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Important Safety Information

- INOMAX is contraindicated in the treatment of neonates dependent on right-to-left shunting of blood.
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- Methemoglobinemia and NO_2 levels are dose dependent. Nitric oxide donor compounds may have an additive effect with INOMAX on the risk of developing methemoglobinemia. Nitrogen dioxide may cause airway inflammation and damage to lung tissues.
- In patients with pre-existing left ventricular dysfunction, INOMAX may increase pulmonary capillary wedge pressure leading to pulmonary edema.
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†Emergency deliveries of various components are often made within 4 to 6 hours but may take up to 24 hours, depending on hospital location and/or circumstances.

Reference: 1. Data on file. Hampton, NJ: Mallinckrodt Pharmaceuticals.

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INOmax Total Care®

INOmax® (nitric oxide gas)

Brief Summary of Prescribing Information

INDICATIONS AND USAGE

Treatment of Hypoxic Respiratory Failure

INOmax® is indicated to improve oxygenation and reduce the need for extracorporeal membrane oxygenation in term and near-term (>34 weeks) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension in conjunction with ventilator support and other appropriate agents.

CONTRAINDICATIONS

INOmax is contraindicated in neonates dependent on right-to-left shunting of blood.

WARNINGS AND PRECAUTIONS

Rebound Pulmonary Hypertension Syndrome following Abrupt Discontinuation

Wean from INOmax. Abrupt discontinuation of INOmax may lead to worsening oxygenation and increasing pulmonary artery pressure, i.e., Rebound Pulmonary Hypertension Syndrome. Signs and symptoms of Rebound Pulmonary Hypertension Syndrome include hypoxemia, systemic hypotension, bradycardia, and decreased cardiac output. If Rebound Pulmonary Hypertension occurs, reinstate INOmax therapy immediately.

Hypoxemia from Methemoglobinemia

Nitric oxide combines with hemoglobin to form methemoglobin, which does not transport oxygen. Methemoglobin levels increase with the dose of INOmax; it can take 8 hours or more before steady-state methemoglobin levels are attained. Monitor methemoglobin and adjust the dose of INOmax to optimize oxygenation.

If methemoglobin levels do not resolve with decrease in dose or discontinuation of INOmax, additional therapy may be warranted to treat methemoglobinemia.

Airway Injury from Nitrogen Dioxide

Nitrogen dioxide (NO_2) forms in gas mixtures containing NO and O_2. Nitrogen dioxide may cause airway inflammation and damage to lung tissues.

If there is an unexpected change in NO_2 concentration, or if the NO_2 concentration reaches 3 ppm when measured in the breathing circuit, then the delivery system should be assessed in accordance with the Nitric Oxide Delivery System O&M Manual troubleshooting section, and the NO_2 analyzer should be recalibrated. The dose of INOmax and/or FiO_2 should be adjusted as appropriate.

Worsening Heart Failure

Patients with left ventricular dysfunction treated with INOmax may experience pulmonary edema, increased pulmonary capillary wedge pressure, worsening of left ventricular dysfunction, systemic hypotension, bradycardia and cardiac arrest. Discontinue INOmax while providing symptomatic care.

ADVERSE REACTIONS

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. The adverse reaction information from the clinical studies does, however, provide a basis for identifying the adverse events that appear to be related to drug use and for approximating rates.

Controlled studies have included 325 patients on INOmax doses of 5 to 80 ppm and 251 patients on placebo. Total mortality in the pooled trials was 11% on placebo and 9% on INOmax, a result adequate to exclude INOmax mortality being more than 40% worse than placebo.

In both the NINOS and CINRGI studies, the duration of hospitalization was similar in INOmax and placebo-treated groups.

From all controlled studies, at least 6 months of follow-up is available for 278 patients who received INOmax and 212 patients who received placebo. Among these patients, there was no evidence of an adverse effect of treatment on the need for rehospitalization, special medical services, pulmonary disease, or neurological sequelae.

In the NINOS study, treatment groups were similar with respect to the incidence and severity of intracranial hemorrhage, Grade IV hemorrhage, periventricular leukomalacia, cerebral infarction, seizures requiring anticonvulsant therapy, pulmonary hemorrhage, or gastrointestinal hemorrhage.

In CINRGI, the only adverse reaction (>2% higher incidence on INOmax than on placebo) was hypotension (14% vs. 11%).

Based upon post-marketing experience, accidental exposure to nitric oxide for inhalation in hospital staff has been associated with chest discomfort, dizziness, dry throat, dyspnea, and headache.

DRUG INTERACTIONS

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Nitric oxide donor agents such as prilocaine, sodium nitroprusside and nitroglycerine may increase the risk of developing methemoglobinemia.

OVERDOSAGE

Overdosage with INOmax is manifest by elevations in methemoglobin and pulmonary toxicities associated with inspired NO_2. Elevated NO_2 may cause acute lung injury. Elevations in methemoglobin reduce the oxygen delivery capacity of the circulation. In clinical studies, NO_2 levels >3 ppm or methemoglobin levels >7% were treated by reducing the dose of, or discontinuing, INOmax.

Methemoglobinemia that does not resolve after reduction or discontinuation of therapy can be treated with intravenous vitamin C, intravenous methylene blue, or blood transfusion, based upon the clinical situation.

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 US-1800236 August 2018

Peer Reviewed

Exploring Factors Nurses Use When Transitioning Hospitalized Preterm Infants to the Supine Position

Sherri L. McMullen PhD, RN, FNP, NNP-BC

Abstract

Objective: *The purpose of the current research was to explore neonatal nurses' opinions and practice regarding the factors surrounding transitioning stable preterm infants to the supine sleep position prior to hospital discharge.*

Methods: *Neonatal nurses were recruited to complete this electronic survey containing 22 multiple-choice and open-ended questions. Nurses were asked to offer their opinion about potential factors that influence their practice in determining when they position preterm infants to the supine sleep position. This electronic survey was distributed on social media, through a professional organization, and one hospital neonatal intensive care unit in the Midwest.*

Primary Results: *Nurses use consistent factors in determining when preterm infants should be transitioned to the supine sleep position, but their opinions vary regarding the influence of these factors. Factors reported by the majority of respondents included respiratory status, corrected gestational age, tolerance of feedings, and the length of time prior to discharge.*

Primary Conclusion: *Nurses must role model adequate transition of hospitalized preterm infants while hospitalized to promote safe sleep after discharge to reduce the risk of sudden infant death syndrome. Nurses did not report compliance with the American Academy of Pediatrics recommendation to transition stable preterm infants by 32 weeks corrected age. Additional research is needed to determine the ideal time to transition stable preterm infants to the supine sleep position prior to discharge.*

Key Words: *Sudden Infant Death Syndrome, Supine Position, Hospitalized Preterm Infant*

Supine sleep position (SSP) has been shown to reduce the risk of sudden infant death syndrome (SIDS). However, the rate of supine sleep has plateaued since 2001.1 After hospital discharge, preterm and full-term infants continue to sleep in non-supine positions increasing the risk of SIDS. In the United States, the prevalence of SSP was reported as 66.5% with those born at the earliest gestation having the lowest rate of SSP after hospital discharge.2 Additional efforts are needed to promote the SSP after hospital discharge. Transitioning preterm infants prior to hospital discharge may contribute to increasing SSP post-discharge, ultimately further reducing the SIDS rate.

"After hospital discharge, preterm and full-term infants continue to sleep in non-supine positions increasing the risk of SIDS. "

More than a decade ago, the American Academy of Pediatrics (AAP) initially recommended stable hospitalized preterm infants begin sleeping primarily in the supine position from at least 32 weeks gestation.3 The recommendation was reinforced to include the supine position as soon as the preterm infant was medically stable, by 32 weeks corrected age.4 The AAP Task Force on Safe Sleep currently endorses hospitalized preterm infants being predominantly in the SSP by 32 weeks.5 Transitioning stable preterm infants in the hospital is encouraged to increase the likelihood of supine sleep post-discharge. Yet, the timing of when nurses transition preterm infants varies from any time to never.6,7 In addition, the literature shows infants are not being transitioned to the SSP at the recommended gestation, but much closer to hospital discharge.8 The reason for the delay in transitioning preterm infants to the SSP is unclear. The purpose of the current research was to explore neonatal nurses' practice and opinions about factors that influence transitioning stable preterm infants to the SSP prior to hospital discharge.

Methods

A survey was conducted to determine what factors neonatal nurses use to decide when preterm infants are ready to transition to the SSP. The REDCap (Research Electronic Data Capture) survey included demographic questions regarding age, education, experience, and geographic location.9 The survey contained 22 questions with several multiple-choice questions (with an option to choose other in some cases) as well as several open-ended questions. For example, one of the questions included "Do you transition medically stable preterm infants to the supine position in preparation for hospital discharge?" The response options included "yes," "no," and "I have no opinion." Open-ended questions requested information about the individual practice of transitioning preterm infants to the SSP and how neonatal nurses defined "medically stable" as well as to identify specific factors that impact their practice in regards to transitioning preterm infants (gestational age, weight, respiratory status, oxygen level, amount and mode of feeding, and timing before discharge). Content validity was provided by two nurse practitioners and one doctorally prepared faculty member. Recruitment of neonatal nurses was through (1) an individual social media account (Facebook on July 10, 2018), (2) a group email request to the American Academy of SIDS Prevention Physicians (AASPP) to forward the survey link to neonatal nurses and (3) one level III Midwest hospital obtained an exempt IRB approval for neonatal nurses at the facility to participate. The response rate is unknown due to the nature of social media and internet recruitment.

Results

A sample of 99 nurses completed surveys representing four countries, United States (94%), India (1%), Australia (4%), and Italy (1%) in five months (between July 11th through December 10, 2018). One respondent opened the survey, but did not respond to any questions; that survey was not included in the data analysis (n=98). The majority of the responses were from the United States with 13 states represented (IL, NY, OH, MI, CA, TX, MO, IN, MT, TN, PA, NJ, VA). The majority of respondents were from IL (n=46, 47%), followed by NY (n=30, 31%). Participants demographics included a wide variety of ages and included vast experience (see table 1). Most of the respondents had a Baccalaureate degree (n=57, 58%), followed by a Master's degree (n=24, 24%), an Associate's degree (n=12, 12%), and Other/Blank (n=5, 5%).

The survey asked respondents to define the term "medically stable" in their own words regarding when preterm infants should transition to the SSP. These responses were analyzed and categorized (see Table 2). The most common written response was when preterm infants are in room air or low flow nasal cannula (n=58, 59%). However, responses varied from when the infant is off a ventilator (n=4, 4%) to when they are ready for hospital dis-

charge (n=5, 5%).

Neonatal nurses reported that infants should be transitioned to the supine position prior to hospital discharge (n=93, 95%) with two respondents having no opinion (n=3, 3%) and two stating infants should not be transitioned prior to hospital discharge (n=2, 2%). When asked if they transition medically stable preterm infants to the supine sleep position prior to hospital discharge in their practice, all responses were affirmative (n=98, 100%). When provided a list of what factors nurses take into consideration when transitioning preterm infants to the SSP, apnea with or without bradycardia (n=71, 72%) was ranked the highest. This factor was followed by corrected gestational age (n=70, 71%), an infant being medically stable (n=69, 70%), and an infant approaching discharge (n=66, 67%). Other factors written in and considered when transitioning to the SSP were vital signs (n=61, 61%), having an infant in an open crib (n=61, 61%), the ability to maintain an adequate temperature in an open crib (n=56, 56%). About half the respondents consider muscle tone (n=51, 51%) and mode or quantity of feeding (n=50, 50%). Thirty-two percent (n=32) consider the infant's weight a factor in the decision to transition to the SSP (a sum greater than 100% as more than one response was allowed). Regarding the

Table 1. Selected Demographics of Survey Sample

Demographics	n	Mean (SD)
Current Age, years	94	42 (13)
Experience as Nurse, years	95	17(13)
Experience as NICU Nurse, years	98	14(12)

SD: standard deviation

Table 2. Survey Response to the Definition of "Medically Stable"

Definition	n (%)
No respiratory support/room air or low flow nasal cannula	58(59)
The ability to tolerate feedings (orally or by gavage)	36(37)
No or few mild apnea or bradycardia (none that require stimulation)	33(34)
Stable vital signs	15(15)
Ability to maintain temperature in open crib	12(12)
>34 weeks corrected gestational age	10(10)
Gaining/maintaining weight or growing appropriately	9(9)
No intravenous	8(8)
Ready for discharge	5(5)
Off ventilator	4(4)
No monitors	2(2)
Other (look at the whole baby and evaluate in case-by-case basis, no medical/surgical issues, not at risk for sudden expiration, not septic, not needing more than basic preterm care, no major medical issues, no vomiting in supine position)	11(11)

*sum is >100 as more than one response was written by respondent

Table 3. Gestational Age Preterm Infants Should Transition to the Supine Sleep Position

Gestational Age	n (%)
32	14(14)
33	2(2)
34	34(35)
35	20(20)
36	12(12)
37	1(1)
Missing	15(15)
Total	98(100)

Table 4. Minimum Weight Preterm Infants Should be Transitioned to the Supine Sleep Position

Weight (grams)	n (%)
1400	1 (1)
1500	8 (8)
1600	4 (4)
1700	2 (2)
1800	15 (15)
1900	1 (1)
2000	16 (16)
3200	1 (1)
Missing	50 (51)
Total	98(100)

Table 5. Respiratory Status at the Time of Transition to the SSP	
Respiratory Status	**n(%)**
Room air	18(18%)
Low flow nasal cannula	14(14%)
In no distress	10(10%)
No apnea, bradycardia, desaturations	9(9%)
No tachypnea	6(6%)
No oxygen or on home oxygen	4(4%)
Nasal cannula, undefined	4(4%)
No airway support/extubated	3(3%)
Continuous positive airway pressure	2(2%)
High flow nasal cannula	2(2%)
Few apnea, bradycardia, desaturations	2(2%)
Minimal oxygen	2(2%)
Nasal cannula or stable tracheostomy	1(1%)
No continuous positive airway pressure, on nasal cannula, undefined	1(1%)
No respiratory support	1(1%)
Missing	19(19%)
Total	98(100%)

Table 6. Length of Time Before Discharge Preterm Infants Should be Transitioned to the Supine Sleep Position	
Timing	**n (%)**
24-72 hours	4(4)
1 week	18(18)
2 weeks	14(14)
3-6 weeks	6(6)
As soon as medically stable	6(6)
At 34 or more weeks gestation	2(2)
Varies by infant	7(7)
N/A or missing	41(42)
Total	98(100)

reasons why transitioning preterm infants to the supine position is important, the highest ranked reason was to provide modeling for families (n=56, 57%), to follow safe sleep guidelines (n=38, 39%), to determine if infants are stable and tolerate the position (n=20, 20%), and to acclimate the infant to supine sleep in preparation for discharge (n=18, 18%) (sum is greater than 100% as more than one response was allowed).

