPT can be used as part of a system to alert physicians of potential signs of sepsis in a newborn based on vital sign data. However, it’s important to note that...Chat GPT doesn’t have direct access to real-time patient data or the ability to monitor vital signs in real-time. It relies on receiving information from external sources.”

Can we trust the facts that you provide?

As an AI language model, my responses are generated based on a mixture of licensed data, data created by human trainers, and publicly available data. I have not been directly trained on specific medical databases or have access to proprietary medical information. While I strive to provide accurate and up-to-date information, it’s important to note that I can’t guarantee the accuracy or reliability of the facts I present.

I should not be considered as a substitute for professional medical advice, diagnosis, or treatment. Always consult with a qualified healthcare professional or trusted source for specific medical concerns or information. They can provide personalized guidance based on your individual circumstances.

It’s also worth noting that information in the healthcare field is constantly evolving, and new research can lead to updates and changes in understanding. Therefore, it’s always a good idea to verify information from multiple reputable sources and consult with healthcare professionals for any medical decisions or concerns.

If you have any specific questions or concerns about the accuracy of information provided by Chat GPT, please let me know, and I’ll do my best to address them or provide additional context.

Where do you get your information from?

As an AI language model, my responses are generated based on a diverse range of sources and data. During my training, I was exposed to a large corpus of text from the internet, including books, articles, websites, and other texts, to develop a broad understanding of human language. This corpus covers a wide array of topics, including but not limited to, general knowledge, scientific literature, medical textbooks, and research papers.

It’s important to note that while I strive to provide accurate and up-to-date information, I do not have direct access to current medical databases or proprietary medical sources. Therefore, my responses may not always reflect the most recent advancements

or specialized knowledge in specific medical fields.

I should be used as a helpful resource for general information and guidance, but it's crucial to consult with qualified healthcare professionals or refer to reputable medical sources for specific medical advice or decisions.

If you have any specific questions or concerns about the sources of information used by Chat GPT, feel free to ask, and I'll do my best to provide further clarification.

“It’s important to highlight that the design and implementation of such a system require collaboration with healthcare professionals, data scientists, and system developers. The system must undergo rigorous testing and validation to ensure accuracy, reliability, and safety. Additionally, compliance with privacy regulations and ethical considerations related to patient data handling should be a priority.”

Can you write a discharge summary for a 25-week gestation infant that was in the NICU for 12 weeks?

Patient: [Infant’s Name] Date of Birth: [Date of Birth] Gestational Age at Birth: 25 weeks Date of Discharge: [Date of Discharge] Length of Stay: 12 weeks

Diagnosis and Clinical Course: [Infant’s Name] was born prematurely at 25 weeks gestation and required intensive care in the NICU. The initial assessment revealed respiratory distress syndrome (RDS) necessitating mechanical ventilation and surfactant therapy. [He/She] also developed a patent ductus arteriosus (PDA) and received medical treatment with indomethacin, which led to successful closure. During the course of [his/her] stay, [he/she] experienced episodes of apnea, which were managed with caffeine therapy.

[Infant’s Name] demonstrated gradual improvement in respiratory function and feeding tolerance over the 12-week hospitalization period. [He/She] successfully transitioned from mechanical ventilation to non-invasive respiratory support, including nasal continuous positive airway pressure (nCPAP) and high-flow nasal cannula. [His/Her] nutritional needs were initially met through total parenteral nutrition (TPN) and gradually transitioned to enteral feeds, primarily fortified human milk.

Additional interventions included monitoring for infection, which involved blood culture surveillance, antibiotic therapy, and sepsis workup whenever indicated. Serial cranial ultrasounds were performed to monitor for intraventricular hemorrhage (IVH) and periventricular leukomalacia (PVL). Fortunately, [Infant’s Name] did not develop significant intracranial abnormalities.

During the hospital stay, [he/she] received appropriate multidisciplinary care, including consultations with pediatric subspecialists, occupational therapy, and ophthalmology

assessments. Regular growth and developmental assessments were conducted, and appropriate interventions were implemented to support [his/her] overall growth and neurodevelopmental progress.

“While Chat GPT can offer general information on nutritional guidelines and considerations, it cannot take into account the unique circumstances and complexities of an individual neonate’s case. Therefore, it’s important to consult with the healthcare team and seek guidance from specialists who can provide tailored recommendations based on the neonate’s specific needs and co-morbidities. Chat GPT can, however, provide general information on topics such as the nutritional requirements of preterm infants, guidelines for feeding and fortification of breast milk or formula, introduction of solid foods, considerations for specific co-morbidities, and potential nutritional challenges that may arise.”

Summary of Discharge Condition: At the time of discharge, [Infant’s Name] is clinically stable with improved respiratory function, adequate feeding tolerance, and weight gain. [He/She] has transitioned to full oral feeds and is maintaining appropriate growth velocity. [His/Her] oxygen requirement has significantly reduced, and [he/she] no longer requires respiratory support.

Instructions and Follow-Up:

1. [Infant’s Name] should be closely followed by a pediatrician or neonatologist for ongoing growth monitoring, immunizations, and developmental assessments.
2. Family education regarding safe sleep practices, infection prevention, and general care of a premature infant should be provided.
3. A referral to early intervention programs or developmental follow-up clinics may be necessary to support [Infant’s Name]’s developmental progress.
4. Ensuring a supportive and nurturing home environment with adequate follow-up care and regular healthcare visits is crucial.

Family Support and Resources: The family has been provided with extensive counseling, emotional support, and education throughout the NICU stay. They have been connected with

appropriate community resources, support groups, and local organizations specializing in neonatal care.

“As an AI language model, my responses are generated based on a mixture of licensed data, data created by human trainers, and publicly available data. I have not been directly trained on specific medical databases or have access to proprietary medical information. While I strive to provide accurate and up-to-date information, it’s important to note that I can’t guarantee the accuracy or reliability of the facts I present. I should not be considered as a substitute for professional medical advice, diagnosis, or treatment. Always consult with a qualified healthcare professional or trusted source for specific medical concerns or information.”

It is essential to recognize that [Infant’s Name] will require ongoing

[CHAT GPT stopped responding]

Regenerated response:

Discharge Summary

Patient Information:

- Name: [Infant’s Name]
- Date of Birth: [Date of Birth]
- Gestational Age at Birth: 25 weeks
- Length of NICU Stay: 12 weeks

Medical History and Diagnosis: [Provide a brief overview of the infant’s medical history and any significant diagnoses or conditions they experienced during their stay in the NICU. Include information on any complications, interventions, or procedures performed.]

Treatment and Management: [Describe the treatments, interventions, and management strategies that were implemented during the infant’s NICU stay. This may include respiratory support, nutrition, medication administration, specialized monitoring, or surgical procedures.]

Progress and Achievements: [Highlight the infant’s progress and achievements during their NICU stay, including improvements in respiratory status, weight gain, feeding milestones, neurological development, and any other notable achievements.]

Outcomes and Prognosis: [Provide an assessment of the infant’s overall health and prognosis at the time of discharge. Discuss

any ongoing concerns or follow-up requirements, and provide recommendations for ongoing care and monitoring.]

“During my training, I was exposed to a large corpus of text from the internet, including books, articles, websites, and other texts, to develop a broad understanding of human language. This corpus covers a wide array of topics, including but not limited to, general knowledge, scientific literature, medical textbooks, and research papers. It’s important to note that while I strive to provide accurate and up-to-date information, I do not have direct access to current medical databases or proprietary medical sources. Therefore, my responses may not always reflect the most recent advancements or specialized knowledge in specific medical fields.”

Plan of Care: [Outline the plan of care following discharge, including any medications, feeding regimen, follow-up appointments, and necessary support services. Include recommendations for developmental follow-up, immunizations, and any specific instructions for the parents or caregivers.]

Education and Support: [Detail the education and support provided to the parents or caregivers during the infant’s NICU stay, including information on infant care, feeding techniques, monitoring signs of illness, and available resources for ongoing support.]

Recommendations and Referrals: [Make appropriate recommendations and referrals based on the infant’s specific needs. This may include referrals to specialists, early intervention services, community resources, or support groups.]

Follow-up Appointments: [Provide a schedule of recommended follow-up appointments with the pediatrician, specialists, or developmental clinics. Include dates, times, and any specific instructions for scheduling these appointments.]

Discharge Medications: [List any medications prescribed at the time of discharge, along with dosages, administration instructions, and possible side effects.]

Contact Information: [Provide contact information for the healthcare team, including the primary care provider, specialty clinics, and any other relevant contacts for the parents or caregivers to reach out to in case of questions or concerns.]

Please note that this discharge summary is a generalized example

and should be tailored to the specific medical condition and requirements of the individual infant. Actual discharge summaries are typically created by healthcare professionals involved in the care of the infant, and they contain more detailed information and documentation specific to the patient's case.

Have you ever gotten anyone into legal trouble?

As an AI language model, I don't have the capability to take actions or cause direct consequences in the real world. I don't have personal interactions or engage in activities that could lead to legal trouble for individuals.

However, it's important to note that while I strive to provide accurate and helpful information, the responsibility for using and interpreting that information lies with the user. It's always advisable to consult with qualified professionals or trusted sources for specific legal advice or when making decisions that may have legal implications.

If you have any concerns about legal matters, it's best to consult with a legal professional who can provide appropriate guidance based on your specific situation and jurisdiction.

“As an AI language model, I don't have the capability to take actions or cause direct consequences in the real world. I don't have personal interactions or engage in activities that could lead to legal trouble for individuals. However, it's important to note that while I strive to provide accurate and helpful information, the responsibility for using and interpreting that information lies with the user.”

Conclusion:

Chat GPT and other AI applications have come a long way and are impressive in their ability to synthesize and present relevant information. They can be utilized as an important adjunct to providing and enhancing care and may be individualized to each patient if access to EMR, including bedside data, can be integrated safely and assured with adequate privacy and security. These would aid in developing a more comprehensive discharge summary, for example.

However, comprehensive algorithms, protocols, and guidelines for the most common conditions must be established to assist physicians in real-time care and individual treatment plans. These would necessitate involvement and consensus in each practice and among hospital, city, state, and possibly national groups and organizations to ensure standards of care are met. Reaching a consensus at all these levels is possible but may take time to develop, incorporate, and implement. Also, up-to-date access to medical journals and other scientific publications would be required in this endeavor.

As mentioned above, AI can be beneficial in follow-up care and

routine maintenance issues, like medication reminders and monitoring and scheduling follow-up appointments, allowing doctors and other care specialists more time to address specific, more serious issues that may arise.

While AI, like Chat GPT, may already be useful in assisting some aspects of patient care, it will still be some time before it can be implemented to assist physicians in making real-time decisions in patient care. Until then and even afterward, we neonatologists still need to keep abreast of the latest advancements, research, and guidelines and use our best clinical judgment based on these and our experience to provide the best care for our patients since AI, no matter how advanced, thus far cannot replace human intuition and experience.

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NT



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RSV:

The leading cause of
infant hospitalization.

**All infants
need protection.**

Reference: Suh M, et al. *J Infect Dis.* 2022;226(Suppl 2):S154-S163.

MAT-US-2300724 V1.0 January 2023

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








www.nationalperinatal.org/rsv

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.



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The 5th International PDA Symposium in Partnership with the 8th World Congress of Pediatric Cardiology and Cardiac Surgery

Program highlights

Joint statement on management recommendations for PDA in the extremely premature infants from the International PDA symposium, World Congress of Pediatric Cardiology and Cardiac Surgery and the NeoHeart Society.

- In depth discussion of PDA treatment options in the extremely premature infants, indications, patient selection, follow-up, and outcomes.
- Examination of current evidence and clinical trials.
- Updates on ongoing clinical trials.
- Hands-on workshop on performing echocardiography to image the PDA in the newborn.
- Hands-on workshop on transcatheter device closure of the PDA in the newborn.
- Debates on whether PDA needs to be closed or not, timing of PDA closure, techniques of PDA closure and interventions to keep the PDA patent in the newborn period.
- Case discussions including taped cases of transcatheter PDA closures.
- Meet the experts session.
- Abstract presentations.
- Updates in interventional techniques to treat PDA in the extremely low birth weight infants.
- Discussion of long-term outcomes of extremely low birth weight infants with PDAs.
- Global trends in PDA management in the extremely premature

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*8th World Congress of
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 WASHINGTON D.C.



A 3-day-old Term Newborn With an Unusual Cause of Weight Loss

Jorge M Lopez Da Re, MD

Abstract:

Esophageal atresia (EA) associated with Tracheoesophageal fistula (TEA) is a rare congenital anomaly caused by abnormal septation of the foregut into the esophagus and trachea. Although almost all Newborns with EA/TEF present symptoms immediately after birth, with excessive secretions (drooling, choking, and resp distress), inability to feed, gastric distention, and reflux with aspiration pneumonia, some can present later (Type E- TEF). This case describes a 3-day-old term newborn with an unusual cause of weight loss (>10%) caused by esophageal atresia (EA) associated with trachea esophageal fistula (TEF). The newborn had a normal exam, vital signs, glucose, and respiratory symptoms on admission. The presumptive diagnosis was based on an x-ray with an OG located on the upper inlet of the anterior-posterior chest radiograph. The confirmatory diagnosis was made by a water-soluble contrast study, using 5 ml of contrast through a Replogle tube. The study showed the esophageal pouch without aspiration, penetration, or fistula. VACTERL association screening was negative. We hypothesize that the absence of symptoms was related to exclusively breastfeeding with a low milk supply.

“A 3-day-old term female newborn was admitted to the inpatient pediatric floor due to hyperbilirubinemia requiring phototherapy and weight loss above 10%. Newborn history: Infant born at 39 weeks gestation to an otherwise healthy 27-year-old gravida 3, para 1 woman via vaginal delivery.”

Case Report:

A 3-day-old term female newborn was admitted to the inpatient pediatric floor due to hyperbilirubinemia requiring phototherapy and weight loss above 10%. Newborn history: Infant born at 39 weeks gestation to an otherwise healthy 27-year-old gravida 3, para 1

woman via vaginal delivery. Maternal laboratory results: O positive, Coombs negative, COVID-19 positive, rest negative. Maternal history: unremarkable and negative for diabetes, hypertension, and polyhydramnios. The mother denied taking drugs during the pregnancy. Routine fetal ultrasound during the second trimester was normal. She received routine resuscitation at birth and Apgar scores: of 7 and 9 at 1 and 5 minutes, respectively. Growth parameters were: weight of 3270 grams at the 53rd percentile; height of 52 cm at the 85th percentile. Head circumference was 35 cm at the 73rd percentile. Newborn blood type was B+, Coombs +. Newborn laboratories were normal. The infant was sent to the nursery for routine care. After two days of life, she went home with a follow-up appointment with a pediatrician within 24 hours after discharge. At home, she was exclusively breastfeeding, voiding, and stooling normally.

“Newborn laboratories were normal. The infant was sent to the nursery for routine care. After two days of life, she went home with a follow-up appointment with a pediatrician within 24 hours after discharge. At home, she was exclusively breastfeeding, voiding, and stooling normally.”

On admission, the newborn physical exam was normal except for weight loss above 10 % from birth and jaundice of the face and trunk. There were no signs or symptoms of dehydration. Vital signs: heart rate 154 bpm, respiratory rate 40 bpm, blood pressure 80/45 mmHg, MAP 57 mmHg, weight 2,828 grams (14% below birth weight), and glucose 83 mg/dl. She continued to breastfeed ad libitum. Laboratory: CBC: 9.8×10^3 /microliter, hemoglobin 10.9 g/dL, Hematocrit 32 %, platelets 344×10^3 /microL normal differential. Bilirubin 16.3 mg/dl at 71 hours of life (high-risk zone), meeting criteria for phototherapy. The basic metabolic profile was unremarkable except for mild hyponatremia (Sodium 149 mmol/L, mild hypokalemia Potassium 3.3 mmol/L). Blood gas was normal. The provider recommended formula supplementation due to dehydration, hyperbilirubinemia, and weight loss. On the first attempt of formula feeding, the newborn presented

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with projectile vomiting (mouth and nose) associated with cyanosis and bradycardia. The infant required positive pressure ventilation with a good response requiring noninvasive respiratory support nC-PAP. Initial chest and abdomen x-ray (Fig. 1) showed clear lungs without acute infiltrate and dilated stomach with a normal bowel pattern. She was transferred to a warmed isolate with orders of n.p.o (nothing by mouth), OG tube placement, IV fluids, sepsis screening, ampicillin, and gentamycin. An attempt to pass an OG tube was unsuccessful. Follow-up x-ray after OG placement showed OG is at the proximal esophageal pouch, suggesting esophageal atresia (arrow); a dilated stomach, with air and fluid-filled, indicating a suspected distal tracheoesophageal fistula (figure 2).



Figure 1. Chest and abdomen x-ray one view—findings: Clear lungs with normal, no opacity, effusion, or pneumothorax. No acute bony abnormality was visualized. The cardio mediastinal silhouette is negative.

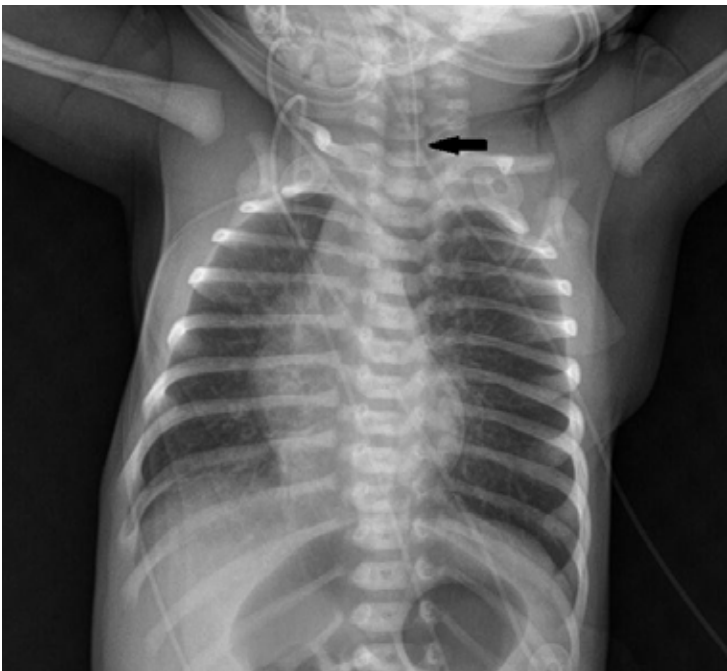


Figure 2. Chest and abdomen x-ray one view. Findings: OG is at the proximal esophageal pouch, suggesting esophageal atresia (arrow); the abdomen is distended, with air and fluid-filled, indicating a distal tracheoesophageal fistula.

Patient Course:

The newborn was transferred to a Level III unit. Type I EA/TEF was confirmed by a water-soluble contrast study using 5 ml of contrast through a Replogle tube (Fig. 3 A, B, and C). This study showed the esophageal pouch without aspiration, penetration, or fistula. The infant underwent surgery with dissection of the upper pouch and anastomosis with the lower esophagus and close of the fistula. The TEF was associated with mild to moderate tracheomalacia. The surgery was uncomplicated; the newborn was extubated and reached ad-lib feeding on days 3 and 6 post-operative, respectively. VATERED association screening was negative, and echocardiography, vertebral studies, and renal ultrasound findings were normal.

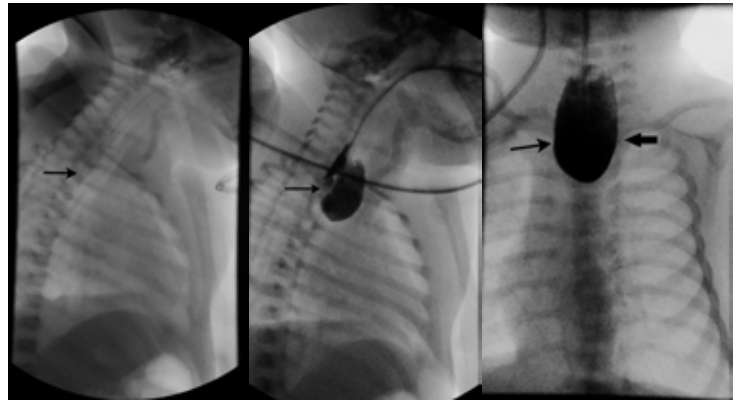


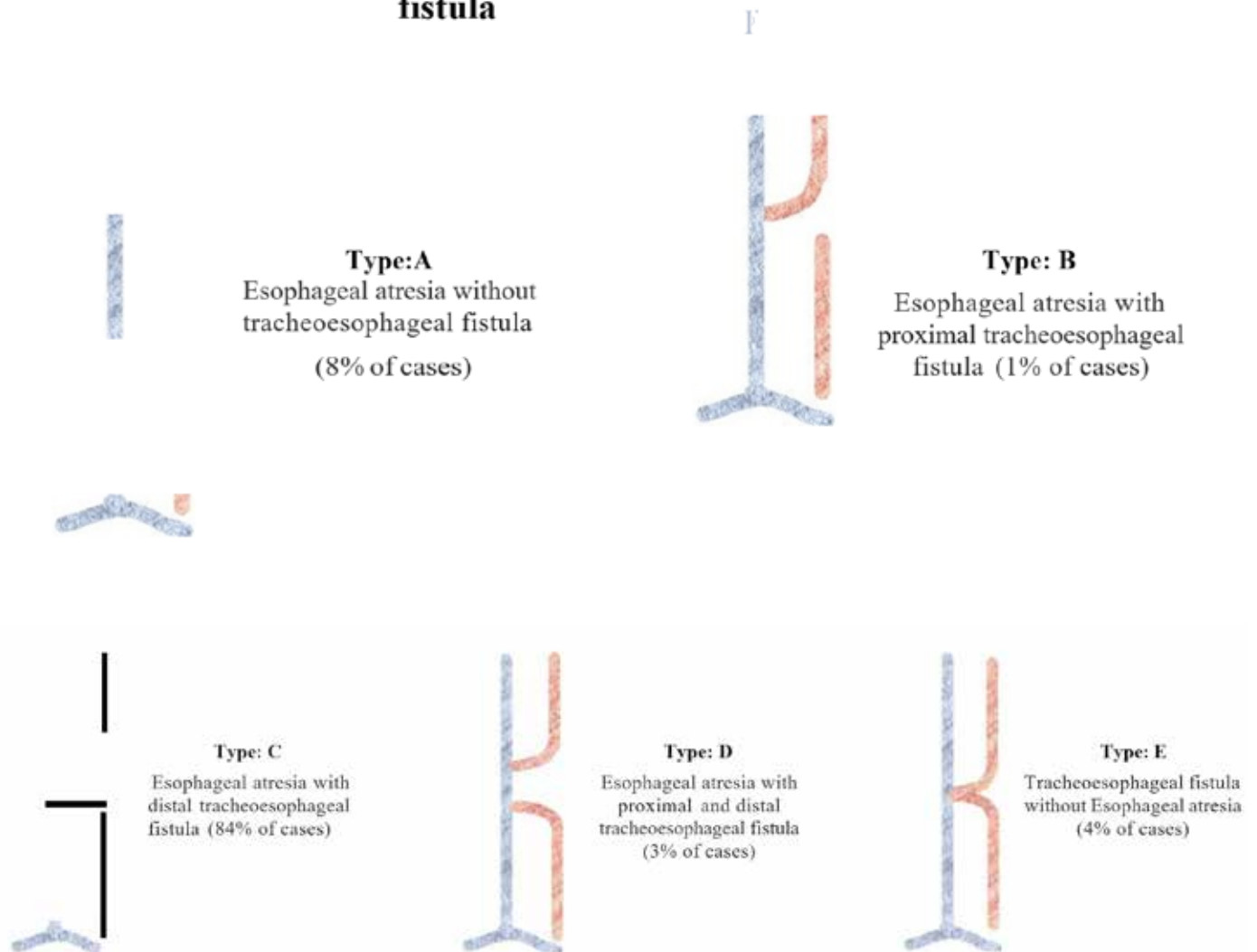
Figure 3 Upper GI study. Contrast x-ray. Fig. 3 A (Lateral no contrast), Fig. 3 B (lateral Contrast), Fig. 3 C (postero-anterior contrast). Findings: The proximal esophagus distends with contrast demonstrating a blind-ending pouch terminating about 3.5 cm thoracic vertebral body weights above the carina—impression: Proximal thoracic esophageal atresia. Given the bowel gas, the finding suggests type C esophageal atresia with tracheoesophageal fistula.

Discussion:

Esophageal atresia (EA) is the failure of the recanalization of the esophagus during the first eight weeks of development, and tracheal fistula is due to abnormal embryonic lung bud development that fails to undergo branching and remains connected to the esophagus. Esophageal atresia (EA) and tracheoesophageal fistula (TEF) have an incidence of 1 in 3500 to 1 in 4500 live births, which increases with maternal age. In the United States, the prevalence is 2.3 per 10,000 live births (1-2).

“Esophageal atresia (EA) is the failure of the recanalization of the esophagus during the first eight weeks of development, and tracheal fistula is due to abnormal embryonic lung bud development that fails to undergo branching and remains connected to the esophagus.”

Types of Esophageal Atresia/ tracheoesophageal fistula



Jorge M Lopez Da Re, MD

Tracheoesophageal fistula types were classified according to the scheme developed by EC Vogt in 1929 as modified by Gross in 1953.

Copyrights apply

Figure 4: Tracheoesophageal fistula types classified according to the scheme developed by EC Vogt[1] in 1929, as modified by Gross[2] in 1953.

Differential diagnosis:

The main differential diagnosis of projectile vomiting includes esophageal atresia, choanal atresia, tracheoesophageal fistula, esophageal stenosis, laryngo-tracheo-esophageal cleft, esophageal webs, esophageal rings, esophageal strictures, tubular esophageal duplications, congenital short esophagus, and pyloric stenosis.

Clinical presentation:

The most common prenatal finding is current or worsening polyhydramnios. At birth, the clinical presentation depends on the presence of esophageal anomaly "atresia (A, B, C, D) Vs. no atresia (E) Figure # 4" and/or the type of tracheoesophageal fistula "A, B no fistula CDE fistula" (3).

Newborns with EA/TEF are symptomatic in more than 95% at birth, and this presentation is independent of the type of tracheoesophageal fistula. The most common type of EA/TEF is type C (85%), with EA with distal TE fistula.

At birth, EA symptoms include excessive secretions that cause drooling, choking, respiratory distress, inability to feed, and, if TEF is present gastric distention. The only type of TEF that does not usually present at birth is the type E or H-type EA/TEFs, symptoms commonly seen after the newborn period due to delayed enteral feeding and no early placement of an NG/OG tube (4). These include a history of mild respiratory distress associated with feeding or recurrent episodes of pneumonia.

Diagnostic imaging:

Prenatal diagnosis of EA/TEF by ultrasound (US) is possible in the late trimester (mid-trimester 4.3% vs. late trimester 33%) (5). The most common signs in the last trimester by fetal ultrasound used to determine the need for further screening are small/absent stomach, esophageal pouch, and current or worsening polyhydramnios.

“(A, B, C, D) can be made by attempting to pass a catheter into the stomach, that usually does not advance beyond 10 cm (average of 10 to 15 cm) and remain high and sometimes curled on the Anterior-posterior chest radiograph in the upper esophageal pouch. It is crucial to remember to avoid forcing the advance of the NG/OG”

Postnatally, the initial presumptive diagnosis in most of the EA/TEF (A, B, C, D) can be made by attempting to pass a catheter into the stomach, that usually does not advance beyond 10 cm (average of 10 to 15 cm) and remain high and sometimes curled on the Anterior-posterior chest radiograph in the upper esophageal pouch. It is crucial to remember to avoid forcing the advance of the NG/OG/Replogle to prevent perforation of the upper esophagus pouch. Anterior-posterior and lateral views X-rays may aid in making the diagnosis of TEF. These will show a coiled catheter in the upper chest or esophagus and a gas-filled stomach. An air contrast or water-soluble contrast study confirms the diagnosis. A barium contrast study is contraindicated due risk of aspiration pneumonia.

“TEF/EA is often associated with CHARGE syndrome or VACTERL association. The management should include echocardiography, renal ultrasonography, and, as clinically indicated, contrast enema and limb radiographs.”

Type E or H-type EA/TEF diagnosis is challenging due to unspecific or late symptoms. A contrasted swallow study is the diagnosis of choice in this type. The contrast will help to visualize the fistula and passage of the contrast to the lungs. Other diagnosis methods include water-soluble contrast material with two-step contrast and low-contrast, followed by the upper esophagus looking for the fistula.

CT scan is an additional study but not commonly done due to the high radiation and high sensitivity and specificity of the upper GI contrast studies.

TEF/EA is often associated with CHARGE syndrome or VACTERL association. The management should include echocardiography, renal ultrasonography, and, as clinically indicated, contrast enema and limb radiographs (6).

This case describes a 3-day-old term newborn with an unusual delay presentation of Type C EA/TEF. Per the mother's report, we attribute the delayed onset of symptoms to exclusive frequent breastfeeding with low milk supply, mostly colostrum, with a volume of less than 5 ml. Symptoms were evident only after higher volume formula supplementation.

We cannot explain how the glucose levels remained normal. A small, not visualized fistula between the upper and lower pouch can be an explanation.

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Letters to the Editor

Letter to Editor: Comment on “Briefly Legal: The Battle of the Experts—and Beyond”

Dear Dr. Schiffrin and Dr. Sims,

As fledgling medical students, we found your article titled “Briefly Legal: The Battle of the Experts - and Beyond” a fascinating exposure to how expert medical testimony is deemed admissible in a court of law, highlighting the nuance and complexities inherent within medical care.

“The practice of medicine and clinical decision-making, especially in obstetrics, can be complex; clinical practitioners no doubt must walk this tightrope and make appropriate judgments despite the complexities of each case. In the clinical case presented, a young woman was navigating the unique challenge of childbirth presented to her due to her small stature.”

The practice of medicine and clinical decision-making, especially in obstetrics, can be complex; clinical practitioners no doubt must walk this tightrope and make appropriate judgments despite the complexities of each case. In the clinical case presented, a young woman was navigating the unique challenge of childbirth presented to her due to her small stature. This ultimately led to the heavy use of labor-inducing drugs and the eventual need for vacuum-assisted delivery. Unfortunately, this resulted in the birth of a newborn that suffered from an intracranial hemorrhage and eventual developmental delays.

“While this scenario was tragic and raises questions about how the case was handled, it also highlights the complexities of medical care. Medical decisions, especially those made in obstetrics, are not made in a vacuum but incorporate the patient’s overall health, anatomy, and preferences”

While this scenario was tragic and raises questions about how the case was handled, it also highlights the complexities of medical care. Medical decisions, especially those made in obstetrics, are not made in a vacuum but incorporate the patient’s overall health, anatomy, and preferences. Although the option for cesarean delivery was presented, and in retrospect, it seems obvious, it could potentially not have been as evident during the actual labor and delivery process. In retrospect, the decision to use high oxytocin doses despite adequate contractions might seem inappropriate. However, it does not elucidate the subjective assessment of the practitioner (which is vulnerable to human error and misinterpretation) at the moment - the practitioner must play a balancing act of stimulating the uterus enough to allow for adequate progression while also staying vigilant and recognizing when overstimulation is causing fetal distress. Likewise, the decision to use vacuum assistance to complete a delivery may seem clear-cut, but such a decision can be blurred when the labor is protracted, as shown in this case. This clinical scenario alone highlights the complexity present within medicine, where even the best-intended interventions can produce unwanted outcomes.

“What we also found interesting were the legal challenges presented within the article. The case presentation initially seemed clear - several missteps throughout the patient’s labor ultimately contributed to an unfortunate outcome for the newborn. Nevertheless, the defendants contended that the medical expert’s testimony did not fit the criteria of Federal Code 702.”

What we also found interesting were the legal challenges presented within the article. The case presentation initially seemed clear - several missteps throughout the patient’s labor ultimately contributed to an unfortunate outcome for the newborn. Nevertheless, the defendants contended that the medical expert’s testimony did not fit the criteria of Federal Code 702. Moreover, because no medical literature supported the claim that mechanical trauma during labor specifically causes focal ischemic strokes, it became more difficult to determine if the court would allow expert witness testimony purely from a legal standpoint. One statement from the article made a poignant point on the credibility of medical expert testimonies on how “research and publications are helpful, but common sense and the ability to communicate” are significant factors in the admission of expert testimony. In this particular case, the court needed to understand the inherent concept that was being contested in this case. Essentially, if one deprives themselves of necessities for too long: food, water, or air, in this case, there will be long-term consequences. This collective common sense allowed the plaintiffs to successfully dismiss the defense’s Daubert challenge by asserting that the literature and studies the plaintiffs provided were “not too great an analytic gap.”

“The lack of knowledge of the issue led to such an unfruitful hearing that the Senate could not make an informed decision. Similarly, if a medical malpractice case did not have expert testimony to summarize the content discussed, it would leave the court less likely to make sound judicious decisions.”

Objective expert testimony is crucial in giving the court an overview of an unfamiliar subject. It allows the court to make more informed and wiser decisions. Especially if the content discussed is not as intuitive as the human body, such as technology. Take, for example, the joint hearing of Mark Zuckerberg in 2018, where lawmakers conducted a hearing to determine if FaceBook required regulation in how their platform deals with hate speech and radical propaganda. It was considered a sham as most of the lawmakers demonstrated they were unfamiliar with the subject matter. Many questions asked were elementary questions on how FaceBook operated or were aimless questions unrelated to the subject matter. The lack of knowledge of the issue led to such an unfruitful hearing that the Senate could not make an informed decision. Similarly, if a medical malpractice case did not have expert testimony to summarize the content discussed, it would leave the court less likely to make sound judicious decisions.

Ultimately, the judicial conclusion in this unfortunate scenario of a young mother and her newborn highlights the importance of clear communication, continued research, and consensus within the medical community. Evidence-based care is especially critical in medical decision-making as it provides a more robust and concrete foundation to make sound clinical decisions and inform future legal decisions. Regardless, the complexity and uncertainty inherent within medicine guarantee to present itself as a challenge that the legal system must continually grapple with, and there is no doubt that expert witness testimony will continue to aid in adjudicating cases such as this one.

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Sincerely,

Labhpreet Singh OMS-III, David Pak OMS-III

Dear Physicians to be Singh and Pak:

Thank you for reaching out and sharing your thoughts on the article titled “Briefly Legal: The Battle of the Experts - and Beyond.” I am glad you found the article fascinating in exploring the complexities of expert medical testimony.

Indeed, the practice of medicine, particularly in obstetrics, is rife with challenges and requires that clinicians navigate intricate decision processes. The case in the manuscript exemplifies the complexities, especially when addressing unique challenges such as a patient’s petite stature. Using labor-inducing drugs and vacuum-assisted delivery resulted in unfortunate consequences for the newborn, including an intracranial hemorrhage and developmental delay.

“The case in the manuscript exemplifies the complexities, especially when addressing unique challenges such as a patient’s petite stature. Using labor-inducing drugs and vacuum-assisted delivery resulted in unfortunate consequences for the newborn, including an intracranial hemorrhage and developmental delay.”

While it is tragic that this scenario unfolded in such a manner, it underscores the intricate nature of medical care. Decisions in obstetrics, like any other medical specialty, are not made in isolation but consider factors such as the patient’s overall health, anatomical considerations, and individual preferences. While cesarean delivery may seem an obvious alternative in hindsight, it may not have been as apparent during the immediacy of the actual labor and delivery process. Despite “adequate contractions,”

the decision to use high oxytocin doses might also be seen as inappropriate in retrospect, but it fails to capture the subjective assessment of the practitioner at the moment. Medical professionals must strike a delicate balance between stimulating the uterus sufficiently for progression and recognizing when overstimulation is detrimental to the fetus. Similarly, as demonstrated in this case, employing vacuum assistance in protracted labor can be challenging. This clinical scenario demonstrates the complexity inherent in medicine, where even well-intentioned interventions can yield unintended outcomes.

“Medical professionals must strike a delicate balance between stimulating the uterus sufficiently for progression and recognizing when overstimulation is detrimental to the fetus. Similarly, as demonstrated in this case, employing vacuum assistance in protracted labor can be challenging. This clinical scenario demonstrates the complexity inherent in medicine, where even well-intentioned interventions can yield unintended outcomes.”

I am pleased to hear that you also found the legal challenges presented in the article intriguing. The case initially appeared straightforward, with multiple missteps contributing to the unfavorable outcome for the newborn. However, the defendants objected to the admissibility of the medical expert’s testimony based on Federal Code 702. The lack of supporting medical literature linking mechanical trauma during labor to focal ischemic strokes added further complexity to the court’s decision regarding the admission of expert witness testimony. The article aptly points out that while research and publications are valuable, the credibility of medical expert testimonies is also influenced by common sense and the ability to communicate effectively. The court needed to comprehend the contested underlying concept in this case. The plaintiffs rebutted the defense’s Daubert challenge by arguing that the literature and studies they presented did not contain significant analytical gaps.

“Objective expert testimony is crucial in providing the court with an understanding of unfamiliar subjects, enabling more informed and wise decisions. This testimony is particularly vital when dealing with topics that are not as intuitive as the human body, such as technology, as exemplified by the joint hearing of Mark Zuckerberg in 2018.”