In response to the open-ended questions for when nurses transition stable preterm infants in regards to corrected gestational age, weight, respiratory status, amount of oxygen, feeding, and timing of transition to discharge, the responses were categorized and analyzed by each of the listed factors. The responses for when nurses transition a medically stable preterm infant regarding corrected gestational age varied from anytime (n=1) to 37 weeks (n=1), with the most common response being 34 weeks (n=34, 34%), followed by 35 weeks (n=20, 20%). Some responded gestational age was not applicable (n=9, 9%) (See table 3). The most common response to the minimum weight to transition to the SSP was a missing response (n=50, 51%). This response was followed by 2000 grams (n=16, 16%) (see table 4). Responses for when nurses transition stable preterm infants regarding respiratory status included room air (n=18,18%), followed by low flow nasal cannula (n=14;14%) (see table 5). The most common amount of oxygen for the stable preterm infant to be transitioned to the supine position was reported as room air (n=25, 25%), followed by 30% oxygen or less (n=8, 8%), 40% oxygen (n=2, 2%), and less than 50% (n=1, 1%). A large percentage of respondents left this open-ended question blank (n=61, 61%). Regarding the factor of feeding, infants are ready to be transitioned to the supine position when they are receiving both gavage and nipple feedings (n=28, 29%), breast or bottle feeding only (n=13, 13%), at least half (or more) of feedings by nipple (n=6, 6%), and gavage feeding only (n=5, 5%), with many missing responses (n=46, 47%). The reported appropriate time to transition before hospital discharge varied with the highest response at one week prior to discharge (n=18, 18%) (See table 6). A large percentage considered it not applicable, or the data was missing (n=41, 42%). Other reported factors reported included when an infant has no evidence of respiratory distress, when preparing for discharge, what the baby looks at as a whole rather than one or two specific factors, when placed into an open crib (n=4, 4%), and one respondent reported that the preterm infant should be positioned supine prior to being placed into an open crib.

Discussion

The respondents varied in their age, experience, and geographical location. There was representation from four countries, but the majority were from Illinois and New York (78%). There was a high level of education reported with 82% having earned a Bachelor's degree or Master's degree.

When asked to define when preterm infants are medically stable, the most frequent response was when the infant is in room air or on a low flow nasal cannula. Other responses to this open-ended question included preterm infants having no or few apnea and bradycardia, maintaining adequate temperature in an open crib, and stable vital signs. Ten percent (n=10) of the respondents specifically stated greater than 34 weeks corrected gestational age.

There was no consensus among neonatal nurses for when the transition to the SSP should occur in preterm infants. All respondents self-reported they transition medically stable preterm infants to the SSP prior to hospital discharge; however, the timing varied regarding when nurses felt it was appropriate to transition to the SSP. Generally, nurses included many of the same factors to consider when transitioning preterm infants to the supine position, but the influence of these factors varied.

Respiratory status was a factor many reported as important when transitioning preterm infants to the SSP for both the multiple choice and open-ended questions. The majority of the respondents reported that an infant in room air or receiving low flow nasal cannula is medically stable. However, some report that as long as an infant exhibits no signs of respiratory distress, has a normal respiratory rate, and has acceptable oxygen saturation, the infant can be considered medically stable to transition to the SSP. Some reported that when an infant is extubated, they are ready to transition to the supine position. Others report that respiratory status was not applicable to the decision to transition infants to the SSP.

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Overall, the most frequent responses by nurses for when preterm infants should be transitioned to the SSP is when they are in room air, at 34 weeks, tolerating feedings via nipple and gavage, and one week prior to hospital discharge. The most frequent response to gestational age was 34 weeks. These responses are conservative and do not offer enough time for the preterm infant to become acclimated to the supine position. The largest number of nurses reported the corrected gestational age to transition to the SSP two full weeks after the AAP recommendation. In addition, 42% of nurses reported that the length of time preterm infants is transitioned prior to discharge is not applicable to their decision to transition a preterm infant supine.

Only 60% of respondents consider an infant being in an open crib as a factor for transitioning an infant to the SSP; however, this is an ideal time to role model appropriate safe sleep in preparation for hospital discharge. If the infant is in an open crib, this provides a preparation period for both infants and their parents to see how the infant tolerates the supine position and role model appropriate safe sleeping routines in preparation for discharge. However, just over half of respondents consider modeling for families when considering transitioning preterm infants to the supine position. Nurses need to understand the influence of role modeling safe sleep prior to hospital discharge.

The limitations of the study include an inability to confirm respondents were all neonatal nurses, the inability to confirm that subjects only took the survey once, and self-reported opinions and practice of supine transition may not be accurate. There was inadequate power to compare nurse's demographics with factors used to transition preterm infants to SSP.

In addition, the survey was developed by the author and has no documented reliability data.

Conclusion

Factors neonatal nurses reported as important when transitioning to the SSP were consistent and included respiratory status, support, and the occurrence of apnea, bradycardia and desaturations as the most often mentioned. Additional factors reported by more than half the respondents included corrected gestational age, medically stable, approaching discharge, when being placed in an open crib, and muscle tone. Factors reported by half or less of the respondents included feeding and infant weight. The majority of factors were consistent among the respondents; however, the influence and timing of each factor varied and were not compliant with AAP recommendations.

The results indicate that the majority of neonatal nurses do not recognize the importance of transitioning preterm infants in the SSP prior to hospital discharge. Supine positioning is the most important modifiable risk factor for SIDS. The risk of SIDS is highest in those preterm infants born earliest; these infants are in non-supine positions for the longest duration during their neonatal intensive care unit hospitalization. If a preterm infant is born at 24 weeks, that infant could potentially spend almost three months in non-supine positions in the hospital. Transitioning infants to the SSP by 32 weeks corrected gestational age and for several weeks prior to hospital discharge allows both the infant and family time to adapt to this position prior to discharge. Additional education for neonatal nurses regarding the importance of transitioning preterm infants to the SSP well before discharge is an important intervention to role model and promote safe sleep after discharge. Future prospective studies are needed to determine the impact transitioning preterm infants to the SSP has on neonatal outcomes including compliance of supine sleep after hospital discharge and motor development of the preterm infant.

References:

1. *Parks SE, Lambert ABE, Shapiro-Mendoza CK. Racial and ethnic trends in sudden unexpected infant deaths: United States, 1995-2013. Pediatrics. 2017;139(6):e20163844. doi:10.1542/peds.2016-3844*
2. *Hwang SS, Smith RA, Barfield WD, Smith VC, McCormick, MC, Williams MA. Supine sleep positioning in preterm and term infants after hospital discharge from 2000 to 2011. J Perinatol. 2016; 36: 787-793. doi:10.1038/jp.2016.80*
3. *AAP Committee on Fetus and Newborn. Hospital discharge of the high-risk neonate. Pediatrics. 2008;122(5):1119-1126. doi:10.1542/peds.2008-2174*
4. *AAP Task Force on Sudden Infant Death Syndrome. SIDS and other sleep-related infant deaths: Expansion of recommendations for a safe infant sleeping environment. Pediatrics. 2011;128:1030-1039. doi:10.1542/peds.2011-2284*
5. *AAP Task Force on Sudden Infant Death Syndrome. SIDS and other sleep-related infant deaths: Updated 2016 recommendations for a safe infant sleeping environment. Pediatrics. 2016; 138(5):1-12. doi:10.1542/peds.2016-2938*
6. *Aris, C Stevens TP, LeMura C, Lipke B, McMullen S, Cote-Arsenault D, & Consenstein L. NICU nurses' knowledge and discharge teaching related to infant sleep position and risk of SIDS. Adv Neonat Care. 2006;6:281-293.*
7. *Grazel R, Phalen AG, Polomano RC, Implementation of the American Academy of Pediatrics recommendations to reduce sudden infant death syndrome risk in neonatal intensive care units: An evaluation of nursing knowledge and practice. Adv Neonat Care. 2010; 10(6):332-342. doi:10.1097/ANC.0b013e3181f36ea0*
8. *McMullen SL, Wu YW, Austin-Ketch T, Carey MG. Transitioning the premature infant from nonsupine to supine position prior to hospital discharge. Neonatal Network. 2014;33(4):194-198. doi:10.1891/0730-0832.33.4.194*
9. *Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. J Biomed Inform. 2009 Apr; 42(2):377-371. doi:10.1016/j.jbi.2008.08.010*

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References: 1. Shafizadeh T. *Neonatal Intensive Care.* 2019;32(2):41-42.
2. Frese SA et al. *mSphere.* 2017;2(6):e00501-17.

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Cobalamin-C Methylmalonic Acidemia and Homocystinuria in Neonate Presenting as Persistent Pulmonary Hypertension Requiring Extracorporeal Membrane Oxygenation

Tammy Bills, RN, BSN, CPN, Laura Davis-Keppen, MD, Lauritz Meyer, MD, Lesta Whalen, MD

ABSTRACT:

Introduction:

Introduction: Inborn errors of metabolism (IEM) represent a small, yet unknown, fraction of idiopathic causes of persistent pulmonary hypertension of the newborn (PPHN). The treatment of a neonate presenting with PPHN follows a well-described pattern until standard medical therapies do not improve the patient's condition. Once these therapies are exhausted, and pulmonary hypertension, as well as acidosis, persists, the search for a more unlikely etiology of PPHN is undertaken. Extracorporeal membrane oxygenation (ECMO) allows for the treatment of PPHN and respiratory acidosis while allowing time for diagnosis and treatment of the IEM.

Case Presentation:

This is the case of a term Hispanic female exhibiting symptoms consistent with PPHN. After initial stabilization with CPAP, antibiotics and inhaled nitric oxide, she deteriorated, requiring intubation. Serial echocardiograms demonstrated worsening pulmonary hypertension along with hemodynamic instability and severe acidosis. Given the failure to respond to maximal medical therapy, she was placed on venovenous ECMO. Despite achieving hemodynamic stability on ECMO, the acidosis persisted leading to exploration of a metabolic cause. A thorough evaluation revealed a diagnosis of methylmalonic acidemia, an inborn error of metabolism. Treatment was started with levocarnitine, hydroxocobalamin, and cessation of proteins. Once treatment was initiated, the patient's metabolic acidosis resolved rapidly, and she was weaned from ECMO support twenty-four hours after initiation. Ultimate diagnosis after genetic testing was cobalamin-C methylmalonic acidemia (Cbl-C) and homocystinuria.

Discussion:

There is evidence that IEM's like Cbl-C represent a subset of idiopathic causes of PPHN, and early diagnosis is crucial to prevent rapid, progressive deterioration. Recognition of an association between IEM, pulmonary hypertension, and the need for ECMO support would lead to a search for underlying IEM and aggressive treatment.

Key Words:

Cobalamin-C Methylmalonic Acidemia, Cbl-C, Homocystinuria, Inborn Error of Metabolism, IEM, Persistent Pulmonary Hypertension, PPHN, Extracorporeal Membrane Oxygenation, ECMO

Introduction:

Persistent pulmonary hypertension of the newborn (PPHN) complicates the course of over ten percent of neonates with respiratory failure and is responsible for over 30% of neonatal mortality.1 More common causes of PPHN include meconium aspiration syndrome, pneumonia, respiratory distress syndrome, sepsis, and congenital diaphragmatic hernia. Idiopathic PPHN is seen in 10-20% of cases; however, an inborn error of metabolism (IEM) is rarely reported as the cause. (1) The rarity of metabolic causes of PPHN can lead to a lag in the initiation of appropriate treatment, placing the patient at significant risk of morbidity/mortality.

Extracorporeal support of the infant with PPHN is considered the last option in infants who have failed all other medical management. Over the last 5 years, (Jan 2013 - Dec 2017) Extracorporeal Life Support Organization (ELSO) reported approximately 4000 neonatal respiratory patients with 40% listed as PPHN or 'other' for diagnosis. (2) It is unclear how many of these patients were eventually diagnosed with a metabolic etiology, but given the lack of case studies reported, it is suspected to be a small subset. Significant, early metabolic acidosis can cause complications such as severe PPHN; whereas extracorporeal membrane oxygenation (ECMO) allows for clearing of lactic acid and assists with resolving the severely acidotic state of the patient while allowing an avenue for reduction of harmful ammonia levels. One case report describes a newborn with Methylmalonic acidemia presenting as PPHN treated with ECMO therapy and another case report describes propionic acidemia reportedly causing initial presentation as PPHN. (3,4) This is a case report a neonate with Cbl-C methylmalonic acidemia presenting with persistent pulmonary hypertension requiring ECMO support for survival.

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Case Presentation

This is the case of a term Hispanic female born via cesarean section to a 30-year-old gravida G_4P_4 mother. Apgars were 8 and 9 at 1 and 5 minutes respectively. Weight was at the sixth percentile, length was at the 58th percentile, and head circumference was < 3rd percentile with some molding. She was stable in the newborn nursery for approximately two hours when she was noted to have hypoxia, differential oxygen saturations between right hand and right foot and hypoventilation that required oxygen therapy per nasal cannula. She was transferred quickly to the Neonatal Intensive Care Unit where she was placed on nasal continuous positive airway pressure (nCPAP). Initial arterial blood gas (ABG) was 7.32/34/18/64/-9 ($pH/pCO_2/CO_2/pO_2$/BE). Once on nCPAP, her oxygen saturations were 88-100% with 3-10 point difference in pre and post ductal saturations. Empiric antibiotics were initiated due to concern for pneumonia and possible sepsis due to infiltrates on chest x-ray and worsening respiratory status. An echocardiogram was performed due to increasing and persistent oxygen needs, which demonstrated moderately decreased function (ejection fraction of 41%) and supra-systemic pulmonary hypertension consistent with PPHN. Given these findings, inhaled nitric oxide was started at 20 ppm. This allowed her to stabilize and FiO_2 was weaned to 40% with pCO_2 in the 40's and PaO_2 41-78 for the next twelve hours.

At 18 hours of age, she was intubated and placed on mechanical ventilation due to worsening tachypnea and respiratory distress. She was given a dose of surfactant due to persistently hazy chest X-ray (CXR) and high oxygen needs. The patient then developed hypotension requiring fluid resuscitation and dopamine infusion. A repeat ECHO showed worsening PPHN (estimated RV pressure suprasystemic). She was started on epinephrine and milrinone to assist cardiac function as well as stress dose hydrocortisone. The patient required escalation of respiratory support progressing to high-frequency oscillatory ventilation with ABG of 7.06/67/36/21/-11. She continued to have worsening respiratory and metabolic acidosis with lactic acidemia (lactate 12 mmol/L). At 26 hours of life, ABG was 7.04/70/39/21/-12 with lactic acid of 11.4 mmol/L. Despite maximal therapy including sedation, muscle relaxation, multiple inotropes and fluid resuscitation she continued to have saturations in the upper 70's to low 80's Due to the maximal support required with no improvement, she was then transferred to the Pediatric Intensive Care Unit and placed on ECMO at 37 hours of life.

The patient was placed uneventfully on Veno-arterial ECMO with a rapid turnaround of her respiratory acidosis. She was weaned off dopamine and dobutamine with epinephrine infusion at minimal dosing 2 hours post cannulation. However, over the next 12 hours, she continued to have a marked lactic acidosis with base deficit ranging -10 to -14 meq/L and lactate 9-12 mmol/L despite adequate fluid resuscitation and appropriate blood pressure off inotropes. Due to the lactic acidosis and ammonia of 105 uMol/L, a Metabolic/Genetics consult was obtained. Expedited newborn screen results were obtained by Genetics consultant, and C3 was found to be highly elevated. Newborn screen collected just prior to 24 hours of life showed a significantly elevated C3 propionylcarnitine of 11.88 µmol/L (normal <6, 'alert' value 8.87) and C3:C2 ratio of 0.68 (normal <0.3). Repeat ammonia was 62 uMol/L, Vitamin B12 603 pg/mL, and homocysteine was highly elevated at 85.3 µMol/L (mean 6.8, normal <12.8). Due to the abnormal newborn screen, lactic acidosis and elevated homocysteine, therapy was started with levocarnitine 100mg/kg/day and hydroxocobalamin 2 mg IM daily. Venous nutrition was continued at 120 kcal/kg/day with cessation of intravenous proteins for twenty-four hours. Methylmalonic acidemia cblC type was suspected due to Hispanic heritage. Within eight hours of initiating treatment, the patient's metabolic acidosis resolved and she was quickly weaned off ECMO therapy with decannulation approximately 24 hours post initiation of ECMO.

Labs were reported over the next 2 days showing an acylcarnitine profile with C3 elevated to 3.47 nmol/mL (normal <0.55). Urine organic acids showed a significant increase of excretion of methylmalonic acid at 1086 mmol/mol creatinine (<4) with other propionate metabolites detected. Homocysteine remained elevated at 92.6, total carnitine was 10 nmol/mL (17-41), free carnitine was 3 nmol/mL (10-21), and acylcarnitine to free carnitine ratio was 2.3 (0.2-1.4). Given these results, a disorder of cobalamin metabolism was suspected, and molecular testing of the MMACHC gene was sent. This patient was found to be homozygous for the c.328_331delAACC pathologic variant, consistent with Cobalamin C (Cbl-C) methylmalonic aciduria and homocystinuria.

The patient was extubated on postnatal day of life six. She remained on therapy with hydroxycobalamin, betaine, Leucovorin, Levocarnitine, and folate supplementation and was discharged home on DOL 39. Unfortunately, she developed suspected cardiomyopathy with biventricular hypertrophy with an ejection fraction of 65%. Given social circumstances, she was scheduled for follow-up at a different institution. Follow-up at eleven months of age at this institution reports that the patient was doing well with mild right ventricular hypertrophy, normal growth, and energy for age.

Discussion

Combined methylmalonic acidemia and homocystinuria, Cbl-C type, is an autosomal recessive inborn error of intracellular cobalamin metabolism. It is the most common inborn error of cobalamin metabolism, with an incidence of 1:100,000 live births. (5,6) The gene mutation (MMACHC) ultimately results in the elevation of methylmalonic acid and homocysteine along with decreased production of methionine. (7) Methylmalonic acid is a potent cell toxin inducing excitotoxic cell death in neuronal cells, explaining the classic presentation and progression of this disease. Cbl-C, has a heterogeneous presentation, making diagnosis difficult. (5) Clinical presentations may be as neonates, infants, childhood, or after age twelve. (8)

Early or infantile presentation of MMA consists of rapid deterioration in a term neonate after a symptom-free interval of hours to weeks. (9,10) Cobalamin-C disease is the most frequently diagnosed form of MMA, presenting with neurologic, ocular, hematologic and gastrointestinal symptoms including failure to thrive, developmental delay, microcephaly, somnolence/lethargy, and hypotonia. (5,10) Infants can present with a high anion gap metabolic acidosis, ketonuria, and hyperammonemia. (8) Hemolytic uremic syndrome and megaloblastic anemia can also be seen with relative frequency. (5) Cardiopulmonary signs have

been reported more recently with congenital heart disease such as septal defects, valve abnormalities, and atrial defects with pulmonary manifestations. (5,11) There are reports of patients with Cbl-C presenting with respiratory failure, and cor pulmonale due to pulmonary thrombosis. (3,12,13) ECMO has been reported as a supportive measure in the treatment of metabolic crisis in older children with MMA and propionic acidemia. (6,14) Two case reports highlight the development of pulmonary hypertension in older patients but only one study by Agarwal and colleagues details the rapid progression of isolated pulmonary hypertension in a newborn with MMA requiring ECMO. (3,11,15) This case is the first patient with Cbl-C disease presenting with pulmonary hypertension that highlights the severity of acidosis and PPHN and usefulness of ECMO in stabilizing the patient. ECMO allowed for the time needed to make the diagnosis and begin appropriate treatment.

This infant was born uneventfully with no concerning risk of infection: mother was GBS negative, membranes were ruptured 2 hours, and amniotic fluid was clear. However, she progressed to significant respiratory distress, hypoxia, and acidosis within 3 hours of postnatal life. Escalation of therapy was necessary with the development of significant PPHN, cardiac dysfunction, and lactic acidosis culminating in the need for ECMO therapy. Neonates have a limited ability to respond to illness and differentiating between causes is difficult with a narrow range of clinical signs and symptoms. (9,16) Common neonatal diagnoses associated with PPHN (sepsis, meconium aspiration, and respiratory distress syndrome) that require ECMO support normally have acidosis that responds quickly to the improved hemodynamic stability achieved on ECMO. Despite achieving adequate hemodynamics with ECMO in our patient, the continued acidosis prompted the search for an inciting metabolic condition. With the laboratory studies recommended by the metabolic consultant and the ability to obtain rapid newborn screen results, MMA was suspected early, and treatment was begun within 12 hours of ECMO cannulation. Once treatment was initiated, acidosis improved rapidly, and the patient was able to decannulate from ECMO in twenty-four hours.

This case highlights the importance of newborn care when considering IEMs in the differential diagnosis of critically ill neonates with pulmonary hypertension, especially those not responding to standard therapies. While expanded newborn screens have facilitated early diagnosis of several IEMs, patients can develop symptoms before newborn screen results are available. (17) IEMs must be considered in the differential diagnosis, especially in a term infant with unexplained lactic acidosis. Obtaining an ammonia level and contacting the state newborn screening lab can be helpful.

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In retrospect, this patient did have clinical signs, and exam findings demonstrated in the prenatal and neonatal presentation of Cbl-C disease including intrauterine growth retardation, microcephaly, metabolic acidosis, and hyperammonemia. (18) However these findings are not diagnostic, which is typical with Cbl-C presentation. In neonates, acidosis and hypoxia can produce pulmonary vasoconstriction and maintain pulmonary hypertension (persistent fetal circulation). In this report, however, the patient developed pulmonary hypertension in the absence of an obvious inciting event such as meconium aspiration. It is postulated that physiologic stress of some type, either in utero or in the early postnatal period, triggered the metabolic decompensation. This caused an anion gap acidosis that resulted in the development or exacerbation of PPHN all due to the underlying Cbl-C. It has been suggested that homocysteine or its derivatives have a role in the pathophysiology of vascular disease, causing blood vessel damage, microangiopathy, and thromboembolism leading to pulmonary arterial hypertension. (7,15) Which came first, the acidosis or the pulmonary hypertension is unclear, but the resulting clinical scenario remains difficult.

In summary, to the best of our knowledge, this is the first report of a neonate with Cbl-C disease presenting with persistent pulmonary hypertension requiring ECMO support for survival. While ECMO support of neonates with IEM has been described, this case highlights the rapidity with which an uncommon cause should be suspected when patients do not respond as expected to the classic treatment for PPHN. There is more evidence that IEM's like Cbl-C represent a subset of idiopathic causes of PPHN, and early diagnosis of this is crucial to prevent rapid progressive deterioration, often leading to death. Recognition that there is an association between IEM, pulmonary hypertension, and the need for ECMO support would lead to a search for underlying IEM and aggressive treatment.

References:

1. *Steinhorn R. Neonatal Pulmonary Hypertension. Pediatr Crit Care Med. 2010. Mar; 11 Suppl 2:S79-84.*
2. *ECLS International Summary Registry Report [Internet]. Extracorporeal Life Support Organization. July 2018 – [cited 2018 Oct 30[. Available from:* https://www.elso.org/Registry/Statistics/InternationalSummary.aspx
3. *Agarwal R, Feldman GL, Poulik J, Stockton DW, Sood BG. Methylmalonic acidemia presenting as persistent pulmonary hypertension of the newborn. Journal of Neonatal-Perinatal Medicine, 2014;7:247-51.*
4. *Shotelersuk V, Srivuthana S, Washarasindhu S, Dhamcharee V, Jaruratanasirikul S, Pangkanon S, Kaewpaluek V, Aroonparkmongkol S. Establishing gas chromatography-mass spectrometry to diagnose organic acidemias in Thailand. Southeast Asian J trop Med Public Health. 2000;31(3):566-70.*
5. *Martinelli D, Deodato F, Dionisi-Vici C. Cobalamin C defect: Natural History, pathophysiology, and treatment. J inherit Metab Dis. 2011;34(1):127-35.*
6. *Stark RJ, Naik-Mathuria BJ, Lam FW, Olutoye O, Sutton VR, Shekerdemian L. Extracorporeal Membrane Oxygenation support of Severe Metabolic Crisis in child with Methylmalonic Acidemia. ASAIO Journal, 2012;58(4):438-9.*
7. *Carrillo-Carrasco N, Venditti CP. Combined Methylmalonic academia and homocystinuria, cblC type. II. Complications, pathophysiology, and outcomes. J Inherit Metab Dis. 2012;35(1):103-14.*
8. *Huemer M, Diodato D, Schwahn B, Schiff M, Bandeira A, Benoist JF, et al. Guidelines for diagnosis and management of the cobalamin-related remethylation disorders cblC, cblD, cblE, cblF, cblG, cblJ and MTHFR deficiency. J Inhert Metab Dis. 2017;40:21-48.*
9. *Levy PA. Inborn errors of metabolism: Part 2: Specific disorders. Pediatr Rev. 2009;30(4):e22-8*
10. *Dodata F, Boenzi S, Santorelli FM, Dionisi-Vici C. Methylmalonic and Proprionic Aciduria. Am J Med Genet C Semin Med Genet. 2006;142C(2):104-12*

11. *Iodice FG, Di Chiara L, Boenzi S, Aiello C, Monti L, Cogo P, Dionisi-Vici C. Cobalamin D Defect Presenting with Isolated Pulmonary Hypertension. Pediatrics. 2013;132(1):e248-51.*
12. *Brandstetter Y, Weinhouse E, Splaingard ML, Tang TT. Cor pulmonale as a complication of methylmalonic academia and homocystinuria (CblC type). Am J Med Genet. 1990;36(2):167-71*
13. *Rosenblatt DS, Aspler AL, Shevell MI, Pletcher BA, Fenton WA, Seashore MR. Clinical heterogeneity and prognosis in combined methylmalonic aciduria and homocystinuria (cblC). J Inherit Metab Dis. 1997;20(4):528-38.*
14. *Sato S, Kasahara M, Fukuda A, Mizuguchi K, Nakagawa S, Muguruma T, Saito O, Karaki C, Nakagawa A, Yoshii K, Horikawak R. Liver transplantation in a patient with proprionic academia requiring extra corporeal membrane oxygenation during severe metabolic decompensation. Pediatr Transpl. 2009;13:790-93.*
15. *Liu J, Peng Y, Zhou N, Liu X, Meng Q, Xu H, Zhao S. Combined methylmalonic academia and homocysteinemia presenting predominantly with late-onset diffuse lung disease; a case serious of four patients. Orphanet Journal of Rare Disease. 2017;12:58.*
16. *Enns GM, Packman S. Diagnosing Inborn Errors of Metabolism in Newborn: Clinical Features. NeoReviews. 2001;2(8):e183-91.*
17. *Dagli AI, Zori RT, Heese BA. Testing Strategy for Inborn Errors of Metabolism in the Neonate. NeoReviews. 2008;9(7):e291-8.*
18. *Carrillo-Carrasco N, Chandler RJ, Venditti CP. Combined methylmalonic academia and homocystinuria, cblC type. I. Clinical Presentations, diagnosis and management. J Inherit Metab Dis. 2012;35(1):91-102*

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Hyperinflation: What is it and what does it mean? The role of high-frequency ventilation (HFV) in Hyperinflation

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.

"Wean the MAP/PEEP; the baby is hyperinflated." It is the recurring waking nightmare of NICU respiratory therapists everywhere. Before having a "knee jerk" reaction to a chest film (CXR) with a (insert arbitrary number here) rib count, it is imperative that clinicians understand what is happening with the patient before reacting to the CXR.