Objective expert testimony is crucial in providing the court with an understanding of unfamiliar subjects, enabling more informed and wise decisions. This testimony is particularly vital when dealing with topics that are not as intuitive as the human body, such as technology, as exemplified by the joint hearing of Mark Zuckerberg in 2018. The lack of familiarity with the subject led to an unfruitful hearing where lawmakers struggled to make informed decisions. Similarly, in medical malpractice cases, the absence of expert testimony summarizing the content discussed would hinder the court’s ability to make sound judgments.

Ultimately, the judicial outcome in the unfortunate scenario involving the young mother and her newborn emphasizes the significance of clear communication, ongoing research, and consensus within the medical community. Evidence-based care is particularly critical in medical decision-making, as it provides a solid foundation for making sound clinical judgments and informing future legal determinations. Nevertheless, the inherent complexity and uncertainty within medicine will continue to pose challenges for the legal system, necessitating the continued involvement of expert witness testimony in cases like the one discussed.

I will forward this response and the original letter to Drs Schiffrin and Sims for additional comments.

Sincerely,



Mitchell Goldstein, MD, MBA, CML

Editor in Chief



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Letters to the Editor

Letter to the Editor: Importance of Looking at the Units of Serum Vitamin D in Neonates

The metabolic bone disease (MBD) of prematurity is monitored by measuring the serum parathyroid hormone (PTH), vitamin D, serum alkaline phosphates, calcium, and phosphate levels. (1) Two units are used to express the serum Vitamin D level; one is nmol/L, and the other is ng/mL. The average serum Vitamin D level in neonates is about 50 nmol/L, corresponding to 20 ng/mL (conversion factor 2.5). It is essential to check the reporting unit of serum Vitamin D. Some centers use ng/mL while others use nmol/L.

“The metabolic bone disease (MBD) of prematurity is monitored by measuring the serum parathyroid hormone (PTH), vitamin D, serum alkaline phosphates, calcium, and phosphate levels. (1) Two units are used to express the serum Vitamin D level; one is nmol/L, and the other is ng/mL.”

In an extremely premature infant, we recently encountered a very high Vitamin D level and severe hyperparathyroidism (PTH level = 212 pg/mL, normal range 9.0-77.0 pg/mL). The infant had persistent high alkaline phosphate and variable calcium and phosphate levels (Table). On day 86 of life, the infant was started on an additional 400 IU of Vitamin D based on ESPGHAN guidelines. (2) On day 100 of life, the Vitamin D level was reported as 104 ng/mL. If the provider was not vigilant, the level of 104 could be overlooked as within the normal range of Vitamin D in nmol/L. A vitamin level of 104 ng/mL was equivalent to 260 nmol/L, a toxic level. The vi-

tamin D was stopped immediately. No clinical complications were observed. High PTH and Vitamin D levels suggest the infant's response to MBD. (3) The infant's Vitamin D and PTH levels were followed, gradually declining. The infant was discharged home in a stable condition.

“In conclusion, practitioners should pay close attention to the units used to monitor neonates' Vitamin levels. The case is an example suggesting using a single international unit for laboratory values. It would be crucial in decreasing variance in practice, preventing medical errors, and enhancing and assuring patient safety.”

In conclusion, practitioners should pay close attention to the units used to monitor neonates' Vitamin levels. The case is an example suggesting using a single international unit for laboratory values. It would be crucial in decreasing variance in practice, preventing medical errors, and enhancing and assuring patient safety.

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Table: Serial Laboratory values of the Metabolic Screen

	Units	Day 72	Day 79	Day 83	Day 86	Day 93	Day 100
Sodium	mmol/L	138	138	140	139	144	138
Potassium	mmol/L	4.8	5.5	5.6	5.0	5.1	4.9
Chloride	mmol/L	100	102	101	99	102	99
CO2	mmol/L	28	26	28	30	33	34
Anion Gap	mmol/L	10	10	11	10	9	5
BUN	mg/dL	22	21	16	20	15	20
Creatinine	mg/dL	0.4	0.5	0.4	0.5	0.4	0.4
Glucose	mg/dL	68	60	67	86	73	73
Calcium	mg/dL	9.4	9.5	9.8	9.5	9.4	9.3
Phosphorus	mg/dL	5.8	6.8	6.1	6.0	6.4	6.3
Magnesium	mg/dL	2.3	2.4		2.2	2.4	2.4
Alkaline Phosphatase	U/L	458	652	693	723	836	874
PTH level	pg/mL						212
Vitamin D	ng/mL						104

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Dear Dr. Manzar:

Monitoring metabolic bone disease (MBD) in premature infants necessitates the measurement of various parameters, including serum parathyroid hormone (PTH), vitamin D, serum alkaline phosphatase, calcium, and phosphate levels. However, it is essential to note that two units are commonly used to express serum vitamin D levels: nmol/L and ng/mL. As noted, neonates' average serum vitamin D level is approximately 50 nmol/L, corresponding to 20 ng/mL (conversion factor 2.5). This discrepancy in reporting units can lead to confusion and potential misinterpretation of results. I wholeheartedly agree with the author's concerns and believe adherence to SI standards is crucial in maintaining consistency and patient safety. This said the SI standard is "nmol/L," but the National Institute of Health uses "ng/mL."

"This discrepancy in reporting units can lead to confusion and potential misinterpretation of results. I wholeheartedly agree with the author's concerns and believe adherence to SI standards is crucial in maintaining consistency and patient safety. This said the SI standard is "nmol/L," but the National Institute of Health uses "ng/mL."

The author presents a case involving an extremely premature infant with a significantly elevated vitamin D level and severe hyperparathyroidism. Fortunately, the provider recognized the error and promptly discontinued vitamin D supplementation, resulting in no observed clinical complications. This case underscores the importance of vigilance and the potential risks associated with misinterpreting vitamin D levels due to inconsistent reporting units.

Practitioners must pay close attention to the units used when



monitoring neonatal vitamin levels To mitigate such risks and enhance patient safety. The author rightly advocates for adopting a single international unit for laboratory values. Standardizing the reporting units would significantly reduce practice variability, minimize the potential for medical errors, and ensure a safer healthcare environment.

"The author rightly advocates for adopting a single international unit for laboratory values. Standardizing the reporting units would significantly reduce practice variability, minimize the potential for medical errors, and ensure a safer healthcare environment."

In conclusion, I support the author's call for using a single international unit for laboratory values in neonatal care. Adhering to SI standards would help alleviate confusion, prevent misinterpretation of results, and ultimately enhance patient safety. I believe healthcare professionals and organizations must embrace standardized practices to provide our most vulnerable patients with the highest quality of care.

Sincerely,

Mitchell Goldstein, MD, MBA, CML

Editor in Chief

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Erratum (Neonatology Today May, 2023)

Neonatology Today is not aware of the erratum affecting the May, 2023 edition.

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

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Should Infants Be Separated from Mothers with COVID-19?

FIRST DO NO HARM

SEPARATION
may not prevent
INFECTION.



SKIN to SKIN CARE
supports newborns' physiology.



SEPARATION
stresses parents and babies.



SEPARATION
weakens immune protections.



SEPARATION
disrupts breastfeeding putting babies' health at risk.



SEPARATING the DYAD
doubles providers' workload, burdening systems.



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

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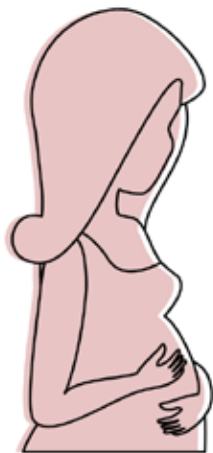
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Ampicillin-Induced Seizures in Neonates - A Review of Current Literature and Future Directions

Jayant Totlani, OMS III

“Neonatal seizures encompass critical clinical syndromes that require a comprehensive evaluation and assessment to protect infants from long-term neurological damage.”

Neonatal seizures encompass critical clinical syndromes that require a comprehensive evaluation and assessment to protect infants from long-term neurological damage. The incidence of neonatal seizures is approximately 80-120 per 100,000 and is inversely correlated to birth weight (1). Common etiologies include ischemic encephalopathy secondary to hypoxia during labor and delivery and/or neonatal respiratory distress syndrome, infection, and intracranial hemorrhage. Infectious etiologies require a complex approach to assessing seizure risk due to multiple associated risk factors such as fever, cortex irritation secondary to meningitis, and alteration of seizure threshold due to antibiotic usage.

Regarding neonatal infectious etiology, it is essential to discuss Group B Streptococcus due to its effect on neurological development. Infants with GBS have a 69% likelihood of sepsis and an 11% likelihood of developing meningitis (2). The treatment of choice for GBS in many clinical settings is ampicillin. Due to the primary role of ampicillin in Neonatal Intensive Care Unit settings, we discuss the complex interplay of ampicillin-induced seizures within the context of risk factors associated with neonatal infections.

“Importantly, ampicillin seems to adversely affect the seizure threshold consistent with the total drug exposure and concentration in the steady state, with a reported cutoff of 140 micrograms per milliliter.”

Though limited literature, sizeable retrospective cohort studies have been performed to investigate correlations of ampicillin-induced seizures against other parameters. In particular, ampicillin has increased seizure likelihood in neonates with higher birth-weight and gestational age (3). Though this seemingly deviates from the inverse correlation of birth weight and seizure risk, it aligns with the seizure risk, specifically from Group B Streptococcal meningitis (4). Importantly, ampicillin seems to adversely affect the seizure threshold consistent with the total drug exposure and concentration in the steady state, with a reported cutoff of 140 micrograms per milliliter.

Assessing seizure risk in the context of ampicillin use would require coverage of ampicillin pharmacokinetics, which presents a challenge due to various unknown variables. Importantly, its unknown protein binding properties create variability regarding its

steady-state concentration, with calculated simulations showing a 50% increase in the proportion of patients crossing the 140 micrograms per milliliter threshold when the dose is doubled from 50 to 100 mg/kg when assuming a 20% protein binding fraction (5). Dosages of 50 to 100 mg/kg, respectively, are recommended by the American Academy of Pediatrics for the treatment of GBS for infants ≤ 34 weeks gestational age and infants older than 34 weeks, respectively (6).

“Dosages of 50 to 100 mg/kg, respectively, are recommended by the American Academy of Pediatrics for the treatment of GBS for infants ≤ 34 weeks gestational age and infants older than 34 weeks, respectively (6).”

This practice guideline may play a role in the higher incidence of ampicillin-induced seizures in neonates with higher gestational birth weight.

Further, robust clinical trials are necessary to allow for a risk assessment tool for ampicillin-induced seizure in neonates. Furthermore, research need not be limited to correlation analysis of patient parameters. Research into streamlining ampicillin treatment protocols due to variability in treatment amongst different NICU settings may be helpful, as the current literature suggests a relatively high frequency of overtreatment (6). Additional considerations, such as the potentially protective role of gentamicin (7), may allow for more efficient streamlining of antibiotic protocols.

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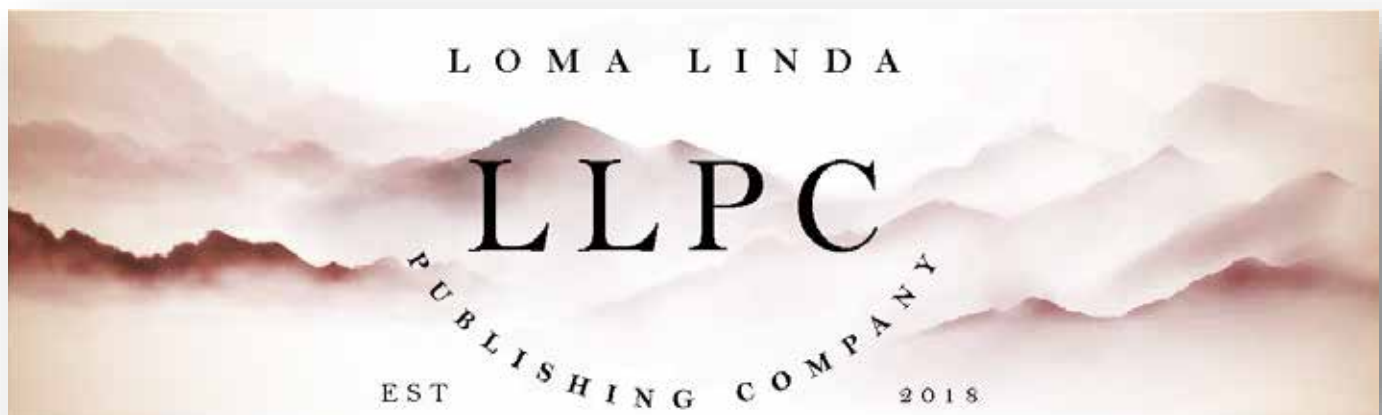
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Impaired Engagement in High-Reliability Organizing (HRO): 4. Situational Cognitive Distortions

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

Abstract:

Rather than describing the environment as a structural entity, the HRO views the environment as the flow of environmental energy. Energy has frequencies, and we can use sound and light to model characteristic energy flow patterns. White light contains all wavelengths of visible light. Long wavelength light (low frequency or long period) is red. Red light has a low frequency but carries more energy. We may better understand individual or organizational responses to risk or hazards if we consider them a response to a specific type, or 'color,' of environmental noise. Our initial response to an adverse or hostile environmental, red noise, is affective – give value to environmental signals and ensure self-protection. How we manage that affective response can augment our cognitive capacity or distort our cognition. It is known that High-Reliability Organizing increases stress capacity and reliability of the organization. What is under-recognized is how this happens: utilization of human affective responses to increase cognitive and stress capacities of individuals, teams, and groups.

“As he discussed the 1930s, all the topics merged into one reference frame Dempsey had drawn us into, manifested by an unfair life, financial uncertainty, and with little support. Our guide decontextualized the Nazi experience through almost extreme contextualization, making it transportable to other cultures and circumstances. We learned how a small group could influence the majority of the population.”

Introduction

One of the authors (DvS) recently visited Germany on a group tour, including the concentration camp at Dachau. Several days before the visit, the tour guide, Michael Dempsey, began minilectures on the coach ride. Topics included German music, art, geography, culture, philosophy, political history, World War II, and the Nazis. Each minilecture answered a question developed during one of the other topics. Initially, the topics seemed disparate. As we approached Dachau, the timeline for the topics began to move up to the 1920s. Then the topics began to merge. As he discussed the 1930s, all the topics merged into one reference frame Dempsey had drawn us into, manifested by an unfair life, financial uncertainty, and with little support. Our guide decontextualized the Nazi experience through almost extreme contextualization, making it transportable to other cultures and circumstances. We learned how a small group could influence the majority of the population.

Their method became recognizable. Take a disliked situation, frame it as a shared threat (even if it is not), then describe the harm it may cause — engender fear of something or someone we routinely encounter. The majority will voluntarily, if not spontaneously, find the cause and 'fix it.' That is, the majority now assigns the blame. Encouraging bad people to do bad things is the easy part. Persuading good people to do bad things is the sad part. We do not want to lose our sense of proportion to the tragedy. Neither do we want to lose the most important lesson of the 20th Century.

“We ask if healthcare has excessively focused on the shared threat of medical error and its harm to patients. Extensive discussion of the threat instills self-regulating behaviors to prevent even the appearance of error.”

We ask if healthcare has excessively focused on the shared threat of medical error and its harm to patients. Extensive discussion of the threat instills self-regulating behaviors to prevent even the appearance of error. The majority then self-regulate through conformity and obedience. Management science assures safety when collected data reduces variance and statistical analysis emerges from the narrowed Gaussian distribution.

We need not sacrifice the benefits of initiative and creativity to secure obedience and conformity. High-Reliability Organizing offers methods to increase individual and organizational capability, the “other” way to address fear. In the early 1970s, the Fire Rescue Ambulances (RA) with the Los Angeles City Fire Department experienced increased fire ambulance-involved motor vehicle collisions. The Department’s response was to send RA drivers to the Los Angeles Police Department’s new “skid school” to learn high-performance driving. Collisions decreased. Note that the final exam was to drive two circuits on the course as one could safely. The first lap was without a siren; the second was with a siren. The driver failed if the siren speed was faster than the non-siren speed. The training officer remarked, “We don’t want you if you are driven by adrenaline.”

“Organizations do not make decisions; people do. However, organizational and national culture have solid and hidden influences on an individual’s decisions.”

Organizations do not make decisions; people do. However, organizational and national culture have solid and hidden influences on an individual’s decisions. Karl Weick’s body of work in Organization Science captures and elaborates on these influences and interactions in High-Reliability Organizing. Dempsey’s presentations revealed the numerous interactions that create a culture and the hidden ways a culture influences personal decisions. John Boyd, an influential US Air Force military tactician, captured this

in the “Orient” function in his OODA Loop method of responsive decision-making (1, 2):

Orient “shapes the way we interact with the environment... The way we *observe*, the way we *decide*, the way we *act*.” “*Seen as a result*, [orient] represents images, views, or impressions of the world shaped by *genetic heritage, cultural tradition, previous experiences, and unfolding circumstances*” John Boyd (3).

Just as a small group brought focus to threats in 1920s Germany, another small group can focus on capability. Rather than focusing on error and patient harm, we can redirect the focus to increasing the capabilities of individuals and organizations.

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The Environment as Noise

Rather than viewing the environment as a structural entity, for HRO, we can describe it by the flow of energy as noise. Environmental noise with constant variance per unit frequency (an equal and independent representation of all frequencies *without* autocorrelation) is ‘white noise.’ Events in white noise environments are random, without temporal correlation, because no frequency dominates (4, 5). These are relatively stable environments.

Stochastic noise, on the other hand, causes disruptions. If we separate and remove signals (cycles with predictability that have meaning) from noise (the residual variability that causes unpredictability), we can distinguish patterns of environmental stochastic noise. We can then describe the frequencies of stochastic noise inherent to the environment as colors.

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This noise can fluctuate over time or through space as serial correlations of flux (autocorrelation), or noise can exist as dominant frequencies in a power spectrum (5, 6). In the analogy with visible light, these fluctuations are termed ‘color’ to describe the pattern of predominant frequencies in a specific fluctuation range (7) [Table 1].

The various colors of noise refer to the disruptive potential of sto-

chastic energy within the environment and the characteristics of that environment. The meaning of the types of noise lies in the unpredictability of events and ‘forcing functions’ of energy, that is, the strength of the environment to force a system or population to respond.

Random fluctuations of energy, independent of time, form ‘white noise’ that follow 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 a more significant influence on the system from uncommon low-frequency events. These red noise events are also poorly predictable.

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The Affective Response to Noise

Fear reactions at the subcortical level maintain a safe distance from the threat. Threat reflexes rapidly initiate protective behaviors. However, these same responses, when unmodulated, can harm the individual, distorting thinking as *situational cognitive distortions* (1). The prevalence of unmodulated stress and fear makes them appear unpreventable if not expected. This duality is the inherent vice of stress and fear. By describing their function and location in the brain, we can identify these behaviors to begin modulation for effective responses to threats.

The locus coeruleus-norepinephrine system and a modulated hypothalamic-pituitary-adrenal (HPA) axis support adequate cognition when forcing functions to exceed a person’s ability to respond. Unfortunately, when unmodulated, the amygdala and cortisol from the HPA axis can turn off an effective response. In some social systems, these unmodulated stress or fear responses become the norm, if not expected. Performance under stress then suffers, and allostatic growth cannot occur.

Stress and fear prepare the brain for adequate cognition during adversity and drive safe and effective behavioral engagement. Not recognizing these functions shifts the research and conversation to the damage caused by unmodulated stress and fear. The *function* stress and fear cause damage. This is the inherent vice of stress (9). Karl Weick described how failure from *not* acting is invisible and becomes organizational knowledge (10). *Not acting* reduces the individual stress experiences in the ecology of fear. When the inherent vices from stress and fear lead to not acting, then the behaviors to avoid threats become the organizational knowledge Weick describes.

Thought in a Noisy Environment

The locus coeruleus-norepinephrine (LC-NE) system is how we think under stress. It is the source of adaptive thinking and behaviors, initiating the adaptive cognitive shift necessary for survival (11). NE can silence some signals while enhancing others. The LC has an increased response to strong stimuli with decreased response to weak stimuli, enhancing the signal-to-noise ratio. The brain can encode and filter salience (12).

It is not happenstance that we contrast conformity and obedience with creativity and initiative. These are opposing sets of cultural values (13). In a white-noise environment, conformity and obedience are sufficient. We need all four in red noise environments, particularly with the abrupt pink noise event.

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Noted in the acknowledgments are individuals who moved from white noise conformity to red noise initiative within months to weeks. They naturally adopted the methods for the red noise environment by observing their success in others, not through education, training, or consulting.

White Noise Stability

‘White noise’ is environmental noise with constant variance per unit frequency. That is, there is an equal and independent representation of energy over all frequencies *without* autocorrelation (feedback). Events in white noise environments are purely random, without temporal correlation, because there is no predominant energy frequency (4, 5).

The variances from data in a white noise environment have characteristics distinguishing them from red or pink noise:

- They form a Gaussian distribution amenable to statistical analysis and calculated probabilities. Environmental elements are fully independent.
- Variance decreases over time or with increasing data.
- Frequencies are uncorrelated in time and have an equal distribution of energy.

The predictability of white noise environments influences the normative stance (14) and is the ideal scientific environment. For example, there is no energy exchange with the external environment, while elements’ independence and randomness support the statistical analysis and probability predictions.

Table 1. Patterns and Characteristics of Noise (8)

Color	Structure	Variance	Distribution
White	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
Red	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
Pink	The midpoint of red noise The slope is precisely midway between white and brown (random) noise.	Data <i>continuously increases</i> variance. Distinguishes pink noise from reddened spectra	Power law distribution - No well-defined long-term mean - No well-defined value at a single point

Stability

When energy enters the system, white noise can cancel the intruding energies like noise-canceling earphones work. This process gives stability but may also produce a false sense of capability that the organization can respond to the unexpected.

Reddened long-period fluctuations or infrequent pink abrupt changes can also give the appearance of a stable environment if not a stable world. The efforts of those familiar with High-Reliability Operations or who recognize the inevitability of a forcing function or abrupt change can maintain system stability despite disruptions or minor forcing functions. This context gives rise to the trope “Armies prepare to fight their last war, rather than their next war.” Viewing wars as pink noise events or reddened noise-forcing functions, we can recognize that the years between wars are not white noise periods of peace. Instead, they are periods of attention to forcing functions and preparation for abrupt change.

“The decreased environmental pressure of white noise environments favors the generalization of a population over periods that extend longer than the life of individuals. System change occurs over generations in an evolutionary manner rather than by context-dependent ecological processes (15).”

The decreased environmental pressure of white noise environments favors the generalization of a population over periods that extend longer than the life of individuals. System change occurs over generations in an evolutionary manner rather than by context-dependent ecological processes (15). Leadership is less critical than executive, administrative, and managerial skills (16), where ‘categorical work’ creates classifications and rules to work by (17) [see below].

The organization also loses specialization as the leadership becomes more centrally located. New members who join the organization or scientific discipline will experience new, reset baselines (18) with new generalized norms and normative values. There is a loss of practical wisdom as new abstract beliefs become privi-

leged. Beliefs change, and the culture follows.

The stability of a white noise environment permits context-free concepts, theories, and problem-solving. Classifications (17) and abstractions (19) gain significance. Experts develop mastery over distinct bodies of knowledge. Rather than *experiential* empiricism, theories, beliefs, and *experimental* empiricism become privileged.

The variances of white noise place minor unexpected demands on the organization. Deviation from accepted values is the error measurement for the organization's response. In white noise, the variance is almost constant, which permits the incorporation of constant variance into planning.

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Affect from White Noise

White noise variance and measured error are also measures of novelty, uncertainty, and uncontrollability, which are the determinants of human stress reactions. The response to these stressors is to “disarm” the *executive functions*, enabling survival behaviors. The hypothalamic-pituitary-adrenal (HPA) axis releases cortisol to constrain the executive functions integrated from opposite ends of the brain: perception, hastily created plans and motor activity. This is the positive aspect of stress or eustress.

These cognitive stress reactions serve the function of enhancing cognitive performance. Cortisol inhibits memory recall in select memory systems while enhancing habit memory and learned behaviors. Cortisol also selects memory formation and transforms threat reflexes into learned behaviors. The stress response *functionally* inhibits executive functions.

Thought in White Noise

Operations in a white noise environment occur independently of the environment. Theories and beliefs are readily incorporated into operations. There is a minimal gap between theory and practice or between belief and the environment.

Concepts provide the necessary elements for comparison, standardization, and quantification. This use of concepts has become a foundation of modern science (20). The Linnaean system categorizes typologies into taxonomic hierarchies to show relationships. ICD-10 codes create discrete categories out of continuous public health data analysis processes. The categories of evidence-based medicine are intended to reduce waste and medical complications.

The idea of concepts entered scientific thought from Immanuel Kant's (1724–1804) original scientific, philosophical work. He posited that knowledge is accessible and that knowing the world and its phenomena is possible because all elements can be contained within known concepts, with a fundamental principle being causation. His influence spans the 18th Century to today in the physical sciences, the life sciences, modern mathematics, mathematical logic (21), and social sciences (22). We use “spatio-temporal re-

lations” from his idea of space and time as entities that structure experience, distinct from objects themselves. The formulation of “social knowledge” is how Kant mediated between the facts and thoughts of reason and the values and actions of morality (22). *Kant's Critique of Pure Reason* (23) is one of the most influential works in philosophy. Kant's influence on the definitions of knowledge and the validity of science directly influences how we experience science.

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In a more predictable environment, homeostasis becomes the goal, the return to the previous state. Resilience describes recovery. A stable environment reduces demands on less experienced personnel who need less supervision compared to the variability of a reddened environment (4). In these environments, we see greater reliance on protocols and algorithms.

Information

For Claude Shannon [1948], choosing between signals and choosing from randomness creates information. Certainty has only one signal to choose. Because having only one possibility is not informative, certainty is not information. Communication is the act of resolving this uncertainty, even as information entropy causes communication to corrupt information.

In the white noise environment, information is similar to Immanuel Kant's idea of concepts – all concepts exist. Because there are no disruptions, information exists, is stable, and is accessible. The Gaussian distribution is information-dependent. Therefore, collecting more information decreases variance. This method makes it easier to treat problems as a puzzle (24). After we collect the puzzle pieces, we have the answer – a form of deductive reasoning.

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Information is also discrete, excluding intermediate values. The information does not contradict other information in the same context. The information does not change. Classical logic serves well

in the context of a white-noise environment.

However, this has a significant influence on arguments. If information cannot contradict other information, and there is no gradation of information, then we can disprove someone's idea by focusing on contradictions and inconsistencies. To disprove one point disproves all. We encounter these individuals as the ones focused on normative values and distracting minutiae.

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Precision, Accuracy, and Error

Data in white noise environments form a Gaussian distribution. Collecting more data narrows variance, making white noise systems *information dependent*. Therefore, it is reasonable for those in business management to be “data-driven.” Increased data can also reveal the presence of distinct populations, such as in a bimodal distribution or a distribution with ‘fat tails.’

“Precision is a measure of reduced variance in a Gaussian distribution. The Gaussian distribution can produce normative values capable of error measurement. Defining error as the distance from the desired or expected (normative) value allows us to use error as a measure of precision.”

Precision is a measure of reduced variance in a Gaussian distribution. The Gaussian distribution can produce normative values capable of error measurement. Defining error as the distance from the desired or expected (normative) value allows us to use error as a measure of precision. Because white noise systems are information-dependent, collecting more data reduces variance and gives more meaning to error measurements. In systems that require or value reductions in variance, such as tightly coupled systems, error as a measure of precision becomes helpful to ensure the smooth functioning of hardware and white noise operations.

We must measure precision as the *distance from* the desired state *before* operations because we cannot change precision *during* operations. Measures of precision errors during the disruption of operations are not valid due to the fluctuating red noise energy frequencies.

Error as the distance from the expected is *one* type of error. Increasing precision to adjust our tools or performance in real-time is not practical. Identification of this type of error allows corrections in training, performance, and production processes *before* use in operations.

“Data from red or pink environments do not form a Gaussian curve. Instead, operators in these environments focus on proximity to the desired value or state. This modus makes sense because fluctuating energy frequencies will change the environment, possibly leading to a change of objective.”

Data from red or pink environments do not form a Gaussian curve. Instead, operators in these environments focus on *proximity* to the desired value or state. This modus makes sense because fluctuating energy frequencies will change the environment, possibly leading to a change of objective. We can use proximity to the desired state to adjust our performance through feedback, increasing our accuracy in real-time. As described above, this is not an option available for precision.

Precision is a single helpful measurement to improve the program, but not in real-time. Accuracy is not a single measurement but a series of measurements generated from feedback. Such a series of measurements improves accuracy in real-time. Accuracy is vital for moving targets [Table 2].

Error in the white noise environment comes from acting and is visible and correctable. The stability of the environment conceals ‘error from not acting,’ enabling such errors to become incorporated into organizational knowledge (10).

Table 2: Precision versus Accuracy (25)

Precision	Accuracy
Hardware	Human behavior
Assures our understanding	Extends our understanding
Applicable to white noise Gaussian distribution (“Six Sigma”)	Applicable for red and pink noise Power distribution
Error identifies structural defect.	Error generates information An error ensures safety by identifying boundaries of knowledge and performance.
Identified by feedback Short feedback only Long feedback contains too many factors	Improved by feedback Incorporates long, delayed, indirect feedback loops
Supports certitude, motivated reasoning, the hedgehog, and narcissism	Creates doubt, the fox, and psychological grounding

Table developed with Ian van Stralen.

Decision making

A convergent, deductive, analytic approach makes sense in white-noise environments. We search for facts and information because they guarantee our deductive hypothesis. The structures we create, and our actions reinforce acceptance of the normative frame and the security they offer.

This linearity and stability, however, impede generating the stochastic resonance that brings stability to dynamic environments (26). Rigid structure and linearity will narrow and increasingly constrain our responses.

“Decision aids in a linear, deterministic environment can use protocols, algorithms, and decision trees. Algorithms decompose a more extensive problem into more minor problems that can be solved more easily. We complete one action before moving on to the next.”

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Decision trees identify alternatives and guide decision-making when the necessary information is unavailable (27, 28). They were first introduced for capital investment and then later applied to healthcare.

Classical logic is central to decision-making in the white noise environment. We stress two well-known laws of classical logic because they may improperly be applied to red or pink noise environments. Some logic can incorporate multiple values, allow contradiction, and include ‘indeterminate’ truth values.

- *The law of excluded middle* – every proposition is either true or false. There is no gradation.
- *The law of noncontradiction* – the same proposition cannot simultaneously be true and false.

Solving

‘White noise’ has the same variance for all frequencies. No temporal or correlation variance exists, and time and space have constant variance (7, 29). The values of a random signal at two instants in time are entirely independent. The Gaussian distribution of white noise environments supports discrete concepts, hierarchical systems, and linear thinking independent of context or the environment. The observer’s frame of reference moves outside the flow of events and becomes fixed as Eulerian specificities (30).

Classifications act as objects for cooperation and create boundary objects for communication across infrastructure during a disaster (31, 32). Classifications build from data, which is not a problem in the Gaussian white noise environment where more data narrows the variance to form a norm. Data increases variance in a red-dened environment, and we lose the norm. One solution is disregarding environmental noise (5), but the noise *is* the crisis.

Classification and standardization can solve the problem of infor-

mation correlation in a white-noise environment. Precision supports distinct classifications, while standardization gives meaning to precision. Precision is reliable in white noise systems as we see repeated or similar actions which produce predictable results. That reliance on precision, such as ICD-10 or DSM codes, leads to loss of information while classifying a situation.

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The white noise environment contains Herbert Simon’s well-structured problem that is amenable to the algorithm (33, 34), solved much like a puzzle with a set number of pieces fitting into a pattern (24). Abstractions and concepts provide the basis for understanding and prediction. With the Gaussian distribution, problems tend to be information-dependent, and error measures the distance from the model or concept. Classical logic and scientific reasoning are used (35).

“When we separate the organization from the environment, as when accepting the white noise environment, we sacrifice accuracy for conceptual tractability. Classification and standardization can solve the problem of information correlation in a white-noise environment.”

Problems

When we separate the organization from the environment, as when accepting the white noise environment, we sacrifice accuracy for conceptual tractability. Classification and standardization can solve the problem of information correlation in a white-noise environment. The problem arises from who sets the standards. Making sense in one context does not necessarily make sense in another, even between a physician and nurse standing by the same neonate. “One person’s standard is another’s confusion and mess,” Leigh Star (36).

Leaders can effectively develop a structured, rule-driven system within white noise stability. All significant thinking occurs in the central part of the organization. Over time, the flow of information diminishes as the periphery becomes marginalized and the central part comes to the protection of its status (37).

The belief develops that the organization is best protected by conforming to standards, obeying rules, and vigilance for error. Discussion of legal matters, compliance, and liability precede increasing capabilities and resources. Repeated discussions of harm and error create the ecology of fear. Repeated discussions

of threat, rather than the capabilities to engage the threat, create self-regulating behaviors that impair initiative and engagement. The lack of variance supports the idea of the effectiveness of fear over capability as a leadership method. Some people think differently, they do not fit in, and they are not “on the bus.”

These outlier members are quietly marginalized out of good judgment if not prudence. Leaders in the organization do not recognize the damage to the social network in the organization, consequent performance decrements, and mental health damage that will pervade the organization.

“These outlier members are quietly marginalized out of good judgment if not prudence. Leaders in the organization do not recognize the damage to the social network in the organization, consequent performance decrements, and mental health damage that will pervade the organization.”

Two physicians addressed this when creating a PICU with ward and NICU nurses and respiratory care practitioners. One was a former US Navy Aviator and Vietnam veteran, and the other (DvS) was a former fire rescue ambulance paramedic. To ensure that all PICU staff could approach one of the intensivists, they made a list of staff members they found challenging to work with. They divided the list into two sets, each taking one list. The intensivist would then focus on the people on their list to keep active contact with the person. From their experience, they did not want anyone to feel isolated. Fifteen years later, one of the physicians (DvS) was assigned “leadership coaching.” The leadership consultants found the author “too approachable during this training.” Staff should not walk up to an attending physician and ask about patients. The hierarchy and chain of command in healthcare have remained.

In the white noise environment, we are challenged and begin to gain a sense of mastery. We begin to see the formation of certitude, the development of self-image that can surpass the environment, and conceptual mastery develop into motivated reasoning.

In the white noise environment, mastery can occur without experience – but not understanding.

Red Noise Forcing Functions

Cognition for the white noise environment is relatively straightforward. Minimal fluctuation in the environment permits precision and procedure that reduces error, identifies specific situations to guide decision-making, and supports information gathering to improve problem-solving. A top-down or ‘whole-field view’ develops when spectators accept this.

It is the act of accepting the white noise environment as normative that privileges the Gaussian distribution, statistics, and probability functions. Knowledge becomes filtered through evidence-based approaches developed in a well-controlled environment. Knowledge from *experiential* empiricism, knowledge by acquaintance, is diminished in favor of knowledge from *experimental* empiricism, that is, knowledge by description.

A white noise environment is a decontextualized environment. Human behavior is feedback from the environment processed through knowledge and experience. That is, human behavior is autocorrelated – red noise.

Forcing Functions

The organization is orderly. The organization is not ready for environmental ‘forcing functions.’ Forcing functions are the strength the environment has to force a system or population to respond. “External forcing by environmental noise alters the qualitative nature of the dynamics” (7). The environmental noise is red noise which will interact with the red noise of human behavior, which has its forcing function.

“Forcing functions are the strength the environment has to force a system or population to respond. “External forcing by environmental noise alters the qualitative nature of the dynamics” (7). The environmental noise is red noise which will interact with the red noise of human behavior, which has its forcing function.”

One behavioral forcing function derived from a white noise environment is the belief in the “zero-sum game.” Resources and energy do not enter or leave these environments. We can see how some individuals believe that resources are limited: if one wins, another must lose. This belief drives behaviors that endanger the organization. These behaviors are too readily described as prudent, ethical, or principled.

Forcing functions are a hallmark of the red noise environment. Stochastic processes with slow fluctuations or low frequencies (lengthy periods) have a ‘red’ spectrum. Low-frequency events are rare and have a greater spectral density. Low-frequency, rare events have a more significant influence on the system than more common, high-frequency events with less spectral density (5). Their influence comes from spectral density.

“The variances from data for the different types of noise produce different probability distributions. Red noise contains low frequencies with energy. Environmental elements are not independent; the organization operates within the external, open-system environment.”

The variances from data for the different types of noise produce different probability distributions. Red noise contains low frequencies with energy. Environmental elements are *not* independent; the organization operates within the external, open-system environment. Variance *increases* over time or with increasing data to form a power distribution. There are rapid fluctuations.

We now see risks from decontextualizing knowledge by acquaintance and experiential empiricism. While top-down specifications produce a broader, ‘whole-field view,’ we overlook the bottom-up

specifications of operations, tactics, human readiness, and experience. These are the qualitative characteristics that emerge from the activities of 'local groupings' (Table 3). The methods used to increase human and system capabilities are overlooked. The contextualization of experience counterintuitively supports translating experience and capabilities into new and different contexts.

Table 3: Specifications of the Whole-Field View and Local Groupings (38)

Whole-field view	Local groupings
Eulerian, quantitative	Lagrangian, qualitative
Decontextualized	Contextual
External, fixed point	Within flow
Select a viewing point	Select a starting point
Focus on the specific location	Focus on an individual moving parcel
Flow	Trajectory
Multiple fixed positions	Continuous measure with position and pressure
Rate of change of system	Individual parcels

“The whole-field view is necessary. What is dangerous is the spectator or observer who moves the frame of reference outside the flow of events. This construct is when the frame becomes fixed as Eulerian specificities (30).”

The whole-field view is necessary. What is dangerous is the spectator or observer who moves the frame of reference outside the flow of events. This construct is when the frame becomes fixed as Eulerian specificities (30). Authorities use this external reference frame to create models for the reddened environment, yet the reddening of the environment increases variance, dissolving Gaussian distributions and creating unpredictability (5).

“The whole-field view is necessary. What is dangerous is the spectator or observer who moves the frame of reference outside the flow of events. This construct is when the frame becomes fixed as Eulerian specificities (30).”

Time Variance, Uncertainty, and Chaos

Time-variance describes a system with output characteristics that are explicitly dependent on time. In time-variant systems, specific parameters or influences change with time. The system responds differently to the same input, depending on when it occurs. Linear time-variant systems are linear because they follow an equation, and time-variant because variability over time (time is a variable)

creates an oscillation.

The time variable gives this “sinusoidal cycling” an associated uncertainty principle: what we measure will change with time. When a wave equation determines a particle’s momentum, we know where it is along the wave form. Heisenberg’s Uncertainty Principle says that to know the particle’s position, we must stop it, but it has no velocity. In a time-invariant system, the output is not a direct function of time. Increasingly precise measurement of one decreases the precision of the other.

Deterministic chaos develops when the oscillation continues, and the ‘output becomes the new input’ in the same deterministic equation. This iterative process is the logistic equation, like the equation for a parabola, but using the output for the following 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* (39). “Deterministic” as it is determined by the logistic equation and “chaos” because the unpredictable outcomes are sensitive to initial conditions” (8, 39). While matter, energy, and probabilities are conserved, information and entropy are not conserved (40).

Self-organization promotes stability and stable patterns. Self-organizing systems can abruptly transition from one pattern to another, even with a slight change in the system, termed a *bifurcation*. Transitions in the logistic equation can be dramatic and related to a single parameter – such as *r*. (39, 41).

Emergence

Local, non-linear interactions are the basis of self-organization. Missed in this organizing principle is the emergence of novel properties. These properties put to the test the capabilities of individuals and the organization. Moreover, it will ruin the best plans.

Affect in Red Noise

Forcing functions have a greater effect on the brain than the disruptions that develop within white noise environments. We begin to experience stress-impaired cognition and fear-circuit behaviors – all responses mediated by neurochemicals. They can come on with incredible speed and, when accepted as simple neurochemical effects, can be interrupted almost as quickly.

Stress

Novelty, uncertainty, and uncontrollability, the domains of the executive functions, initiate the release of cortisol. Cortisol blocks memory retrieval in the prefrontal cortex and hippocampus (memory center), and the amygdala directly inhibits the prefrontal cortex. Under stress, the brain “disarms” the executive functions to prevent the intrusion of abstractions and future thinking while limiting various memory systems. Even minor stress will impair executive functions (42).

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The Executive Functions

Appreciating the executive functions helps understand the function of the stress response. The executive functions support motor attention, working memory, and inhibitory control:

- *Motor attention* prepares for impending motor action – “memory of the future” (43).
- *Working (short-term) memory* allows changing sensory stimuli to mediate perception and action toward a goal in real-time (43). As we work, we can ‘delete’ these memories as soon as we no longer need them.
- *Inhibitory control* and selective attention protect goal-directed behavior from interference, distracting information, and impulsive or reflexive behaviors (43); inhibit emotional memories (44, 45), well-established habits, and more easily processed intuitions (46).

“Working memory allows you to remember events of the last several seconds or minutes and to prepare and plan “forward” in time for prospective, near-future motor acts. Working memory has the attribute of rapidly ‘forgetting’ information as motor actions evolve. During the action, we must release memories as we continually bring new things into memory.”

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Cognitive flexibility refers to the ability to shift between cognitive rules or modes of thought (48). Unrestrained neurological stress responses release almost pure bottom-up control to produce self-preserving behaviors. Cortisol and the amygdala continue suppressing executive functions, and a defense cascade follows (49).

Stress-Impaired Cognition

Uncontrollable stress releases cortisol to produce *stress responses*, generally related to failed memory recall. The primary memory systems affected are declarative memory for what is learned, episodic memory of experiences, and working memory for active problem-solving. Retained is procedural, or habit, memory, allowing the person to continue acting with practiced behaviors without losing time thinking and developing plans or actions.

This is “distress.” For those using the Yerkes-Dodson Curve (50), this inflection is when stress impairs performance. For those with experience in dangerous contexts, impaired performance reveals poor training and leadership.

Forcing functions increase the valence of novelty, uncertainty, and

uncontrollability.

- *Novelty* is processed in the right cerebral cortex, while the left cerebral cortex processes familiar perceptions. With increasing novelty, it becomes more difficult to identify something familiar or identify an analogy that brings understanding.
- *Uncertainty* and ambiguity in decision-making occur in the ventromedial prefrontal cortex (vmPFC). The vmPFC is also involved with making decisions in uncertainty (50). See below. Acting to change an element of uncertainty readily supports creating Shannon Information in a white noise environment.
- *Uncontrollability* or unpredictability is the stimulus for the HPA axis.
 - Uncontrollability is the most significant stressor because finding controllability is the primary objective during any crisis, and uncontrollability is the greatest threat to humans.
 - *Motor cognition* describes how we adjust our actions to changing situations and learn through physical actions. The operator learns what works through action; experienced operators think best while acting (20, 51). Karl Weick captured this in his “recipe” for sensemaking, “How can I know what I think until I see what I say?” (52).

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However, the field is more extensive, and circumstances are in flux amidst a red noise-forcing function. Beliefs must be revised and updated through doxastic operators, one of the modal logics. Modal logic can incorporate multiple values. Rather than value as a function, values can operate as relations. The proposition relates to true, false, or neither (53).

Doxastic logic (Greek *doxa*, “belief”), a form of epistemic logic, concerns the logic of participants’ beliefs. Doxastic logic provides reasons for belief rather than knowledge. The difference is that a belief is probably not necessarily true.

- *A belief update* refers to accounting for a change in the situation and acquiring new, more reliable information; this requires us to change our inaccurate old beliefs to more accurate, new ones.
- *Belief revision* occurs when we identify the old information as less reliable and 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, more accurate information.

Operators in dangerous contexts use concrete nouns for description and emphasize action verbs for communication. Recent neuroscience findings support this behavior. Action words and mo-

tor action, noted above, share common cortical representations. Action verbs, more so than concrete nouns, affect overt motor performance dependent on timing. An action verb will interfere with a reaching movement in progress within 200 msec. The exact words processed *before* movement will *assist* the movement (54). This action, fortunately, is category specific. A quick shout to move a hand causes hands to move, not random body parts. The category-specific, functional linking of language and motor action in the left hemispheric cortical systems link arm and leg actions with processing specific kinds of words. The two systems interact to produce meaningful information about language and action (55-57).

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Fear-Circuit Behaviors

For practicality, we consider fear-circuit behaviors as safety behaviors that respond to approaching threats, then maintain a safety distance. The initial fear reaction is cortical. With increasing proximity to the threat, fear migrates to the midbrain.

An impending threat initiates fear circuitry behaviors below the level of awareness. Upon reaching awareness, the individual can augment or accelerate fear behaviors. Fear behaviors maintain a ‘flight distance’ from the threat, creating a safe distance (‘fear flight’), or they create a safe distance should the threat breach the ‘defense distance.’ The individual will attack for self-defense and escape (‘fear fight’) (58).

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A distant threat within the “flight distance,” whether temporal or spatial, increases the ventromedial prefrontal cortex (vmPFC) activity. This region is vital for decision-making in uncertain, risky, ambiguous, or context-dependent conditions. The vmPFC uses conceptual information about specific outcomes to shape affective

responses, such as determining the most adaptive response given the particular situation (59). The vmPFC connects to the amygdala to determine the motivational importance or degree of the threat (50). The amygdala connects onward to the bed nucleus of the stria terminalis (BNST) to control a repertoire of behavioral defensive states (60, 61).

“The additional proximal threat will switch activity from the vmPFC to the phylogenetically older midbrain periaqueductal gray (PAG) nucleus. The PAG identifies an approaching or receding threat to functionally switch the repertoire of behaviors to fast reflexive behaviors (e.g., fight, flight, or freeze) (60, 62, 63).”

The additional proximal threat will switch activity from the vmPFC to the phylogenetically older midbrain periaqueductal gray (PAG) nucleus. The PAG identifies an approaching or receding threat to functionally switch the repertoire of behaviors to fast reflexive behaviors (e.g., fight, flight, or freeze) (60, 62, 63). This continuous switching within the PAG is a blend of the bottom-up responses to threats before they come to our awareness and top-down cortical neuromodulation from the vmPFC and the anterior cingulate cortex.

Problems

Cognitive behaviors directed toward self-protection are organized into offensive and defensive actions. *Offensive protections*, generally initiated to protect others, include prompt attacks, surprise, concentrated actions, fast tempo, and audacity to stop the spread of the problem. This aggressive force projection secures the initiative but is pathological when directed toward people. The aggressor uses blame, accusation, and personal attacks.

Defensive protections, generally initiated to protect self or close associates, come about when demands clearly, though subjectively, exceed a person’s capabilities, performance, security, or ability to survive. Ad hoc emergency plans will focus on personal survival or the person’s sense of safety. The person may withdraw or move to a place of psychological or physical safety (64) – not going near the source of the threat, which could be the leader, an administrator, or a colleague. Whether a leader, administrator, or line worker, the individual keeps a safe distance from the situation, which impairs their ability to identify correlations or causations. As a result, rationalizations, analogies, clichés, metaphors, and abstractions support reasoning, plans, and actions. The person will deflect, excuse, justify, or use prophylactic self-blame. This individual is less helpful in protecting others because of the primary focus on reducing risk to themselves.

Fear fight-or-flight. The proximity of the threat drives fear-flight. *Fear-fight* develops during the fear process to enable escape (58). Because humans can separate the motor and affective components of emotion, the motor component of fear-flight can appear as physically leaving. Fear-fight, the self-defense fight, is a fight to escape and more likely consists of pushing, shoving, and poorly aimed punches. For the affective component, the person appears to avoid, ignore, or distract, perhaps by asking for more information (65). Verbal maneuvers include denial of a problem, dismissiveness of the individual’s concerns, or depreciation of discon-

firing information. Statements such as “Why wasn’t I informed” or “The problem is that you complained wrong” are common. Fear-fight for self-defense starts within the defensive distance to help the individual escape.

“Because proximity drives fear, the individual with extreme unmodulated fear has a narrow perceptual focus toward the threat and operates with severely concrete thinking. Concomitant stress from uncertainty and feelings of uncontrollability (hopelessness) generates a cortisol HPA response taking the prefrontal cortex ‘off-line,’ impairing cognition.”

Because proximity drives fear, the individual with extreme unmodulated fear has a narrow perceptual focus toward the threat and operates with severely concrete thinking. Concomitant stress from uncertainty and feelings of uncontrollability (hopelessness) generates a cortisol HPA response taking the prefrontal cortex ‘off-line,’ impairing cognition. The reasoning is not practical. Physically, rather than running from the threat, the person escapes directly toward a safe place. There is no time horizon. Fear-fight is focused on escape from the threat, then running in a straight path to a safe place. Once in safety, the affective and motor components are likely to cease.

Stress-induced Cognitive Disorders

Stress impairs abstract thought and working memory. This impairment affects the ability to regulate thought, behavior, emotion, and flexibility of attention:

- Choke (expectations being observed).
- Impaired memory recall/enhanced procedural memory.
- Loss of abstract thought when prefrontal cortex and executive functions are impaired.
- Concrete thinking and reasoning due to loss of abstract abilities (amygdala impairs cortex).
- Rules are abstractions, therefore, challenging to recall and use.
- Failure of cognitive strategies: “*Even quite mild acute uncontrollable stress can cause a rapid and dramatic loss of prefrontal cognitive abilities*” (42).

Thought in Red Noise

The focus on stress, eustress, and distress distracts from the brain systems for thinking under stress: the locus coeruleus-norepinephrine (LC-NE) system. The amygdala responds to the perceived threat by causing the periventricular nucleus of the hypothalamus to secrete corticotropin-releasing factor (CRF). CRF simultaneously stimulates two systems: 1) the hypothalamic-pituitary-adrenal axis (HPA) to inhibit abstract thinking and memory and 2) the locus coeruleus-norepinephrine (LC-NE) system for adaptive thinking and behaviors. This initiates the adaptive cognitive shift necessary for survival (11).

From a thorough review of the literature, Jennifer Ross and Elisabeth Van Bockstaele (12) have identified the two themes of attention and arousal. More critical is their finding that LC-NE mediates selective attention for salient stimuli with concurrent silencing of irrelevant stimuli. That is, during a challenge from threat, both excitation and inhibition coincide throughout the brain.

While combined excitation and inhibition seem straightforward, the method used in the models effectively engages threats. NE can silence some signals while enhancing others. The LC has increased response to solid stimuli with decreased response to weak stimuli, enhancing the signal-to-noise ratio. The brain can encode and filter salience (12).

Inhibitory control, or response inhibition, is the executive function that inhibits impulses and dominant, pre-planned (prepotent) behavioral responses to stimuli. This executive function helps select behaviors consistent with one’s goals (66).

“The focus on the effects of stress on attention leads to the idea that active attention processes information from the top down. The individual directs attention to attaining a goal. Passive attention processes information from the bottom-up, driven by environmental stimuli.”

The focus on the effects of stress on attention leads to the idea that active attention processes information from the top down. The individual directs attention to attaining a goal. Passive attention processes information from the bottom-up, driven by environmental stimuli. Attention is intentionally focused (top-down), or attention is attracted (bottom-up) (12). Humans may innately and subcortically evaluate the environment before environmental cues reach awareness, trigger emotions, or initiate higher-order cognition (67).

Salience. As stress research increased, the threat became the focus of the stimulus that caused stress. A threat can compromise survival. Suppressing threats would involve any number of tasks. Specifically, it would involve selecting specific tasks at the opportune time. Ross and Van Bockstaele (12) posit that task prioritization to meet the threat led to the consideration of salience as a cognitive process.

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Dorsal and Ventral Attention Networks

Two neuroanatomically defined systems appear to control the top-down and bottom-up information processing during the orienting reflex. Environmental cues from novel or infrequent events interrupt ongoing task-related cognitive activities. This bottom-up pro-

cessing of sensory cues quickly reorients cognitive attention (68).

- Dorsal Attention Network (DAN), top-down cognitive information processing, task-related stimulus-response, pairs cognitive cues with motor responses
- Ventral Attention Network (VAN), bottom-up identification of salient or novel stimuli in the environment

DAN, left-lateralized in the prefrontal cortex, may control attention involved in motor responses to task-related stimuli. The right-lateralized VAN may facilitate reorientation when encountering a novel or infrequent sensory stimulus. When VAN detects unexpected or novel stimuli, it interrupts DAN to reorient from the current activity to a new behavioral response. This VAN activity depends on norepinephrine delivered from the locus coeruleus (69).

The Triple Network

Brain regions do not respond to stress in isolation. Organized, functional, dynamic networks interact across brain regions (70).

- *The salience network (SN)* responds to salient stimuli, orienting and coordinating attention toward internal or external information. SN may support hypervigilance.
- *The default mode network (DMN)* is activated during stimulus-independent tasks or internal thought, forming perceptions of others, or retrieving memories, usually suppressed during CEN activation.
- *The central executive network (CEN)* supports higher-order cognitive tasks, attention, manipulating information, working memory, and decision-making for goal-directed behavior.

“The science has not settled, causing inconsistent naming and regionalization. However, the SN (salience) appears to be the highest in the hierarchy. The Attention and Triple Networks interact, suggesting that cognition under stress balances three core ICNs: DMN, CEN, and S.N.”

Combined Networks

The science has not settled, causing inconsistent naming and regionalization. However, the SN (salience) appears to be the highest in the hierarchy. The Attention and Triple Networks interact, suggesting that cognition under stress balances three core ICNs: DMN, CEN, and S.N. From their coordination emerges cognition, goal-directed, and stimulus-directed behavior (12).

- Connections from SN (salience) and DAN (information processing) to DMN (stimulus-independent) are inhibitory, while reverse connections are weakly excitatory.
- Bidirectional connections between SN (salience) and DAN (information processing) are excitatory.
- VAN (environmental reorienting) has shared regions with SN (salience).

Information

This problem of more data clouding the conclusions develops when an event is influenced by what preceded the event. That is, the event is no longer independent of preceding events. Auto-

correlation is when past observations or events have an impact on current ones. Autocorrelated events are more susceptible to feedback loops, allowing even minor or mundane noise signals to achieve resonance, becoming amplified and consequential.

In the red noise environment, information has the behavior of Shannon's Information Entropy (71). Disruptions from forcing functions change information as well as the character of information. More data increases the variance of the Gaussian curve. Data in the red noise environment create a power distribution with greater spectral density in the less frequent spectral ranges, a behavior similar to red light spectra.

With information being less reliable, we approach the environment as a mystery (24). We are unaware of the information until we use it, a form of inductive reasoning. We may not know the answer until after the resolution of the event, and at that point, another forcing function may arrive.

“Ambiguity develops when we add the element of time – the addition of a past creates multiple ways the situation developed; the addition of a future creates multiple possible developments; the addition of only one intervention, added to the complexity of the situation, creates multiple possible responses.”

Ambiguity is, to some degree, uncertainty with a time dimension. Ambiguity develops when we add the element of time – the addition of a past creates multiple ways the situation developed; the addition of a future creates multiple possible developments; the addition of only one intervention, added to the complexity of the situation, creates multiple possible responses. More information does not resolve ambiguity, as the relevance of information may change with a different past or future. Because of the many choices, the unexpected event has high information entropy. We gain information by making choices when we engage in the unexpected (72).

The give and take of interacting systems, increasing feedback, rapid oscillating processes, the frequency of the forcing functions, and the loss of the Gaussian distributions disintegrate the utility of inferences from classical logic. Events of lesser time scales and smaller magnitudes do the same. We will experience contradictions and the need to infer across quantitative and qualitative data collected from heterogeneous systems in many states.

Paraconsistent and paracomplete logics meet the needs for rapidly changing, conflicting information and adjusting solutions.

“Handling contradictory data is one of the most complex and important problems in reasoning under uncertainty” (73). Paraconsistent logic allows contradiction without allowing any solution, thus treating inconsistencies as informative. Paracomplete logic allows us to work with entities undergoing continuous change. There is no need to assume “A” or “not-A.” Nonmonotonic logic allows us to change our solutions as events evolve.

Precision, Accuracy, and Error

Structures exposed to entropic dissipating energy must remain within a specified range for continued operations. The system fluctuates in response to these environmental forcing functions,

with variance increasing concerning the power of the forcing functions. Feedback within and between the forcing function and the system forms a power distribution. More data increases variance making prediction difficult. Measurements that differ from expected or desired values may indicate changing circumstances, the limits of knowledge, or the boundary of performance. Error, wrongly considered a failure signal (74), has value in the HRO. Though red and pink noise environments are *information insensitive*, they are not feedback insensitive. Engagement generates information through real-time feedback despite rapid changes in human performance or the environment.

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Accuracy measures increasing proximity to the desired or expected target [Table 2, above]. Reciprocal feedback uses errors for real-time correction. This correction is the artillery mantra, “Ready! Fire! Aim!” Accuracy is valuable when engaging uncertainty; it is necessary for ambiguity and a moving target. Accuracy from reciprocal feedback is a basic form of engagement.

“Accuracy is a protective process for a reddened noise environment. Accuracy can correct the model or information during the operation when relying on a new model or imperfect information. In dangerous contexts, inaccurate information and models can kill (75).”

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Problem-Solving

Loosely coupled, overlapping, and gapping concepts create a confusing environment where the problems are ill-defined (14). Herbert Simon (33) described how we naturally use heuristics to solve these ill-structured problems. Heuristics, however, create a bias (76) that can be corrected by error (74) and motor cognition (77) – ‘error by acting’ is visible and correctable (10). In a dynamic environment, the ill-structured problem is more of a mystery we solve by finding clues (24).

Doubt as a problem-solving method, combined with rigorous evaluations of failure, breeds super forecasting ‘foxes’ who know a

little about a lot, a strategy that further drives learning and develops a different type of mastery (78). Doubt, broad knowledge, and concern for consequences are characteristics of practical common sense problem solving (79). Leadership is an integral part of executive, administrative, and managerial skills (80), bringing together categorical work with ‘articulation work,’ the way things worked out in practice (17).

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The long periods without change mimic a white noise environment. Individuals who enter a red-noise environment during such a period may believe they are operating in a stable environment, much like a shifting baseline (18) [see below]. The result is tolerance of ‘hedgehog forecasting’ but with greater value in ‘fox super forecasting.’

Situational Cognitive Distortions

It is often the situation that distorts our cognition. We do not live in a constant state of stress, fear, or amygdala-driven behaviors. Maladaptive stress and fear behaviors become normalized when we do not recognize how the situation distorts our thinking. We call these *situational cognitive distortions* because, absent stress or fear, the individual operates at a high level of cognition (1, 65, 81).

- Stress – cognitive impairment
- Fear – the creation of distance, drive to a safe place
- Amygdala – existential protection

Situational cognitive distortions can develop from intrinsic sources, such as a supervisor pressuring somebody mentally, causing the impaired recall of information. This freeze response is typical in the medical education method of “pimping,” to ask questions that demonstrate a person does not know. It is like choking in sports. This quickly develops into innate responses of subordinates to the supervisor’s presence while reinforcing the supervisor’s belief in the poor performance of the individual.

Common cognitive distortions include (82, 83):

- Anger
- Frustration
- Avoidance
 - Complete or avoid tasks
 - Focus on inconsequential tasks
 - Addressing easily accomplished tasks first
- Distractive comments
 - Responding to distractions
- Freeze (“attentive freeze”)
- Actual cognitive or physical freezing
- Nausea and avoidance
 - Urge to urinate or defecate

- Confusion
- Mental freeze
 - Inability to solve simple problems
 - Failure to recall knowledge
 - Impaired working memory

From our experiences and discussions with veterans from dangerous contexts, we have identified three salient situational cognitive distortions:

- Blocked recall.
 - We ask an individual to recite the months of the year. Then we change the protocol to reciting the months in alphabetical order.
 - After reciting 3-4 months (and leaving out several), the individual finds it difficult to recall any month.
 - This demonstrates to the individual and witnesses the rapidity of cognitive freeze, which is a neurochemical. It has nothing to do with intellect or abilities.
 - We provide an escape. Doing anything physical reverses the freeze immediately.
- Attentive freeze (threat-freeze).
 - The individual experiences an abrupt threat and feels the freeze but is fully attentive to the surroundings. They will misinterpret this as being “frozen from fear” or tonic immobility.
 - By pointing out that they had focused attention to detail and the mental preparation for action, they appreciate that attentive freeze is a strength.
- Tonic immobility
 - In its milder form, it appears as active refusal or avoidance to make a decision. The individual feels a “knot in the stomach” or mild nausea. In more severe cases, they may vomit.
 - They do not discuss their intestinal discomfort, thinking it is unique to them and a sign of weakness, or they interpret the sensation as caused by the attending or leader.

“A special relationship occurs at the 1/f oscillation, where an increased power spectrum at low frequencies produces abrupt, rapid fluctuations and catastrophic failure. This is ‘pink noise.’ Pink noise lies between the predictability of white noise (no autocorrelation) and the forcing function of red noise (autocorrelation).”

Pink Noise Abrupt Change

A special relationship occurs at the 1/f oscillation, where an increased power spectrum at low frequencies produces abrupt, rap-

id fluctuations and catastrophic failure. This is ‘pink noise.’ Pink noise lies between the predictability of white noise (no autocorrelation) and the forcing function of red noise (autocorrelation). The variance of pink, or 1/f-noise, differs from other red-spectrum noises in that variance continues increasing regardless of the length of the measured time series (5). Midway between white and red noise, environmental pressure from pink noise equally favors a balance of generalization and specialization (15).

- *Pink noise* (fractal or 1/f-noise) power spectral density is inversely proportional to the frequency with the possibility of low-frequency *catastrophic* events.
- Fluctuations with long frequencies that can cause abrupt catastrophic events are *pink noise* because they are *strictly* between white and red noise or between white noise and the randomness of brown noise.
- Rare events (as forcing functions) are more severe and sudden in the pink noise environment (84), forming a power distribution.

Affect from Pink Noise

The abrupt change associated with pink noise has a more significant effect on the emotional state than the movement of forcing functions that elicit fear-circuit behaviors. Abrupt change becomes an existential threat, eliciting amygdala-driven behaviors (85).

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The distant threat increases activity in the ventromedial prefrontal cortex (vmPFC) which connects to the amygdala to determine the motivational importance of, or degree of, the threat. The amygdala connects onward to the bed nucleus of the stria terminalis (BNST) to control a repertoire of behavioral defensive states (61).

Additional proximal threats will switch activity from the vmPFC to the phylogenetically older midbrain, increasing PAG activity. The PAG controls fast reflexive behaviors (e.g., fight, flight, or freeze) and fear-induced analgesia (61, 63). The release of endogenous opioids in the PAG inhibits the effect of expected pain on decision-making. (The vmPFC is vital for decision-making in uncertain, risky, ambiguous, or context-dependent conditions (50).

The PAG also identifies an approaching or receding threat (62) specific to one of the *greatest* fears, an approaching predator. Detection of changes in distance from threat functionally switches the animal’s repertoire of behaviors (62). Berkun et al. (86) found this from the descriptions of army recruits in dangerous situations. Distance, as perceived physical proximity or time, dominated the thinking of “evacuators,” becoming a determinant for running away.

This movement from contextual decision-making under uncertainty in the vmPFC to reflexive decision-making from the PAG makes the fight or flight of the *fear reactions* appear to be the same as the fight or flight from *threat reflexes*. What it describes, though, is the functional flow of response to a developing danger as apprehen-

sion leads to avoidance (flight), then becomes engagement (self-defensive fight). As a functional approach, *fear reactions* (PAG) develop from distance-based assessments, while *threat reflexes* (amygdala) come from active danger.

The PAG has different functions in its several dorsoventral and rostrocaudal divisions. Dorsal stimulation promotes passive freezing, while ventral stimulation promotes escape and other active coping behaviors (61). From nose to tail, active coping strategies shift from moderate to active defense, then aggressive defense; then strong threat display and *non-opioid*-mediated analgesia; followed by vigorous escape when the enemy is near. When escape from an enemy is impossible, passive coping strategies disengage from the environment, and behaviors shift to freezing, then moderate to solid immobility with increasing proximity. Lastly, intense freezing with *opioid*-mediated analgesia occurs (87, 88).

“ When escape from an enemy is impossible, passive coping strategies disengage from the environment, and behaviors shift to freezing, then moderate to solid immobility with increasing proximity. Lastly, intense freezing with opioid-mediated analgesia occurs (87, 88). ”

Threat reflexes initiate behaviors for survival and adaptation to adverse or hostile environments. Perceptions of threat trigger reflexes that operate below the level of consciousness (LeDoux 2014).

- A fight engages intending to overcome the threat.
- Flight rapidly increases separation to the flight distance previously described.
- Freeze, as attentive awareness with cessation of movement, has two components: 1) focused collection of the necessary information and 2) posture poised for immediate, effective action.
- Tonic immobility, the intense awareness with the inability to move, is accompanied by mild-to-severe nausea and possibly evacuation of body contents.

How they present:

- The fight is manifested by anger and frustration
- The flight takes the form of avoidance and distraction.
- Freeze as a physical freeze is immobility with intense attention, while a mental freeze is an inability to recall knowledge or use working memory.
- Tonic immobility prevents physical movement despite awareness of surroundings, but milder presentations are intense aversion, gastric upset, or nausea.
- Startle reflex scream, an involuntary jerk or “start.”
- Dissociation is depersonalized, emotional numbing.
- Emotional memory presents as a severe response independent of, and disproportional to, the event.

Fight. As described by (58), an animal will attack with emergency characteristics, going beyond self-defense, when an enemy en-

ters the critical flight distance. Separating the motor and emotion components leads to responding with anger (emotion component) without physical contact (motor component).

The prevalence and pervasiveness of relaxed fight responses give the impression that anger is a normal, if not necessary, behavior in an urgent or emergency environment. For example, the immediate reactions observed using the fear responses of anger and force reinforce the belief in their effectiveness. The observed effectiveness, however, is an immediate change toward homeostasis at best while impairing allostatic strengthening.

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Attentive freeze. The body is tense and poised to act; the mind is watchful, collecting information. In prey species, it prevents motion detection by predators. Freeze is the brake on fight-or-flight reactions to learn more, avoid a fight, or prevent a futile flight to failure. Freezing is also associated with faster subsequent cued responses (89).

Information can have multiple meanings, and actions can have more than one effect, contributing to the hypervigilant freeze. This pause can be misinterpreted as denial, indecision, confusion, or waiting for leadership.

Tonic immobility. The person is “frozen” and, despite muscle tone, *cannot* move (differing from attentive freeze), emotionally aroused, full of fear, and unable to call out or respond to pain. However, the person maintains full awareness and consciousness (49, 90). The vagus nerve mediates many of the features of tonic immobility: bradycardia (slow heart rate), life-threatening arrhythmias, decrease in respiration, nausea and vomiting, urination, and defecation.

“Without the behavioral component, tonic immobility appears as nausea when faced with a difficult decision, the “pit of my stomach” feeling. For novices, nausea accompanies their first independent decision and, if unresolved, will inhibit future decision-making. ”

Without the behavioral component, tonic immobility appears as nausea when faced with a difficult decision, the “pit of my stomach” feeling. For novices, nausea accompanies their first independent decision and, if unresolved, will inhibit future decision-making. The individual does not necessarily become trapped in tonic immobility. Kozłowska et al. (49) described actions a Second World War Flying Officer would take when training pilots: he used

a “firm voice devoid of fear to issue simple orders that the men had already learned and that was automatic: ‘flaps,’ ‘raise the stick,’ ‘rudder.’”

Startle reflex.

A stumble, a sudden, loud sound, or a quick movement noticed from the corner of your eye requires reflexive protective action. With rapid body movements, one regains balance, reflexively postures to protect vital organs, and becomes poised for action. Mentally, one assesses information for salience, meaning, and relevance (91-93). Through convergent evolution, Startle became a repertoire of protective behaviors, reflexively bringing protection from disconnected threats represented by sound, sight, and imbalance. More commonly, they present as a single scream (for example, in a scary movie), flexing into the fetal position for protection during a fall (94), or suddenly attending to a “distraction.”

“A stumble, a sudden, loud sound, or a quick movement noticed from the corner of your eye requires reflexive protective action. With rapid body movements, one regains balance, reflexively postures to protect vital organs, and becomes poised for action. Mentally, one assesses information for salience, meaning, and relevance (91-93). Through convergent evolution, Startle became a repertoire of protective behaviors, reflexively bringing protection from disconnected threats represented by sound, sight, and imbalance.”

Vocalizations in the startle response may be misinterpreted as “screaming in panic” when they are involuntary reflexive responses to regain posture, orient toward a threat, and prepare for voluntary movement.

Thought in Pink Noise

Reciprocal decision-making, such as John Boyd’s OODA Loop, keeps one grounded during the flux of events. More significant is the objective of slowing the rate of change. Deterministic chaos develops as the rate of change in the logistic equation increases. From the authors’ experience, reducing the rate of change has a greater effect than choosing entry into the event.

Information

Until the rate of change is decreased, we recommend treating all information as transient, if not ephemeral.

Classification and standardization can solve the problem of information correlation in a white-noise environment. The problem arises from who sets the standards. Making sense in one context does not necessarily make sense in another, even between a physician and nurse standing by the same neonate. “One person’s standard is another’s confusion and mess,” Leigh Star (36)—standardization and communicating across contexts also corrupt information.

However, we caution against reliance on approaches developed in predictable white noise environments. Most likely, they have not been tested in complex or chaotic circumstances and may not support the engagement of forcing functions or abrupt crises. On the other hand, approaches that emerge from effectively engaging forcing functions or abrupt crises can, and do, translate to routine operations.

Conclusion

White noise systems are relatively closed systems limiting energy flow with the environment. The system can readily absorb limited energy, producing a relatively stable state. People may accept the “zero-sum game” where there must be a loser for every winner. People fight to win, and they fight not to lose. There is reliance on discrete concepts, linearity, and classical logic. Expertise is in the form of mastery over cognitive functions; individuals are at risk of having a sense of certitude, even narcissism. There are no outside forces that remind us that the environment always has a vote in our plans.

Red noise systems are open systems with energy freely flowing between the system and the environment. The flux of events touches all those in the system. In red noise, the storm harms all just as the rising tide raises all boats. We are all equally affected by events and help each other, particularly those who cannot help themselves..

There is an ecological hierarchy of problems, however. Problems in a white noise environment tend to be well-structured. In a red noise environment, we can encounter ill-structured problems; in a pink noise environment, problems are embedded in the environment’s stochastic activity.

However, we caution against reliance on approaches developed in predictable white noise environments. Most likely, they have not been tested in complex or chaotic circumstances and may not support the engagement of forcing functions or abrupt crises. On the other hand, approaches that emerge from effectively engaging forcing functions or abrupt crises can, and do, translate to routine operations.

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Liminal people. Those who have sustained liminal experiences find that their values and characteristics have changed (95). They are often marginalized from the dominant account, for example, combat veterans. Combat veterans are reluctant to use and share their experiences, particularly those from the Vietnam era, because of their liminal wisdom (95). Reasoning from experience to apply to present experience seems irrational since the situations are not identical. The combat veteran learned that experience is a process and engagement that relies on constant reciprocal feedback to learn what works through action. Mastery of concepts, a Kantian approach, becomes the dominant account, suppressing interpretations of those constructing reality. Liminality nor experi-

ence, as arts (96), cannot be mastered.

People inexperienced or unaccustomed to operating in pink noise abrupt events will exhibit unrecognized stress reactions and fear responses. We must not use malice if ignorance, stress, or fear will explain the individual's actions.

“People inexperienced or unaccustomed to operating in pink noise abrupt events will exhibit unrecognized stress reactions and fear responses. We must not use malice if ignorance, stress, or fear will explain the individual's actions.”

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SYSTEMS THINKING IN COMPLEX ADAPTIVE SYSTEMS



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

POSITIONING & TOUCH FOR THE NEWBORN

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



SLEEP AND AROUSAL INTERVENTIONS FOR THE NEWBORN

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



SKIN-TO-SKIN CONTACT WITH INTIMATE FAMILY MEMBERS

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



REDUCING AND MANAGING PAIN AND STRESS IN NEWBORNS AND FAMILIES

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



MANAGEMENT OF FEEDING, EATING AND NUTRITION DELIVERY

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



WANT TO KNOW MORE ABOUT THE STANDARDS AND RECOMMENDATIONS? VISIT: [HTTPS://NICUDESIGN.ND.EDU/NICU-CARE-STANDARDS/](https://nicudesign.nd.edu/nicu-care-standards/)

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Keeping Your Baby Safe

during the COVID-19 pandemic

How to protect your little one from germs and viruses

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

Here's what you can do...

Wash Your Hands

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



Limit Contact with Others

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



Provide Protective Immunity

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



Take Care of Yourself

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



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

WARNING

Never Put a Mask on Your Baby

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



If you are positive for COVID-19

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



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www.nationalperinatal.org/COVID-19



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.

Briefly Legal: Tachycardia Mistakenly Attributed to Caffeine Instead of Late-Onset Group B Streptococcus

Maureen E Sims, MD and Barry Schifrin, MD

The patient is an 18-year-old primigravida with a prenatal course complicated by the use of cocaine. She presented to the hospital in threatened preterm labor at 28 4/7 weeks with unknown Group B Streptococcus (GBS) status. On admission, she had uterine contractions and a questionable rupture of membranes with a 6 cm dilated cervix. Over three days, she was given tocolytics, a full course of steroids, and penicillin G q 4 h until delivery. Despite these efforts, three days after admission, she delivered vaginally.

“The patient is an 18-year-old primigravida with a prenatal course complicated by the use of cocaine. She presented to the hospital in threatened preterm labor at 28 4/7 weeks with unknown Group B Streptococcus (GBS) status.”

At birth, the infant was a vigorous, appropriately grown male who weighed 1350 grams (AGA) and received Apgar scores of 9 and 9 at 1 and 5 minutes of life. Except for moderate respiratory distress, the physical examination was normal. A complete blood count (CBC) was unremarkable. Ampicillin and gentamycin were administered for 72 hours but were discontinued when the blood culture was negative. A chest radiograph was consistent with respiratory distress syndrome (RDS). The infant received surfactant replacement once. He transitioned to nasal continuous positive pressure (NCPAP) within the first few days and was placed on a standard dose of caffeine, initially intravenously and then orally, to reduce the frequency of potential apneic episodes. A percutaneous central line was placed shortly after birth, and parenteral nutrition was provided. At ten days, trophic feeds with breast milk began and were gradually increased. At seven days of age, a cranial ultrasound at seven days was normal. Following caffeine, the infant's baseline heart rates were consistently about 160 bpm, about 10–15 bpm higher than his pre-caffeine baseline.