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Why is a baby hyperinflated? Unfortunately, the standard CXR does not differentiate between lungs that are showing air trapping from ones in which the lung is actually over inflated. There are, however, signs to watch for when dealing with this situation. There are situations where moderate hyperinflation may help the patient and attempts to "fix" it do more harm than good.

There are many reasons for which we consider decreasing MAP/PEEP, the interpretation of a CXR being just one of them. In addition to the CXR, blood pressure issues and/or suspected impairment of venous return are the most common reasons for decreasing MAP. Hemodynamic compromise may or may not be improved by decreasing MAP, depending on what is happening within the lungs. While intrathoracic pressure is most commonly blamed for blood pressure problems, we tend to forget that pulmonary vascular resistance (PVR) is highest at both ends of the pulmonary compliance curve and lowest at optimal compliance. Poorly and/or non-recruited lungs press against pulmonary vasculature and result in increased PVR. In this case, decreasing MAP will not help and may well make matters worse. Cerebral blood return will also be impaired if PVR is high.

In clinical practice, the most useful indicators of optimal pulmonary compliance are oxygen saturation (SpO_2) and oxygen requirements (FiO_2) since optimal compliance is the point at which adequate oxygenation occurs with the lowest FiO_2 (and the lowest ventilating pressures).

A baby with FiO_2 of 0.21 and SpO_2 100% is quite simply not hyperinflated, regardless of what a CXR may show at this point, but if the current picture is the result of air trapping, they may become hyperinflated over time. Impaired blood flow through the lungs impacts oxygenation, as does impaired blood pressure. Neither of these factors is present in this situation. In clinical practice, the precursor to hyperinflation is often air trapping. In its insidious progression, air trapping increases expansion and, counterintuitively, FiO_2/SpO_2 may improve as inadvertent PEEP approaches optimal PEEP.

It is very unlikely that a baby with a MAP of 7-9 cmH_2O is actually hyperinflated, and a CXR showing this is actually a warning NOT to decrease MAP/PEEP. Doing so might make matters worse as it leads to more gas trapping and ultimately collapse and derecruitment.

A study in gas trapping

Figure 1 day 1

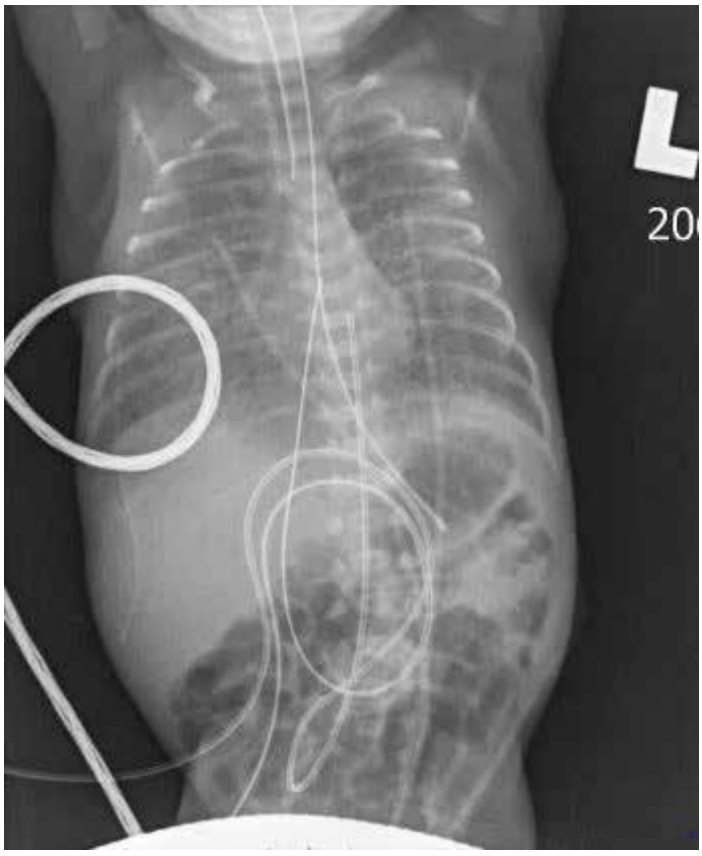

Figure 1

Figure 1 is a CXR of a 648-gram baby, day one of life, being oscillated (HFO) at 9 Hz, maximum amplitude of 20 cmH_2O (on volume guarantee using 18 cmH_2O) at a MAP of 10 cmH_2O. Several things jump out here that warn of impending trouble. The grossly "hyperinflated" picture actually shows gas trapping. We do not think of PEEP when using HFO, but the effective PEEP at these settings is 2 cmH_2O. (MAP minus ½ amplitude). Such a low PEEP is likely not adequate to maintain airway stability. (See figure 5, courtesy of Bunnell Inc)

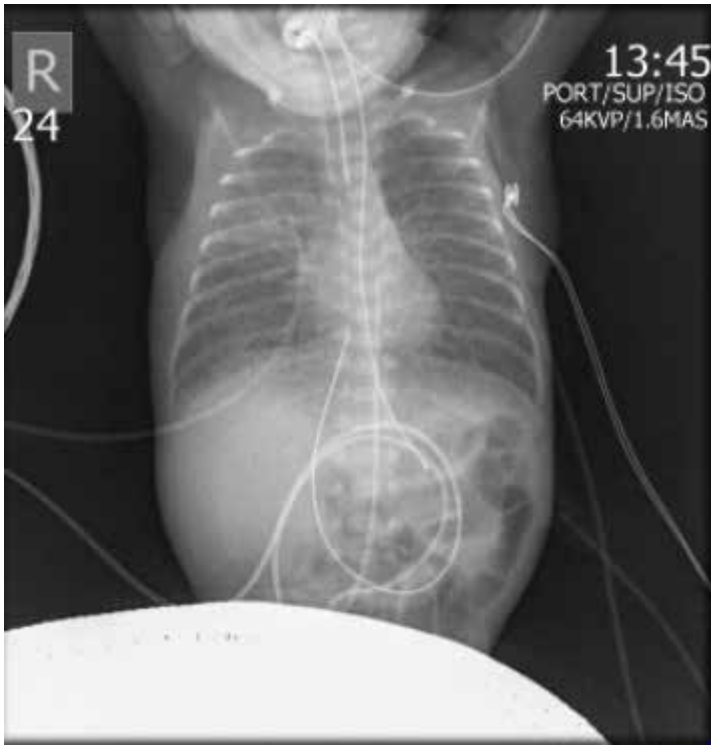

Figure 2 Day 1

Figure 2 is the same infant, now on HFJV the same day. Ventilator settings are rate of 300, pressures of 28/10 (HFJV reading PEEP 9.8 cmH_2O) and HFJV inspiratory time (JTi) of 0.02 seconds, and FiO2 0.39. PEEP is then weaned to 9 with HFJV PEEP measuring 8.8 cmH_2O. The picture is arguably worse. In the face of air trapping, this patient would benefit from a decrease in HFJV rate and higher PEEP. Instead, the PEEP was further decreased to 8 cm$H_2$0. Numerous adjustments were made, and by day 4 (figure 3) FiO_2 had climbed to 0.67 after PEEP had been reduced from 10 to 8 cmH_2O, and recruitment maneuvers were started at 6 cmH_2O above PEEP with a 2-second inspiratory time (Ti) and rate of 10 in an attempt to decrease FiO_2 and optimize lung volume.

By day 5 the team decided to leave the PEEP, now increased back to 10 cmH_2O, as is and stay the course as the patient's condition and CXR had improved. Between adjustments in JTi and recruitment maneuvers, FiO_2 had decreased to 0.37.

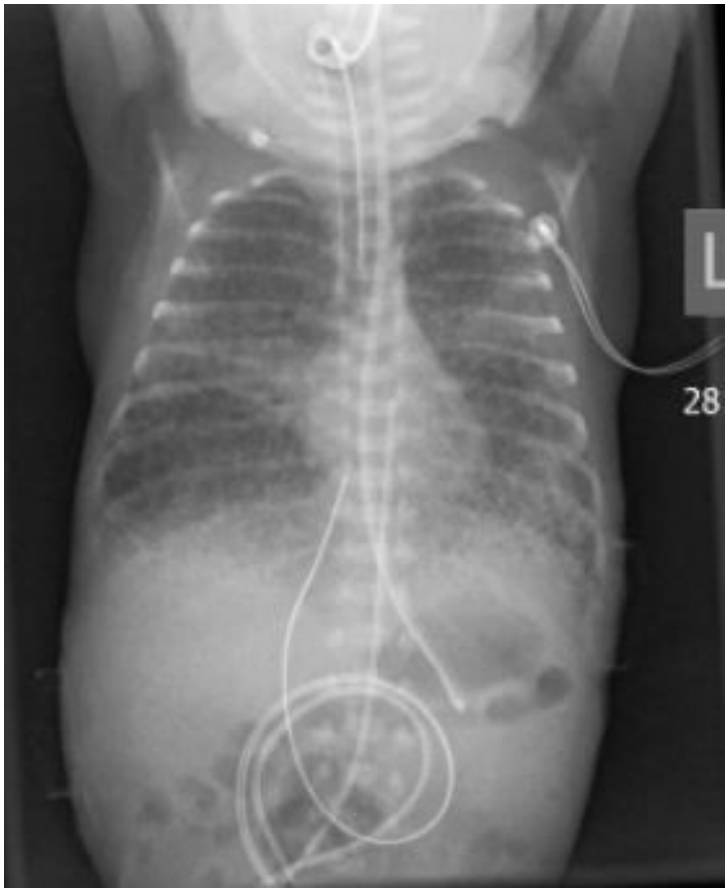

Figure 3 Day 4

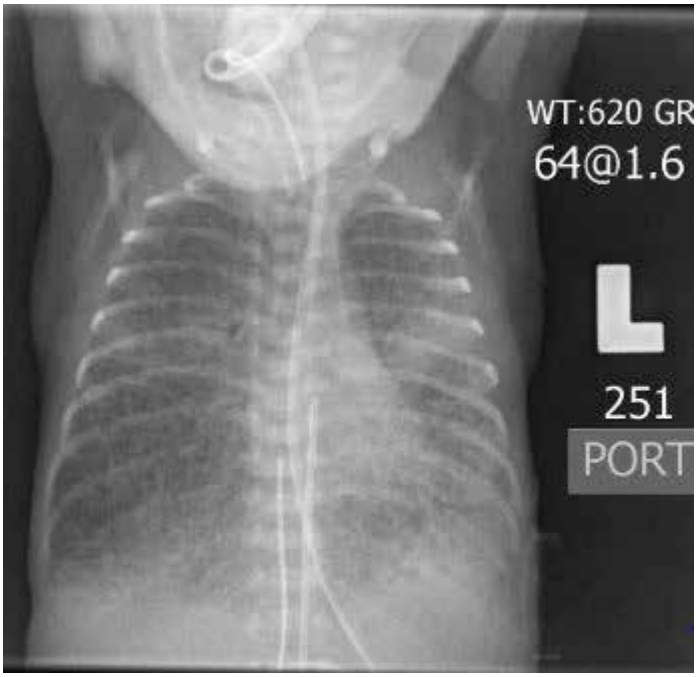

Figure 4 Day 5

"This case of patient management is an example of a team failing to recognize gas trapping and being led astray by rib counting. When "hyperinflation" worsens with decreased PEEP/MAP clinicians are well advised to head in the opposite direction. "

This case of patient management is an example of a team failing to recognize gas trapping and being led astray by rib counting. When "hyperinflation" worsens with decreased PEEP/MAP clinicians are well advised to head in the opposite direction. HFJV is the best way to mitigate air trapping by virtue of a possible I:E ratio of 1:12 and the nature of the HFJV breath in relation to conducting airways. In this case, it did not eliminate it, but it did not help that the team failed to utilize maximum I:E ratio by decreasing the HFJV rate to its minimum of 240, although this was done eventually. It is also interesting to note in this case that increasing JTi (as high as the maximum of 0.034 seconds) did not result in a change in HFJV measured PEEP, the standard indicator of systemic gas trapping. I surmise that since the larger jet breath must displace more gas in its path, increased concurrent expiration mitigated the decreased time for passive exhalation. The greater momentum combined with increased time also allows the breath to travel further down the distal airways.

Adjustments to jet inspiratory time are great physics, but the fine-tuning in clinical practice is, I think, evolving and sometimes patient specific. As an admittedly jet-biased clinician, one of the things I like about the machine is the ability to micro-tune breaths and MAP for airway resistance, respiration, and ventilation.

Managing hyperinflation/gas trapping with HFO

Raising MAP in HFO can help prevent air trapping, as can low-

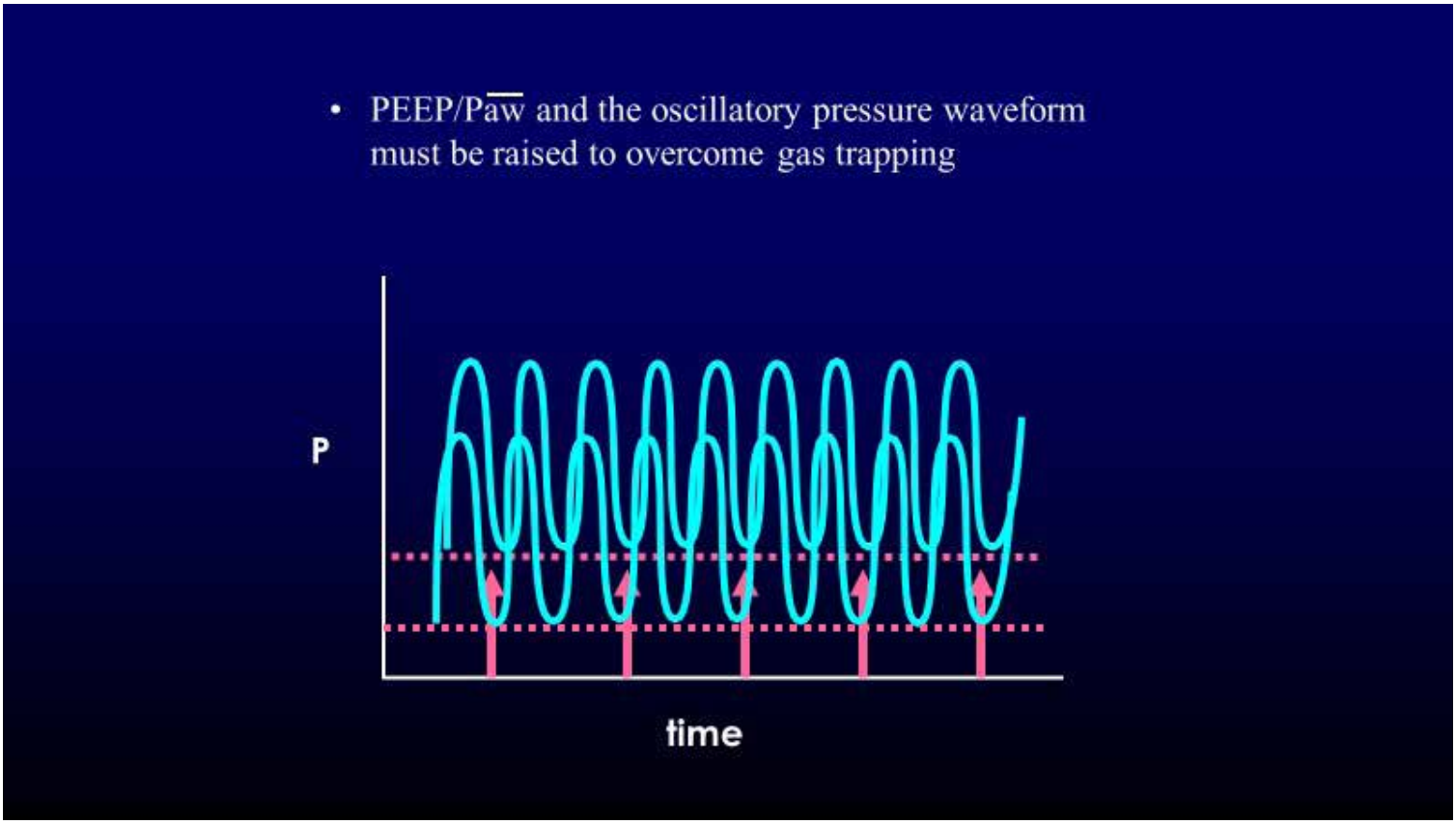

Figure 5 courtesy Bunnell Inc

ering frequency. Lowering frequency may allow for maintenance of minute volume while using lower amplitude. This will be much easier to do if the next generation ventilators with volume targeting and measurement are available. Using the lowest frequency possible with the lowest amplitude possible to maintain ventilation may be useful in the absence of HFJV or in milder cases. Be very cautious as amplitude approaches double the MAP, which can set the stage for airway instability and gas trapping especially in smaller babies with inherent high airway resistance.

Hyperinflation and chronic lung disease

We have all witnessed babies who, while appearing hyperinflated on CXR, get much worse when MAP/PEEP is decreased. These babies are telling us that they are not effectively hyperinflated, rather they are at a place on the compliance curve optimal to their own physiology. The familiar histology slide in figure 6 shows the problems associated with CLD: decreased surface area due to lack of secondary crests, and thickened membranes resulting from absent or inadequate apoptosis. This impacts gas exchange as there is both a lack of real estate available (aka surface area), increased airway resistance, and an increased diffusion gradient. How might some hyperinflation benefit these patients? As long as volutrauma is avoided by using HFO or HFJV, moderate hyperinflation stretches these surfaces and may result in a decreased diffusion gradient while increasing available surface area for gas exchange.

If decreasing (or increasing) MAP/PEEP necessitating increased amplitude or HFJV PIP to maintain ventilation, it is an indicator of lost compliance and the move should be reconsidered, as should it be if the baby's condition deteriorates. Increased FiO_2 should also be considered as a deterioration.

"As long as volutrauma is avoided by using HFO or HFJV, moderate hyperinflation stretches these surfaces and may result in a decreased diffusion gradient while increasing available surface area for gas exchange."

Avoiding "The MAP Trap"

- Air trapping first appears as hyperinflation on CXR

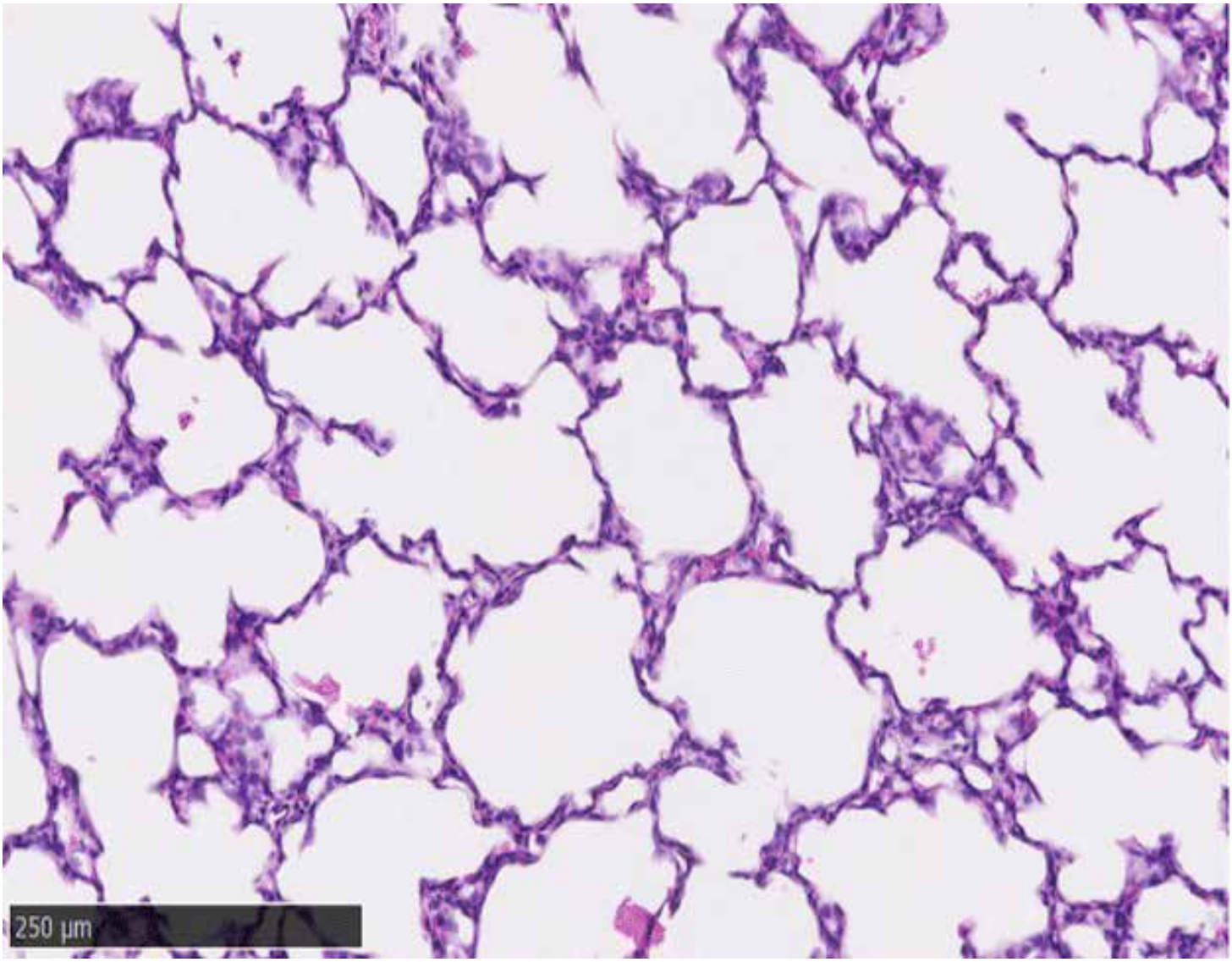

Figure 6 with permission Hyperoxia-induced lung structure–function relation, vessel rarefaction, and cardiac hypertrophy in an infant rat model. (2)

- Intuitive response is to wean MAP/PEEP
- "Hyperinflation" on CXR is unchanged or worse
- Decrease the MAP/PEEP more
- CXR progresses to "hyperinflated" but hazy with chronic changes
- By this time the damage is beginning, and the lungs will only improve with higher MAP/PEEP!
- Once the damage is done the HFJV can only do so much!

Remembering these points can help clinicians avoid this trap:

- Infants in 21% oxygen are likely NOT hyperinflated no matter what the CXR shows
- Infants with no apparent cardiovascular impairment are likely not hyperinflated
- Infants who show "hyperinflation" and crump when MAP is decreased are telling you they are not hyperinflated
- CLD may benefit from hyperinflation
- An underinflated lung will affect blood pressure as much as an overinflated lung

Air trapping is a precursor to hyperinflation. Guard against it by being mindful of:

- "Hyperinflation" on relatively low MAP/PEEP
- "Hyperinflation" that worsens when MAP/PEEP is decreased
- If using HFJV measured PEEP approaches or exceeds set PEEP
- Strongly suspect air trapping in all micro-prems!
- Copious secretions/meconium lead to air trapping
- Higher rates/frequencies can lead to or worsen air trapping
- Small airway diameter and its effect on time constants

We cannot change the nature of the patients we treat, but we can keep ourselves from using treatment strategies that exacerbate the problems associated with that nature and learning to listen to the language these patients speak: SpO_2 and FiO_2.

Next month: Non-Invasive Nasal HFJV Assisted (NINJA) Ventilation. Hint: it's this patient.

References:

1. *Bunnell Inc*
2. *Greco F, Wiegert S, Baumann P, Wellmann S, Pellegrini G, Cannizzaro V. Hyperoxia-induced lung structure–function relation, vessel rarefaction, and cardiac hypertrophy in an infant rat model. Journal of Translational Medicine. 2019;17(1):91.*

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Peer Reviewed

Use of Double Lumen Umbilical Catheters in Stable Premature Infants

Shabih Manzar, MD, Nitin Walyat, MD, and Sheri Gersch

Double lumen catheters (DLC), umbilical or peripherally inserted, are commonly used in NICU. (1) The main objective of using DLC is to have additional intravenous access. However, in stable preterm infants, its use in early days of life may compromise nutrient delivery.

Case Scenario:

A preterm infant weighing 900 grams was born at 26 weeks of gestation. The delivery was conducted due to maternal pre-eclampsia. The infant was stable at birth with Apgar scores of 7 and 8 at one and five minutes. He was placed on nasal continuous positive airway pressure (NCPAP). His vital signs including the blood pressure were stable. Soon after admission to neonatal intensive care unit (NICU) two double lumen umbilical catheters, venous and arterial, were inserted. After verifying the position with x-ray, admission fluids, including the starter total parental nutrition (TPN), were ordered. Total fluids were kept at 80 ml/kg/day. The rate of TPN infusion was set at 1.5 ml/hr; the other 1.5 ml/hr was run through the lumens of the catheters, see Table 1, column 1.

"The main objective of using DLC is to have additional intravenous access. However, in stable preterm infant, its use in early days of life may compromise nutrients delivery. "

Discussion:

Table 1 showed the options of fluid administration at admission. As noted in option one, 50% of the total fluids is consumed in maintaining the patency of other lumens. It is now standard of care to start protein containing fluids soon after birth in the preterm infant. The idea is to prevent negative nitrogen balance and provide adequate nutrition soon after birth. As noted in the case scenario, the use of double lumen catheters (DLC) resulted in the loss of 50% of the total fluid as it is consumed by other lumens, compromising the delivery of essential nutrients to the preterm

Table 1: Options of running IVF using single and double lumen umbilical catheters

Total Fluids	UVC port 1 (TPN fluid)	UVC port 2 (IVF + Heparin)	UAC port 1 (IVF + Heparin)	UAC port 2 (IVF + Heparin)
3ml/hr (80 ml/kg/day)	1.5 ml/hr (40 ml/kg/day)	0.5 ml/hr (13.3 ml/kg/day)	0.5 ml/hr (13.3 ml/kg/day)	0.5ml/hr (13.3 ml/kg/day)
3ml/hr (80 ml/kg/day)	2.5 ml/hr (67 ml/kg/day)	Heparin flushes	0.5 ml/hr (13.3 ml/kg/day)	Heparin flushes
3ml/hr (80 ml/kg/day)	2.5 ml/hr (67 ml/kg/day)	Single port	0.5 ml/hr (13.3 ml/kg/day)	Single port

TPN: Total Parental Nutrition (Dextrose and Protein)
IVF: Intravenous fluid (D10, 0.45 NS, 0.25 Na acetate)
UVC: Umbilical Venous Catheter
UAC: Umbilical Arterial Catheter

First option: Double lumen catheters, one running TPN, other three running IV fluids
Second option: Double lumen catheters, one running TPN, one IVF and other two heparin flushes
Third option: Single lumen catheters, both running fluids, no extra IVF or heparin flushes needed

infant.

The second option while still using DLC is to use frequent heparin flushes to keep lumen patent. However, this will result in frequent breaks in the central line circuit and also extra use of heparin. That could be a potential source of medication errors.

The use of DLC does not provide any extra benefits in newborn infants. This has been shown in a recent Cochrane review. (2) Double lumens have been shown to be an additional risk factor for central line-associated bloodstream infection in pediatric patients (CLABSI). (3)

" The use of DLC does not provide any extra benefits in newborn infants. This has been shown in a recent Cochrane review. (2) Double lumens have been shown to be an additional risk factor for central line-associated bloodstream infection in pediatric patients (CLABSI)."

Basing on this brief review, we suggest that routine use of double lumen umbilical catheters in stable premature infants should be viewed critically and its use should be limited to sick unstable neonates that might need vasopressors and/or fluid resuscitation.

References:

1. *O'Malley C, Sriram S, White M, Polinski C, Seng C, Schrieber MD. Feasibility and Outcomes Associated With the Use of 2.6-Fr Double-Lumen PICCs in Neonates. Adv Neonatal Care. 2018 Oct 18. Doi: 10.1097/ANC. 0000000000000570*
2. *Kabra NS, Kumar M, Shah SS. Multiple versus single lumen umbilical catheters for the newborn infant. Cochrane Database of Systematic Reviews. 2005, Issue 3. Art no: CD004498.doi: 10.1002/ 14651858. CD004498.pub2*
3. *Carter JH, Langley JM, Kuhle S, Kirkland S. Risk Factors for Central Venous Catheter-Associated Bloodstream Infection in Pediatric Patients: A Cohort Study. Infect Control Hosp Epidemiol 2016;37: 939 –945. Doi:10.1017/ice.2016.83*

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Shedding Light on the Dark Reality of Disparities in Perinatal Care

Viveka Prakash Zawisza, MD, FACOG

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

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

National Perinatal Association
Educate. Advocate. Integrate.