For the first three weeks, the baby's course was stable with the continuation of the caffeine. On day 20, the infant developed increased work of breathing with intermittent high heart rates averaging 180 bpm, with many reaching or exceeding 200 bpm. Blood pressure and the physical exam, however, remained

normal. Although these heart rates represented an increase over the rates seen during the first week of caffeine administration, the further elevation of the heart rate was, nevertheless, attributed to the ongoing caffeine administration. The infant did not receive an evaluation for these increased heart rates.

“For the first three weeks, the baby's course was stable with the continuation of the caffeine. On day 20, the infant developed increased work of breathing with intermittent high heart rates averaging 180 bpm, with many reaching or exceeding 200 bpm. Blood pressure and the physical exam, however, remained normal. Although these heart rates represented an increase over the rates seen during the first week of caffeine administration, the further elevation of the heart rate was, nevertheless, attributed to the ongoing caffeine administration. The infant did not receive an evaluation for these increased heart rates.”

On the cusp of day 22, the baby became lethargic, mottled, and had multiple episodes of apnea, desaturation, and profound hypotension. A CBC, blood culture, and arterial blood gas were drawn. The blood gas showed a pH of 6.82, a pCO₂ of 183 mmHg, a pO₂ of 48 mmHg, and a base excess of -13.2. The baby was intubated and placed on a high-frequency oscillatory ventilator with 100% inspired oxygen. Vancomycin and cefotaxime were started. Multiple boluses of normal saline and pressors were administered for the assumed diagnosis of septic shock. Within 24 hours, the blood culture was positive for Group B Streptococcus (GBS). The Mother's breast milk was not tested for GBS. On therapy, the

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baby's condition gradually stabilized; a lumbar puncture done on day 23 was unremarkable. A repeat cranial ultrasound a month after birth (8 days after the episode of septic shock) now showed periventricular leukomalacia. The magnetic resonance imaging (MRI) done at the time of discharge at three months showed massive, diffuse encephalomalacia.

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On follow-up, the child has cerebral palsy and severe neurodevelopmental impairment. The hospital and neonatologist were sued because of a lack of recognition and evaluation of the neonate's tachycardia.

“The magnetic resonance imaging (MRI) done at the time of discharge at three months showed massive, diffuse encephalomalacia. On follow-up, the child has cerebral palsy and severe neurodevelopmental impairment.”

Plaintiff allegations:

- The nurses and neonatologists failed to timely recognize, interpret and respond to the infant's tachycardia and subsequent respiratory difficulties.
- A CBC, C-reactive protein, blood, urine, cerebral spinal fluid cultures, blood gases, and a complete physical evaluation should have been performed when increased work of breathing and the new higher levels of heart rate developed.
- Failure to properly and timely respond to the baby's condition resulted in profound hypotension and acidosis in the face of infection that caused brain damage.
- A proper and timely response to the changes in the baby's condition would have prevented the serious, permanent neurological consequences.
- If the further rise in heart rate (tachycardia significantly above what had become baseline secondary to the caffeine) had been appreciated and a proper evaluation been performed in a timely manner on days 20–21, the baby would not have developed septic shock from the GBS.

Defense position:

- It was clinically acceptable that nurses and physicians assumed that the tachycardia was secondary to caffeine and maintained that the rest of the physical examination was documented as normal.
- The adverse outcome was secondary to prematurity
- Premature infants are more susceptible to infection.

Discussion

“Group B Streptococcus (GBS) colonizes the vagina and vaginal/rectal areas of 10%–30% of pregnant women. GBS is a significant cause of neonatal and infant infection, with high mortality and morbidity rates. Late-onset neonatal GBS disease (LOGBS) occurs 7–89 days after birth. The incubation period in LOGBS is unknown.”

General:

Group B Streptococcus (GBS), or *Streptococcus agalactiae*, colonizes the vagina and vaginal/rectal areas of 10%–30% of pregnant women. GBS is a significant cause of neonatal and infant infection, with high mortality and morbidity rates. Late-onset neonatal GBS disease (LOGBS) occurs 7–89 days after birth. The incubation period in LOGBS is unknown.

“Transmission routes are poorly understood in LOGBS...Colonization acquired during birth can be confirmed up to one year of age...Vertical transmission, however, cannot account for all cases of LOGBS since intrapartum antibiotic prophylaxis (IAP), known to prevent early colonization at birth, had no effects on incidence rates of GBS. IAP may delay LOGBS or reduce its severity, probably by preventing early neonatal colonization at birth and shifting the mode of acquisition of GBS from vertical to horizontal. IAP does not eradicate colonization in the mother, who may remain a postnatal source of GBS...”

Transmission and Risk Factors

Transmission routes are poorly understood in LOGBS but can result from neonatal colonization acquired during passage through the birth canal. Colonization acquired during birth can be confirmed up to one year of age. In a sentinel study, 48% of infants were colonized at birth with the same GBS serotype that subsequently caused LOGBS. Vertical transmission, however, cannot account for all cases of LOGBS since intrapartum antibiotic prophylaxis (IAP), known to prevent early colonization at birth, had no effects on incidence rates of GBS. IAP may delay LOGBS or reduce its severity, probably by preventing early neonatal colonization at birth and shifting the mode of acquisition of GBS from vertical to horizontal. IAP does not eradicate colonization in the mother, who may remain a postnatal source of GBS for the newborn and subsequent pregnancies. Although still under debate, GBS-contaminated breast milk, with or without mastitis, has been associated with heavy neonatal colonization and LOGBS. However, most breastfed infants do not develop LOGBS, as up to 3.5% of breastfeeding mothers carry GBS in their milk. In approximately 1/3 of cases, LOGBS is acquired from non-maternal sources (caregivers and healthcare workers). Such nosocomial transmission of GBS from non-maternal sources is more common in preterm than term infants, undoubtedly secondary to their compromised immune systems and prolonged hospital stays. Approximately 40% of all LOGBS now affect preterm infants under 37 weeks gestation. Preterm infants have a case fatality rate twice that of full-term infants, 7.8% v. 3.4%. Hospital clusters of GBS have been associated with crowding, high patient-to-nurse ratio, and inadequate disinfection practices.

“In approximately 1/3 of cases, LOGBS is acquired from non-maternal sources (caregivers and healthcare workers).”

Presentation:

Typically, LOGBS begins at 3–4 weeks of age. Some presenting signs (apnea, tachycardia, poor feeding) are common in younger preterm infants and overlap with other disorders. LOGBS must be considered in any in-hospital neonate with such clinical issues. A single case of LOGBS identified should be considered secondary to potential nosocomial transmission, and both retrospective and prospective surveillance should be enhanced to identify any possible cluster. Approximately 30% of LOGBS involve meningitis, but other sites such as bone, soft tissue, urinary tract, or lungs may also produce focal infections.

Early recognition of clinical signs, rapid evaluation, and prompt initiation of treatment are crucial to optimize outcomes. Newer approaches to help with early recognition of infection in the NICU include evaluating beat-to-beat HR monitoring. While this is appealing and could add another dimension for a more proactive approach, there is an ongoing need to emphasize dedicated attention to clinical/vital signs changes, as illustrated in the above case.

Prevention:

Since LOGBS is primarily attributed to nosocomial or

horizontal pathogen acquisition from the hospital or community environments, impeccable technique is critical in handling indwelling or invasive catheters, in contact with care providers and/or other environmental sources and surfaces. Preventive measures include hand hygiene, strict adherence to infection control protocols, and implementation of antimicrobial programs that promote collaboration between the prescribing clinicians, infection disease specialists, and pharmacists.

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A promising strategy to reduce antibiotic use and to prevent both early- and late-onset GBS infections is the vaccination of pregnant women in the second or third trimester. The vaccination would confer passive immunity to the newborn for up to 3 months of life through the transplacental transfer of IgG antibodies. Vaccination strategy may be less effective in protecting very preterm neonates from LOGBS because the transplacental transfer of antibodies mainly occurs after 34 weeks gestation.

Treatment:

In addition to hemodynamic stabilization and other supportive interventions, the appropriate antibiotic choice is essential. Ampicillin and gentamicin are recommended. High doses of Ampicillin plus cefotaxime should be used in case of suspected meningitis.

Ten–14 days of intravenous antibiotics are suggested for sepsis without a focus or uncomplicated by meningitis. Current guidelines recommend 3 to 4 weeks to treat septic arthritis or osteomyelitis. Routine administration of polyvalent intravenous immunoglobulin (IVIG) is not recommended. For late-onset GBS infants 8–28 days of age, if the infant is not critically ill and has no evidence of meningitis, Ampicillin plus either gentamicin or cefotaxime is adequate. If meningitis is suspected, Ampicillin plus cefotaxime,

not gentamicin, should be used. For infants 29–90 days of age, ceftriaxone is recommended. If evidence of meningitis or critical illness exists, vancomycin should be added to expand empiric coverage.

“Since LOGBS is primarily attributed to nosocomial or horizontal pathogen acquisition from the hospital or community environments, impeccable technique is critical in handling indwelling or invasive catheters, in contact with care providers and/or other environmental sources and surfaces. Preventive measures include hand hygiene, strict adherence to infection control protocols, and implementation of antimicrobial programs that promote collaboration between the prescribing clinicians, infection disease specialists, and pharmacists.”

Summary:

Preterm infants are at particularly high risk for life-long morbidities and death. Since the clinical presentation of late-onset GBS is varied and nonspecific, the clinician must be vigilant for abnormalities or changes in clinical conditions. Assuming the tachycardia was secondary to caffeine, although the high heart rates exceeded the levels during earlier caffeine administration, caused a delay in evaluation and intervention at the early stage of late-onset GBS. Prompt attention to clinical signals emanating from the baby is critical to timely intervention and preventing serious consequences.

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SKIN-TO-SKIN CARE DURING COVID-19



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work with your medical team to create a plan

GET CLEAN WASH YOUR HANDS, ARMS, and CHEST

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



PUT ON FRESH CLOTHES

change into a clean gown or shirt.

IF COVID-19 + WEAR A MASK

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



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Chronic Lung Disease (CLD): Prevention is the Cure

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.

Like the obnoxious uncle everyone hopes will be a no-show, CLD keeps crashing our party, just as it has since we first started resuscitating premature infants over 60 years ago. Today, antenatal steroids are given. With lung-protective ventilation, moderate to severe CLD is largely avoidable in the ≥ 25 -week PMA (post-menstrual age) cohort. This is generally not the case in the more premature population, particularly those born ≤ 24 weeks PMA, antenatal steroid administration notwithstanding. Despite our best efforts to minimise lung injury, these infants will likely develop at least mild CLD.

“With lung-protective ventilation, moderate to severe CLD is largely avoidable in the ≥ 25 -week PMA cohort. This is generally not the case in the more premature population, particularly those born ≤ 24 weeks PMA, antenatal steroid administration notwithstanding. Despite our best efforts to minimise lung injury, these infants will likely develop at least mild CLD.”

CLD is characterised by dysplastic changes throughout the lungs and airways, which collectively reduce their ability to function normally and efficiently. Airways may be hyper-reactive but generally have high resistance, even if not. Alveoli are not as numerous, and the surface area for gas exchange is significantly reduced due to a lack of secondary crests. Failure of appropriate apoptosis results in decreased diffusion gradient because thickened walls increase the distance between pulmonary contents and the capillaries, which must collect oxygen and carbon dioxide for distribution and removal. Lungs are often not evenly recruited and may have areas of collapse, while others may be overinflated due to a combination of gas trapping and volumes being delivered

preferentially to areas of higher compliance. Ventilation-perfusion mismatching occurs, further reducing ventilatory efficiency.

Judicious use of non-invasive ventilation and limiting invasive ventilation as much as possible are critical mitigators of pulmonary damage. Anyone familiar with previous columns will know that when invasive ventilation is required, I strongly recommend high-frequency jet ventilation (HFJV) and/or oscillation (HFO), the latter utilizing volume targeting, if available, as a first-line mode in tiny babies.

If ventilating with conventional ventilation (CV), lung protective strategies must be followed: volume targeting of 3–4 ml/kg in tiny babies and 4–5 ml/kg in larger infants, pressure support mode if tolerated and, most critically, maintaining adequate inflation with PEEP. PEEP may need to be increased when switching from assist-control to pressure support as the inherently shorter inspiratory time produces less mean airway pressure (MAP). Regardless of ventilation mode, FiO_2 should be the lowest attainable to reduce oxidative stress; this occurs at optimum compliance, where lung injury is least likely.

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Permissive hypercapnia is a common strategy to reduce lung injury, but evidentiary support for it is inconclusive, and many studies advise against the practice. Given the wide variations

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in ventilatory practice, this might not be surprising. One study terminated prior to completion as evidence favoured the control group. However, this study started on post-natal day 1 (1). This is not surprising since the risk of cerebral bleeds is highest during the first 72 hours of extrauterine life when CO_2 should be carefully maintained in a relatively narrow range, and hypercapnia avoided. Another meta-analysis showed no significant difference in a range of hypercapnia outcomes but found no benefit (2). Actual PaCO_2 is not mentioned in the analysis.

“This is not surprising since the risk of cerebral bleeds is highest during the first 72 hours of extrauterine life when CO_2 should be carefully maintained in a relatively narrow range, and hypercapnia avoided.”

Hypercapnic effects are not limited to the brain and pulmonary system; the cardiovascular system responds independently. Mild hypercapnia increases cardiac output multi-factorially, but this response is unpredictable, and a good thing can lead to bad things quickly (3).

The net harmful effect(s) of hypercapnia appears to be time- and severity-weighted. Brain-injured patients with hypercapnia do not seem to be harmed if pH is corrected within 24 hours (3). Extrapolated within reason, incremental increases in PaCO_2 of 7 mmHg may not have significant harmful effects if pH is compensated—one guideline for an upper PaCO_2 in the adult population is 70 mmHg (3). Premature infants are less able to respond to rapid changes in pH. Thus, NaHCO_3 correction is risky. Unless severe, acidosis should not be corrected aggressively with ventilation; hypocarbia-accompanied acidosis is a bad combination. Since the chemical reaction balance shifts toward CO_2 , adequate ventilation is essential if there is to be an improvement in pH when giving NaHCO_3 .

“ PaCO_2 may be allowed to rise to 70 mmHg or more in my practice, provided metabolic compensation maintains pH above a minimum of 7.2. This is also done gradually, and swings in PaCO_2 are avoided whenever possible. During the first 72 hours of life, $\text{PaCO}_2 >52$ is avoided if possible.”

PaCO_2 may be allowed to rise to 70 mmHg or more in my practice, provided metabolic compensation maintains pH above a minimum of 7.2. This is also done gradually, and swings in PaCO_2 are avoided whenever possible. During the first 72 hours of life, $\text{PaCO}_2 >52$ is avoided if possible. It is worth noting that our follow-up clinic has not identified neurodevelopmental issues above what would be expected in the preterm population. Regardless of how high CO_2 is allowed to rise, rapid changes are to be avoided

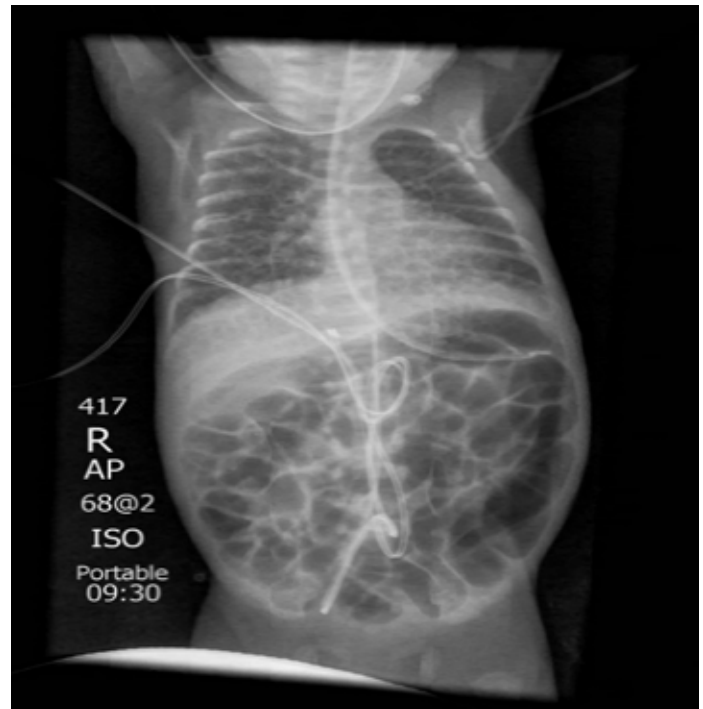


Figure 1. CXR of infant never intubated managed on CPAP

at all costs, particularly during the first 72 hours. The evidence supporting permissive hypercapnia is small relative to that against it, and I cannot recommend the practice.

CLD is most often thought of as a sequela to invasive mechanical ventilation, but it can develop in babies supported with non-invasive ventilation (NIV) (Figure 1).

This is especially true if clinicians fail to recognise that a baby is failing NIV until the lungs completely collapse and at which point intubation is the only option available to re-recruit them. This is a double whammy since the lungs are most prone to injury during recruitment/re-recruitment on top of atelectatic injury.

“CLD is most often thought of as a sequela to invasive mechanical ventilation, but it can develop in babies supported with non-invasive ventilation. This is especially true if clinicians fail to recognise that a baby is failing NIV until the lungs completely collapse and at which point intubation is the only option available to re-recruit them. This is a double whammy since the lungs are most prone to injury during recruitment/re-recruitment on top of atelectatic injury.”

Other contributory factors such as oxidative stress (4), infection (both antenatal and post-natal) (5), nutrition (6), genetics (7), and

even maternal body mass index (8) are all linked to increased risk of CLD. Ventilatory management (or mismanagement) that provides either too much or too little functional residual capacity, excessive tidal volume, and high FiO_2 are the primary drivers of lung injury. Hyperinflation usually gets much more air time than hypo-inflation, but atelectasis resulting from inadequate distending pressure is far from benign. Besides decreasing ventilatory efficiency and lung compliance, atelectasis increases pulmonary vascular resistance (PVR), thus decreasing cardiac output; damages the alveolar-capillary barrier; decreases pulmonary bioavailability of antibiotics; increases lung protein permeability; and triggers a local cellular inflammatory response (9). Alveoli are dependent on each other for structural integrity, and when adjacent to areas of collapse, they are damaged as they contort and expand into adjacent voids left by their collapsed neighbours.

“Ventilatory management (or mismanagement) that provides either too much or too little functional residual capacity, excessive tidal volume, and high FiO_2 are the primary drivers of lung injury.”

What should be done once a CLD diagnosis is made? How can ventilation be continued to facilitate pulmonary development and not to exacerbate damage already done? Different approaches to achieving these goals are emerging.

One method uses CV (SIMV + pressure support) and relatively high volumes (8–12 ml/kg). I cannot endorse this approach. Courtesy of our adult colleagues working with ARDS (Adult Respiratory Distress Syndrome), we know that high tidal volumes damage an adult’s lungs, and it stands to reason that the same is true of the developing lungs of an infant. While babies with CLD do “want” higher tidal volumes, this is at least partly due to their higher physiological dead space, and a tidal volume of 7 ml/kg has been associated with lower work of breathing in infants with CLD (10). The high and varying conducting airway resistance plus non-homogenous lung compliance characteristic of CLD mean that volume will not be delivered to the lung evenly. 8–12 ml/kg at the patient wye may translate to 16–24 ml/kg where delivered.

HFJV is ideal for overcoming the obstacles CLD presents. It is less affected by airway resistance and does not deliver gas preferably to areas of higher compliance; thus, overdistention of these areas is avoided. Of any mode of invasive ventilation, HFJV is least likely to produce gas trapping, mitigating another problem when ventilating CLD. If lung protection is the goal, HFJV will likely hit that target.

So why not HFJV in CLD? HFJV’s gentleness and relatively low pressures are generally considered lung protective. The mean airway pressure generated is sufficient to maintain airway and alveolar stability but insufficient to recruit areas needing it. Recruitment maneuvers do what the name implies, but in practice, recruitment maneuvers are discouraged once the task is accomplished. This is in recognition of the potentially damaging effects of larger tidal volumes. In the case of older babies with CLD, this may not be the best approach.

As damaged as they are, the lungs of these babies are still developing. New alveoli cannot participate meaningfully in gas

exchange unless recruited; as mentioned above, HFJV does not do this well. I suggest a hybrid approach to ventilating CLD that will take advantage of the protective nature of HFJV and recruit new alveoli as they are formed. Using recruitment maneuvers at a low rate or applied intermittently may offer the best of both worlds.

“HFJV is ideal for overcoming the obstacles CLD presents. It is less affected by airway resistance and does not deliver gas preferably to areas of higher compliance; thus, overdistention of these areas is avoided. Of any mode of invasive ventilation, HFJV is least likely to produce gas trapping, mitigating another problem when ventilating CLD. If lung protection is the goal, HFJV will likely hit that target.”

Conventional breaths used with HFJV have traditionally been referred to as “sigh breaths” and used pressures and inspiratory times used in conventional ventilation. More recently, the term “recruitment maneuvers” (RMs) has been coined to reflect a gentler approach to their delivery. Instead of high peak pressures and inspiratory times of 0.4 to 0.5 seconds, a lower peak pressure of 5–6 cmH_2O above PEEP and a longer inspiratory time of 2–3 seconds are used. Utilizing a lower peak pressure affords some protection to areas of the lung with higher compliance (where gas delivered by CV will go first), while the longer inspiratory time provides time for pendelluft to occur and allows the lower pressure to exert an effect that a shorter inspiratory time cannot do. The lower peak pressures are also important in reducing sheer forces on lungs held at higher end-expiratory volumes than those typically found with CV.

“More recently, the term “recruitment maneuvers” (RMs) has been coined to reflect a gentler approach to their delivery. Instead of high peak pressures and inspiratory times of 0.4 to 0.5 seconds, a lower peak pressure of 5–6 cmH_2O above PEEP and a longer inspiratory time of 2–3 seconds are used.”

In a hybrid approach, a continuous low rate (2–3/minute) of RMs or giving them for a short time every few hours may be helpful in both recruiting new lung growth as well as aiding in oxygenation (the primary difficulty in CLD) and maintaining airway and alveolar stability.

RMs may also allow using a lower PEEP level while maintaining overall MAP, thus improving venous return while maintaining oxygenation. Another possible benefit of using HFJV is that

the lungs can be held at higher inflation. This may improve gas exchange via several mechanisms: slightly stretched alveoli, combined with MAP, may increase diffusion gradient while avoiding shear forces associated with the larger tidal volumes of CV. Activation of stress receptors may also decrease air hunger.

“In a hybrid approach, a continuous low rate (2–3/minute) of RMs or giving them for a short time every few hours may be helpful in both recruiting new lung growth as well as aiding in oxygenation (the primary difficulty in CLD) and maintaining airway and alveolar stability. RMs may also allow using a lower PEEP level while maintaining overall MAP, thus improving venous return while maintaining oxygenation. Another possible benefit of using HFJV is that the lungs can be held at higher inflation. This may improve gas exchange via several mechanisms: slightly stretched alveoli, combined with MAP, may increase diffusion gradient while avoiding shear forces associated with the larger tidal volumes of CV.”

As the PMA of our patients becomes ever lower, gentle, lung-protective ventilation is essential given that the success rate of NIV in the sub-25-week PMA cohort is very low, and invasive mechanical ventilation is all but unavoidable. How well invasive mechanical ventilation is practised will determine how often we are presented with the myriad of problems we face when ventilating CLD babies. One of those problems is our impatience. Healing damaged lungs takes time, and clinicians may be too quick in pronouncing an intervention ineffective.

Given the 30+% rate of CLD that has persisted over the years, all the hopeful technological advances notwithstanding, for 60 years, we'd best up our game. I submit HFJV is an excellent place to start.

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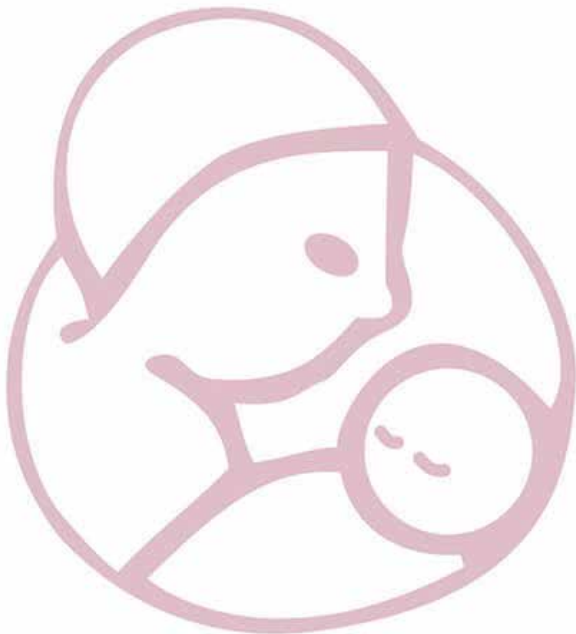
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Thirteen-year-old Emily Rose Shane was tragically murdered on April 3, 2010 on Pacific Coast Highway in Malibu, CA. Our foundation exists to honor her memory.

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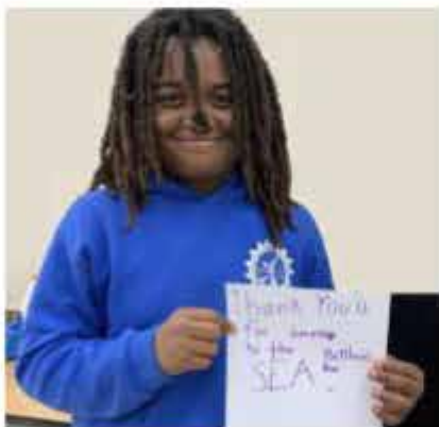
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The average cost for the program to provide a mentor/ tutor for one child is listed below.



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

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The Village Son



A Life's Journey

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

Houchang D. Modanlou

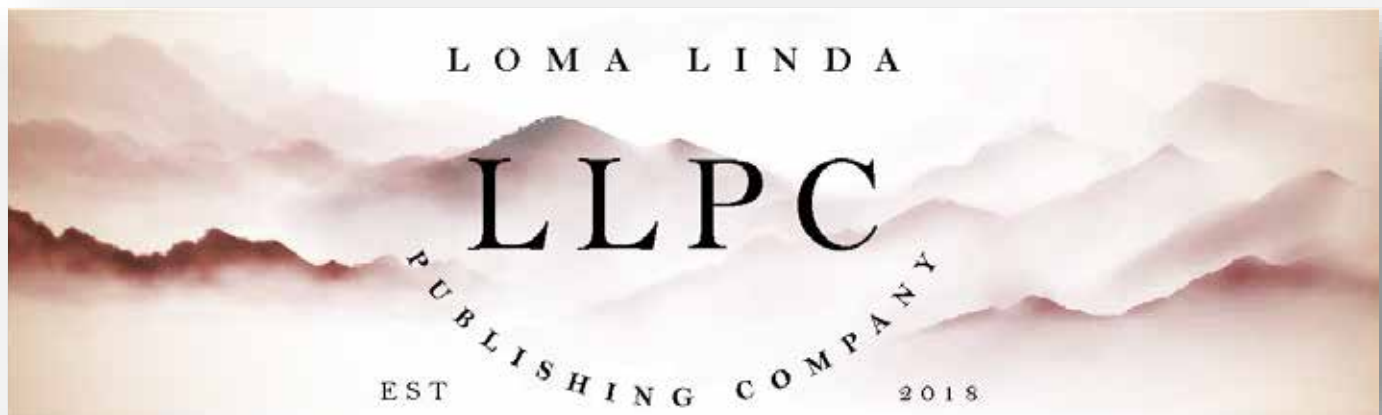
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As we indicated last month, we look forward to a number of new features as well.

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

The Necessity of Speaking Out for Breastfeeding Support Practices and Products

Alison Jacobson



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.

“At First Candle, we are committed to promoting activities and practices that help reduce the rate of Sudden Infant Death Syndrome (SIDS).”

At First Candle, we are committed to promoting activities and practices that help reduce the rate of Sudden Infant Death Syndrome (SIDS).

One of these is breastfeeding. Not only does breastfeeding reduce the rate of SIDS by 50% and is recommended by the American Academy of Pediatrics (AAP), but breastfeeding helps mothers recover more quickly from the effects of childbirth and lowers the risk of:

- Breast, ovarian, and endometrial cancer

- Thyroid cancer
- Osteoporosis
- Cardiovascular disease, including high blood pressure and high cholesterol

Breastfeeding may also lower the risk of postpartum depression. A recent meta-study (1) in the Journal of Women's Health reported that, overall, breastfeeding is associated with improved maternal mental health outcomes, and a COVID-19 era study by the University of Michigan (2) found that participants who formula-fed had 92% greater odds of screening positive for postpartum depression and were 73% more likely to screen positive for major depressive symptoms, compared to those who breastfed or bottle-fed with their own human milk.

The Michigan study also noted that lack of social support due to COVID-19 may have resulted in more formula feeding and that, in general, “Clinics and healthcare systems are encouraged to bolster their breastfeeding support and resources, with an emphasis on social support, to help patients achieve their breastfeeding goals and reduce their risk for postpartum depression.”

“The evidence of the benefits of breastfeeding for infants and mothers themselves is incontrovertible, which is why we are concerned about the possible action by the Consumer Product Safety Commission (CPSC) to change significantly or even ban nursing pillows.”

We agree. The evidence of the benefits of breastfeeding for infants and mothers themselves is incontrovertible, which is why we are concerned about the possible action by the Consumer Product Safety Commission (CPSC) to change significantly or even ban nursing pillows. Nursing pillows are safely depended on millions of times a day by mothers and caregivers to aid in breastfeeding their babies. Without this support, breastfeeding could become too challenging for mothers, and they will give up.



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

“We know that many Sudden Unexplained Infant Deaths (SUID) have some element of unsafe sleep, and parents and caregivers must understand and follow product manufacturer instructions and guard against accidental suffocation.”

In June 2022, the CPSC warned about the dangers of using infant products intended for supervised awake time for infant sleep. We know that many Sudden Unexplained Infant Deaths (SUID) have some element of unsafe sleep, and parents and caregivers must understand and follow product manufacturer instructions and guard against accidental suffocation. This advice applies to nursing pillows as well.

Nursing pillows, also known as nursing supports, are specifically designed to help mothers and infants succeed in breastfeeding, extending their benefits to families at large, particularly to premature babies, who are in critical need of what breastmilk offers. If a mother's infant is in the NICU and she wants to breastfeed, providers will work toward getting the baby to the breast if at all possible, sometimes as part of a plan that may include multiple feeding approaches, such as Supplemental Nursing System (SNS), cup, finger or tube feeding.

“Nursing pillows are extremely helpful in getting the baby appropriately positioned for successful, comfortable breastfeeding.”

Nursing pillows are extremely helpful in getting the baby appropriately positioned for successful, comfortable breastfeeding. Mothers will not continue to do something painful and uncomfortable, and if the baby is not positioned correctly, getting a good latch will be difficult, resulting in insufficient milk transfer to the baby and causing breast pain. This cascade sets mothers up to fail rather than to be encouraged and supported.

There is sufficient concern about the future of nursing pillows that several manufacturers, retailers, breastfeeding advocates, and medical professionals have formed the Breastfeeding Infant Development Support Alliance (<https://bfidsa.org>) to provide education and advocacy.

We share their concern while we continue to press for collaboration. As we have said before, regulators, manufacturers, and advocates want the same thing – safe products for infants – but they hinder this goal when they do not seek cooperation or input from public health professionals and community organizations who work with families where they are and know their needs.

Removing an essential support product such as nursing pillows from the market would leave these families with one less fit-for-

purpose option and the possibility that whatever substitute they manage to come up with could be risky.

Mothers need more support, not less, to help them raise healthy babies and stay healthy.

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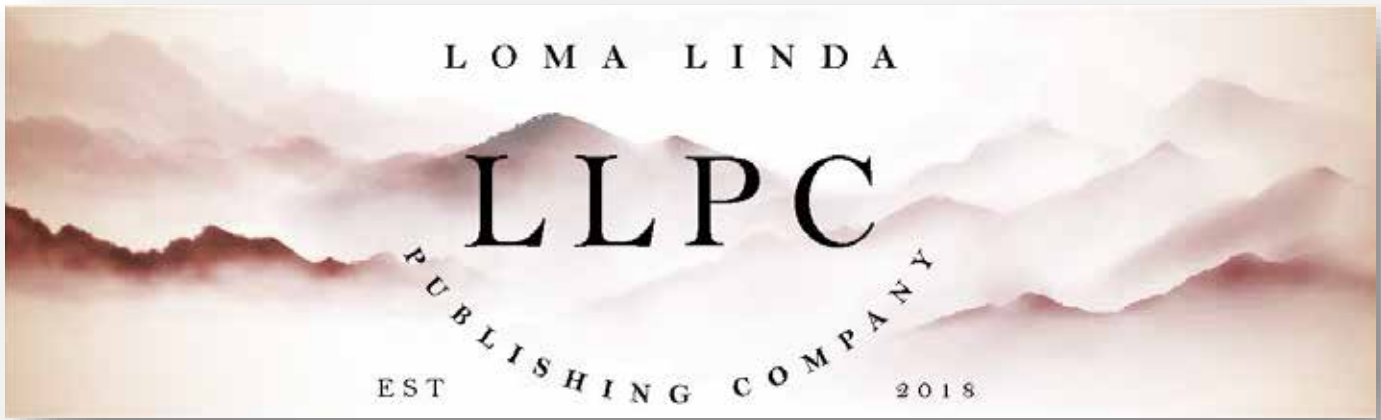
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About First Candle

First Candle, based in New Canaan, CT, is a 501c (3) committed to eliminating Sudden Unexpected Infant Death 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 3,500 infant deaths nationwide per year.



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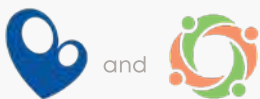
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TOP 10

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."

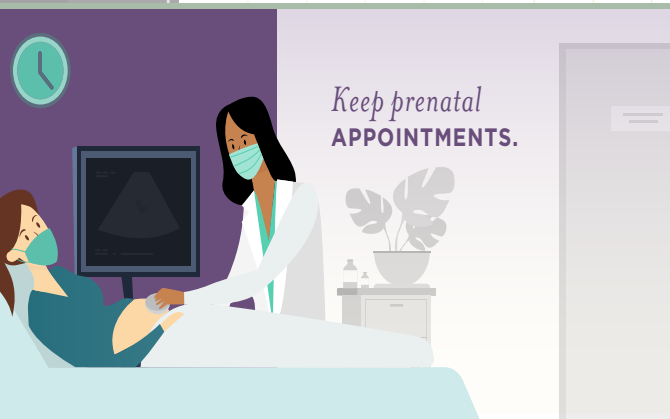


10 HELP US HEAL

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

SUPPORT4NICUPARENTS.ORG

The PREGNANT MOM'S Guide To Staying SAFE DURING 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



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Position available for Neonatal Nurse Practitioner (NNP)

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

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Protecting your baby from Respiratory Viruses:

What parents need to know this RSV and flu season



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

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



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

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



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

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



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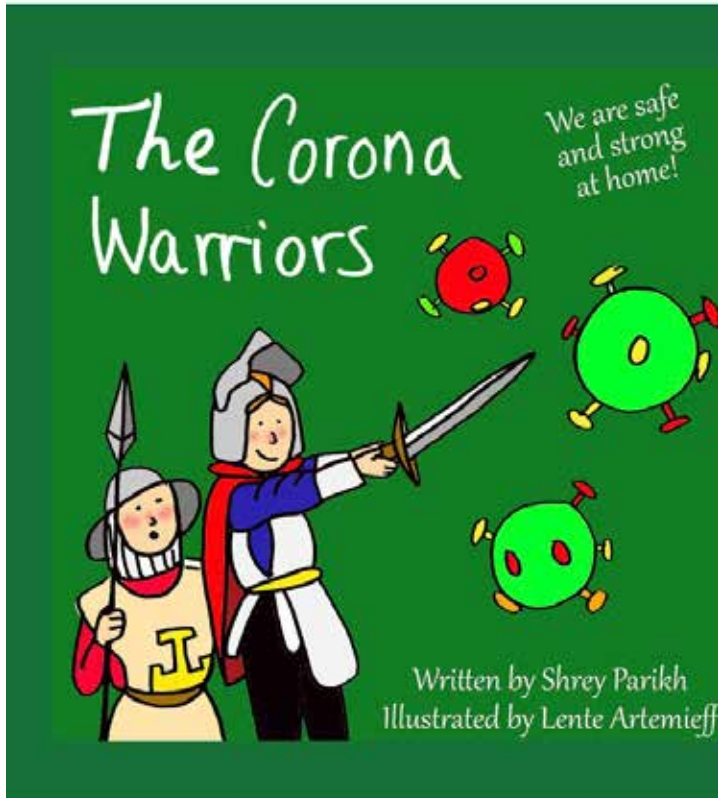
Raising Global Awareness of RSV

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

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

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





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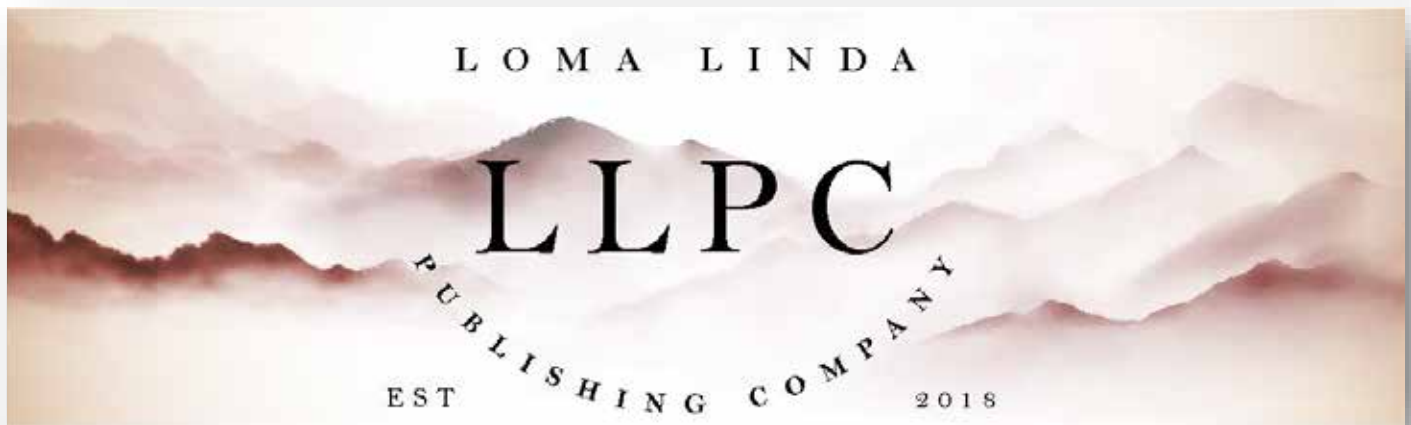
SCREEN DADS TOO

10% of fathers experience depression and anxiety during the perinatal period.