The National Perinatal Association endeavors to develop a conference each year around a particularly salient theme of importance to perinatal health advocates. This year's conference "Improving Access to Perinatal Care: Confronting Disparities and Inequities in Maternal-Infant Health" was no exception. The rising maternal mortality rate in the United States is of serious concern but embedded within that is the additional disturbing statistic that the maternal mortality rate for black women is 3-4 times higher than for white women. Some awareness of this troubling fact was brought to the national consciousness through the widely publicized story of Serena Williams. The repeated dismissal of her symptoms by her providers and the ultimate delayed diagnosis of a postpartum pulmonary embolism is a story to which many black mothers can relate. For every high-profile near-miss, there are hundreds of lives lost of women whose names we may never know; their children left without mothers for a lifetime. NPA's conference delved into the reasons why maternal and infant mortality and other perinatal health issues disparately affect marginalized communities, with an emphasis, as always, on a multidisciplinary approach.

"The repeated dismissal of her symptoms by her providers and the ultimate delayed diagnosis of a postpartum pulmonary embolism is a story to which many black mothers can relate."

The first day started with a panel on perinatal care for patients with disabilities, featuring Dr. Monika Mitra, the Director of the Lurie Institute for Disability Policy at Brandeis University, Dr. John Harris, an OB/GYN from UPMC-Magee Women's Hospital, and Nicole Lomerson, MPH, a public health expert and parent. This session was sponsored by the Family Advocacy Network and was a highly successful demonstration of the importance of an interdisciplinary approach to perinatal care. The conference officially opened with a powerful keynote address from Dr. Joia Crear-Perry, an OB/GYN and advocate for reproductive justice who founded the National Birth Equity Collaborative (www.birthequity.org). Dr. Crear-Perry gave many eye-opening statistics and evidence-based hypotheses about why disparities in perinatal care are harming black women and infants in our country. The morning continued with an inspiring talk from Dr. Christopher DeRienzo, a neonatologist from Asheville, North Carolina and leader in quality and data analytics. Dr. DeRienzo applied lessons he has learned from his practice caring for vulnerable babies to the challenging work being done to address disparities in health. Following this, there was a presentation on addressing racial inequities within an organization with Beth Buxton, LICSW and Stephanie Campbell, MPH from the Massachusetts Department of Public Health. They presented many actionable steps that any organization can take to increase internal awareness and dialogue around race and racism. The day concluded with a panel on NPA's recent position paper "Disparities and Health Care Access" on which I had the privilege to participate along with Dr. Jerry Ballas and Aarin Williams, JD, from National Advocates for Pregnant Women.

The second day continued to build the momentum with an opening address from Aarin Williams, JD on protecting the rights of pregnant people in states where fetal personhood is a controversial reality. This was followed by an inspiring talk by Dr. Neel Shah, an OB/GYN at Harvard Medical School and Director of Delivery Decisions initiative at Ariadne Labs on designing perinatal systems to protect the dignity of parents and babies as they grow their families. His work is internationally lauded, and he and his team continue to develop innovative solutions to address disparities in perinatal health. The day continued with a breakout session featuring three concurrent presentations: Mimi Niles, CNM on the role of midwifery in combating disparities, Dr. Naomi Bar-Yam from Mother's Milk Bank Northeast on improving access to donor milk in disadvantaged communities, and Dr. Stacy Seyb on disparities in rural communities. The afternoon went on with the annual address from NPA President Dr. Jerry Ballas wherein he spoke about the "why" at the heart of NPA's mission and the current variety of workgroups and programs within the organization with a call to action for all who are interested in joining. This was followed by a presentation on perinatal mental health disparities by Dr. Karen Tabb Dina from the University of Illinois. Dr. Dina discussed some innovative approaches to community research and the challenges of capturing racial in-

equities in study design. The day concluded with an energizing talk by Katie Schubert, Chief Advocacy Officer at the Society for Maternal-Fetal Medicine. Ms. Schubert discussed current legislation related to perinatal health issues and ways to get involved as perinatal health advocates.

"This was followed by an inspiring talk by Dr. Neel Shah, an OB/GYN at Harvard Medical School and Director of Delivery Decisions initiative at Ariadne Labs on designing perinatal systems to protect the dignity of parents and babies as they grow their families."

The third and final day of the conference featured two dynamic speakers. First, Dr. Alison Stuebe, a high-risk OB/GYN specialist from University of North Carolina, discussed disparities in the fourth trimester, bringing awareness to an issue that will be the central theme of next year's NPA conference. Following this, Dr. Liddy Hope, a psychologist from Elgin Community College in Illinois, spoke about working with LGBTQ+ families in the context of perinatal care. Both speakers provided illuminating data and concrete tools that all providers can use to improve the care they deliver. The conference ended on a high note, leaving all in attendance with a renewed sense of purpose and a powerful vision of a world where all parents, babies, and families have equal access to high-quality care and are able to build strong families regardless of what they look like or how much privilege they have. As this year's conference shed light on the stark realities of health inequity in the United States, there has never been a more relevant and urgent need for an organization like NPA. By keeping at its core the mission to educate, advocate, and convene through a multidisciplinary approach, NPA is uniquely positioned to meaningfully impact the perinatal community by addressing disparities in perinatal health. We welcome all members of the community to join in this critical work so we can collectively transform health injustice for some into health justice for all.

The author has no relevant disclosures.

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- Treatment of serious infections in low and middle income countries

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Call for Abstracts – Deadline December 15, 2019

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Peer Reviewed

Fellow's Column: Use of a Clinical Respiratory Score to Improve Care of Pediatric Patients Hospitalized for Asthma

Luis RIvera, MD

Luis Rivera, MD, FAAP, is a Neonatology fellow at Loma Linda University Children's Hospital. He has a background working with underprivileged populations and is interested in global health as well as learning about health disparities in the neonatal intensive care unit.

Dr. Rivera is the editor of the new Fellowship column. Information on submission of material for the column follow below.

Fellow's Column is published monthly.

- Submission guidelines for "Fellow's Column":
- 1250 word limit not including references or title page.
- QI/QA work, case studies, or a poster from a scientific meeting may be submitted..
- Submission should be from a resident, fellow, or NNP in training.
- Topics may include Perinatology, Neonatology, and Younger Pediatric patients.
- No more than 7 references.
- Please send your submissions to:

Luis Rivera, MD
lurivera@llu.edu

Background:

Asthma is one of the most common chronic illnesses of childhood, affecting an estimated 6 million children in the United States. Asthma has serious consequences on growth and development in children as well as serious economic and social burden for them and their families. The prevalence of asthma among the pediatric population is increasing and it is now the number one cause of pediatric hospitalizations in the United States, accounting for direct costs of 3.6 billion dollars per year.

During hospitalization, a child will be evaluated by different providers including nurses, physicians or respiratory therapists, each focusing on different aspects of the examination and assessing a patient differently. The use of a validated instrument, the Clinical Respiratory Score (CRS), and a clinical asthma pathway will allow for more objective assessments and create a more standardized approach to the management of these patients according to their acuity.

The assessment of respiratory status drives clinical decision making in children admitted for asthma, specifically when to step-up therapy or wean medications, and when to discharge or escalate care.

"The prevalence of asthma among the pediatric population is increasing and it is now the number one cause of pediatric hospitalizations in the United States, accounting for direct costs of 3.6 billion dollars per year."

Study Aim:

To reduce length of stay (LOS) and number of albuterol doses by 10% in patients with asthma admitted to the pediatric inpatient unit by implementing a clinical pathway integrating the use of a clinical respiratory score.

Measures:

Process Measure:
- Proportion of monthly asthma patients with Inpatient Asthma Pathway used (verified by chart documentation of Clinical Respiratory Score).

Outcome Measure:
- Reduction in LOS
- Reduction in number of albuterol doses per pediatric asthma patient

Balance Measure:
- Percentage of ED revisits to SBH within 30 days of admission.

Methods:

Education: Pediatric residents participated in a training session on the use of a CRS-based asthma clinical pathway for the pediatric inpatient unit.

Data collection: Chart review of all patients with an ICD-10 discharge diagnosis of acute asthma exacerbation was performed. Average length of stay, average number of albuterol doses per patient, and SBH re-admits or ED re-visits within 30 days were obtained pre-intervention (N=9 patients, from Dec 2017) and compared with post-intervention (N=9 patients, from Dec 2017-Jan 2018).

Results:

- There was 100% compliance in documenting the use of the

Clinical Respiratory Score

Variable	0 Points	1 Point	2 Points	3 Points
Respiratory Rate				
<2 months		≤60	61-69	≥70
2-12 months		≤50	51-59	≥60
13-23 months		≤40	41-44	≥45
2-3 year		≤34	35-39	≥40
4-5 year		≤30	31-35	≥36
6-12 year		≤26	27-30	≥31
>12 year		≤23	24-27	≥28
Retractions	None	Subcostal or intercostal	2 of the following: subcostal, intercostal, substernal OR nasal flaring (infant)	3 of the following: subcostal, intercostal, substernal, suprasternal, supraclavicular OR nasal flaring/head bobbing (infant)
Dyspnea				
0-23 months	Normal feeding, vocalizations and activity	1 of the following: dif culty feeding, decreased vocalization or agitated	2 of the following: difficulty feeding, decreased vocalization or agitated	Stops feeding, no vocalization, drowsy or confused
2-4 years	Normal feeding, vocalizations and play	1 of the following: decreased appetite, increased coughing after play, hyperactivity	2 of the following: decreased appetite, increased coughing after play, hyperactivity	Stops eating or drinking, stops playing, OR drowsy and confused
>4 years	Counts to ≥10 in one breath	Counts to 7-9 in one breath	Counts to 4-6 in one breath	Counts to ≤3 in one breath
Auscultation	Normal breathing, no wheezing present	End-expiratory wheeze only	Expiratory wheeze only (greater than end-expiratory wheeze)	Inspiratory and expiratory wheeze OR diminished breath sounds OR both

Minimum score: 1; Maximum score: 12

Adapted from: Liu LL, Gallaher MM, Davis RL, Rutter CM, Lewis TC, Marcuse EK. Use of a respiratory clinical score among different providers. Pediatr Pulmonol 2004;37(3):243-8.

Clinical Asthma Pathway-Pediatric Emergency Department

***For patients over two years without preexisting conditions**

INITIAL ASSESSMENT (1st HOUR)

RS 1	RS 2-5	RS 6-12
*Discharge with albuterol	-Albuterol x1 Reassess after 20 to 60 minutes (Max:3 doses) **Steroids based on history & presentation -Consider ipratropium/albuterol if >1 Albuterol is needed	-Albuterol + Ipratropium x3 back to back -Steroid therapy -Consider Magnesium Sulfate **With signs of clinical decline: ICU consult, consider BiPAP, epinephrine or terbutaline, prepare for intubation

****Signs of Clinical Decline**
1. Drowsiness
2. Agitation
3. Confusion
4. Silent chest exam

Obtain Peak Flow on ALL patients ≥ 5 years old if feasible

REASSESSMENT (2nd Hour)

RS 1-4	RS 5-8	RS 9-12
*Discharge	-Observe for 1hour -Consider Albuterol q1hour -Consider Magnesium sulfate (if not given) -If O2 sat <92% on 2LNC **OR** 40%FM: Mg sulfate, continuous albuterol , CXR and PICU consult	-Continuous albuterol -Magnesium sulfate (if not given) -Consider BiPAP, epinephrine or terbutaline, CXR, ICU consult -If undecided between Inpatient or ICU, proceed to 3rd hour

***Discharge Planning**
1. Albuterol every 4 hrs for 2 days, then every 4hrs as needed
2. Continue steroids for 3-5 days if started in the ED
3. Education use of spacer in patient 5 years and older
4. Asthma Action Plan
5. Appointment with PMD or subspecialty if indicated

CHAM PICU ≤ 15 years old
SBH ICU if > 15 years old (contact senior house)

SBH Health System PEDIATRICS

Typical Medications:
Albuterol
<20 kg: 4 puff MDI or 2.5 mg nebulized
≥20 kg: 8 puff MDI or 5 mg nebulized
Continuous albuterol via nebulizer:
<20 kg: 10 mg/hr
≥20 kg: 15 mg/hr
Ipratropium bromide: 0.5mg every 20min up to 3 doses

Prednisone or Prednisolone (oral):
1st dose: 2 mg/kg/day (max dose 60 mg/day)
Subsequently: 1-2 mg/kg/day
Dexamethasone: 0.3 mg/kg PO/IM (max 10 mg)
Methylprednisolone:
1st dose: 2 mg/kg (max- 60mg)
Then: 1 mg/kg IV Q6h (max 125 mg/day)

**Consider systemic steroids if using albuterol q4 hours at home without clinical improvement or cough > 1 week
Indications for IV/IM steroids: Inability to tolerate PO or concern for inadequate (not adequate) GI absorption.