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Gravens by Design: Family Integrated Care: An Evidence-Based and Inclusive Model for Delivering on Your NICU's Commitment to Family-Centered Care

Linda S Franck, PhD, RN, FRCPCH, FAAN,
Karel O'Brien, MB BCh BAO, FRCP(C), MSc

“Safe and high-quality neonatal care is best provided with the involvement of the infants’ parents/primary caregivers. (1) This is supported by research showing the harm caused to infants, parents, family systems, healthcare professionals, and healthcare delivery systems when family- and community-centered neonatal care is not provided.”

Introduction:

Safe and high-quality neonatal care is best provided with the involvement of the infants’ parents/primary caregivers (1). This is supported by research showing the harm caused to infants, parents, family systems, healthcare professionals, and healthcare delivery systems when family- and community-centered neonatal care is not provided. Despite strong evidence, knowledge, and intention, most NICUs do not fully and consistently practice family-centered care, and care delivery remains predominantly provider and organization-centered. Now that there is strong evidence for a range of approaches for achieving family-centered care, the debate has shifted to be less about whether or not to provide family-centered care but rather how best to do so. Unfortunately, this shift has still not resulted in a noticeable improvement in the implementation of family-centered care. Instead, it may have distracted from the fundamental reforms needed to overhaul the neonatal care delivery model.

“For many decades, the Gravens conference has been a forum for healthcare professionals and family advocates to exchange knowledge, share innovative new practices, discuss ethical and social issues and recommit to advocacy and action to improve family and infant outcomes.”

Changing clinical practice is hard (2). Sharing power and redistributing resources is even harder. Nevertheless, we are all called to do this hard work as part of our social contract as health professionals. For many decades, the Gravens conference has been

a forum for healthcare professionals and family advocates to exchange knowledge, share innovative new practices, discuss ethical and social issues and recommit to advocacy and action to improve family and infant outcomes. At the 2023 Gravens conference, a session was devoted to discussing some of the main evidence-based programs that include families as partners. By the end of the panel discussion, it was clear that each program offered a unique focus while sharing some common features. What was striking was that the programs were not mutually exclusive and that in an ideal NICU, different approaches could be employed concurrently or as needed to support infants and families for the benefit of all. It was clear from the discussion that implementation of any program required similar actions: a demonstrated commitment to change the unit (and hospital) culture to support the family partnership in care delivery; resources for (re)training and maintaining staff skills; and resources/redesign of systems to address the socioeconomic barriers to full family engagement and participation in care.

Our thesis is that the Family Integrated Care (FICare) model (3) is the ideal starting point for NICU care delivery redesign, addressing some of the most fundamental structural changes in unit culture and practice that can enable the successful incorporation of other specific family-centered care practices and programs. In this article, we summarize the key features of FICare and suggest resources for successful implementation.

Family Integrated Care (FICare):

In the FICare model, parents/primary caregivers are welcomed as essential members of the infant’s healthcare team, and the team works together to promote parent involvement to the fullest extent possible. Crucial to implementing FICare is the partnership with former NICU parents (veteran, graduate, or alumni parents) in the core steering group to plan, implement and sustain FICare in each NICU. The expertise provided by families with lived experience in the NICU is essential to care delivery redesign and innovation. The FICare model is a comprehensive framework with four main pillars: NICU Environment; NICU team education and support; Parent education/psychological support; and Active parent participation/partnership. This model’s **environment** is designed or adapted physically and through policy change to support 24-hour parental presence/participation. The model includes healthcare **team training** and ongoing education and coaching on the importance of family engagement in caring for their infants and how best to support families to parent in the NICU. There is a program of **parent-group education** as well as individualized bedside coaching/teaching by the healthcare team. Parents receive

Steps to Take for Successful FICare Implementation

- Find champions and decision-makers
- Engage all your stakeholders - especially families
- Learn together
- Assess your unit/hospital family resources/assets*
- Develop a stepwise implementation plan
- Define metrics of success
- Celebrate each win!

*See <https://www.ipfcc.org> and <https://familyintegratedcare.com> for assessment and implementation resources (3).

psychosocial support from professionals and trained **parent-peer mentors**. Finally, parents actively participate in **daily rounds** and shared decision-making and provide **direct care** for their infant in collaboration with nurses and other team members.

“Multiple studies in level 2 and 3 NICUs worldwide have shown that FiCare improves infant and parent outcomes compared with generic or unstructured family-centered care.”

Multiple studies in level 2 and 3 NICUs worldwide have shown that FiCare improves infant and parent outcomes compared with generic or unstructured family-centered care. See <https://familyintegratedcare.com/research/> for a comprehensive list of FiCare research. Improved infant outcomes include higher rates of exclusive breastfeeding, increased weight gain, shorter lengths of stay, and lower infection rates. In follow-up studies, preterm infants exposed to the FiCare model during their NICU stay had more robust self-regulation, fewer challenges with sleep, eating, or communication, and less negative emotionality compared with infants who received NICU FCC. Improved parent outcomes for FiCare compared with FCC include less stress and improved mental health for mothers and fathers, sustained post-discharge. The first study of FiCare in the United States recently found improved weight gain and reduced nosocomial infections for preterm infants (4) and depression and PTSD symptoms for mothers after NICU discharge (under review) compared with unstructured FCC implementation.

An extensive library of resources for implementing FiCare can be found at: <https://familyintegratedcare.com>. The British Association of Perinatal Medicine has also guided the implementation of FiCare: <https://www.bapm.org/resources/ficare-framework-for-practice>. Guidance on assessing leadership and institutional assets for implementing family-centered care principles can be found at: <https://www.ipfcc.org>.

“While specific individual intervention programs may be implemented at any time, we argue that without the foundation of FiCare, fundamental issues of partnership with parents at the unit level and environmental and psychosocial support for families and staff remain unaddressed.”

Once the structural aspects of FiCare have been addressed, the work will naturally focus on specific areas where training or resources are needed. For example, improving healthcare team and family relational communication might be a priority. Units may also wish to incorporate additional evidence-based programs for improving parent-infant emotional connection. An important area of focus might be to engage the healthcare team and families in quality improvement initiatives to optimize neurodevelopmental

care. Another priority might be introducing mental health screening, universal mental health support, and additional resources in trauma-informed care. Finally, additional attention may be needed to implement specific parent-delivered interventions to address feeding issues and pain management (5).

While specific individual intervention programs may be implemented at any time, we argue that without the foundation of FiCare, fundamental issues of partnership with parents at the unit level and environmental and psychosocial support for families and staff remain unaddressed. If not addressed, these fundamental issues will ultimately undermine the successful implementation of any given intervention.

Implementing Sustainable Structural Change in NICU Care Delivery:

Although it may appear daunting when seeing the entire FiCare program in detail, in our experience, NICUs rarely start with a blank slate, and many NICUs have some aspects of FiCare that can be built upon and nurtured. The partnership with families to complete the initial assessment of assets and needs is critical and a powerful resource to sustain team motivation when inevitable challenges or setbacks arise. Best practices for any successful organizational change can be deployed for FiCare (see Table 1).

For further evidence, implementation tips, and inspiration, please join us in person or virtually at the next FiCare conference, September 30, 2023, in Toronto, Canada <https://familyintegratedcare.com/conferences/>

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The I-Rainbow: A flexible, evidence-based care path for providing developmental care in the NICU

1



Melissa Scala, MD

Clinical Associate Professor of Pediatrics
Lucile Packard Children's Hospital
Stanford University
Director of Inpatient Infant Neurodevelopmental Care

Pronouns: she/her



Eilish Byrne, MSPT

Physical Therapist, El Camino Hospital
Assistant Professor at the University of Saint Augustine for Health Sciences

Pronouns: she/her

Social Media: A Tool for Connecting with Families

2



Daphna Barbeau, MD

Neonatologist IICA University Hospital
Director, High Risk Infant Follow Up Clinic

Pronouns: she/her

How Mammha is Closing Gaps in Maternal Mental Health Care in NICUs

3



Maureen Fura

CEO & Founder, Mammha
Member of National Coalition for Maternal Mental Health (NCMMH)
Member of Postpartum Support International (PSI) Miami

Pronouns: she/her

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Fragile Infant Forums for Implementation of IFCDC Standards: Pain and Stress, Families

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



“Having a baby is stressful enough for any family, but it can be much worse with the unexpected complication of having their baby admitted to intensive care. Although every family is different, almost all families admitted to intensive care experience increased stress, sometimes extreme.”

Having a baby is stressful enough for any family, but it can be much worse with the unexpected complication of having their baby admitted to intensive care. Although every family is different, almost all families admitted to intensive care experience increased stress, sometimes extreme.

When referring to families, we infer that parents, siblings, grandparents, foster parents, and other relations suffer the consequences of intensive care pain and stress. However, most literature focuses on the parents, primarily mothers. Experiencing pregnancy, labor, delivery, and postpartum events, mothers, in particular, have documented pain and stress. (1, 2, 3) The result of vaginal birth and/or Cesarean section often leaves the mother with pregnancy-related physiologic changes, including pain, stress, and recovery from stressful medical procedures. (2)

“A baby’s admission to intensive care can lead to maternal and paternal mental health issues not previously experienced.”

A baby’s admission to intensive care can lead to maternal and paternal mental health issues not previously experienced. Perinatal posttraumatic stress disorder, anxiety disorders, and postpartum depression have been documented in rates over and above those related to more typical births. (4, 5, 6, 7, 8, 9) Mothers who have a prior history of a mental illness like depression, anxiety, or another diagnosed mental health condition, may bring mental health complexities that are compounded by the stress of intensive care. (10, 11)

Addressing and managing stress related to intensive care experiences is essential to maximize outcomes for babies, parents, and future family functioning post-discharge. (12) Family mental health issues that develop due to an intensive care experience can impact the baby’s development and outcomes. (1, 13) Additionally, the immediate and extended family also suffer the ramifications of the intensive care experience, as there is a disruption in familiar routines, support network availability, travel, and care for siblings. Cultural practices and family customs are also likely to be disrupted. As all families come to the intensive care experience with different expectations, backgrounds, and parenting practices, individualizing approaches and interventions to address stress and promote wellbeing are essential. Consideration for the entire family constellation is appropriate as all members are likely to be experiencing stress as a result of the hospitalization. (14)

The Infant and Family-Centered Developmental Care Standards, Competencies, and Best Practices (IFCDC) have articulated evidence-based practices to assess and ameliorate family pain and stress (<https://nicudesign.nd.edu/nicu-care-standards/ifcdc-recommendations-for-best-practice-reducing-managing-pain-stress-in-newborns-families/>). The standards, listed in the chart below, are consistent with the Psychosocial Program Standards for NICU Parents. (15) The IFCDC standards aim to recognize the prevalence of family mental health issues resulting from a baby’s hospitalization and provide caregiving environments that ameliorate stress and promote wellbeing.

“As all families come to the intensive care experience with different expectations, backgrounds, and parenting practices, individualizing approaches and interventions to address stress and promote wellbeing are essential.”

“The Infant and Family-Centered Developmental Care Standards, Competencies, and Best Practices (IFCDC) have articulated evidence-based practices to assess and ameliorate family pain and stress (<https://nicudesign.nd.edu/nicu-care-standards/ifcdc--recommendations-for-best-practice-reducing-managing-pain-stress-in-newborns-families/>).”

Alleviating stress and promoting wellbeing in families:

First and foremost, ensuring families, particularly parents, have unlimited access to care for their babies is essential. Much stress results from the separation of parents and their babies. (16, 17) Family, distance, or financial issues often impede parents from being with their babies full-time (14), but assuring that when parents are available, they can be with their babies can alleviate stress. Skin-to-skin experiences (there are many ways of assuring skin-to-skin contact, not only on the parent's chest, that can be encouraged) for both mothers and fathers have been shown to reduce stress and should be encouraged regardless of the severity of the baby's medical issues. (18, 19, 20, 21, 22)

Parents are typically the most consistent and familiar caregivers for their babies. They may or may not understand the baby's behavioral communication. Providing them with information about observing and interpreting their baby's behavior and developmentally appropriate care will assist them in responding empathically and ameliorating their baby's distress. (23, 24) Psychoeducation provided individually or in group settings can

Standard 1, Pain and Stress, Families: The interprofessional team shall document increased parental/caregiver wellbeing and decreased emotional distress (WB/D) during the intensive care hospital (ICU) stay. Distress levels of the baby's siblings and extended family should also be considered.

Competency 1.1: Parents shall have unlimited opportunities to be with their baby and be encouraged to engage with their baby, including skin-to-skin interactions.

Competency 1.2: Education shall be provided to all parents on how to (a) recognize their baby's behavioral communications of pain and distress as well as signs of comfort and (b) support parents to use practical ways to comfort and soothe their baby safely.

Competency 1.3: WB/D shall be evaluated within 72 hours of admission and 48 hours before discharge (as well as other times indicated by clinical judgment).

Competency 1.4: Training should be provided for staff in how to screen, assess and document parent/family WB/D in accordance with ICU policies.

Competency 1.5: Evaluations of WB/D shall include informal and routine bedside conversations with all parent/caregivers by social workers and psychologists (one per 20 beds), who may utilize appropriate questionnaires and/or inventories to assess for postpartum depression (PPD), Posttraumatic Stress Disorders (PTSD) or other mental health concerns. This information shall be communicated to relevant members of the interprofessional team in accordance with ICU policies.

Competency 1.6: Standardized education programs on the reduction of distress and anxiety in families shall be provided for all professionals and include topics: (a) provision of Infant and Family-Centered Developmental Care; (b) recognition of symptoms of anxiety, PPD, and PTSD; (c) use of reflective listening skills and non-judgmental feedback; (d) understanding of implicit cultural biases; and (e) utilization of emotional and physical self-care.

Competency 1.7: All parents/caregivers shall be provided with psychoeducational groups emphasizing developmental care as well as the opportunity for individual peer-to-peer support by trained volunteers in the ICU.

Competency 1.8: Selected ICU staff should be appointed to provide targeted levels of support (e.g., listening visits) for parents/caregivers deemed at risk for emotional distress.

Competency 1.9: Appropriate emotional interventions and support shall be provided by social workers, psychologists, and psychiatrists within the ICU to parents/caregivers with debilitating levels of symptoms or acute distress.

Competency 1.10: Referrals of ICU family members for psychotherapy outside the ICU shall be provided using established hospital resources and referral strategies.

Competency 1.11: Discharge planning should include information about parent WB/D and related interventions. This information should be communicated to follow-up providers to promote optimal IFCDC at home.

also benefit parents so that they understand the cause and impact of stress in intensive care. (25) Often peer to peer conversations can effectively provide support and promote wellbeing. (26) Talking with someone who has gone through a similar experience can help alleviate stress.

Mental health screening, assessment, and supportive interventions:

An intensive caregiving environment provides appropriate assessment and interventions individualized to the baby and family's needs. It ensures the availability of well-trained professionals who provide supportive interventions to alleviate parental stress. (27)

“First and foremost, ensuring families, particularly parents, have unlimited access to care for their babies is essential. Much stress results from the separation of parents and their babies... but assuring that when parents are available, they can be with their babies can alleviate stress. Skin-to-skin experiences...for both mothers and fathers have been shown to reduce stress and should be encouraged regardless of the severity of the baby’s medical issues.”

Appropriate, timely mental health screening and assessment should be expected practice, normalized in supporting the parents to care for their baby appropriately. (4, 28) IFCDC competencies related to this standard include that wellbeing and/or distress be evaluated within 72 hours of admission and 48 hours before discharge (as well as other times indicated by clinical judgment). Training in how to screen for and document wellbeing and/or distress should be provided to all intensive care professionals.

“Psychoeducation provided individually or in group settings can also benefit parents so that they understand the cause and impact of stress in intensive care.”

Various professionals can do screening and assessment, but it would be best provided by those trained to determine the best strategies to provide supportive intervention both in the NICU and referrals for when the family is discharged into their community. Perinatal Social Workers (<https://www.napsw.org>) have been at the forefront of providing support to families and

are typically available to ensure that appropriate referrals are made to various resources, including mental health. They are now joined by increasingly available Neonatal Psychologists trained to address mental health concerns in intensive care (<https://www.nationalperinatal.org/psychologists>). Many intensive care units also have access to Psychiatrists for mental health consultations. Current recommendations for mental health staff to address mental health needs include at least one per 20 beds. (29)

All professionals need education about recognizing and responding to mental health concerns in family members. Approaches may include active listening and reflective questioning, typically not taught in professional education, so they must be included in educational sessions. (29, 30) Often, family and/or staff mental health crises reveal the need for access to professionals who can appropriately respond to these emerging challenges, provide emotional/psychological intervention and take necessary steps to address the issue. (31) Appropriately trained staff and policies targeted to address crisis episodes and provide referrals to resources outside the hospital setting are essential. (32) Another competency for alleviating stress in family members is to, with permission, assure appropriate referrals upon discharge to community mental health resources.

“Appropriate, timely mental health screening and assessment should be expected practice, normalized in supporting the parents to care for their baby appropriately. IFCDC competencies related to this standard include that wellbeing and/or distress be evaluated within 72 hours of admission and 48 hours before discharge (as well as other times indicated by clinical judgment). Training in how to screen for and document wellbeing and/or distress should be provided to all intensive care professionals.”

Conclusion:

The stress of intensive care impacts the parents and the baby's extended family. The literature is replete with documentation of parents' mental health concerns that should be assessed and appropriately addressed during the intensive care experience and as the family transitions to the community. As parental mental health issues can subsequently affect the baby's developmental outcomes, *prevention* measures to avoid adverse baby and family outcomes and *intervention* measures to address immediate concerns are necessary.

The IFCDC standards provide an evidence-based rationale for developing significant educational, procedural, and systems change strategies to alleviate stress and promote wellbeing in family members. First and foremost, parents and babies with unrestricted physical, social, and emotionally supported access to each other can reduce stress, enhance wellbeing and result

in more optimal outcomes. Awareness of stress-related behavior, communication, and provision of screening procedures by all intensive care professionals will help determine family mental health needs. Adequately staffed mental health providers should provide focused assessment, crisis intervention and referral to appropriate resources. Awareness of the importance of addressing optimal family wellbeing, developing policies prioritizing reducing stress in families, and strong leadership is foundational to implementing the IFCDC evidence-based standards on Pain and Stress in Families.

“All professionals need education about recognizing and responding to mental health concerns in family members. Approaches may include active listening and reflective questioning, typically not taught in professional education, so they must be included in educational sessions.”

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SHARED DECISION-MAKING PROTECTS MOTHERS + INFANTS

DURING COVID-19

KEEPING MOTHERS + INFANTS TOGETHER

Means balancing
the risks of...

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



EVIDENCE

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

PARTNERSHIP

What is the best
for this unique dyad?

SHARED DECISION-MAKING

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



TRAUMA-INFORMED

Both parents and providers
are confronting significant...

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

LONGITUDINAL DATA

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

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



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

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when it matters most.

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Association of
Neonatal
Nurses



National
Perinatal
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COURSE ORGANIZERS:

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HIH Health, Good Samaritan Hospital
Professor of Pediatrics
Division Chief, LAC+USC Medical Center
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Director, Division of Cardiology, LAC+USC Medical Center

Website for the course material and echo simulator:

www.neochosim.com



Registration fee is \$1000. For those in training the registration fee is \$700

For program information please contact: Ms Reyna Mayoral Program Coordinator at Mayoral@usc.edu or call (323) 409-3406

Space is limited. Please register prior to July 15, 2023

Simulator Instructors

Dr. Rangasamy Ramanathan,
Dr. Mahmood Ebrahimi
Dr. Shahab Noori
Dr. Yogen Singh
Dr. Jennifer Shepherd
Dr. Karla Ortiz
Dr. Victoria Hamilton
Dr. Gabriella Larusso

Dr. Paul Arichai
Dr. Ivonne Sierra-Strum
Dr. Jane Huang
Dr. Stacy Kim
Dr. Megan Chang
Dr. Maria Martes Gomez
Dr. Jessica Yom
Dr. Rutuja Kibe

Recommended Book for the course:

Practical Neonatal Echocardiography
Mc Graw Hill, 2019

FACULTY DISCLOSURE

Current guidelines state that participants in continuing medical education activities should be aware of any affiliation or financial interest that could affect the speaker's presentation(s). Faculty members have completed conflict of interest declarations and those potential conflicts will be listed in the course syllabus.

ACCREDITATION STATEMENT

The Keck School of Medicine of the University of Southern California is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

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Disparities in Perinatal Care Among the Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ+) Community

Viveka Prakash-Zawisza, MD, MS, MBA,
Mitchell Goldstein, MD, MBA, CML

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.



“Despite advancements in LGBTQ+ rights and increased social acceptance, inequalities persist in various aspects of healthcare, including perinatal care. This manuscript reviews the existing literature, discussing barriers to care, discrimination and stigma, mental health considerations, and strategies for improving perinatal care for LGBTQ+ individuals.”

Many groups in the United States are impacted by disparities and inequities in healthcare in general and perinatal care. Since Pride Month is celebrated every June, we chose to focus on the perinatal experience of the LGBTQ+ population. Despite advancements in LGBTQ+ rights and increased social acceptance, inequalities persist in various aspects of healthcare, including perinatal care. This manuscript reviews the existing literature, discussing barriers to care, discrimination and stigma, mental health considerations, and strategies for improving perinatal care for LGBTQ+ individuals. By shedding light on these disparities, we hope to raise awareness and promote the development of inclusive and equitable healthcare practices. (1)

“Lesbian, gay, bisexual, transgender, and queer (LGBTQ+) individuals face significant disparities in perinatal care. Research has shown that compared to heterosexual-WSM (women who have sex with men), homosexual-WSW (women who have sex with women), and bisexual/lesbian women are more likely to report miscarriages and stillbirths.”

Lesbian, gay, bisexual, transgender, and queer (LGBTQ+) individuals face significant disparities in perinatal care. Research has shown that compared to heterosexual-WSM (women who have sex with men), homosexual-WSW (women who have sex with women), and bisexual/lesbian women are more likely to report miscarriages and stillbirths. Lesbian women are more likely to have low birth weight infants, while bisexual and lesbian women have a higher likelihood of very preterm births. These disparities highlight the need for improved perinatal care for LG-

BQ+ individuals. (1)

“Several key strategies can be implemented to address these disparities. Firstly, it is crucial to justify the inclusion of LGBTQ+ individuals in research studies and to fund studies focused explicitly on perinatal care for LGBTQ+ populations.”

Several key strategies can be implemented to address these disparities. Firstly, it is crucial to justify the inclusion of LGBTQ+ individuals in research studies and to fund studies focused explicitly on perinatal care for LGBTQ+ populations. Supporting and nurturing researchers focused on sexual identities, including gender-expansive populations, is essential. Diverse representation of researchers, inclusive of LGBTQ+ individuals, should be encouraged. Building and increasing participation in LGBTQ+ research networks focused on pregnancy research can further contribute to understanding and addressing these disparities. (1,2)

“Participating in or establishing multidisciplinary networks with clinicians providing gender-affirming and patient-centric services is vital to ensuring inclusive perinatal care. (3)”

In clinical care settings, promoting outreach to LGBTQ+ communities and organizations is crucial. Creating universal staff training

and office guidelines that foster a safe and friendly environment for LGBTQ+ individuals is necessary. Participating in or establishing multidisciplinary networks with clinicians providing gender-affirming and patient-centric services is vital to ensuring inclusive perinatal care. (3)

In terms of education, incorporating curricula on gender-inclusive healthcare in medical schools and training programs for all healthcare professionals is essential. Continuing medical education should focus on gender-affirming care and health disparities within pregnant LGBTQ+ populations. Providing educational and community resources for pregnant LGBTQ+ individuals and their families can help bridge the information gap and improve their overall care experience. (2)

“Addressing these disparities is of utmost importance, as more than half of LGBTQ+ birthing individuals have reported that bias or discrimination impacted their pregnancy, birth, and postpartum care experiences. By implementing these strategies, we can work towards equitable and inclusive perinatal care for LGBTQ+ individuals, promoting positive health outcomes and a supportive healthcare environment. (3)”

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References:

1. Everett BG, Kominiarek MA, Mollborn S, Adkins DE, Hughes TL. Sexual Orientation Disparities in Pregnancy and Infant Outcomes. *Matern Child Health J.* 2019 Jan;23(1):72-81. doi: 10.1007/s10995-018-2595-x. PMID: 30019158; PMCID: PMC6501574.
2. Croll J, Sanapo L, Bourjeily G. LGBTQ+ individuals and pregnancy outcomes: A commentary. *BJOG.* 2022 Sep;129(10):1625-1629. doi: 10.1111/1471-0528.17131. Epub 2022 Mar 25. PMID: 35243765; PMCID: PMC9540187.
3. Alvarado, C., Caccidy, D., Orgera, K., & Piepenbrink, S. New national poll: Majority of Americans support policies protecting LGBTQ people from discrimination in health care and birth control. Website: AAMC Health Justice Now 2022 URL: [https://www.aamchealthjustice.org/news/polling/lgbtq-birth]

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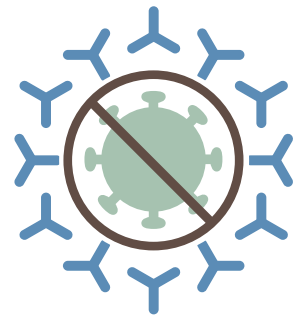
Postpartum Revolution

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Protecting your baby and family from

Respiratory Viruses:



What parents need to know this RSV and flu season



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



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



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



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



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

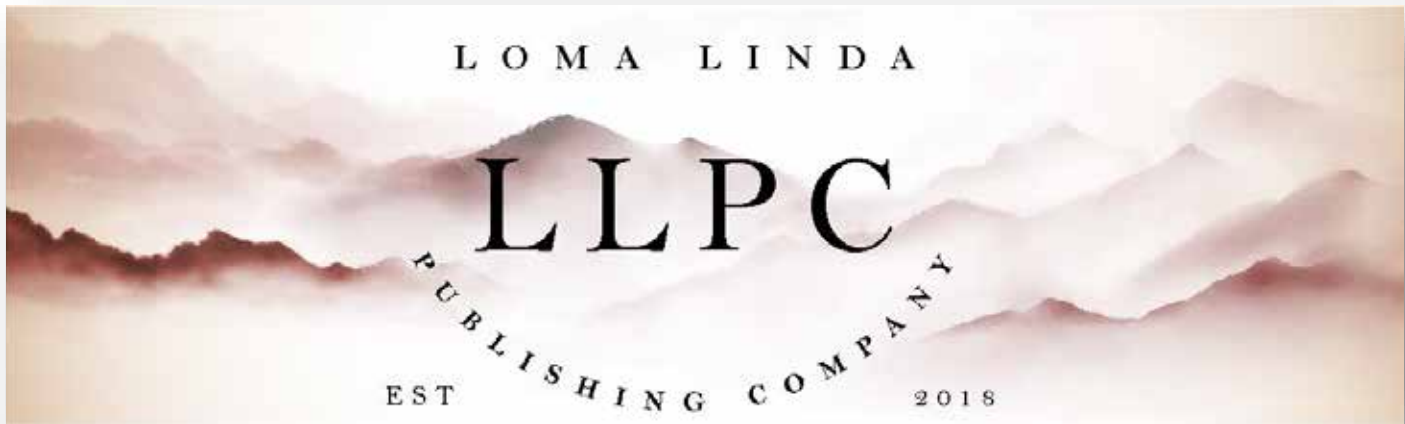


Babies older than 6 months can get a flu shot and COVID-19 vaccinations. There is no vaccine for RSV, but monthly antibody shots during RSV season can help protect them.



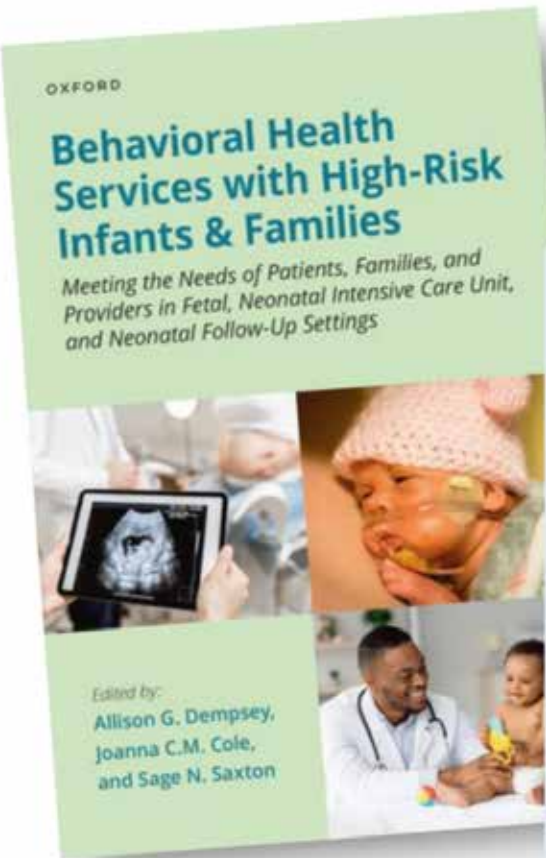
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The Gravens Conference: Our Message to the Supporters, Attendees, and Participants in Gravens Conferences

Kelly McGlothen-Bell PhD, RN, IBCL, Christie Lawrence, DNP, RNC-NIC, APN/CNS, Joy Browne, Ph.D., PCNS, IMH-E(IV), April Laramey



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

“We want to acknowledge concerns regarding holding the 2024 meeting in Florida. For all those who have communicated your thoughts about attending the meeting, we want you to know that we appreciate your forthrightness and wish to offer a statement of our collective thinking on this important matter.”

Our Gravens community seeks to affirm our commitment to addressing issues of racism and bias and audit our systems to ensure that we are proactive in the implementation of strategies that promote health equity and social justice. We strive to provide a space that is supportive, inclusive, and welcoming to all individuals involved in the physical and developmental environment of the neonatal intensive

care unit (NICU), including family members, healthcare providers, designers, and industry supporters.

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

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

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

“The Planning Committee for the 2024 Gravens Conference has discussed at length the pros and cons of going forward with holding our meeting in Florida, given the recent political decisions there that threaten an open and inclusive society.”

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

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

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

- Commit to learning and reflecting on

the many ways that racism and bias impact us today and how our history led us here.

- Vote for political candidates that are in line with your values.
- Use your voice, lived experience, and privilege to bring awareness and action to address disparities in health outcomes and healthcare quality.

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

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

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

Disclosures: *There are no reported disclosures*

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The Gravens Conference would also like to acknowledge contributions from:
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Vincent Smith, MD

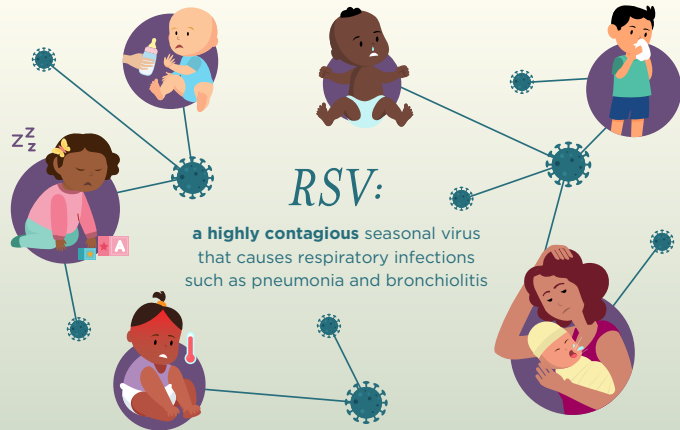


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Respiratory Syncytial Virus

DID YOU KNOW?



The Gap Baby: An RSV Story



Infants under age 1



RSV is the leading cause of hospitalization



16x more likely to get RSV than the flu



Postpartum Revolution

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Kids under age 5 experience



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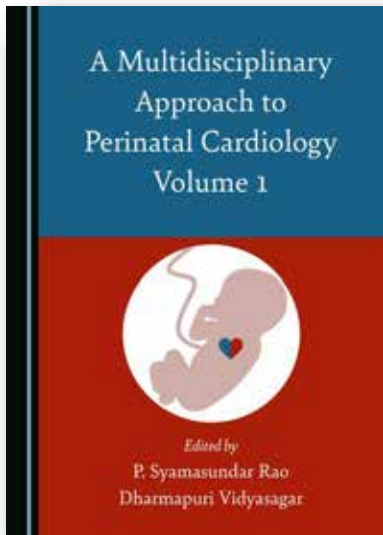
Second Edition

**Gary D. Miner, Linda A. Miner,
Scott Burk, Mitchell Goldstein,
Robert Nisbet, Nephi Walton,
Thomas Hill**



A Multidisciplinary Approach to Perinatal Cardiology Volume 1

Edited by P. Syamasundar Rao and Dharmapuri Vidyasagar



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Book Description

Recent developments in diagnostic and therapeutic aspects of cardiac and neonatal issues have advanced the care of the newborn. To achieve excellence in cardiac care, however, close interaction and collaboration of the pediatric cardiologists with neonatologists, pediatricians, general/family practitioners (who care for children), anesthesiologists, cardiac surgeons, pediatric cardiac intensivists, and other subspecialty pediatricians is mandatory. This book provides the reader with up-to-date evidence-based information in three major areas of neonatology and prenatal and neonatal cardiology. First, it provides an overview of advances in the disciplines of neonatology, prenatal and neonatal cardiology, and neonatal cardiac surgery in making early diagnosis and offering treatment options. Secondly, it presents a multidisciplinary approach to managing infants with congenital heart defects. Finally, it provides evidence-based therapeutic approaches to successfully treat the fetus and the newborn with important neonatal issues and congenital cardiac lesions. This first volume specifically explores issues related to perinatal circulation, the fetus, ethics, changes in oxygen saturations at birth, and pulse oximetry screening, diagnosis, and management.

About the Editors

Dr P. Syamasundar Rao, MD, DCH, FAAP, FACC, FSCAI, is Professor of Pediatrics and Medicine and Emeritus Chief of Pediatric Cardiology at the University of Texas-Houston Medical School. He received his medical degree from Andhra Medical College, India, and subsequently received post-graduate training both in India and the USA before joining the faculty at the Medical College of Georgia, USA, in 1972. He has also served as Chairman of Pediatrics at King Faisal Specialist Hospital and Research Center, Saudi Arabia, and Professor and Director of the Division of Pediatric Cardiology at the University of Wisconsin and St. Louis University, USA. He has authored 400 papers, 16 books and 150 book chapters, and is a recipient of numerous honors and awards.

Dr Dharmapuri Vidyasagar, MD, MSc, FAAP, FCCM, PhD (Hon), is currently Professor Emeritus in Pediatrics at the University of Illinois, Chicago, where he served as Professor of Pediatrics for four decades. He is a graduate of Osmania Medical College, India. He has published over 250 papers and authored several books with a focus on prematurity, neonatal pulmonary diseases and neonatal ventilation. His goal is to reduce neonatal mortality in the USA and around the world, and he has received multiple awards and honors including the Ellis Island Award.

A Multidisciplinary Approach to Perinatal Cardiology Volume 1 is available now in Hardback from the Cambridge Scholars [website](#), where you can also access a free [30-page sample](#).



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Providing Psychosocial Support During
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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 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 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.

Follow us online at [@MyNICUNetwork](https://www.instagram.com/MyNICUNetwork)

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



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

Partnering for patient-centered care
when it matters most.

nann.org nationalperinatal.org



National
Association of
Neonatal
Nurses



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



CDC Committee Tackles Childhood Immunizations

Josie Cooper

The Alliance for Patient Access, 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, a related 501(c)(3) non-profit corporation. The Institute for Patient Access is a physician-led policy research organization dedicated to maintaining the primacy of the physician-patient relationship in the provision of quality health care. In furtherance of its mission, IfPA produces educational materials and programming designed to promote informed discussion about patient access to approved therapies and appropriate clinical care.

Visit allianceforpatientaccess.org and instituteforpatientaccess.org to learn more about each organization.



A CDC advisory committee's recent discussion about childhood immunizations could impact which new vaccines are available to which children.

“Recommendations about new vaccines and immunizations typically come from the CDC’s Advisory Committee on Immunization Practices, which is critical in protecting public health – including infant health.”

Recommendations about new vaccines and immunizations typically come from the CDC’s Advisory Committee on Immunization Practices, which is critical in protecting public health – including infant health. The committee’s meeting earlier this year spotlighted two specific vaccines: pneumococcal and RSV, or respiratory

syncytial virus.

Pneumococcal Vaccine Considerations

Complex pneumococcal vaccines protect against infections, ranging from “mild to very dangerous,” that affect the brain, ears, and lungs.

Different pneumococcal vaccines are often compared based on how many strains of the bacterium they protect against, a concept known as valency. But as Melinda Wharton, MD, of the Advisory Committee on Immunization Practices, noted in a [recent webinar](#), that is not the only factor that should be considered.

“The vaccines’ effectiveness in real-world use is also essential. Approved pneumococcal vaccines require four doses for complete protection. Nevertheless, many children, including the nation’s most vulnerable children, do not complete the entire series.”

The vaccines’ effectiveness in real-world use is also essential. Approved pneumococcal vaccines require four doses for complete protection. Nevertheless, many children, including the nation’s most vulnerable children, do not complete the entire series. Committee members should, therefore, also consider which vaccines offer the best protection if the series is not completed.

Considerations like these are crucial as the committee issues its formal recommendations, published in what is known as the Morbidity and Mortality Weekly Report. Those recommendations need to highlight the differences among pneumococcal vaccines and potential trade-offs. Only then can pediatric healthcare providers make informed decisions about how to serve their patients best.

RSV Vaccine Considerations

Forthcoming tools to protect against RSV are also on the CDC committee’s radar.

“In particular, the committee’s most recent meeting covered a maternal RSV vaccine and a novel immunization to protect infants from RSV.”

In particular, the committee’s most recent meeting covered a maternal RSV vaccine and a novel immunization to protect infants from RSV. Both are expected to be approved by the FDA in the coming weeks. After that, the Advisory Committee on Immunization Practices will decide whether to recommend these interven-

tions' use formally.

“For a nation acutely aware of the impact of infectious diseases, access to immunizations is as timely a topic as ever.”

The committee will also determine whether the novel immunization for infants, a long-acting preventive monoclonal antibody, should be added to the federally funded [Vaccines for Children Program](#). The program provides free shots to children who risk not being vaccinated due to a lack of insurance or financial resources. The committee's decision should ensure broad, equitable access – not exacerbate existing health disparities.

For a nation acutely aware of the impact of infectious diseases, access to immunizations is as timely a topic as ever. So too, is the role that the CDC's Advisory Committee on Immunization Practices plays in building trust, generating confidence, and ensuring access for young children.

References:

1. https://www.immunizationcoalitions.org/content/uploads/2023/04/GMT20230411-155819_Recording_2560x1440.mp4
2. [Centers for Disease Control and Prevention. Vaccines for Children Program \[Internet\]. Atlanta \(GA\): Centers for Disease Control and Prevention; \[cited 2023 Jun 13\]. Available from: https://www.cdc.gov/vaccines/programs/vfc/index.html](https://www.cdc.gov/vaccines/programs/vfc/index.html)

Disclosures: Josie Cooper is the executive director of the Alliance for Patient Access. This article was also published at healthpolicytoday.org.



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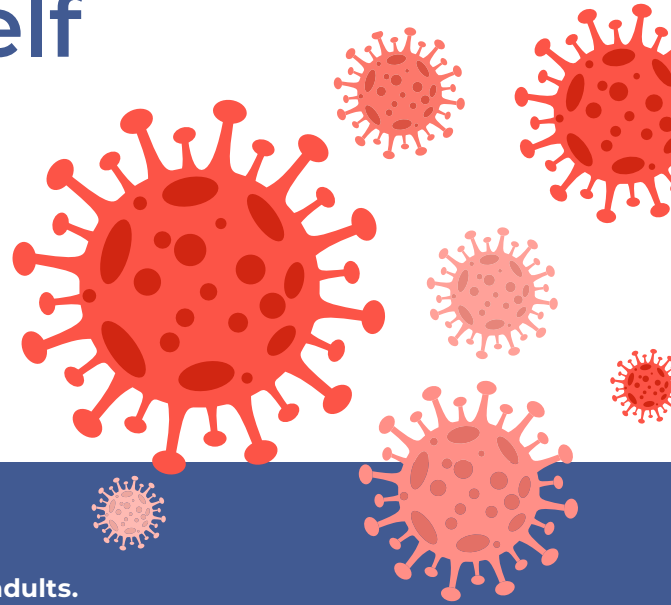
Sign up for free membership at 99nicu, the Internet community for professionals in neonatal medicine. Discussion Forums, Image Library, Virtual NICU, and more...”

www.99nicu.org

Immunizing Yourself Against COVID-19

COVID-19 vaccines have been shown to:

- ✓ Lessen the severity of symptoms¹
- ✓ Reduce disease transmission³
- ✓ Reduce risk of mortality²
- ✓ Make communities healthier and safer⁴



Understanding the Options

COVID-19 vaccines are available for children, adolescents and adults. There are 3 types to choose from.



mRNA VACCINES

New to market, but research has been ongoing since the 1990s.



PROTEIN SUBUNIT VACCINES

Used for three decades against the flu, whooping cough and hepatitis B.



VECTOR VACCINES

Used for decades against chickenpox, malaria and tuberculosis.

HOW THEY WORK:

Instruct cells to make COVID-like proteins that trigger the immune system to fight the virus.

Deliver harmless versions of the COVID protein that train the immune system to fight the virus.

Use a modified virus, such as a common cold, to teach the body to fight off COVID.

COVID vaccines are recommended for everyone ages 6 months and older, and boosters for everyone ages 5 years and older, if eligible.⁵

Safe and Sound

COVID vaccines have been:



Thoroughly tested

through multi-phase trials with tens of thousands of participants⁶



Proven safe and effective

for adults as well as children⁷



Vetted and approved by the US FDA and EMA and endorsed by the WHO⁸⁻¹⁰

Get Your Job

Vaccines are available at your:



Doctor's office



Neighborhood pharmacy



Community health center



Talk to your health care provider or pharmacist about which vaccine is right for you.

1. <https://www.mayoclinic.org/diseases-conditions/coronavirus/symptoms-causes/syc-20479963>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8782520/>
3. <https://www.nejm.org/doi/full/10.1056/nejmc2107717>
4. <https://royalsocietypublishing.org/doi/full/10.1098/rsif.2020.0683>
5. <https://www.cdc.gov/vaccines/covid-19/clinical-considerations/interim-considerations-us.html>
6. <https://doh.wa.gov/emergencies/covid-19/vaccine-information/safety-and-effectiveness>

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8. <https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines>
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10. http://www.bccdc.ca/Health-Info-Site/Documents/COVID-19_vaccine/WHO-EUA-qualified-covid-vaccines.pdf



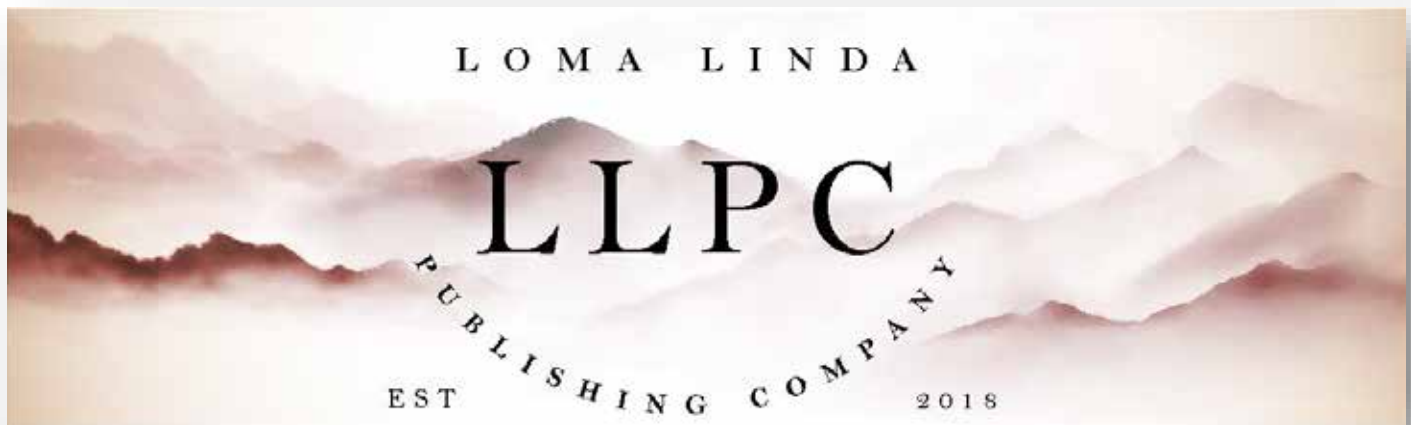
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March 6-9, 2024



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Abstracts due October 1, 2023



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Keeping Your Baby Safe

during the COVID-19 pandemic

How to protect your little one from germs and viruses

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

Here's what you can do...

Wash Your Hands

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



Limit Contact with Others

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



Provide Protective Immunity

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



Take Care of Yourself

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



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



WARNING

Never Put a Mask on Your Baby

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



If you are positive for COVID-19

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



We can help protect each other.

[Learn more](#)

www.nationalperinatal.org/COVID-19



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

Amplifying Young Voices: iCAN Empowers Pediatric Patients in Healthcare

Sabina Schmidt Goldstein-Becerra



Get involved today and Join the iCAN Parent Council!

“iCAN, or the International Children's Advisory Network, is committed to providing numerous opportunities for the pediatric community to come together and hear from the most crucial stakeholders in healthcare: the patients.”

iCAN, or the International Children's Advisory Network, is committed to providing numerous opportunities for the pediatric community to come together and hear from the most crucial stakeholders in healthcare: the patients. Our organization empowers all pediatric patients worldwide by facilitating their active participation in innovation, research, and medicine. Whether you are a patient, family member, healthcare professional, or supporter of the cause, we welcome you to visit our website at www.iCAN.health

SAVE THE DATE!
July 10 - 14

The **iCAN Annual Advocacy and Research Summit**, presented by Jumo Health, will take place in San Diego, California.

to learn more about our mission, various programs, and initiatives. Join us to ensure that every child's voice is heard and that their unique experiences are taken into account to improve healthcare outcomes for all pediatric patients.



REGISTRATION FOR THE 2023 iCAN RESEARCH AND ADVOCACY SUMMIT IS OPEN!

SAN DIEGO, CA
JULY 10 - JULY 14, 2023

TO REGISTER OR SPONSOR, PLEASE VISIT
<https://www.icanresearch.org/summit>

For any questions, please contact:
abbyclark@icanresearch.org

BE A PARTNER IN TRANSFORMING PEDIATRIC HEALTHCARE: JOIN US AS AN EVENT SPONSOR FOR OUR HIGHLY ANTICIPATED 2023 SUMMIT, PRESENTED BY JUMO HEALTH

We extend our heartfelt gratitude to our current summit sponsors, including Jumohealth, Pfizer, LabCorp, Pediatric Trials Network, Advances in Therapeutics and Technology, Georgia Institute of Technology, Everylife Foundation for Rare Diseases, and Global Center for Medical Innovation, among others. Their valuable partnerships are instrumental in our mission to ensure that every pediatric patient has a voice in medicine, research, and innovation. Furthermore, we would like to acknowledge the significant role our sister organization, the International Society for Pediatric Innovation (iSPI), played in organizing our annual summit.

As we gear up for our much-awaited 2023 Summit, we seek additional event sponsors to maximize its impact. This is a unique opportunity for you to make a tangible difference in the pediatric medical field as we know it. By becoming an event sponsor, you will contribute to transforming pediatric patients' lives and shaping healthcare's future.

One of the primary objectives of our summit is to provide our youth chapter members with an invaluable platform to connect with esteemed healthcare professionals. Through this interaction, they will have the opportunity to learn from the unique experiences of



**Help Support a Child
\$1,000**

Help Our Youth Share Their Story

Did you know that iCAN has a Young Adult Professionals Program?

other children living with chronic and/or rare diseases, fostering empathy, understanding, and support. The event also facilitates direct engagement between the scientific community and young patients and their families, emphasizing the importance and relevance of the pediatric patient's perspective in medicine, research, and innovation.

Make a lasting impact on pediatric medicine by joining us as an event sponsor today. Visit <https://www.icanresearch.org/sponsoring> to learn more about how you can support our mission and



shape a brighter future for pediatric healthcare. Together, we can create a world where every child's voice is heard, and their well-being is prioritized.

AMPLIFY YOUTH ENGAGEMENT: SPONSOR A CHILD FOR THE 2023 iCAN SUMMIT

Each year, the iCAN Summit brings together an exceptional group of iCAN youth chapter members worldwide, made possible through the generous sponsorships provided by individuals like yourself. This year, we are dedicated to upholding this cherished tradition and uniting an even larger cohort of young chapter members to partake in this summer extravaganza.

“Register now to be a part of an unforgettable experience at the 2023 iCAN Summit in San Diego, where you will have the chance to wear Holden’s winning t-shirt design and learn from pediatric patients, caregivers, and pediatric healthcare experts.

Our ultimate goal is to provide a dynamic platform for today's youth to amplify their valuable voices, insights, and perspectives at the highly anticipated iCAN Summit while fostering meaningful connections with esteemed healthcare professionals. We firmly believe that this transformative experience has the potential to in-

spire, educate, and empower the next generation of leaders in the field of pediatric healthcare and all stakeholders involved.

We invite you to join us in this endeavor by considering the sponsorship of a child to attend the momentous 2023 iCAN Summit. Together, we can forge a profound impact and propel the frontiers of pediatric healthcare advocacy and innovation.

To learn more about how you can contribute to the empowerment of iCAN youth, please visit our donation page at <https://www.icanresearch.org/donate>. Your support will be vital in shaping a brighter future for pediatric healthcare.



**TRACY GRAY,
M.S., M.B.A., R.N.**

TRACY GRAY: EXPERT SPEAKER SPOTLIGHT AT SUMMIT 2023

We are excited to announce Tracy Gray, the Patient Engagement Lead in the FDA's Center for Devices and Radiological Health (CDRH), Office of Strategic Partnerships and Technology Innovation, Patient Science and Engagement Program, as a prominent speaker at our 2023 Annual Summit. Tracy's extensive experience and expertise will be showcased in two captivating sessions: "FDA's Total Product Lifecycle Advisory Program" and "Careers in

Healthcare.”

During the “FDA’s Total Product Lifecycle Advisory Program” session, Tracy will provide valuable insights into this pivotal program that guides the entire lifecycle of medical products. Drawing upon her role as the Patient Engagement Lead in the FDA’s CDRH, Tracy will offer attendees a comprehensive understanding of the program’s significance and impact.

In the session centered around “Careers in Healthcare,” Tracy will share her wealth of knowledge and expertise, offering invaluable guidance and insights into the diverse career opportunities within the healthcare industry. Attendees will gain valuable perspectives on career paths, professional development, and the dynamic landscape of healthcare.

Tracy’s role within the FDA involves fostering a culture of patient engagement by collaborating with internal and external stakeholders. Tracy strives to create mutual benefits for the FDA, patient communities, and caregivers through purposeful patient interactions. Before joining the FDA, Tracy held leadership positions in the Health Resources and Services Administration (HRSA), showcasing her extensive experience in both for-profit and non-profit healthcare organizations and direct patient care.

Tracy’s educational background further underscores her expertise. She holds a BS in Biological Sciences from the University of Maryland, College Park, an MBA from Marymount University, and an RN and MS in Clinical Nurse Leadership from the University of Maryland School of Nursing in Baltimore, MD. This diverse academic foundation and her hands-on experience significantly enhance her ability to engage with patients and drive healthcare innovation.

Do not miss the opportunity to gain insights from Tracy Gray’s engaging sessions at Summit 2023, where she will share her expertise and knowledge in these pivotal domains.



MAY RECAP: EXPERT INSIGHTS ON HEALTHCARE CAREERS - IGNITING YOUTH PASSION



Uganda Youth Chapter engages in our “Ask the Experts” segment on careers in medicine, innovation, and research

In our recent segment held on May 20th, we had the privilege of hosting three esteemed speakers who shared their invaluable expertise. Ananya Ganesh, the founder of Girls Maker Initiative, Rachel Reynolds, a Unit Coordinator, and Nadia Ansari, the co-founder of Flux Wear, converged to illuminate the realm of healthcare careers. Their remarkable achievements at a young age served as inspiration for the attendees, showcasing that age is not a barrier to making significant impacts in their respective fields. The unique perspectives brought by these speakers truly captivated the audience, and we were thrilled to have the entire Uganda chapter actively participating and raising profound questions. The session ignited a spark in the young participants, encouraging them to pursue their passions and embrace new experiences, highlighting that one is never too young to embark on their journey of success.

DON'T MISS OUR MONTHLY ASK THE EXPERTS (ATE) SERIES EXPLORING HEALTHCARE, TECHNOLOGY, AND INNOVATION

Join us for our highly anticipated Ask the Experts (ATE) series, a monthly event featuring distinguished experts from various fields, including healthcare, technology, and innovation. Our next session is just around the corner in June, and we strongly encourage you to take advantage of this enlightening opportunity by registering through our website. By attending, you will have the chance to delve into insightful discussions and gain valuable knowledge that can shape your understanding of healthcare careers.

We extend a warm invitation to everyone to be part of these informative sessions. Stay up to date with the latest ATE topics and session dates by following our Instagram account, @icanresearch.

At iCAN, we are committed to providing a platform for experts to share their expertise and insights. If you are an expert in pediatric healthcare, whether in the areas of innovation, medicine, or technology, we welcome you to join us as a speaker for one of our ATE sessions. For more information, please contact us at abbyclark@icanresearch.org.

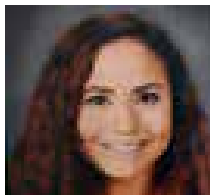
Don't miss out on the opportunity to learn from and engage with

top healthcare experts. Reserve your spot now for our upcoming ATE session, and we eagerly look forward to your participation!

Disclosures: *There are no reported disclosures*

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Phone: (+1) 818-256-7120

Email: sabina.goldstein@icanresearch.org

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to be held July 10-14th in Southern California



Join Us In-Person for 2023
Kids - Make Your Summer Count!

- Travel to California
- Share your expert voice
- Shape the future of clinical research
- Support new pediatric innovation
- Learn about careers in healthcare
 - Engage with global leaders
- Meet friends from around the world
- Make a positive impact in healthcare



www.iCANResearch.org

Registration opens March 1st, 2023

iCAN is not responsible or liable for any and all travel arrangements (including but not limited to flights, trains, cars, transport of any kind, accommodations, meals, reservations or other rental/vacation services acquired) by/for participants for any reason. iCAN is not responsible for any attendee medical needs. iCAN advises attendees to purchase travel insurance for the iCAN Summit.



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Partnering for patient-centered care when it matters most.



National Association of Neonatal Nurses

nann.org



nationalperinatal.org

Your Pregnancy and Substance Use

4 Things you can do to improve your health and lower your risk for complications



Get Prenatal Care

Start early. Go to all your visits. Empower yourself with information so you can make smart decisions. Build relationships with providers who understand Substance Use Disorders (SUDs) and know how to help. Partner with them to reach your goals. But remember, you do not need to be abstinent from substance use to get care. Go now.

Reduce Your Use

There are simple things you can do to limit the harm substances might do.

- Use fewer substances
- Use smaller amounts
- Use less often
- Learn how to use safer



Reducing or quitting smoking is a good place to start. Set your goals, then ask for help. One of the best things you can do is to stop using alcohol. We know that even small amounts are risky. And when combined with benzos and opioids, alcohol can kill.

Use Medications for Opioid Use Disorder (MOUD) if you are opioid dependent

Methadone and Buprenorphine (Subutex® or Suboxone®) are the "Standard of Care" during pregnancy because they:

- Eliminate the risks of illicit use
- Reduce your risk for relapse
- Can be a positive step towards recovery



Take Good Care of Yourself

You deserve a healthy pregnancy & childbirth.

- Eat healthy and take your prenatal vitamins
- Find the right balance of rest and exercise
- Surround yourself with people who care

Your Health Matters



Academy of Perinatal Harm Reduction

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www.nationalperinatal.org

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Keeping Your Baby Safe from respiratory infections



RSV
COVID-19
colds
flu

How to protect your little ones from germs and viruses

This year is an especially dangerous cold and flu season - especially for vulnerable infants and children. Fortunately, there are proven protective measures that we can take to stay healthy.

Here's what you can do...

Wash Your Hands

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



Limit Contact with Others

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



Provide Protective Immunity

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



Take Care of Yourself

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



Get Immunized

Vaccinations save lives. Protecting your baby from COVID-19, flu and pertussis lowers their risks for complications from respiratory infections.



WARNING

Never Put a Mask on Your Baby

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



If you feel sick or are positive for COVID-19

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



We can help protect each other.
www.nationalperinatal.org/rsv



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

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

Respiratory Syncytial Virus:

How you can advocate for babies this RSV season

Track national data and trends at the CDC's website www.cdc.gov/rsv



Identify babies at greatest risk



including those with CLD, BPD, CF, and heart conditions

Teach families how to protect



their babies from respiratory infections

Advocate for insurance coverage for palivizumab prophylaxis so more babies can be protected *



Use your best clinical judgement



when prescribing RSV prophylaxis

Tell insurers what families need



and provide the supporting evidence



*See the NPA's evidence-based guidelines at 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

PREEMIE BOOK ON SALE

ONCE UPON A PREEMIE

BY JENNÉ JOHNS
AUTHOR | SPEAKER | ADVOCATE



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Still a Premie?

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

But that's not every preemie's story.

Born between 34 and 36 weeks' gestation?

STILL A PREMIE

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



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



Born preterm at a "normal" weight?

STILL A PREMIE

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

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

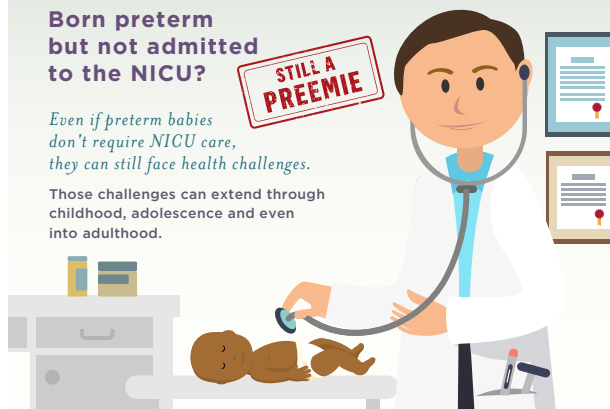


Born preterm but not admitted to the NICU?

STILL A PREMIE

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

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



Some Premies

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

All Premies

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

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

OPIOIDS and NAS

When reporting on mothers, babies, and substance use

LANGUAGE MATTERS



I am not an addict.

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



I was exposed to opioids.

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



NAS is a temporary and treatable condition.

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



My mother may have a SUD.

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

My potential is limitless.

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



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

National Perinatal Association



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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 Sandeep Lankireddy, BA, OMS 3

For children born prematurely, assess developmental risks with help of new report

NEWS PROVIDED BY

[American Academy of Pediatrics](#)

by Beth Ellen Davis, M.D., M.P.H., FAAP

June 26, 2023

One in 10 U.S. infants is born preterm (<37 weeks' gestation), and most are cared for by their primary care pediatrician.

While advances in neonatal intensive care units have improved neonatal mortality dramatically, especially for extremely preterm infants (<28 weeks' gestation), prematurity and other perinatal conditions place infants at high risk for many developmental disabilities.

A new AAP clinical report consolidates contemporary data to provide a primary care framework that informs pediatricians about developmental risks for infants with a history of prematurity.

The report Primary Care Framework to Monitor Preterm Infants for Neurodevelopmental Outcomes in Early Childhood, from the AAP Council on Children with Disabilities and Committee on Fetus and Newborn, is available at <https://doi.org/10.1542/peds.2023-062511> and will be published in the July issue of Pediatrics.

Challenging Evaluations

Pediatricians are trained to recognize early developmental differences by providing targeted screening and enhanced surveillance throughout infancy, toddler and preschool years. Despite extensive research on neonatal outcomes, clinical decision-making about the degree of developmental risk associated with a child's perinatal history can be challenging.

The report provides suggestions for enhanced monitoring by pediatricians throughout early childhood when increased developmental risks are identified.

The framework, for example, helps providers quickly appreciate the risk of a motor disability such as cerebral palsy (CP) in a child born at less than 28 weeks' gestation, which is 23-45 times greater than for children in the general pediatric population. Even a child born at 32-36 weeks' gestation has a risk of CP that is two times greater than the general pediatric population.

There is a brief update on developmental disabilities associated with prematurity and neonatal complications such as gestational age, intraventricular hemorrhage, hypoxic ischemic encephalopathy, bronchopulmonary dysplasia, retinopathy of prematurity and necrotizing enterocolitis.

Discussing Findings

To help pediatricians discuss their findings with families, brief overviews address developmental disabilities associated with prematurity, including neurodevelopmental impairment, intellectual disability, visual impairment, hearing loss and autism spectrum disorder, and risk for later-presenting, lower-severity disabilities, such as learning disorders.

Pediatricians also can use the report to help them confidently reassure a family when their child is developing typically in various developmental domains, despite a high-risk history.

Recommendations

In addition to maintaining a collaborative relationship with local neonatology and high-risk infant follow-up programs, pediatricians can implement appropriate next steps for all children born prematurely, which may include:

- referral to early intervention services (Individuals with Disabilities Education Act Part C);
- enhanced screening and surveillance as outlined in Figure 2 in the report; and
- discussions with families about when and how developmental monitoring is occurring, and provision of additional supports if social determinants of health needs are unmet.

For children with increased degrees of risk for developmental disabilities, additional actions may include:

- referral to high-risk infant follow-up program and supports;
- timely referral or follow-up to ophthalmology and audiology, if indicated;
- caregiver education about episodes that may be a sign of a seizure disorder; and/or

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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.

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- referral to physical therapy, occupational therapy and/or speech-language pathology to clarify the nature of developmental concerns.

The benefits of risk awareness based on a child's perinatal course can help inform the need for enhanced developmental surveillance between regularly scheduled health supervision visits and developmental screening. This can facilitate early identification, timely intervention and healthy development for all children.

Dr. Davis is a lead author of the clinical report. She is a former member of the AAP Council on Children with Disabilities Executive Committee.

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NT

Impact of postnatal steroids on peripheral avascular retina and severity of retinopathy of prematurity

NEWS PROVIDED BY

[Pediatric Research](#)

by Shekhawat, PS; Ali, MAM; Kanekanti, N; et al.

June 8, 2023

Background

We investigated the role of postnatal steroids on the severity of retinopathy of prematurity (ROP) and its impact on peripheral avascular retina (PAR).

Methods

A retrospective cohort study of infants born at ≤ 32 weeks gestation and/or birth weight ≤ 1500 g. Demographics, the dose and du-

ration of steroid treatment, and age when full retinal vascularization occurred were collected. The primary outcomes were the severity of ROP and time to full vascularization of the retina.

Results

A total of 1695 patients were enrolled, 67% of whom received steroid therapy. Their birth weight was 1142 ± 396 g and gestational age was 28.6 ± 2.7 weeks. The total hydrocortisone-equivalent dose prescribed was 28.5 ± 74.3 mg/kg. The total days of steroid treatment were 8.9 ± 35.1 days. After correction for major demographic differences, infants who received a higher cumulative dose of steroids for a longer duration had a significantly increased incidence of severe ROP and PAR ($P < 0.001$). For each day of steroid treatment, there was a 3.2% increase in the hazard of the severe form of ROP (95% CI: 1.022–1.043) along with 5.7% delay in achieving full retinal vascularization (95% CI: 1.04–1.08) ($P < 0.001$).

Conclusion

Cumulative dose and duration of postnatal steroid use were independently associated



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with the severity of ROP and PAR. Thus, postnatal steroids should be used very prudently.

Impact

- We report ROP outcomes in a large cohort of infants from two major healthcare systems where we have studied the impact of postnatal steroids on the severity of ROP, growth, and development of retinal vessels.
- After correcting our data for three major outcome measures, we show that high-dose postnatal steroids used for a prolonged duration of time are independently associated with severe ROP and delay in retinal vascularization.
- Postnatal steroids impact the visual outcomes of VLBW infants significantly, so their clinical use needs to be moderated.

NT

Pediatric hospital prevents central line infections for nearly a year

NEWS PROVIDED BY

[Medical Xpress](#)

By Association for Professionals in Infection Control

June 28, 2023

A Virginia pediatric hospital eliminated central line-associated bloodstream infections (CLABSI) among its most vulnerable patients for 300 days during 2021 and 2022. Their results are being presented at the Association for Professionals in Infection Control and Epidemiology's (APIC's) Annual Conference in Orlando Florida,

June 26-28.

When the infection prevention and quality departments at Inova L.J. Murphy Children's Hospital, part of the Inova Health System and located in Falls Church, Virginia, benchmarked their CLABSI rates against other pediatric hospitals, they saw opportunities for improvement. Recognizing the need for a multidisciplinary solution, infection preventionist Becky Lopian, MPH, CIC, and quality director Allison Barberio, MHSA, CPHQ, formed a team that included frontline nurses and techs, environmental services personnel, physicians, neonatologists, and OR and Emergency Department staff.

Through regular harm prevention meetings and infection prevention work groups, they homed in on opportunities to improve environmental cleaning, line access, and auditing practices. Meticulous focus on central line removal, proper line maintenance, and daily device rounding by the multi-disciplinary team, as well as better patient education on oral, personal, and hand hygiene by bedside nurses, contributed to a 80% drop in Standardized Infection Ratio (SIR).

Their collaboration resulted in over 300 days without a CLABSI with more than 10,000 days that patients had a central line in the hospital between 2021 and 2022.

"We realized that to truly drive down infections and sustain our progress, we had to look beyond basic practices and engage a diverse team in process improvement," said Lopian. "Our success is truly owned by every member of the team."

"A CLABSI can be catastrophic for any patient with a central line," said 2023 APIC President, Patricia Jackson. "The Inova team shows how a collaborative approach that engages multiple stakeholders can lead to improved patient outcomes."

NT

American Academy of Pediatrics Proposes Primary Care Framework to Evaluate Preterm Infants for Early Childhood Developmental Risks

NEWS PROVIDED BY

[American Academy of Pediatrics](#)

Media Contact: Lisa Black

June 26, 2023

Preterm birth and its complications are the leading causes of neonatal illnesses and deaths in the United States. Early identification of neurodevelopmental conditions for children who graduated from the neonatal intensive care unit is critical, according to a new clinical report from the American Academy of Pediatrics (AAP) published in the July 2023 issue of *Pediatrics* (published online June 26). The report "Primary Care Framework to Monitor Preterm Infants for Neurodevelopmental Outcomes in Early Childhood" encourages primary care pediatricians to take a more critical role in the long-term, timely, and coordinated care needed by high-risk infants during their early childhood years. This includes assessing growth, development, feeding, and behavior; mitigating functional limitations; and determining appropriate medical subspecialty and community level supports. In keeping with the tenets of family-centered care and the medical home, the AAP says the use of ongoing developmental surveillance, coordinated-care, shared decision making, strengths-based guidance, and advocacy for appropriate rehabilitative or rehabilitative services is essential. Benefits of risk awareness based on history of perinatal conditions can empower pediatricians to prioritize healthy development. Authors of the report say increased awareness coupled with heightened developmental surveillance between routine health supervision or validated screening visits will optimize early identification and referral of

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at-risk children with signs or symptoms of developmental differences. Lastly, another benefit of linking perinatal risk awareness to neurodevelopmental outcomes is to prompt clinicians to seek additional information when developmental delays exceed anticipated risks.

###

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.

NT

Female leadership in neonatology: The value of mentorship

NEWS PROVIDED BY

[Boston Children's Hospital](#)

by Nancy Fliesler

March 21, 2023

While the majority of neonatologists are women, women make up a far smaller proportion of neonatologists in leadership positions. A recent national survey led by Kristen Leeman, MD, in the Division of Newborn Medicine at Boston Children's and Lindsay Johnston, MD, at Yale, finds that many female neonatologists face roadblocks to career development. They often miss out on speaking engagements, career guidance, additional training, networking opportunities, and above all, mentors.

To learn more about their needs, Leeman and her colleagues contacted nearly 4,000 female neonatologists from the AAP-affiliated Women in Neonatology group and a Facebook group for female neonatologists. They received 451 survey responses, revealing several additional challenges:

- gender-based salary discrepancies, reported by 49 percent of respondents
- delayed promotion (37 percent)
- harassment by colleagues (31 percent), trainees (8 percent), staff (24 percent), and patient families (32 percent)
- lack of an established mentor (61 percent).

Female neonatologists also tend to struggle more than their male counterparts with work/life balance issues, Leeman notes, making it hard to advance. "Women commented on child care stress and burnout," she says. "The supports are not there at vulnerable times in their careers. It's a leaky pipeline."

Building a mentoring program for female neonatologists

Leeman and Johnston decided to address what they see as the key missing ingredient — mentors.

"Both of us have had the benefit of superb mentorship, which has been integral to our careers," says Leeman. "We wanted to offer an opportunity for all women across the U.S. to have access to female role models to help mentor them through different elements of their careers."

With colleagues across the country, they created the National Women in Neonatology Mentorship Program. Bringing together senior, mid-career, and junior neonatologists, the year-long pilot program, which concludes in August, has three goals:

- to provide resources to facilitate career advancement and professional and personal satisfaction
- to identify strategies to help female neonatologists gain appropriate compensation, promotions, and professional recognition
- to foster a feeling of community.

In virtual and in-person meetings, the

program's 250-plus participants read and discuss materials, hear speakers, share their thoughts and experiences, network, offer mutual encouragement, and consult with mentors. The program has various subgroups, including groups for women practicing in community NICUs, groups for specific interests like global health or lab research, and groups for women from backgrounds that tend to be underrepresented in medicine.

Neonatology mentorship at Boston Children's: Balancing medicine, research, and family

Patricia Davenport, MD, and Martha Sola-Visner, MD, neonatologists at Boston Children's, illustrate the value of mentorship. As a junior faculty member, Davenport found herself juggling her clinical, research, and family responsibilities. In addition to caring for patients in the NICU, she joined Sola-Visner's lab to conduct research on neonatal platelet transfusions. Sola-Visner quickly became a mentor.

"Martha's mentorship has been crucial to me," Davenport says. "She values her patients, her research, and her family. Holding those three things equally in your hands is really important. I had never done basic science before and needed a lot of mentoring, not just at the bench but also writing and presenting."

Whether it's an unfortunate patient outcome, an experiment that didn't work, or a family emergency, Sola-Visner has been a vital support and sounding board. And the benefits of mentorship flow in both directions.

"I'm established now, and at this stage in my career, seeing other people progress and move forward is the most rewarding part of what I do," says Sola-Visner. "Making sure that the people who I've mentored are succeeding becomes more and more important over time. I get great joy to see that."

Davenport is also an enthusiastic participant in the national pilot mentorship program, where she is part of a subgroup on basic science.





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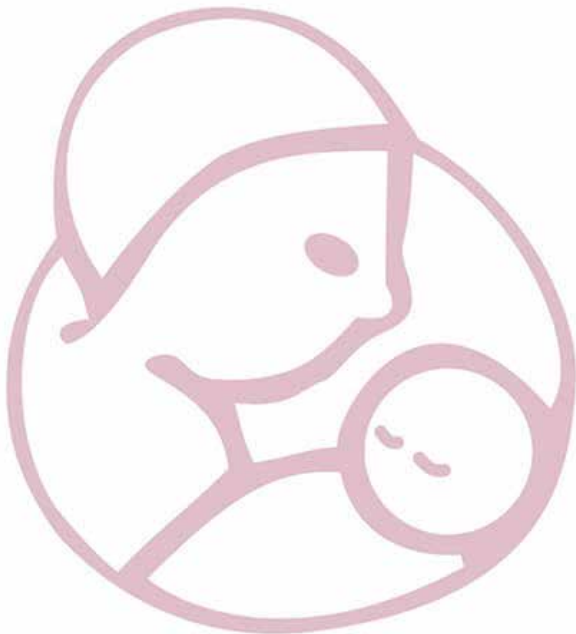
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Consultation

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

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"We talk about funding difficulties, how to organize a lab, wellness, how to care for yourself," she says. "There's a real sense of community across the nation. You're always asking, 'am I good enough?' and it's nice to hear other women having the same thoughts and feelings of 'imposter syndrome.' But we're all doing good work."