Adjunct Therapies:
Magnesium sulfate IV: 50-75 mg/kg (max dose 2 gms) over 20 minutes (Consider administration of Normal Saline bolus)
Epinephrine (1 mg/ml) 0.01mg/kg IM every 10-20min (max dose 0.3mg) **OR**
Terbutaline (1 mg/ml):
0.01 mg/kg SQ every 20min for total 3 doses (max dose 0.25mg)

Adapted from Children's Hospital of Montefiore, *Clinical Asthma Pathway,* with modifications based on expert local consensus

REASSESSMENT (3rd Hour)

RS 1-4	RS 5-8	RS 6-12
*Discharge	-Admit to Inpatient if tolerating Albuterol q2 hours -Consider adjunct therapies IF O2 sat <92% on 2LNC or 40%FM: Mg sulfate, continuous albuterol , CXR and PICU consult	-Continuous albuterol -Admit to ICU ***With signs of clinical decline or lack of improvement: consider BiPAP, epinephrine or terbutaline, prepare for intubation

***Discharge Planning**
1. Albuterol every 4 hrs for 2 days, then every 4hrs as needed
2. Continue steroids for 3-5 days if started in the PED
3. Education use of spacer in patient 5 years and older
4. Asthma Action Plan
5. Appointment with PMD or subspecialty if indicated

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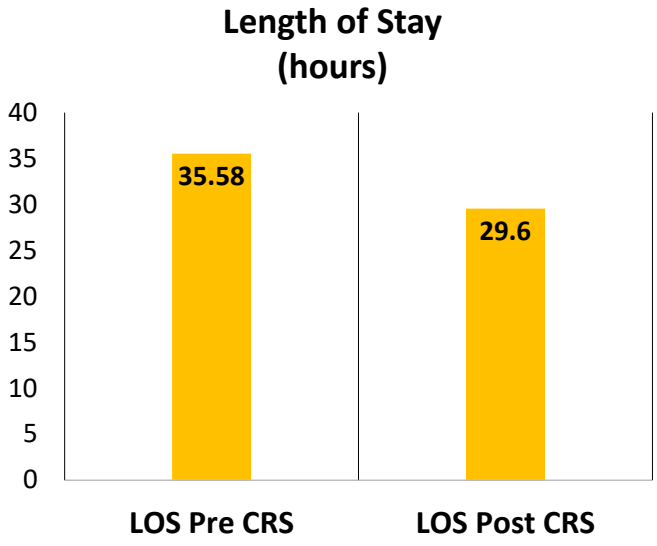
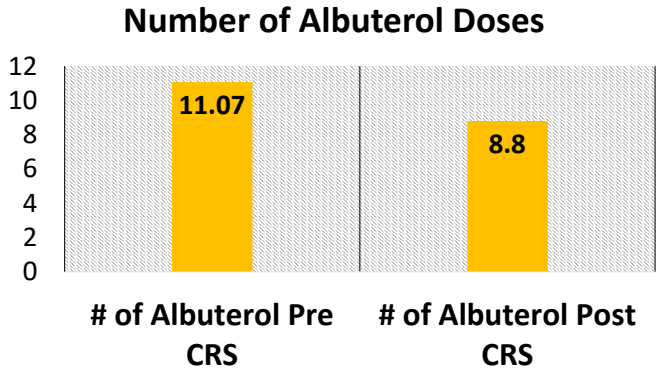
Average Length of Stay Pre and Post Intervention



Average number of Albuterol Doses Pre and Post Intervention



CRS in the post-intervention group.

- Both groups had equal number of return visits to the SBH Pediatric Emergency Department (11%)

CONCLUSIONS

- The implementation of CRS-based asthma clinical pathway successfully decreased the average LOS in hours and number of albuterol doses by more than 10%.

References:

1. *Guidelines for the Diagnosis and Management of Asthma. Oct 2007 National Heart Lung and Blood Institute National Asthma Education and Prevention Program Expert Panel Report*
2. *Use of a Respiratory Score Among Different Providers. Pediatric Pulmonology 37:243 – 248 (2004)*
3. *Children's Hospital at Montefiore Clinical Asthma Pathway*

Disclosure: The author does not identify any relevant disclosures.

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The Advancing Care for Exceptional (ACE) Kids Act Puts Complex Pediatric Cases at the Forefront

Darby O'Donnell, JD, Alliance for Patient Access (AfPA) Government Affairs Team

The Alliance for Patient Access (allianceforpatientaccess.org), founded in 2006, is a national network of physicians dedicated to ensuring patient access to approved therapies and appropriate clinical care. AfPA accomplishes this mission by recruiting, training and mobilizing policy-minded physicians to be effective advocates for patient access.

Earlier this month, the United States Senate passed unanimously a bill that contained a number of Medicaid provisions, including the Advancing Care for Exceptional (ACE) Kids Act of 2019.

The ACE Kids Act is a congressional proposal that would allow state Medicaid programs to improve how care is delivered through a coordinated care model for children with medically complex conditions.

The United States House of Representatives passed the package in the week prior to the Senate's action, so the ACE Kids Act is on its way to the president's desk for his signature.

Why does the ACE Kids Act do?

Under the bill, care can now be provided to patients through a so-called "health home" (i.e., a designated provider or team of health-care professionals). These individuals help navigate care and the health care system across one patient's multiple appointments with potentially multiple providers, much like a case manager. When families get overwhelmed, they have a team of individuals to support them.

Senate Finance Committee Chairman Chuck Grassley (R-Iowa), a co-leader of the legislation on the Senate side, said, following the unanimous passage of the bill:

Thankfully, most children are healthy. But there are some children with medically complex needs that see multiple different doctors to keep them healthy and out of the hospital. On average, these children can require five to six doctors and as many as 20-30 allied health care professionals. Families of these children are frequently left alone to navigate a complicated health care system. ACE Kids will provide those families with an option to have better care coordination for their children."

" On average, these children can require five to six doctors and as many as 20-30 allied health care professionals. Families of these children are frequently left alone to navigate a complicated health care system. "

Easing access to care across state lines

Another aim of the ACE Kids Act is to resolve discrepancies between state Medicaid programs when a child or infant must be treated across state lines. The policy goal is better coordination reduces health care costs to the Medicaid system because it could mean less emergency room visits and hospitalizations too.

Chairman Grassley also noted that more children are surviving and living their lives despite 'life-threatening conditions" in childhood, including prematurity, childhood cancer, and complications associated with Down syndrome. These children have ongoing medical and health needs, though. Their families are often required to seek care for them in another state to find treatment. This travel across states lines for care presents another set of complications for a sick child, particularly when it comes to coverage.

According to a release earlier this year by Senator Grassley's office and other advocates for the ACE Kids Acts:

- Medicaid covers about two-thirds of the three million children with complex medical conditions
- These represent nearly 40 percent of Medicaid costs for children.

Opponents & Proponents

Passage of the bill took a multi-year effort and was not without controversy.

Modern Healthcare summarized in an article last year when the bill was considered during the 115th Congress: “Medicaid plans that stand to lose an expensive group of patients remain staunchly opposed, and other non-industry analysts and advocates are lukewarm and still confused about what the legislation will actually do, as well as what the health home model will look like since the legislation is vague about the details.” (1)

“ Medicaid plans that stand to lose an expensive group of patients remain staunchly opposed, and other non-industry analysts and advocates are lukewarm and still confused about what the legislation will actually do, as well as what the health home model will look like since the legislation is vague about the details.”

According to the article, some conservatives criticized the program of changing from fee for service to health home beyond the scope of the original intent of Medicaid.

However, the legislation also had a broad network of supporters. Notably, it was supported by groups such as The American Academy of Pediatrics, The American Board of Pediatrics, The Association of American Medical Colleges, The Children’s Hospital Association, The March of Dimes, Moms Rising, and The National Association of Pediatric Nurse Practitioners, to name a few. This list of supporters helped push the bill across the finish line after coming close to completion in previous sessions of Congress.

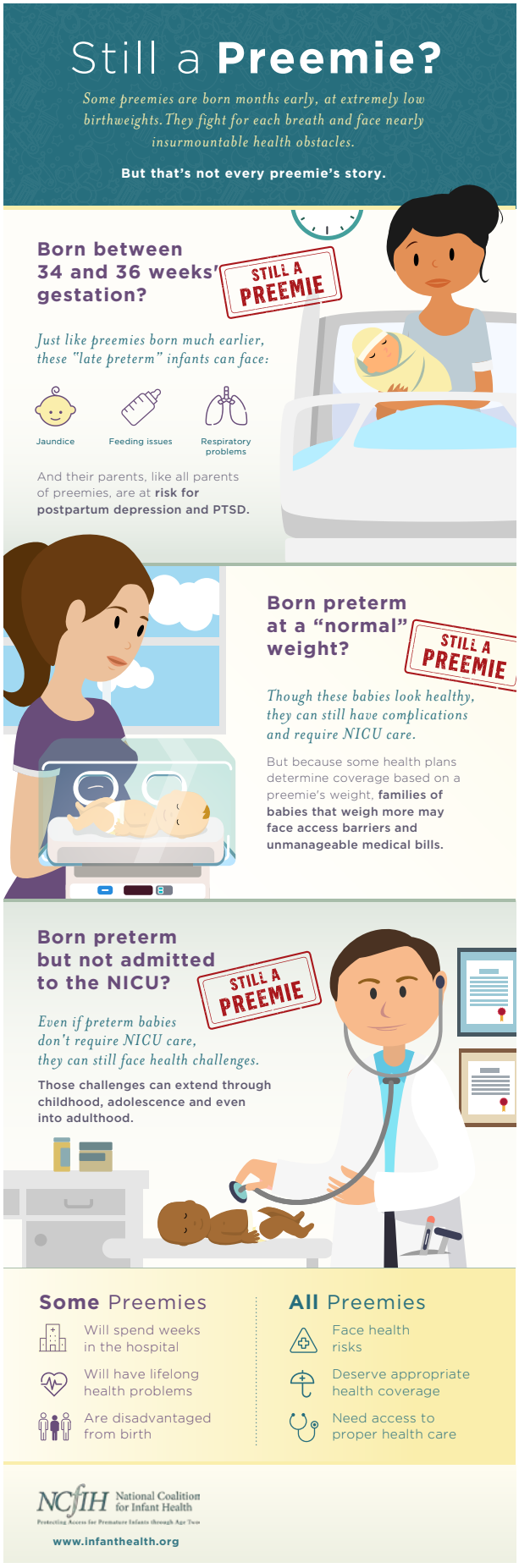
Beyond Medicaid policy …

Jim Kaufman, vice president of public policy at the Children’s Hospital Association, believes one of the other significant pieces - beyond cost reductions for the Medicaid system and improved health outcomes - is that it sets a "national definition" of kids with medical complexity. It codifies in statute the need to “shrink the burden on the kids' families as well as treatment costs.” (1, 2)

Once signed into law, the ACE Kids Act will hopefully be a pathway to better treat pediatric patients with complex medical conditions, helping them and their families get the care and support they need.

References:

1. *Health Homes For Chronically Ill Kids Spark Lame-duck Battle,* https://www.modernhealthcare.com/article/20181128/NEWS/181129936/health-homes-fo *(accessed April 08, 2019).*



2. *Lawmakers Look To Improve Care For Kids With Complex ..., https://www.disabilityscoop.com/2018/10/01/lawmakers-complex-conditions/25548/ (accessed April 08, 2019).*

The author has not indicated any disclosures.

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Compiled and Reviewed by Mitchell Goldstein, MD Editor in Chief

The International Society for Quality in Health Care Partners with the Patient Safety Movement Foundation to Achieve Zero Preventable Deaths in Hospitals

Partnership promises increased synergy in meeting combined goal to reach zero preventible patient deaths by 2020 in healthcare systems around the world.

March 25, 2019 – Irvine, CA & Dublin, Ireland – The International Society for Quality in Health Care (ISQua) is pleased to announce their support of the Patient Safety Movement Foundation (PSMF) and their mission to eliminate preventable deaths in hospitals, with a signed cooperation agreement.

With this agreement, ISQua and PSMF agree to work together to further their aims to improve quality and safety in healthcare and eliminate preventable patient deaths. The partnership will provide synergy so that our missions can be amplified.

ISQua and PSMF will work together to identify common projects in the field of patient safety and promote each other's activities on an ongoing basis. ISQua and PSMF will hold joint sessions at their respective conferences, at ISQua's 36th International Conference (20th – 23rd October 2019) in Cape Town, South Africa; and PSMF's 8th Annual World Patient Safety, Science & Technology Summit in 2020.

"ISQua has been a global leader in elevating safe, high quality healthcare for many years. We are excited to partner with them in working towards our common goals," stated David Mayer, MD, Chief Executive Officer of Patient Safety Movement Foundation. "We feel strong collaborations like this one will help us accelerate the progress we are making towards zero preventable deaths in hospitals and save lives around the world."

For over 30 years, ISQua has worked to improve the quality and safety of health care worldwide. ISQua's networks connect health professionals across all six continents. The organization aims to achieve their goal through education, knowledge sharing, external evaluation, supporting health systems worldwide and connecting like-minded people through their health care networks.

"Patient Safety is at the core of our work at ISQua. We believe that by working together we can reach the zero target quicker. We are pleased to join with the Patient Safety Movement Foundation to spread the interventions that are key for reaching Zero. The energy we can bring together will make a difference. We should all aim for Zero," says Peter Lachman, MD, MPH, MBCh, FRCPCH, FCP (SA), FRCPI, Chief Executive Officer of ISQua.

About The Patient Safety Movement Foundation

More than 200,000 people die every year in U.S. hospitals and 4.8 million worldwide in ways that could have been prevented. The Patient Safety Movement Foundation is a global non-profit

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Next-Level Perinatal/Neonatal Comfort Care Training

Creating an Interdisciplinary Palliative Care Plan for Each Baby and Their Family

A 3-day intensive training of seminars and hands-on activity sessions to provide an overview of the methods, elements, and strategies needed to create a comprehensive neonatal comfort care plan for the entire perinatal team.

Perinatal detection of congenital anomalies leads to the identification of infants who are affected by life-limiting conditions with a short life expectancy. Moreover, a significant number of newborns admitted to the neonatal ICU in critical condition face potentially adverse prognoses. Perinatal palliative care offers a plan for improving quality of life of the infant and the family, when extending the baby's life is no longer the goal of care or the complexity of the medical condition is associated with uncertain prognosis. The evidence base for perinatal palliative care continues to grow. However, there is no consensus about best clinical practice in promoting support for the family or comfort for the neonate. Support for the family is achieved through appropriate pre- and postnatal consults, shared-decision making, and advance care planning. A state of comfort for the neonate is achieved when relational basic needs such as bonding, maintenance of body temperature, relief of hunger/thirst, and alleviation of pain/discomfort are met.

This three-day training will cover virtually all aspects of perinatal palliative care, including information about the successful experiences of the Neonatal Comfort Care Program in providing perinatal palliative care for over a decade at Columbia University Irving Medical Center (CUIMC). Faculty will discuss evidence-based rationale, practical aspects and strategies for implementing and applying aspects of the CUIMC to provide support for families and achieve a state of comfort for newborns with limiting or life-threatening conditions. Health professionals at all career stages are welcome to attend. Registration is required.