NT

Close contact intervention between mum and her premature baby may cut risk of death by almost a third

NEWS PROVIDED BY

[British Medical Journal](#)

May 6, 2023

'Kangaroo mother care' seems to reduce the risk of infant mortality by 32% and severe infection by 15%, study suggests.

A method of care involving skin-to-skin contact between a mother and her prematurely born or low birth weight baby appears to impact the child's chances of survival significantly, suggests a study published online in the journal *BMJ Global Health*.

Starting the intervention within 24 hours of birth and carrying it out for at least eight hours a day both appear to make the approach even more effective in reducing mortality and infection, researchers found.

The method of care known as 'Kangaroo mother care' (KMC) involves an infant being carried, usually by the mother, in a sling with skin-to-skin contact and many studies already carried out have shown this is a way of reducing mortality and the risk of infection for the child.

The World Health Organization recommends it as the standard of care among low birth weight infants after clinical stabilisation.

However, less is known about the ideal time at which to begin the intervention. Hence, researchers from India conducted a review of numerous large multi-country and community-based randomised trials on the subject.

By looking at existing studies, they set out to compare KMC with conventional care and to compare starting the approach early (within 24 hours of the birth) with later initiation of KMC to see what effect this had on neonatal and infant mortality and severe illness among low birth weight and preterm infants.

Their review looked at 31 trials that included 15,559 infants collectively and of these, 27 studies compared KMC with conventional care, while four compared early with late initiation of KMC.

Analysis of the results showed that compared with conventional care, KMC appeared to reduce the risk of mortality by 32% during birth hospitalisation or by 28 days after birth, while it seemed to reduce the risk of severe infection, such as sepsis, by 15%.

It also emerged that the reduction in mortality was noted regardless of gestational age or weight of the child at enrolment, time of initiation, and place of initiation of KMC (hospital or community).

It was also noted that the mortality benefits were greater when the daily duration of KMC was at least eight hours per day than with shorter duration KMC.

Those studies that had compared early with late-initiated KMC demonstrated a reduction in neonatal mortality of 33% and a probable decreased risk of 15% in clinical sepsis until 28 days following early initiation of KMC.

The review had some limitations in that the studies looked at involved an intervention that was obviously known about by participants so that it could be seen as biased,

and very low birth weight, extremely preterm neonates, and severely unstable neonates were often excluded from studies.

However, the review authors said that the risk of bias in the included studies was generally low, and because their review had included a comprehensive and systematic search of existing studies, the certainty of the evidence for the primary outcomes was moderate to high.

They concluded: "Our findings support the practice of KMC for preterm and low birth weight infants as soon as possible after birth and for at least eight hours a day.

"Future research should focus on overcoming barriers and facilitators to large-scale implementation of KMC in facility and community settings. Data on long-term neurodevelopmental outcomes are also needed."

Research: Kangaroo mother care for preterm or low birth weight infants: a systematic review and meta-analysis doi:10.1136/bmjgh-2022-010728

Journal: *BMJ Global Health*

NT

Kangaroo care gets a major endorsement. Here's what it looks like in Ivory Coast

NEWS PROVIDED BY

[NPR](#)

by Andrew Caballero-Reynolds

June 8, 2023

Kangaroo care received a ringing endorsement in a study published in the *British Medical Journal* this week.

It's the latest affirmation of skin-to-skin care for small and preterm babies to reduce the risk of infection and mortality.



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Reviewing 31 trials that involved over 15,000 infants, the new study noted a reduction in childhood mortality by approximately a third among those who experienced kangaroo care starting within 24 hours of birth.

The World Health Organization offered a similar perspective last November, advising "immediate skin to skin care for survival of small and preterm babies."

In other words: When a baby is born prematurely, a good way to help the baby survive and thrive is simply to hold it close to a parent's naked chest.

The name conjures up the way that kangaroo moms hold their offspring in their pouch.

The technique is especially valuable in low-resource areas of the world that may be short on medical technology, including incubators. Kangaroo care, in effect, turns parents into pseudo-incubators. No technology needed!

In 1978, physician researchers Edgar Rey Sanabria and Héctor Martínez-Gómez introduced the technique at the maternity

ward of the San Juan de Dios Hospital in Bogota, Colombia. They were hoping to find a way to reduce the country's high death rate for premature infants — approximately 70% at the time.

Formerly, these premature babies were placed in incubators — when they were available — to control the infants' temperatures, provide an optimal amount of oxygen and keep them away from disturbing loud noise and bright lights. But resource-poor countries have precious few incubators, and babies were dying for lack of technology.

The Colombian researchers found that parent-child snuggling had benefits similar to incubators.

Kangaroo care works, researchers believe, because the infants pick up heartbeat and breathing rhythms from the parents' bodies, helping to stabilize their own heartbeat and breathing. The body warmth of a parent also helps control the baby's temperature.

The researchers published their results in the 1983 Spanish language journal *Curso de Medicina Fetal*. They presented their


results that year at a UNICEF conference: The babies in kangaroo care sleep more, and cry less, than those in incubators.

UNICEF, recognizing the potential of kangaroo care, began distributing information on the technique worldwide.

According to a study by the World Health Organization, starting kangaroo parental care immediately after birth has the potential to save up to 150,000 infant lives each year.

Since 1983, the practice has slowly spread around the world — for low-weight full-term babies as well as preemies and in wealthy nations as well as resource-poor countries. Fathers are being recruited as well — babies don't care which parent is the kangaroo.

One of the countries that has started to encourage this practice is Ivory Coast, where in 2019 the infant mortality rate for children under 12 months was 59 deaths per 1,000 births. By comparison, the average infant mortality rate in industrialized countries was 4 deaths per 1,000 births; the U.S. rate was 6 deaths per 1,000 births.



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In 2019 with the help of UNICEF, the University Hospital Medical Center at Treichville in Abidjan, the largest city in the country, opened its first kangaroo care ward. In the ward, referred to by the World Health Organization as a mother-infant ICU, the mother is available to the baby around the clock. This intensive care unit is under the guidance of pediatrician Dr. Some Chantière. It's a pilot program to educate mothers and fathers in a technique not widely known in the country.

"There was a lot of death and lack of knowledge on how to take care of premature babies among the parents we were discharging, so we had to start this," says Chantière. "We knew about the program from its roots in Colombia. Before the program, 60 to 70% of all the premature children that would come out of the NICU boxes [or incubators] would die. Now we are saving over 90%."

The new program is "of critical importance in reducing the mortality of premature babies and can influence hospitals from the public to private sector in Cote d'Ivoire," says Dr. Berthe Evelyne Lasme-Guillao, associate lecturer of pediatrics at the Université Félix Houphouët-Boigny and head of the neonatology department at the CHU hospital in Yopougon.

She believes kangaroo care is a perfect fit for Cote d'Ivoire because of the high infant death rate and the dearth of medical technology, including incubators. "Programs like this can be adapted anywhere with dedicated and trained people," say Lasme-Guillao.

Dads are being trained in the technique, too, according to Mark Vincent, UNICEF representative in Cote d'Ivoire. "The fathers see the importance of the close proximity of the babies to the mother's body," he says. "They realize they can do it as well."

In April 2022, I was able to interview and photograph a number of couples who have participated in the Ivory Coast's pilot program of kangaroo care at the Treichville hospital.

These are the stories of the moms and dads – and babies – I met.

Not all kangaroo care starts in a hospital. Bru Adjen learned the program at home. His wife, Inzuwe Rose, gave birth to twins. The son weighed over 4 pounds but the daughter weighed only 2.7 pounds, making her a strong candidate for kangaroo care. Inzuwe Rose learned the technique in the hospital's ward and brought the knowledge home with her when her daughter had reached 4 pounds and could be released. She taught the technique to her husband.

He had never seen mothers, much less fathers, use kangaroo care. "The start was strange for me, but over time I got used to it," he says. "It was what we had to do and it saved my child's life."

Pastor Kubyas Abuwaka lives in the northern Yopogoon district. His wife, Abuwa Kristien, gave birth to twins. The boy, born weighing 2.6 pounds, died in the incubator. He and his wife feared they would lose their daughter, who weighed 2.7 pounds at birth, as well.

But when mother and daughter were admitted to the hospital's mother-infant ward, their girl gained weight rapidly. By the time she reached 4 pounds, she was discharged to continue the program at home.

"I saw the benefit, and I have been doing kangaroo care with my wife for a month and a half," says Abuwaka. "We both do it. It creates a link to my child and brings me closer with my wife."

The snuggling technique, he says, has made him a better father. "I want other fathers to take part in this. I know fathers have time issues with work, but it is important to get more involved helping mothers."

Ablodie Kouwasi, 35, gave birth five weeks prematurely to triplets. Each baby weighed under 4 pounds. Soon after birth, one infant died.

The surviving babies went into two of the hospital's scarce incubators long enough to stabilize their breathing and heart rates before coming out to make room for other infants in need. But Kouwasi and her hus-

band, Yappe Pako, could only take their daughter, Ambo Mari Este, home. Their son, Ambo Crisostome, had contracted malaria and had to stay in the hospital.

But without the support of the incubator, neither infant thrived. Their baby girl lost weight at home, and while their son recovered from malaria, he did not gain weight.

The hospital staff suggested kangaroo care, and mother and her two infants were admitted to the kangaroo care ward. The couple learned the techniques of skin-to-skin care, and mom was on hand around the clock.

It worked quickly. "My wife has been doing it for three weeks, and now my son is healthy, and gaining weight. My daughter gained all her lost weight back, and more," says Pako. "I started taking part myself to give the love of a father to my children."

I met Day Adeline, 40, when her babies were two weeks old. "My twins were born at 32 weeks, both under 1.3 kilograms (3 pounds)," she says. "The doctors say I cannot walk outside [and risk contracting an illness] to make sure they do not get sick. I have to stay inside this room." But she loves to walk with them. Holding one at a time, bare skin to bare skin, she walks laps in the small ward to pass the time, and to get her own exercise. "The kangaroo experience has been good. I love it because I can walk with them and have them with me, and it encourages growth." When the babies reached 4 pounds, she was able to go home with them. Doctors say it typically takes 2 to 3 weeks of kangaroo care before a newborn can leave the ward.

Youal Emmual, 15, is in 9th grade. Her twins, born at 32 weeks, both weighed under 3 pounds. Mother and babies were all admitted to the kangaroo care ward, where Emmual was happy to be taken under the wings of some older mothers. In addition to the education provided by hospital staff, some of the older mothers in the ward form a kind of impromptu village, passing their knowledge and experiences on to younger mothers. "There is a community in this

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ward," says Emmual. "The other mothers are always here for me. I can see my children growing. I will be here for another week or two. I want to go back home to continue school. I will continue to do kangaroo at home."

While Aluneumua Kalmel, 40, is taking care of her premature son in the kangaroo ward, her grandmother watches her other three children at home. "In this community that we have formed we do everything together," she says of the ward. "When one person wakes up, we all wake up to help each other. We eat together, and we make sure we are all looking out for each other. We have formed a village. We like it so much, even if we didn't need to be here, we would want to stay. It's safer and healthier for the child. If we were home alone, we would not have this knowledge. When I am out of here, I want to be an advocate for the program in my community. I have seen how it has saved children."

Weighing just 2.7 pounds, the baby girl had no name when I met her in April, 2022 in Cote d'Ivoire. Her mother, Diara Subs Aisha, was following a common local practice among parents to put off naming premature babies until they're confident the infants will survive. On her first day in the mother-infant kangaroo ward at the hospital, Aisha waits to take a class, her baby on her chest, as the infant pokes a tiny hand from under a blanket.

Andrew Caballero-Reynolds is a freelance photographer based in Abidjan, Côte d'Ivoire. He was a staff photographer and editor with AFP. He worked as the Reuters chief photographer in Sri Lanka and as a Gulf News staff photographer in Dubai. He has also worked as an emergency logistics coordinator for Doctors Without Borders and a National Forest Service firefighter in Oregon on a hotshot crew.

NT



Persistent barriers to achieving quality neonatal care in low-resource settings: perspectives from a unique panel of frontline neonatal health experts

NEWS PROVIDED BY

[The Journal of Global Health Reports](#)

by Eshkeerat Kaur, Michelle Heys, Caroline Crehan, Felicity Fitzgerald, Msandeni Chiume, Ellen Chirwa, Emma Wilson, Mari Evans

March 24, 2023

Background

Despite increasing rates of facility-based deliveries, neonatal mortality rates remain persistently high in low-resource settings (LRS). This has catalysed international focus on understanding and enabling quality newborn care. We aimed to understand persistent barriers to Quality of Care (QoC) and to identify quality improvement priorities from the perspective of a panel of neonatal experts with first-hand experience of delivering newborn care in low-resource settings (LRS).

Methods

We conducted 13 semi-structured interviews with neonatal health experts via Skype. All interviews were recorded and transcribed verbatim. We adopted an inductive thematic analytical approach. Ethical approvals were not required.

Results

Twenty-two experts were invited to participate, of whom 16 responded and 13 agreed to take part (five neonatologists, six paediatricians and two advanced neonatal nurse practitioners). Participants had a mean of 13 (± 7 SD) years working in LRS. Lack of physical resources including basic equipment and infrastructure such as running water, combined with limited human resources, education and specialist neonatal training were cited as key barriers to delivering quality care. In addition, weak leadership at the community, local and national level were thought to hinder progress. Poor communication within

clinical teams, limited documentation and lack of standardised and locally appropriate guidelines were also identified as challenges. Digital technologies were perceived to have potential for data capture and enabling standardised care. However, some highlighted that unreliable internet access and possible stigma may hinder implementation.

Conclusions

With less than 10 years to reach the Sustainable Development Goals (SDGs), it is critical to ensure access to quality care for all sick and vulnerable newborns admitted to health facilities. Clinical leaders in low resource settings need to be empowered to define local agendas and advocate for critical resources in order to close the gap between local and global quality of care priorities.

NT

Paenibacillus spp infection among infants with postinfectious hydrocephalus in Uganda: an observational case-control study

NEWS PROVIDED BY

[The Lancet](#)

by Sarah U Morton, MD; Christine Hehnly, PhD; Kathy Burgoine, MD; Paddy Ssentongo, MD; Jessica E Ericson, MD; M Senthil Kumar, PhD; et al.

June 19, 2023

Background

Paenibacillus thiaminolyticus is a cause of postinfectious hydrocephalus among Ugandan infants. To determine whether *Paenibacillus* spp is a pathogen in neonatal sepsis, meningitis, and postinfectious hydrocephalus, we aimed to complete three separate studies of Ugandan infants. The first study was on peripartum prevalence of *Paenibacillus* in mother–newborn pairs. The second study assessed *Paenibacillus* in blood and cerebrospinal fluid (CSF) from neonates with sepsis. The third study assessed *Paenibacillus* in CSF from

infants with hydrocephalus.

Methods

In this observational study, we recruited mother–newborn pairs with and without maternal fever (mother–newborn cohort), neonates (aged ≤ 28 days) with sepsis (sepsis cohort), and infants (aged ≤ 90 days) with hydrocephalus with and without a history of neonatal sepsis and meningitis (hydrocephalus cohort) from three hospitals in Uganda between Jan 13, 2016 and Oct 2, 2019. We collected maternal blood, vaginal swabs, and placental samples and the cord from the mother–newborn pairs, and blood and CSF from neonates and infants. Bacterial content of infant CSF was characterised by 16S rDNA sequencing. We analysed all samples using quantitative PCR (qPCR) targeting either the *Paenibacillus* genus or *Paenibacillus thiaminolyticus* spp. We collected cranial ultrasound and computed tomography images in the subset of participants represented in more than one cohort.

Findings

No *Paenibacillus* spp were detected in vaginal, maternal blood, placental, or cord blood specimens from the mother–newborn cohort by qPCR. *Paenibacillus* spp was detected in 6% (37 of 631 neonates) in the sepsis cohort and, of these, 14% (5 of 37 neonates) developed postinfectious hydrocephalus. *Paenibacillus* was the most enriched bacterial genera in postinfectious hydrocephalus CSF (91 [44%] of 209 patients) from the hydrocephalus cohort, with 16S showing 94% accuracy when validated by qPCR. Imaging showed progression from *Paenibacillus* spp-related meningitis to postinfectious hydrocephalus over 1–3 months. Patients with postinfectious hydrocephalus with *Paenibacillus* spp infections were geographically clustered.

Interpretation

Paenibacillus spp causes neonatal sepsis and meningitis in Uganda and is the dominant cause of subsequent postinfectious hydrocephalus. There was no evidence of transplacental transmission, and geo-

graphical evidence was consistent with an environmental source of neonatal infection. Further work is needed to identify routes of infection and optimise treatment of neonatal *Paenibacillus* spp infection to lessen the burden of morbidity and mortality.

Funding

National Institutes of Health and Boston Children's Hospital Office of Faculty Development.

NT

Mother-to-child transmission of SARS-CoV-2 infection in high-income countries: a systematic review and meta-analysis of prospective observational studies

NEWS PROVIDED BY

[Scientific Reports](#)

by Morniroli, D.; Vizzari, G.; Tosi, M. et al.

May 31, 2023

Abstract

Mother-to-child transmission of SARS-CoV-2 has been reported since the onset of the COVID-19 pandemic. We conducted a study to summarize evidence on the risk of mother-to-child transmission in the first 30 days after birth in high-income countries and to evaluate the association between preventive measures and the risk of infection for the neonate. A systematic review and meta-analysis were undertaken following PRISMA guidelines. The National Library of Medicine, Web of Science, and Excerpta Medica databases were screened on February 26, 2022. All pro-

spective observational studies addressing the frequency of infection in infants born to mothers SARS-CoV-2 positive were included. Twenty-six studies were included, reporting data of 2653 mothers with SARS-CoV-2 and 2677 neonates. The proportion meta-analysis pointed out an overall estimate of SARS-CoV-2 infection among infants of 2.3% (95% CI: 1.4–3.2%). Data from studies with (1.4%, 95% CI: 0.8–2) and without (1.3%, 95% CI: 0.0–2.7%) rooming-in provided similar risk of infection. Adopting at least two prevention measures during rooming-in resulted in a rate of mother-to-child infection of 1.0% (95%CI: 0.3–1.7%). The results of this study show a low rate of perinatal infection, support the rooming-in and confirm the effectiveness of preventive measures in reducing the risk of mother-to-child viral transmission.

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Genetics Corner: Sleep-Disordered Breathing in a Term Newborn with Achondroplasia

Robin Dawn Clark, MD

“A 39-week-gestation female infant with suspected skeletal dysplasia was born to a 32-year-old G6P4SAb2 mother of average stature by repeat C-section.”

Case Summary:

A 39-week-gestation female infant with suspected skeletal dysplasia was born to a 32-year-old G6P4SAb2 mother of average stature by repeat C-section. BW was 3.42 kg, BL was 37.3 cm, and HC was 37.3 cm. She was treated with blow by O₂ at 4 minutes of life with fluctuating saturations at 39-76% and weaned to room air by 8 minutes without grunting or retractions. A nasal cannula was applied with a flow of 1LPM at 21% FiO₂ x 1 hour. Saturation in room air was normal, 96% and respiratory rate was 41. Initial glucose was 51. Apgar scores were 7 and 9. The baby was admitted to the regular nursery to room in with her mother.

Radiographs showed classic features of achondroplasia: macrocephaly, small chest, short ribs, narrow thorax, anterior vertebral beaking, lack of the normal progression of interpedicular distance from the upper thoracic to the lumbar vertebrae, flat acetabular roof, squared iliac wings, narrow sacrosciatic notch. The metacarpals and long bones were short, especially the humeri, tibiae, and femurs. Metaphyses were flared and irregular, especially proximal femoral metaphyses. There was mild bowing of the tibiae and fibulae.

The infant had typical features of achondroplasia on physical examination. When sleeping, there was no respiratory distress. She had macrocephaly with frontal bossing and hypoplastic midface. Her thorax was narrow and short without cyanosis, tachypnea, or retractions, although there was paradoxical breathing: the chest sunk, and the abdomen rose with inspiration. There was a mild lumbar gibbus. She had disproportionate short stature with rhizomelic shortening of the extremities and trident-shaped hands with a distal gap between the middle and ring fingers. She had generalized joint hypermobility and hypotonia. Hip abduction was limited to 145 degrees.

The family history was not contributory. The father was 36 years of age.

“A polysomnogram on day of life 5 was abnormal, with significant central and obstructive sleep apnea and short (< 20 seconds) central apneas associated with significant desaturations. A pulmonology consultant recommended a repeat sleep study with supplemental O₂. There was a substantial improvement in the sleep study performed on day of life 8 with 0.5LPM of supplemental O₂ by nasal cannula.”

When the mother was ready for discharge, the baby had not yet had a sleep study that had been ordered shortly after delivery. The family lived an hour from the hospital in a rural area, so the infant was transferred to the NICU to complete the recommended workup before discharge. A polysomnogram on day of life 5 was abnormal, with significant central and obstructive sleep apnea and short (< 20 seconds) central apneas associated with significant desaturations. A pulmonology consultant recommended a repeat sleep study with supplemental O₂. There was a substantial improvement in the sleep study performed on day of life 8 with 0.5LPM of supplemental O₂ by nasal cannula.

“A brain and cervical spine MRI showed no cord impingement at the level of the foramen magnum as the CSF space around the cranio-medullary junction was maintained.”

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	Central Apneas (Index: #events /hr)	Obstructive Apneas (Index)	Mixed Apneas	Total Apneas (Index)	Total Hypopneas (central/ obstructive)	Total Apneas + Hypopneas (Index)	Min Sp O ₂	Total time Sp O ₂ < / = 88 % (min)
Polysomnogram day of life 5	98 (12.3)	20 (2.5)	3	121 (15.1)	18 (0/18)	139 (17.4)	78%	141 min
Polysomnogram with 0.5 L nasal O ₂ day of life 8	22 (2.8)	7 (0.9)	0	29 (3.6)	13 (0/13)	42 (5.3)	81%	10.6 min

A brain and cervical spine MRI showed no cord impingement at the level of the foramen magnum as the CSF space around the cranio-medullary junction was maintained. No foramen magnum narrowing was seen. However, the narrowing of the canal in the cervical and upper thoracic spine caused moderate to severe stenosis, most pronounced at the upper cervical spine levels. The neurosurgery consultant did not recommend surgical intervention. After passing a car seat test, the baby was discharged at 11 days of age on supplemental O₂ with an apnea monitor and plans for outpatient follow-up with otolaryngology and other specialists.

Assessment:

Achondroplasia, the most common type of skeletal dysplasia, is associated with significant health concerns that begin in infancy and extend throughout life. The most serious early problems include cervical cord impingement from a narrow foramen magnum, spinal stenosis, and central and obstructive sleep apnea (1). Untreated, these problems can be lethal, causing a significantly increased risk of sudden infant death (SIDS) in achondroplasia.

“Unexpected infant death occurs in up to 7.5% of infants with achondroplasia (2). Legare et al. (3) reported that acute life-threatening events (ALTEs) occurred in the first year of life in 18 of 477 individuals (3.8%).”

Unexpected infant death occurs in up to 7.5% of infants with achondroplasia (2). Legare et al. (3) reported that acute life-threatening events (ALTEs) occurred in the first year of life in 18 of 477 individuals (3.8%). Most ALTEs (14/18, 78%) occurred in the first six months of life and presented as episodes of apnea or seizures, often while infants were in car seats (11/18, 61%).

Although these risks are widely understood, there is no consensus on how to assess the newborn with achondroplasia to minimize these risks. Guidelines from the American Academy of Pediatrics (1) published in 2020 recommend that infants with achondroplasia should have a polysomnogram study in the first month of life or if diagnosed later in infancy, then at the time of diagnosis. An international consortium published in 2022 recommends a sleep study in the first year of life (4). Gooch et al. (5) reported their protocol in

2019, which specifies that all newborns with achondroplasia have a polysomnogram prior to discharge, and if abnormal, the infant would have an evaluation by a sleep specialist before discharge. Their medical center in Alabama serves a large area that includes rural communities without local hospitals at some distance from their facility, similar to our region.

For this reason, I followed their lead and completed the sleep study before discharge. Although she had reassuring MRI imaging of her craniocervical junction, need more detailed imaging studies may be needed to demonstrate cord impingement. Kashanian et al. (6) describe their protocol for neuroimaging infants with achondroplasia that includes flexion and extension views, which can demonstrate impingement that is not evident in a neutral position.

Although my decision to delay the baby’s homecoming by a week to complete her work up, was not a popular one, it was justified in retrospect by the pathology demonstrated in the first polysomnogram and by the improvement in the subsequent polysomnogram with supplemental O₂. There was no outward evidence of central or obstructive apnea while the baby was rooming in with her mother. This argues for performing a polysomnogram in infants with achondroplasia even when apnea is not clinically suspected. Had this baby been discharged without a sleep study, she would have been subject to apnea and its sequelae and to hours of nightly desaturations that could adversely affect her brain development.

“There was no outward evidence of central or obstructive apnea while the baby was rooming in with her mother. This argues for performing a polysomnogram in infants with achondroplasia even when apnea is not clinically suspected.”

Achondroplasia is the most common type of dwarfism, occurring in 1 in 15-25,000 live births. It is typically caused by one of two recurrent pathogenic gain-of-function variants in *FGFR3*. It is a *de novo* or new mutation in 80% of cases, almost always occurring on the paternally transmitted allele. Twenty percent of the time, the condition is inherited from a similarly affected parent as an autosomal dominant trait. *FGFR3* signaling inhibits chondrocyte proliferation and differentiation. The pathogenic variants respon-

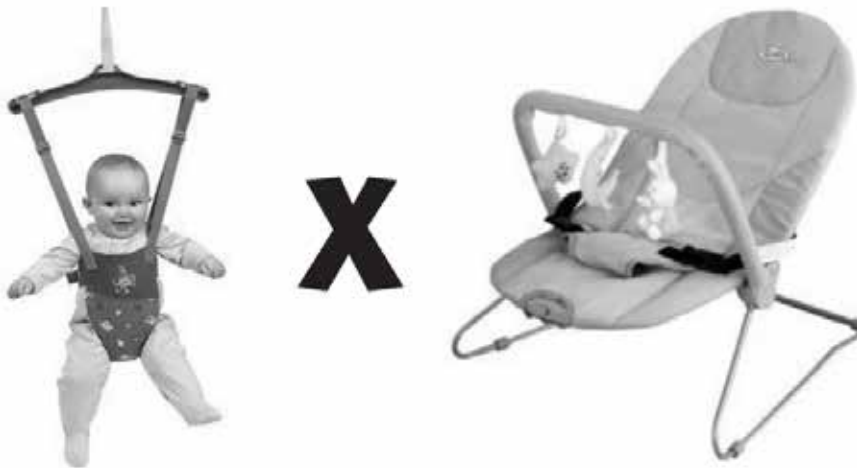
sible for achondroplasia cause a gain-of-function in this pathway that increases signaling and inappropriately suppresses chondrocyte proliferation and differentiation at the growth plate.

New therapeutic agents are designed to block the pathway downstream from this gain-of-function FGFR3 signal and reduce its effectiveness. One drug, Vosoritide (BioMarin), has been FDA-approved in the United States for achondroplasia from age 5 (in Europe, it is approved for use from age 2). It enhances the growth of long bones and increases height. Infants are being treated with Vosoritide on a research basis to determine if this therapy may ameliorate the risk of severe co-morbidities, including craniocervical compression at the foramen magnum and SIDS.

“Meanwhile, efforts should also be focused on reducing the risk of injury to the cervical cord. New parents of infants with achondroplasia need detailed education about how to handle their baby, specifically, the need to support their baby’s head, neck, and spine.”

Meanwhile, efforts should also be focused on reducing the risk of injury to the cervical cord. New parents of infants with achondroplasia need detailed education about how to handle their baby, specifically, the need to support their baby’s head, neck, and spine. A baby with achondroplasia should have head support when in a car seat. Soft infant carriers such as baby slings, front-loading baby carriers, umbrella-type strollers, or soft-backed infant seats that allow the head to flex forward onto the chest should be avoided. The baby should not use a bouncer. Educational materials about caring for infants with achondroplasia designed for new parents are available. (7,8). The illustration below (8) shows examples of seating that should be avoided for infants with achondroplasia.

These types of play equipment are not recommended



Parents should be instructed to notify their healthcare provider immediately if there is any change in their baby’s baseline status, such as asymmetric use of the extremities or weakness.

The neonatal care team is instrumental in ensuring that babies with achondroplasia receive the best medical care by carefully evaluating them in the immediate newborn period and referring them to appropriate specialty services. Optimally, infants with achondroplasia should be followed closely by a multidisciplinary medical team that specializes in skeletal dysplasias.

“Optimally, infants with achondroplasia should be followed closely by a multidisciplinary medical team that specializes in skeletal dysplasias.”

Practical Applications:

1. Appreciate that infants with achondroplasia are at an increased risk for sudden infant death, especially in a car seat. They are at risk for central sleep apnea, craniocervical impingement due to a narrow foramen magnum, and spinal stenosis.
2. Incorporate a polysomnogram into the care plan for newborn infants with achondroplasia. This procedure should be done early in life, and in some healthcare settings, the best time to do this would be before hospital discharge after delivery.
3. Understand that obstructive or central sleep apnea may not be apparent to parents or healthcare providers without a polysomnogram.
4. Counsel parents of infants with achondroplasia to always provide head support, especially in a car seat, and use only seats with a hardback. Educate parents to avoid soft-backed infant seats, slings, strollers, or bouncers that allow neck flexion.
5. Refer infants with achondroplasia to a multidisciplinary medical team that specializes in skeletal dysplasias.

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INTENSIVE CARE,
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COMPLICATED
PREGNANCIES

Annie Janvier, MD, PhD

Translated by Phyllis Aronoff and Howard Scott

Add-On Codes in Neonatal Critical Care

Scott D. Duncan, M.D., M.H.A.

“Many neonatologists would recognize these common procedures, including thoracentesis, thoracostomy, partial exchange transfusion, exchange transfusion, abdominal paracentesis, peripherally inserted central catheter, subdural/reservoir or shunt tap, and circumcision, as procedures that are not included in the global intensive or critical care codes.”

Several years ago, an article appeared in Neonatology Today titled “The Bundled Neonate,” which focused on procedures that were either not bundled into the global Current Procedural Terminology (CPT®) intensive care and critical care codes or could be used in the setting of delivery room management or hourly critical care codes.¹ Many neonatologists would recognize these common procedures, including thoracentesis, thoracostomy, partial exchange transfusion, exchange transfusion, abdominal paracentesis, peripherally inserted central catheter, subdural/reservoir or shunt tap, and circumcision, as procedures that are not included in the global intensive or critical care codes.

Within neonatology, scenarios exist that require additional work and expertise. The daily global CPT® codes for critical care (99468, 99469, 99471, and 99472) account for the considerable work required by the physician in directing care. This work is measured using relative value units (R.V.U.s), encompassing physician work, practice expense, and malpractice. Physician work considers the time, skill, training, and intensity required for providing a service.

“The most common situational examples a neonatologist may face where the work surpasses the global daily critical care codes R.V.U.s are in extracorporeal life support/extracorporeal membrane oxygenation (ECLS/ECMO) and therapeutic hypothermia.”

The most common situational examples a neonatologist may face where the work surpasses the global daily critical care codes R.V.U.s are in extracorporeal life support/extracorporeal membrane oxygenation (ECLS/ECMO) and therapeutic hypothermia.

In both instances, using the add-on codes and the daily global critical care code is appropriate. The R.V.U.s associated with the global critical care codes and the add-on codes for ECLS/ECMO and therapeutic hypothermia are found in Table 1.

Code	Description	wRVUs
99468	Initial critical care, 28 days or less	18.46
99469	Subsequent critical care, 28 days or less	7.99
99471	Initial critical care, 29 days–24 months	15.98
99472	Subsequent critical care, 29 days–24 months	7.99
33946	ECLS/ECMO provided by the physician, initiation, venovenous	6
33947	ECLS/ECMO provided by the physician, initiation, veno-arterial	6.63
33948	ECLS/ECMO provided by the physician, daily management, venovenous	4.73
33949	ECLS/ECMO provided by the physician, daily management, veno-arterial	4.6
99184	Initiation of selective head or total body hypothermia in a critically ill neonate	4.5

Table 1: RVUs by CPT Code²

Question:

A neonatologist attends a scheduled delivery of an infant with a known left-sided congenital diaphragmatic hernia. The infant is intubated, stabilized at delivery, and transferred to the NICU. The NICU team initiates a standardized protocol of care. The infant progresses through the protocol, requiring high-frequency ventilation, inhaled nitric oxide, and pressor support with afterload reduction. The echocardiogram reveals significant pulmonary hypertension with diminished left ventricular function. By the afternoon of day 1, the oxygenation index continues to hover around 40 for 4 hours when a decision is made to initiate veno-arterial ECMO. The pediatric surgeon successfully places the venous and arterial cannulas, and circuit management is turned over to the NICU team. What is the correct code(s) for the neonatologist?

- A. 99469 – subsequent critical care, 28 days or less
- B. 33947 – ECLS/ECMO initiation, veno-arterial
- C. 33953 – insertion of peripheral (arterial and/or venous), open, birth through 5 years of age
- D. 99469, 33947

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Correct Answer: D. 99469 – subsequent critical care, 28 days or less, 33947 - ECLS/ECMO provided by physician, initiation, veno-arterial. The initiation of ECMO is an example of an add-on code, which recognizes the additional work associated with the complexity of this patient, exceeding traditional critical care. 33953 is for the insertion of the ECLS/ECMO cannulas, which the surgeon records. Should this infant continue requiring veno-arterial ECMO, the neonatologist would use the daily global code 99469 and code 33949, indicating the daily management of a veno-arterial ECLS/ECMO patient.

Question:

A term infant is delivered via emergency cesarean section due to placental abruption. The baby requires positive pressure ventilation, intubation, U.V.C. placement, and volume expansion at delivery. Cord venous gas reveals pH 6.8, pCO₂ 75, PaO₂ 19, BE -18. The infant is admitted to the NICU. The infant demonstrates seizure activity. By examination, the infant is in Sarnat stage 2. You place a U.A.C. for monitoring and decide to start total body cooling. The correct C.P.T. code(s) for NICU admission include:

- A. 99468 – initial inpatient critical care
- B. 99468, 36660 – catheterization umbilical artery
- C. 99468, 99184 – initiation of hypothermia
- D. 99468, 36660, 99184



Correct Answer C: 99468 – initial critical care, 28 days or less, 99184 – initiation of hypothermia. The umbilical artery catheterization is considered a bundled procedure with 99468. In this case scenario, the admission codes include the initial inpatient critical care and initiation of hypothermia. 99184 represents the initiation of selective head or total body hypothermia in critically ill neonates, recognizing the additional work required on the day body or selective head cooling is begun.

Discussion:

ECLS/ECMO and total body or selective head cooling represent

critical care management options in patients that require additional work beyond that accounted for in the global daily critical care codes. Neonatology has successfully sponsored the current CPT® code sets and advocated for codes where additional work is required. As a brief review, the American Medical Association (A.M.A.) CPT® Editorial Panel is responsible for maintaining and updating the CPT® code set. The Editorial Panel is appointed by the A.M.A. Board of Trustees and supported by CPT® Advisors, physician representatives from the national medical specialty societies represented in the A.M.A. House of Delegates, and the A.M.A. Health Care Professionals Advisory Committee (HCPAC).³

“Category III codes are temporary codes for new and developing technology, procedures, and services created for data collection and analysis.³ Following data collection and assessment, these temporary codes were converted to Category I codes, then revised to include only the day of initiation for total body or selective head cooling. ”

An example of this advocacy is found in the cooling code. The current cooling code evolved from an application resulting in two category III codes, 0260T and 0261T, total body cooling and selective head cooling, daily. Category III codes are temporary codes for new and developing technology, procedures, and services created for data collection and analysis.³ Following data collection and assessment, these temporary codes were converted to Category I codes, then revised to include only the day of initiation for total body or selective head cooling.

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Measles
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COVID-19



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Yes

Yes



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The Indirect Impact of RSV

Susan Hepworth, Suzanne Staebler, DNP, APRN, NNP-BC, FAANP, FAAN, Mitchell Goldstein, MD, MBA, CML

OVERVIEW

RSV impacts not only infants and young children, but also entire families.

The National Coalition for Infant Health and the Alliance for Patient Access sought to examine the multifaceted burden that RSV places on families and to identify potential policy solutions.

Two surveys were conducted, one of parents who had at least one child contract RSV and one of health care providers who treat infants and children with RSV.

Both surveys were conducted with YouGov, a global public opinion and data company. Parents and providers were recruited from a pool of pre-selected respondents to ensure they met the survey's requirements. Participants received an honorarium.



RSV PARENT SURVEY

340 parents who had at least 1 child sick with RSV



67% of parents said their child was hospitalized for RSV

RSV HEALTH CARE PROVIDER SURVEY

175 health care providers across various pediatric and neonatal subspecialties



67% worked in an outpatient facility
33% worked in a hospital

RESULTS



FINANCIAL BURDEN

More than 2/3 of parents said the costs of RSV posed a financial burden or financial crisis.

7% of parents said they were fired as a result of caring for their child with RSV.

32% of parents reported losing potential income while their child had RSV.



EMOTIONAL BURDEN

68% of parents said watching their child suffer affected their mental health.

69% of parents felt guilty that they could not do more to prevent their child's RSV.

When parents found out there was no treatment for RSV, only supportive care:

- 48% felt angry
- 46% felt helpless



SOCIAL BURDEN

43% of parents had never heard of RSV before finding out their child was sick.

54% of parents had to rely on family and friends for sibling care, transportation and other responsibilities.

42% of parents said they struggled to care for their other children when one faced RSV.

RESULTS



PARENT EDUCATION & AWARENESS

86% of providers said they include RSV education as part of routine care.

99% of providers agreed that parents need more information about RSV.



TREATMENT CHALLENGES

Nearly 1/3 of providers have been reluctant to test for RSV because no treatment exists.

48% of providers said it was difficult to decide whether to send an infant or child with RSV to the emergency room.

92% agreed that if an immunization were available, it should be added to the Vaccines for Children program's list of pediatric vaccines.



MISCONCEPTIONS

A majority of providers (60%) explained that around 50% or more of the babies they see hospitalized for RSV were born healthy, despite many people thinking severe RSV only impacts premature infants or those with preexisting conditions.

CONCLUSION

Both surveys highlighted that the burden of RSV extends well beyond its physical symptoms.

The virus may lead to:

- **Long-lasting health challenges** for babies and young children
- **Financial, social and emotional burdens** for families
- **Frustration for providers**, who lack a cure or viable preventive interventions

This burden is not experienced by the few. Most infants and children contract RSV by the time they are two, and challenges that accompany RSV may impact anyone who has been affected.

Moving forward, the many burdens of RSV demonstrate the need for:

- **More RSV education**
- **Research and innovation** for preventive interventions
- **Access to prevention and treatment** for all babies and children

The challenges caused by RSV can reach far and wide, and its indirect impacts often leave families struggling.

How Better Data Could Reduce Stillbirths

Susan Hepworth



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.

“American mothers and babies are dying during childbirth far too often, a recent report from the National Institutes of Health confirms. Poor data practices could stand in the way of policy solutions to this major public health concern.”

American mothers and babies are dying during childbirth far too often, a recent report from the National Institutes of Health confirms. Poor data practices could stand in the way of policy solutions to this major public health concern.

Stillbirth is a stubborn health problem in the United States.

While the United States has some of the most comprehensive health care on the planet, stillbirth remains a common problem. The risk of a fetus or baby dying in the womb is far more common in the U.S. than it should be.

“Some studies suggest the U.S. may be witnessing the highest rate of stillbirths in several decades, partially attributable to inadequate access to obstetric care during pregnancy.”

Some studies suggest the U.S. may be witnessing the highest rate of stillbirths in several decades, partially attributable to inadequate access to obstetric care during pregnancy. Race is also a factor in the likelihood of stillbirth and the accurate diagnosis of a cause after death. Significant disparities exist in maternal and fetal outcomes based on geography, race and income.

More data and better funding could help.

The risk factors contributing to this national trend are not widely understood, perhaps because data on stillbirths are difficult to obtain.



Best practices in perinatal care — and in the worst cases, perinatal pathology — can help us understand these troubling trends. When babies are stillborn, for example, grief should be balanced against the urgent need for accurate medical data. Fetal autopsy, while it may be controversial for some, offers significant insight into causes of death, and therefore, prevention. Understanding the causes of stillbirth and other adverse outcomes can contribute to life-saving progress.

“Fetal autopsy, while it may be controversial for some, offers significant insight into causes of death, and therefore, prevention. Understanding the causes of stillbirth and other adverse outcomes can contribute to life-saving progress.”

Federal agencies should also collaborate with state and local officials to reduce barriers to obstetric care for rural or low-income women. More funding is needed to expand research into stillbirth in communities most in need of support and also to provide active intervention in those communities.

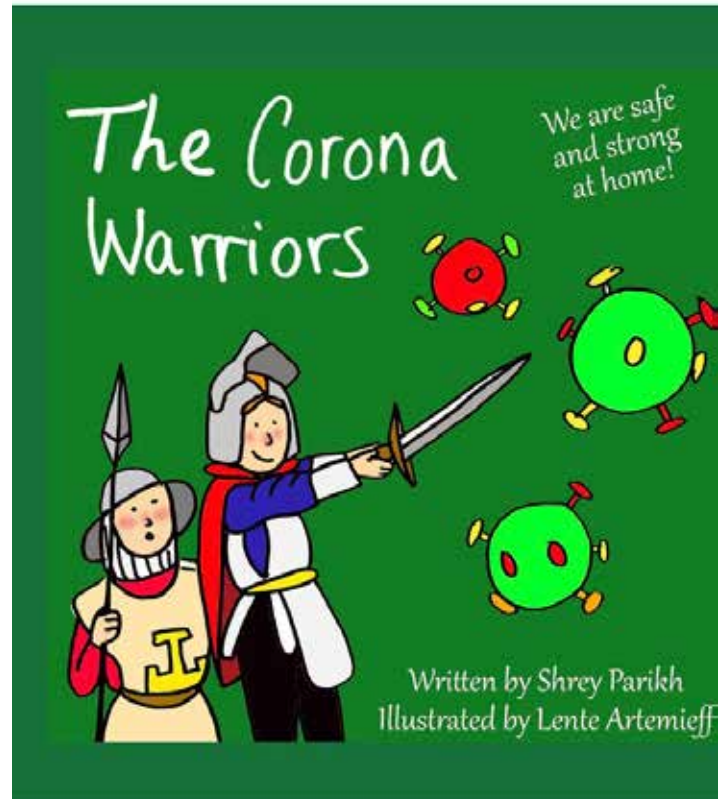
Stillbirth rates should be falling, not rising. Best practices and more robust public health funding could help the U.S. understand — and ultimately prevent — stillbirths.

Disclosures: The author has no disclosures

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National Coalition for Infant Health Values (SANE)

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

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

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

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

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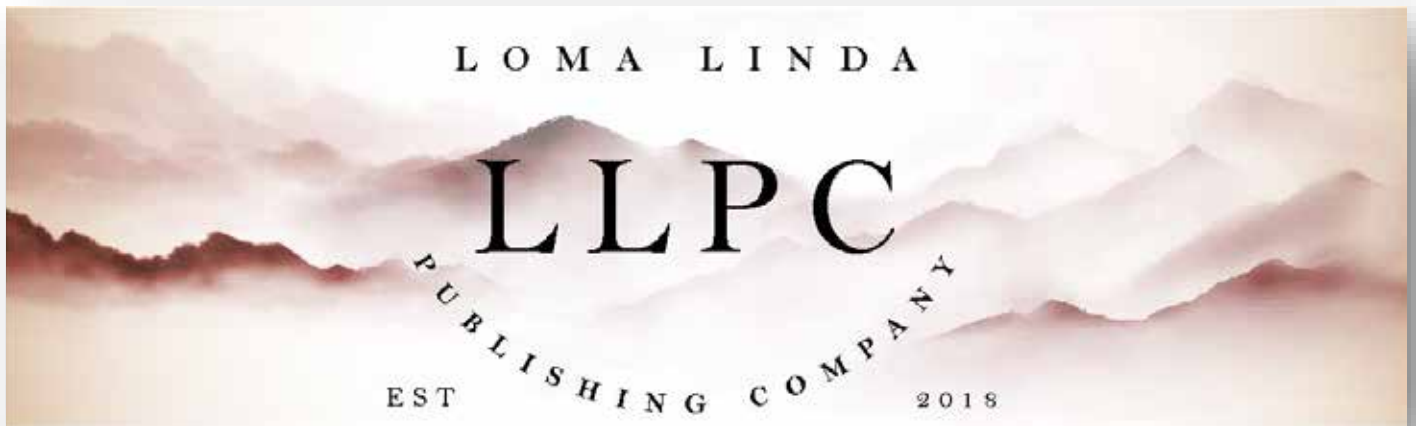
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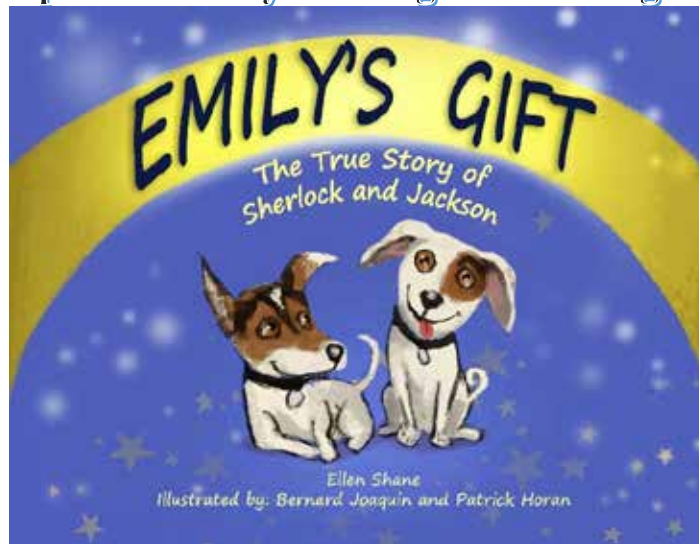
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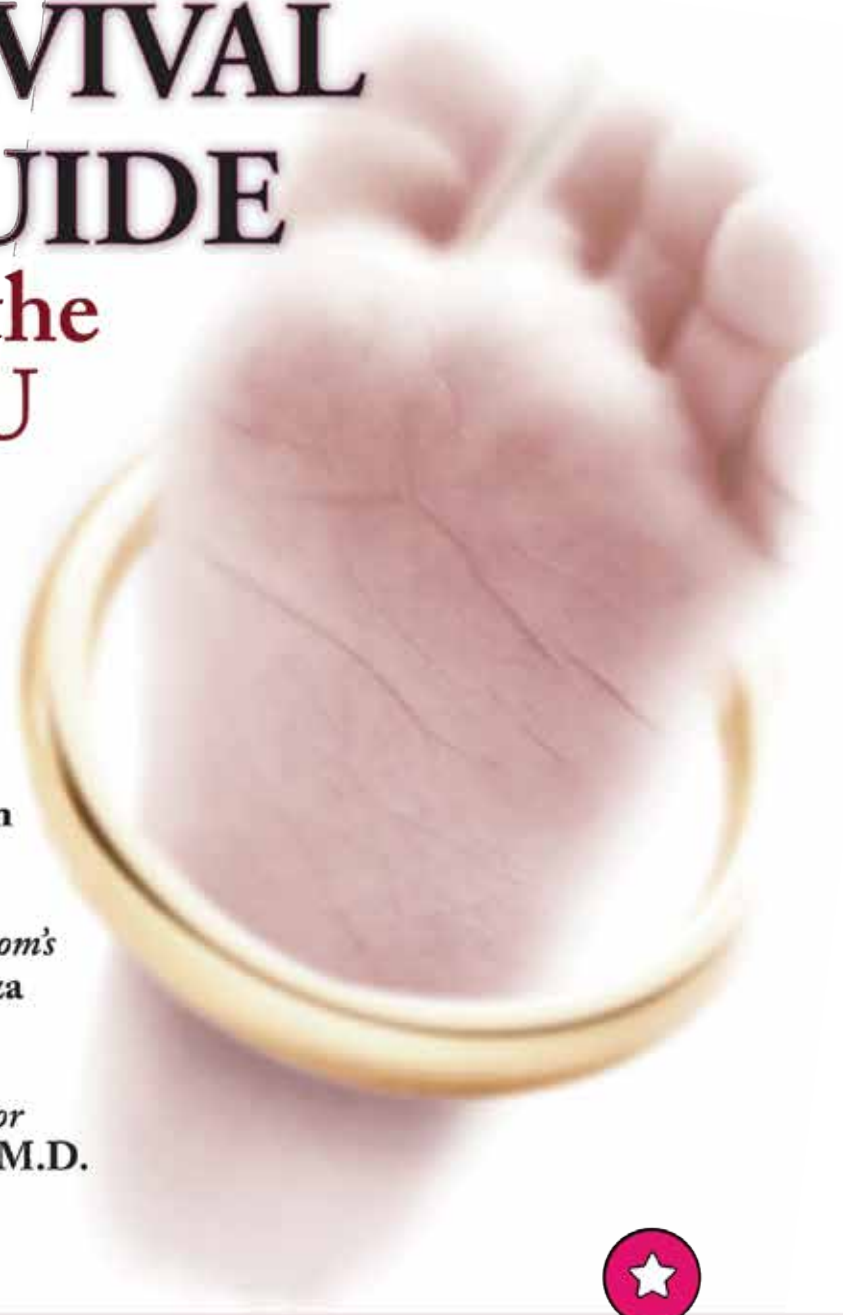
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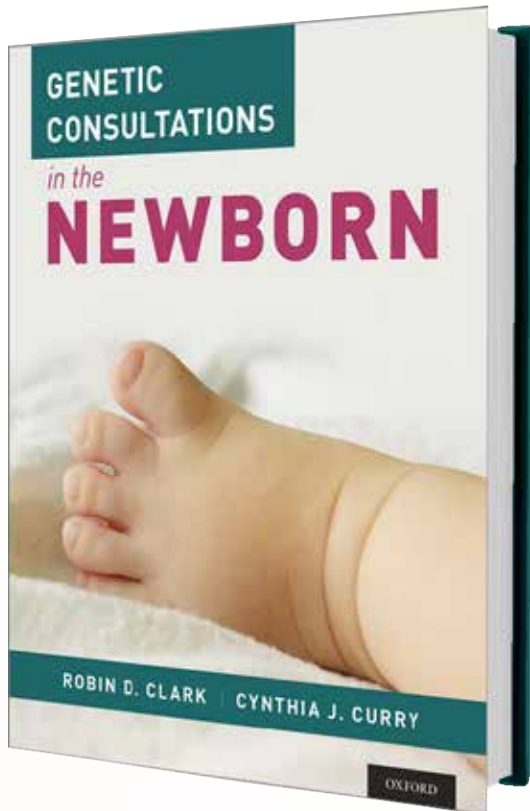


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Clinical Pearl: Long COVID in Infants Born to Women with COVID-19 Infection during Pregnancy

Walid Hussain, MD, Mitchell Goldstein, MD, MBA, CML,
Joseph R Hageman, MD

“Long COVID is a prolonged, debilitating illness which is seen in 10% of severe acute respiratory virus syndrome coronavirus 2 (SARS-CoV-2).”

Long COVID is a prolonged, debilitating illness which is seen in 10% of severe acute respiratory virus syndrome coronavirus 2 (SARS-CoV-2) (1). In children and adults, more than 200 symptoms involving multiple organ systems have been identified, with an estimated 65 million people worldwide having long COVID (1). The vast majority of children and adults with Long COVID are aged 15-19 years (1). There have been a number of studies in newborns born to pregnant mother with SARS-CoV-2 infection who, in general, have done well over the short term (2,3). However, a recent retrospective cohort study by Edlow and colleagues examined the neurodevelopmental outcomes at 12 months of age of 222 births to SARS-CoV-2 positive (PCR positive) mothers compared with 7466 pregnant mothers not SARS-CoV-2 exposed (4). Maternal SARS-CoV-2 positivity during pregnancy, especially during the third trimester, was associated with a greater rate of neurodevelopmental diagnoses in their infants in unadjusted as well as adjusted models (Odds Ratios: 2.17 and 1.86; $p < 0.003$ and $p < 0.06$ respectively) (4). The specific neurodevelopmental diagnoses included pervasive and specific developmental disorders: developmental disorders of speech and language; specific developmental disorders of scholastic skills; specific developmental disorder of motor function; pervasive developmental disorders; other/unspecific disorder of psychological development, and intellectual disabilities (4). The specific ICD-10 codes are listed in the body of the paper (4).

“Maternal SARS-CoV-2 positivity during pregnancy, especially during the third trimester, was associated with a greater rate of neurodevelopmental diagnoses in their infants in unadjusted as well as adjusted models.”

In addition, preterm delivery was more frequent among SARS-CoV-2 exposed mothers (14.4% vs. 8.7%, ($p < 0.003$)) which is consistent with previous studies (2-4).

It is important to remember that this study is preliminary with follow-up only up to 12 months of age and longer follow-up studies are necessary to confirm these associations (4).

Long COVID, also known as post-acute sequelae of SARS-CoV-2 infection (PASC), has become a significant concern among pediatric

patients. While children generally experience milder symptoms than adults, a growing body of evidence suggests that they are not immune to the long-term effects of COVID-19. As a physician, it is crucial to effectively communicate the risks associated with long COVID to parents, ensure the protection of fragile infants, and advocate for vaccination among mothers and co-workers.

“As a physician, it is crucial to effectively communicate the risks associated with long COVID to parents, ensure the protection of fragile infants, and advocate for vaccination among mothers and co-workers.”

Explaining Risks to Parents:

When discussing the risks of long COVID with parents, it is crucial to maintain open and honest communication while providing reassurance. Here are some key strategies to consider:

- Accurate Information:** Present accurate and up-to-date information about the potential long-term consequences of COVID-19 in children. Even though most children recover from acute COVID-19, a small percentage may experience prolonged symptoms or develop post-acute sequelae.
- Individual Risk Assessment:** Assess the child's specific risk factors, such as any pre-existing medical conditions, to determine the likelihood of long COVID. Emphasize that while the overall risk is low, it is not negligible.
- Symptom Recognition:** Educate parents about the signs and symptoms of long COVID in children, such as persistent fatigue, cognitive difficulties, and respiratory issues. Encourage them to monitor their child's health and seek necessary medical attention.
- Supportive Care:** Explain that even if a child develops long COVID, supportive care and symptom management can significantly improve their quality of life. Offer guidance on managing symptoms, accessing appropriate resources, and advocating for their child's needs.

“Explain that even if a child develops long COVID, supportive care and symptom management can significantly improve their quality of life.”

Protecting Fragile Infants:

Infants, particularly those born prematurely or with underlying health conditions, may be more vulnerable to severe COVID-19 illness and long COVID. To protect these fragile infants, physi-

cians should consider the following measures:

- a. **Vaccination of Caregivers:** Encourage parents, immediate family members, and caregivers to get vaccinated against COVID-19. Vaccination reduces the risk of household transmission, providing indirect protection to vulnerable infants.
- b. **Strict Hygiene Practices:** Emphasize the importance of hand hygiene, respiratory etiquette, and regular disinfection of frequently-touched surfaces within the home. These measures can help reduce the risk of exposure to the virus.
- c. **Limiting Visitors:** Advise parents to limit the number of visitors, particularly those who are unvaccinated or have a higher risk of COVID-19 exposure. Encourage the use of virtual interactions as an alternative to in-person gatherings.

“Ensure regular follow-up appointments for infants with a history of COVID-19 or those at higher risk for long COVID. Monitor their development closely and promptly address any concerns that may arise.”

- d. **Medical Follow-up:** Ensure regular follow-up appointments for infants with a history of COVID-19 or those at higher risk for long COVID. Monitor their development closely and promptly address any concerns that may arise.

Vaccination Advice for Mothers and Co-workers:

To protect pediatric patients from long COVID, physicians should advocate for the vaccination of mothers and co-workers. Consider the following recommendations:

- a. **Maternal Vaccination:** Encourage pregnant and breastfeeding women to get vaccinated against COVID-19. Studies have shown that vaccination during pregnancy can protect both the mother and the baby, reducing the risk of severe illness and potential transmission.

“Encourage pregnant and breastfeeding women to get vaccinated against COVID-19. Studies have shown that vaccination during pregnancy can protect both the mother and the baby, reducing the risk of severe illness and potential transmission.”

- b. **Co-worker Vaccination:** Advocate for COVID-19 vaccination among healthcare workers, educators, and other individuals who interact closely with children. Ensuring a vaccinated environment can significantly reduce the risk of COVID-19 transmission to vulnerable pediatric patients.

- c. **Education and Awareness:** Provide evidence-based information about COVID-19 vaccines to address any concerns or

misconceptions among mothers and co-workers. Promote vaccine confidence through open dialogue, sharing reputable resources, and addressing individual concerns.

Conclusion:

Long COVID is an emerging concern in pediatric patients, necessitating proactive measures from physicians. By effectively explaining the risks to parents, protecting fragile infants through various strategies, and encouraging vaccination among mothers and co-workers, healthcare providers can play a vital role in mitigating the long-term impacts of COVID-19 on children. Through collaboration and informed decision-making, we can strive to ensure the health and well-being of pediatric patients in the face of this pandemic.

“By effectively explaining the risks to parents, protecting fragile infants through various strategies, and encouraging vaccination among mothers and co-workers, healthcare providers can play a vital role in mitigating the long-term impacts of COVID-19 on children.”

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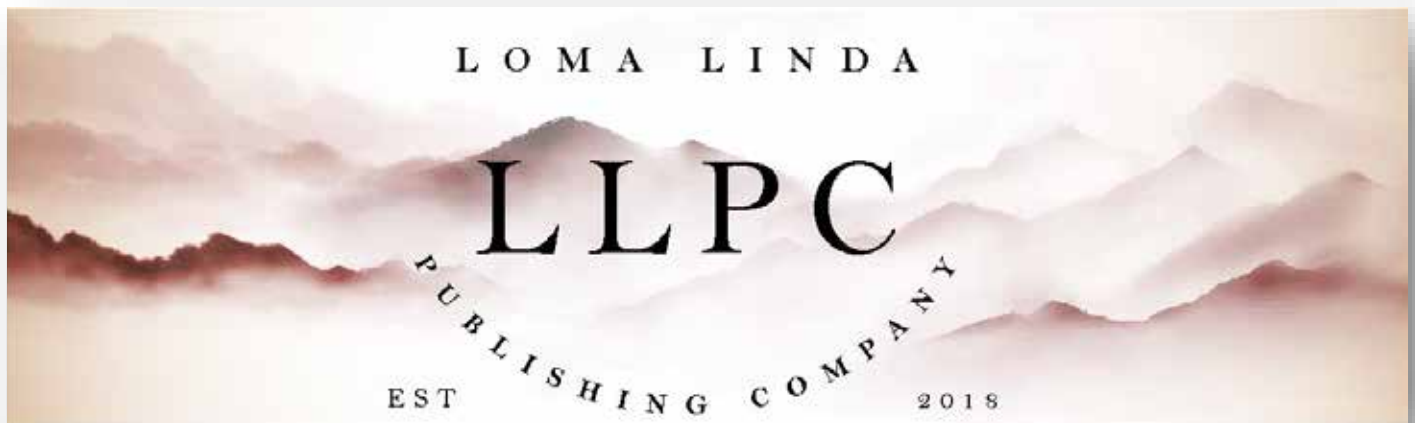
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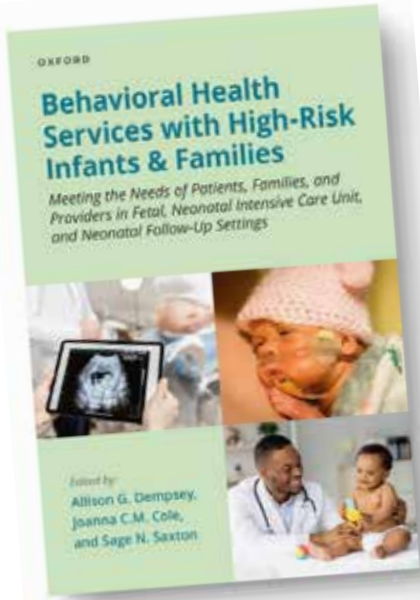
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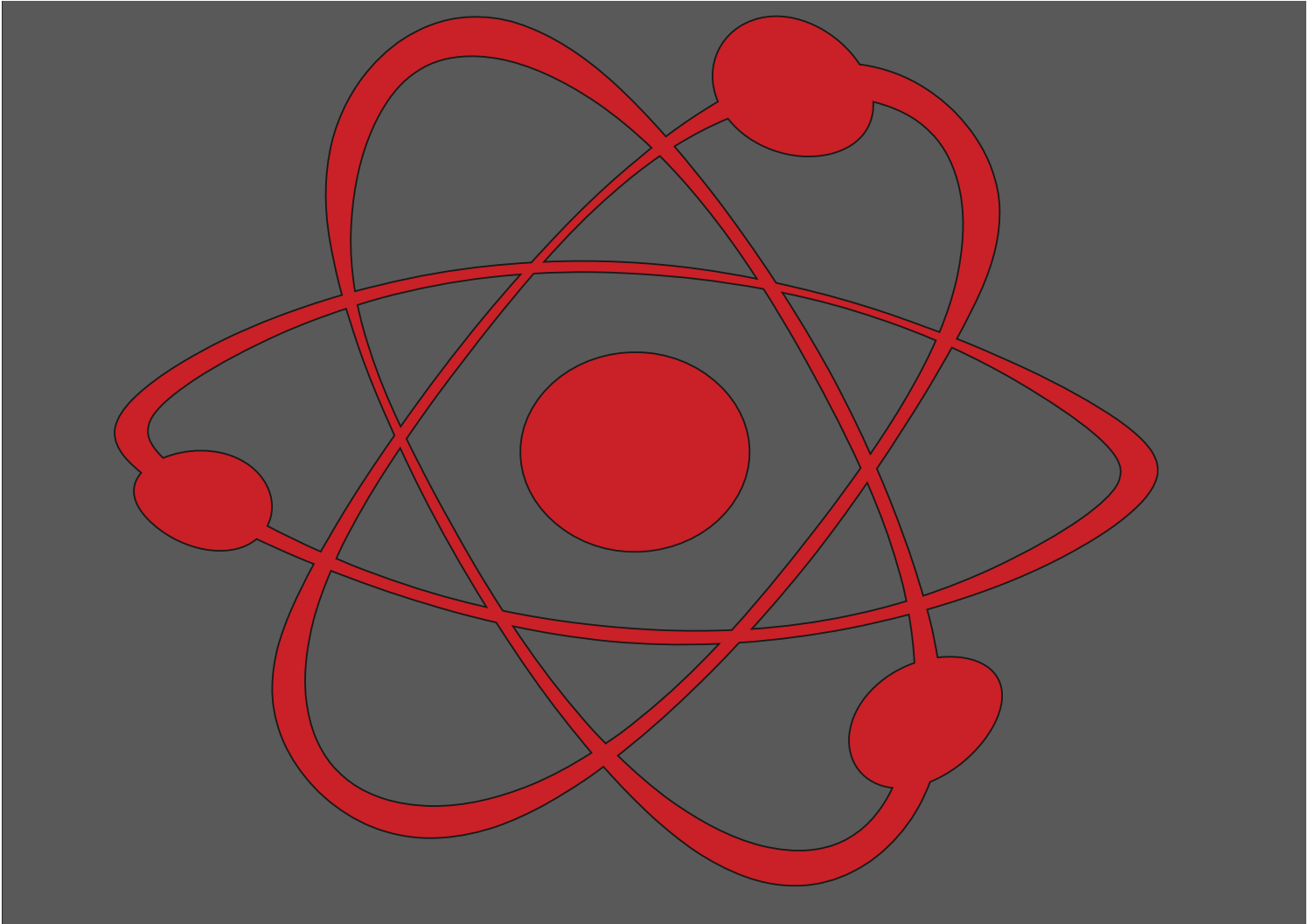
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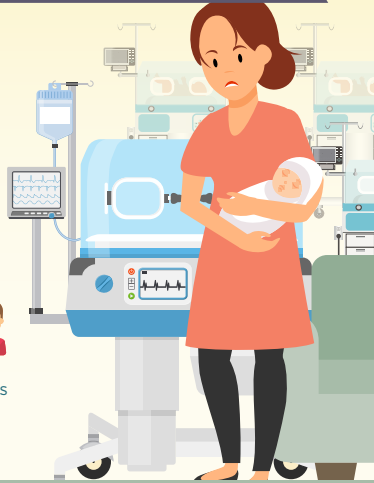
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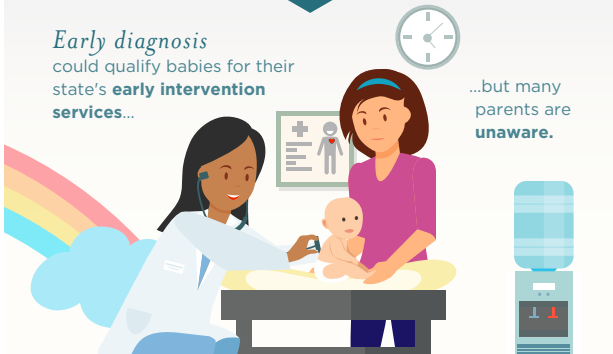
Address physical challenges



Prevent mild difficulties from developing into major problems

Early diagnosis could qualify babies for their state's **early intervention services**...

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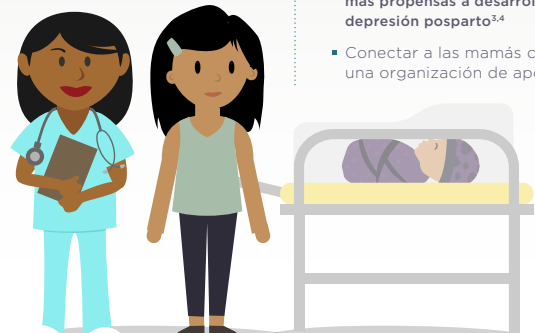
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- Proteger el acceso al tratamiento



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- Capacitar a los profesionales de la salud para proporcionar apoyo psicosocial a las familias... **Especialmente aquellas con bebés prematuros, que son 40% más propensas a desarrollar depresión postparto**^{3,4}
- Conectar a las mamás con una organización de apoyo



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¹ American Psychological Association. Accessed on: <http://www.apa.org/women/resources/reports/postpartum-depression.aspx>

² National Institute of Mental Health. Accessed on: <http://www.nimh.nih.gov/health/publications/postpartum-depression-facts/index.shtml>

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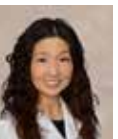
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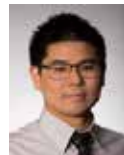
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 Sandeep Lakireddy, OSMIV - Western University
 P. Syamasundar Rao, MD - UT-Houston Medical School
 Joseph Schulman, MD, MS - California Department of Health Care Services
 Steven B. Spedale, MD, FAAP - Woman's Hospital
 Alan R. Spitzer, MD
 Cherry 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
 T.F. Yeh, MD - Cook County and Taipei Medical University

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
 National Perinatal Association

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

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>

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Neonatology and the Arts

This section focuses on artistic work which is by those with an interest in Neonatology and Perinatology. The topics may be varied, but preference will be given to those works that focus on topics that are related to the fields of Neonatology, Pediatrics, and Perinatology. Contributions may include drawings, paintings, sketches, and other digital renderings. Photographs and video shorts may also be submitted. In order for the work to be considered, you must have the consent of any person whose photograph appears in the submission.

Works that have been published in another format are eligible for consideration as long as the contributor either owns the copyright or has secured copyright release prior to submission.

Logos and trademarks will usually not qualify for publication.

This month we continue to feature artistic works created by our readers on one the next to last page as well as photographs of birds on rear cover.. For this edition, our art was graciously provided by Colleen Kraft, MD. It is a work done by her son Tim. In her words, "This was a painting, also a self portrait, during the worst of the COVID pandemic when people were disrespectful of medical professionals, masks, vaccines. From the Pink Floyd lyrics 'Did they get you to trade your heroes for ghosts?'" .Our Bird is a Toucan from my collection.



Mita Shah, MD,
Neonatal Intensive Care Medical Director
Queen of the Valley Campus
Emanate Health, West Covina, CA

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Manuscript Submission: Instructions to Authors

1. Manuscripts are solicited by members of the Editorial Board or may be submitted by readers or other interested parties. Neonatology Today welcomes the submission of all academic manuscripts including randomized control trials, case reports, guidelines, best practice analysis, QI/QA, conference abstracts, and other important works. All content is subject to peer review.

2. All material should be emailed to: LomaLindaPublishingCompany@gmail.com in a Microsoft Word, Open Office, or XML format for the textual material and separate files (tif, eps, jpg, gif, ai, psd, SVG, or pdf) for each figure. Preferred formats are ai, SVG, psd, or pdf. tif and jpg images with sufficient resolution so as not to have visible pixilation for the intended dimension. In general, if acceptable for publication, submissions will be published within 3 months.

3. There is no charge for submission, publication (regardless of number of graphics and charts), use of color, or length. Published content will be freely available after publication. There is no charge for your manuscript to be published. NT does maintain a copyright of your published manuscript.

4. The title page should contain a brief title and full names of all authors, their professional degrees, their institutional affiliations, and any conflict of interest relevant to the manuscript. The principal author should be identified as the first author. Contact information for the principal author including phone number, fax number, e-mail address, and mailing address should be included.

5. A brief biographical sketch (very short paragraph) of the principal author including current position and academic titles as well as fellowship status in professional societies should be included. A picture of the principal (corresponding) author and supporting authors should be submitted if available.

6. An abstract may be submitted.

7. The main text of the article should be written in formal style using correct English. The length may be up to 10,000 words. Abbreviations which are commonplace in neonatology or in the lay literature may be used.

8. References should be included in standard "NLM" format (APA 7th is no longer acceptable). Bibliography Software should be used to facilitate formatting and to ensure that the correct formatting and abbreviations are used for references.

9. Figures should be submitted separately as individual separate electronic files. Numbered figure captions should be included in the main file after the references. Captions should be brief.

10. Only manuscripts that have not been published previously will be considered for publication except under special circumstances. Prior publication must be disclosed on submission. Published articles become the property of the Neonatology Today and may not be published, copied or reproduced elsewhere without permission from Neonatology Today.

11. NT recommends reading Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals from ICMJE prior to submission if there is any question regarding the appropriateness of a manuscript. NT follows Principles of Transparency and Best Practice in Scholarly Publishing(a joint statement by COPE, DOAJ, WAME, and OASPA). Published articles become the property of the Neonatology Today and may not be published, copied or reproduced elsewhere without permission from Neonatology Today.

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NEONATOLOGY TODAY is interested in publishing manuscripts from Neonatologists, Fellows, NNPs and those involved in caring for neonates on case studies, research results, hospital news, meeting announcements, and other pertinent topics.

Please submit your manuscript to: LomaLindaPublishingCompany@gmail.com



NICU BABY'S Bill of Rights

1- THE RIGHT TO ADVOCACY

My parents know me well. They are my voice and my best advocates. They need to be knowledgeable about my progress, medical records, and prognosis, so they celebrate my achievements and support me when things get challenging.

2- THE RIGHT TO MY PARENTS' CARE

In order to meet my unique needs, my parents need to learn about my developmental needs. Be patient with them and teach them well. Make sure hospital policies and protocols, including visiting hours and rounding, are as inclusive as possible.

3- THE RIGHT TO BOND WITH MY FAMILY

Bonding is crucial for my sleep and neuroprotection. Encourage my parents to practice skin-to-skin contact as soon as and as often as possible and to read, sing, and talk to me each time they visit.

4- THE RIGHT TO NEUROPROTECTIVE CARE

Protect me from things that startle, stress, or overwhelm me and my brain. Support things that calm me. Ensure I get as much sleep as possible. My brain is developing for the first time and faster than it ever will again. The way I am cared for today will help my brain when I grow up. Connect me with my parents for the best opportunities to help my brain develop.

5- THE RIGHT TO BE NOURISHED

Encourage my parents to feed me at the breast or by bottle, whichever way works for us both. Also, let my parents know that donor milk may be an option for me.

6- THE RIGHT TO PERSONHOOD

Address me by my name when possible, communicate with me before touching me, and if I or one of my siblings pass away while in the NICU, continue referring to us as multiples (twin/triplets/quads, and more). It is important to acknowledge our lives.

7- THE RIGHT TO CONFIDENT AND COMPETENT CARE GIVING

The NICU may be a traumatic place for my parents. Ensure that they receive tender loving care, information, education, and as many resources as possible to help educate them about my unique needs, development, diagnoses, and more.

8- THE RIGHT TO FAMILY-CENTERED CARE

Help me feel that I am a part of my own family. Teach my parents, grandparents, and siblings how to read my cues, how to care for me, and how to meet my needs. Encourage them to participate in or perform my daily care activities, such as bathing and diaper changes.

9- THE RIGHT TO HEALTHY AND SUPPORTED PARENTS

My parents may be experiencing a range of new and challenging emotions. Be patient, listen to them, and lend your support. Share information with my parents about resources such as peer-to-peer support programs, support groups, and counseling, which can help reduce PMAD, PPD, PTSD, anxiety and depression, and more.

10- THE RIGHT TO INCLUSION AND BELONGING

Celebrate my family's diversity and mine; including our religion, race, and culture. Ensure that my parents, grandparents, and siblings feel accepted and welcomed in the NICU, and respected and valued in all forms of engagement and communication.

Presented by:



NICU PARENT NETWORK

NICU Parent Network

Visit nicuparentnetwork.org to identify national, state, and local NICU family support programs.

* The information provided on the NICU Baby's Bill of Rights does not, and is not intended to, constitute legal or medical advice. Always consult with your NICU care team for all matters concerning the care of your baby.

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