Elvira Parravicini, MD, Columbia University and New York Presbyterian/Morgan Stanley Children's Hospital, Director of Columbia University's Neonatal Comfort Care Program

Brian Carter, MD, University of Missouri-Kansas City and Children's Mercy Hospital

Charlotte Wool, PhD, RN, York College of Pennsylvania; Perinatal Palliative Care Consultant

See site for full instructor list.

Continuing Medical Education (CME) and Continuing Nursing Education (CNE): This course has been approved for CME credits. CNE credits pending.

Accreditation Statement: The Columbia University Vagelos College of Physicians and Surgeons is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. **AMA Credit Designation Statement:** The Columbia University Vagelos College of Physicians and Surgeons designates this live activity for a maximum of 18.75 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

More details and registration: mailman.columbia.edu/comfort-care

which creates free tools for patients and hospitals. The Patient Safety Movement Foundation was established through the support of the Masimo Foundation for Ethics, Innovation, and Competition in Healthcare to reduce that number of preventable deaths to ZERO. Improving patient safety will require a collaborative effort from all stakeholders, including patients, healthcare providers, medical technology companies, government, employers, and private payers. The Patient Safety Movement Foundation works with all stakeholders to address the problems with actionable solutions for patient safety. The Foundation also convenes the World Patient Safety, Science & Technology Summit. The Summit brings together some of the world's best minds for thought-provoking discussions and new ideas to challenge the status quo. By presenting specific, high-impact solutions to meet patient safety challenges, called Actionable Patient Safety Solutions, encouraging medical technology companies to share the data their products are purchased for, and asking hospitals to make commitments to implement Actionable Patient Safety Solutions, the Patient Safety Movement Foundation is working toward ZERO preventable deaths. Visit patientsafetymovement.org.

About the International Society for Quality in Health Care (ISQua)

ISQua is a member-based, not-for-profit organisation, which has been working to improve the quality and safety of health care worldwide for over 30 years.

ISQua's mission is to inspire and drive improvement in the quality and safety of health care worldwide through education and knowledge sharing, external evaluation, supporting health systems and connecting people through global networks. Our vision is to be the global leader of transformation in healthcare quality and safety.

Our extensive network of health care professionals spans over 70 countries and 6 continents. ISQua's members are continually working towards quality improvement in health care around the world.

ISQua is committed to the improvement of patient safety, and the imperative to place patient safety at the core of health care delivery. https://www.isqua.org/.

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American Academy of Pediatrics, Section on Advancement in Therapeutics and Technology

Released: Thursday 12/13/2018 12:32 PM, updated Saturday 3/16/2019 08:38

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

- Connect with other AAP members who share your interests in improving effective drug therapies and devices in children.
- Receive the SOATT newsletter containing AAP and Section news.
- Access the Section's Website and Collaboration page – with current happenings and opportunities to get involved.
- Network with other pediatricians, pharmacists, and other health care providers to be stronger advocates for children.
- Invitation for special programming by the Section at the AAP's National Conference.
- Access to and ability to submit research abstracts related to advancing child health through innovations in pediatric drugs, devices, research, clinical trials and information technology; abstracts are published in Pediatrics.

AAP members can join SOATT for free. To activate your SOATT membership as an AAP member, please complete a short application at http://membership.aap.org/Application/AddSectionChapterCouncil.

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

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

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Dedicated to the Health of All Children

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

NT

Research Finds Simple Urine Test Allows for Rapid Diagnosis of Preeclampsia

Preeclampsia can now be diagnosed with a single non-invasive urine test.

Article ID: 709489
Released: 12-Mar-2019 11:05 AM EDT
Source Newsroom: Ohio State University Wexner Medical Center

Newswise — COLUMBUS, Ohio – Researchers with The Ohio State University College of Medicine, The Ohio State University Wexner Medical Center and Nationwide Children's Hospital have found that a simple urine test can rapidly detect one of the world's deadliest pregnancy-related conditions, which could have a major impact on global health.

In an effort to reduce illness and deaths among expecting mothers and their unborn children, maternal-fetal medicine and perinatal physician-researchers designed a rapid tool to identify preeclampsia using an affordable and non-invasive clinical "red dye-on paper" test. It was piloted in a clinical study at Ohio State Wexner Medical Center. The results are published in Lancet's E-Clinical Medicine.

"This is the first clinical study using the point-of-care, paper-based Congo Red Dot (CRD) diagnostic test, and the mechanism proved superior in establishing or ruling out a diagnosis of preeclampsia," said Dr. Kara Rood, first author on the collaborative project and maternal-fetal medicine physician at Ohio State Wexner Medical Center. "Our findings will have a huge impact on the health of women and children."

Currently, preeclampsia is identified by high blood pressure and certain proteins in the urine. The disorder is the number one reason physicians decide to deliver children prematurely and is responsible for approximately 18 percent of maternal deaths in the U.S.

"Preeclampsia affects up to eight percent of pregnancies. The challenge is that it's a progressive disease and not everyone progresses at the same time," said Rood, who is also an assistant professor of maternal-fetal medicine at The Ohio State University College of Medicine. "Some women can have the disease for weeks before having symptoms, whereas other women can progress to a dangerous level within days."

In the study, researchers enrolled 346 pregnant women who were being evaluated for high blood pressure and possible preeclampsia. They used the CRD urine test which provides results at the bedside within three minutes. Trained clinical research nurses analyzed results before the patient's doctor made a final diagnosis. Results of the CRD test were not shared with the patient's care team.

Eighty-nine of the pregnant women had a clinical diagnosis of preeclampsia. Of those, 79 percent were induced due to preeclampsia, with an average age of delivery at 33 weeks gestation. The team found the CRD test was superior to the other biochemical tests, with an accuracy rate of 86 percent.

These findings confirm that the CRD test is a simple, "sample in/answer out" clinical tool that allows for very accurate and rapid diagnosis of preeclampsia, Rood said.

"Preeclampsia is often described as "mysterious" because it's difficult to diagnose," said Dr. K. Craig Kent, dean of the College of Medicine. "I'm proud of our dedicated researchers for showing that there's an easy, non-invasive test that will help diagnose this condition and maintain the health of pregnant women and their babies."

If undetected, preeclampsia can lead to eclampsia, one of the top five causes of maternal and infant illness – including seizures and coma – and the cause of 13 percent of maternal deaths globally. Pregnant women may be induced and unborn children delivered early, even if there's just suspicion of preeclampsia. Premature birth is also a concern because it increases the risk of learning disabilities, cerebral palsy and blindness in newborns.

Rood says in addition to clinicians using this test during prenatal appointments, she also sees this as an easy tool for pregnant women in underdeveloped countries where there's a lack of resources available.

The Congo Red Dot test was developed by Dr. Irina Buhimschi at Yale University.

Funding support came from Saving Lives at Birth Partners: USAID, the Bill and Melinda Gates Foundation, the government of Norway, Grand Challenges Canada, the United Kingdom's Department for International Developement. The Eunice Kennedy Shriver National Institute of

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Child Health and Human Development also contributed.

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NT

Forgotten Fathers: New Dads Also at Risk for Postpartum Depression

This study looks at the new dem UNLV study provides an in-depth look at new fathers' experiences with Postpartum Depression.

Article ID: 709275
Released: 7-Mar-2019 11:45 AM EST
Source Newsroom: University of Nevada, Las Vegas (UNLV)

Newswise — It's increasingly common to hear about new moms suffering from the baby blues. But what about new dads?

A new UNLV study, published last week in the Journal of Family Issues, offers an in-depth view of new fathers' experiences with postpartum depression (PPD). The study explores issues they encounter and how they can move beyond barriers they face in receiving diagnoses and treatment of the little-known phenomenon.

Between 5 and 10 percent of new fathers in the United States suffer from PPD, according to U.S. Centers for Disease Control and Prevention data. One study shows that the risk goes up to 24 to 50 percent for men whose partners suffer from PPD.

A team of researchers, led by UNLV Couple and Family Therapy professor Brandon Eddy, scoured blogs, websites, forums, and chat rooms for first-hand accounts from new dads. Six themes emerged:

Needing education. Fathers didn't know men could suffer from PPD and were surprised to learn others experienced it. Women who saw PPD in men were unsure of what to call it. Men complained about pushback or not receiving information from doctors or therapists, or frustration that the PPD resources they did manage to find focused solely on how to help their wives.

- Adhering to gender expectations. Many dads felt pressured to espouse traditional "tough guy" stereotypes. In fact, one man who told another father to "suck it up" said he knew it was bad advice but explained that it's what's expected of men.
- Repressing feelings. Men were reluctant to share their feelings for fear of sounding ridiculous or looking weak to their wives, who were the primary caregivers.
- Overwhelmed. Many of the new dads found it difficult to express their emotions of confusion, exhaustion, helplessness, loneliness, and feeling trapped. Parents often suffer from lack of sleep after birth, which can exacerbate stress and depressive symptoms — making them more irritable to their children's crying.
- Resentment of baby. While many fathers expressed joy and excitement for the arrival of their children, others resented their baby's constant needs and attention. A few talked about suppressing urges to hurt the baby or themselves.
- Experience of neglect. The dads felt lost, forgotten, and neglected — by their wives, the health care system, and society. One father described "uncomfortably laughing" while reading PPD screening questions typically asked of women during routine checkups: "I began to feel like someone should be asking me the same questions." Another said men, who must simply wait while women do the hard work of pregnancy and labor and lack an umbilical cord connection to their children, had often shared with him similar stories of struggling with PPD: "There's no truly acceptable place or context for men to publicly reveal being challenged — much less rocked to the core — by what I call 'sudden parenthood'."

Overall, the findings complement previous studies on barriers for fathers suffering from PPD. UNLV researchers said encountering a lack of information and stigma often causes dads to distance themselves from their child

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PAC/LAC's core values for improving maternal and child health have remained constant for over 30 years – a promise to lead, advocate and consult with others.

Leadership

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

Advocacy

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

Consultation

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

and has been associated with marital difficulties.

Previous research elsewhere has found that paternal involvement has many positive outcomes for children, such as boys displaying less hostile behavior then children with absent dads, reduced delinquency for both sexes, considerably higher IQ scores for children in their early development years, and lower levels of emotional distress. That's on top of studies showing fathers who suffer from PPD report lower levels of communication with their partners, as well as increased rates of substance abuse and domestic violence.

"The expectations society gives to men of what they are supposed to be, what they are supposed to do, and how they do it was a significant factor on how many of these men chose to cope with life stressors," the UNLV researchers wrote.

"Because men are already less likely than women to seek professional help for depression, it is vital that the stigma of PPD decreases," they added. "Because paternal involvement is a significant factor in the healthy development of children, it would seem wise to make information about paternal PPD more available in order to combat its negative impact on families."

The U.S. Preventative Services Task Force — an independent coalition of national experts — recently recommended that all women be screened for depression before and after giving birth. There is no current assessment designed to specifically screen men for PPD.

"With the vast amount of research conducted on the importance of paternal involvement and the rising rates of PPD in fathers," researchers wrote, "it seems logical that fathers should also be included in this recommendation.".

NT

Harrington Discovery Institute at University Hospitals Opens Call for 2020 Harrington Scholar-Innovator Award

Open call for grant funding up to $700,000 USD for innovative work.

Article ID: 709417
Released: 11-Mar-2019 2:05 PM EDT
Source Newsroom: University Hospitals Cleveland Medical Center

Newswise — CLEVELAND -- The Harrington Scholar-Innovator Award offers inventive physician-scientists the resources to advance their discoveries into medicines. Up to 12 applicants will be selected to receive:

- $100,000 guaranteed; opportunity to qualify for up to $700,000
- Drug development and project management support through the Harrington Discovery Institute's Innovation Support Center

The competition is open to physician-scientists at accredited academic medical centers, research institutions and universities in the United States and Canada. Selection criteria include innovation, creativity and potential for impact on human health. Applicants must have a doctorate in medicine and demonstrate exceptional promise. Award recipients will be selected by the Harrington Discovery Institute's Scientific Advisory Board and announced in December 2019. Award recipients (and their institutions) retain the intellectual property rights for their work.

The deadline to submit a Full Application is May 3, 2019 at 11:59 PM Eastern Daylight Time. A Letter of Intent is not required.

Previous Harrington Scholar-Innovators have shared their experiences and the impact the program has had on their drug discoveries. View videos.

Learn more and apply at www.Harrington-Discovery.org/Grant.

About Harrington Discovery Institute

The Harrington Discovery Institute at University Hospitals in Cleveland, OH – part of The Harrington Project for Discovery & Development – aims to advance medicine and society by enabling our nation's most inventive scientists to turn their discoveries into medicines that improve human health. The institute was created in 2012 with a $50 million founding gift from the Harrington family and instantiates the commitment they share with University Hospitals to a Vision for a 'Better World'.

About The Harrington Project for Discovery & Development

The Harrington Project for Discovery & Development (The Harrington Project), founded in late February 2012 by the Harrington Family and University Hospitals of Cleveland, is a $300 million national initiative built to bridge the translational valley of death. It includes the Harrington Discovery Institute and BioMotiv, a for-profit, mission-aligned drug development company that accelerates early discovery into pharma pipelines.

For more information, visit: Harrington-Discovery.org.

About University Hospitals

Founded in 1866, University Hospitals serves the needs of patients through an integrated network of 18 hospitals, more than 40 outpatient health centers and 200 physician offices in 15 counties throughout northern Ohio. The system's flagship academic medical center, University Hospitals Cleveland Medical Center, located on a 35-acre campus in Cleveland's University Circle, is affiliated with Case Western Reserve University School of Medicine. The main campus also includes Universi-

ty Hospitals Rainbow Babies & Children's Hospital, ranked among the top children's hospitals in the nation; University Hospitals MacDonald Women's Hospital, Ohio's only hospital for women; and University Hospitals Seidman Cancer Center, part of the NCI-designated Case Comprehensive Cancer Center. UH is home to some of the most prestigious clinical and research programs in the nation, including cancer, pediatrics, women's health, orthopedics, radiology, neuroscience, cardiology and cardiovascular surgery, digestive health, transplantation and urology. UH Cleveland Medical Center is perennially among the highest performers in national ranking surveys, including "America's Best Hospitals" from U.S. News & World Report. UH is also home to Harrington Discovery Institute at University Hospitals – part of The Harrington Project for Discovery & Development. UH is one of the largest employers in Northeast Ohio with 26,000 employees.

UH's vision is "Advancing the science of health and the art of compassion," and its mission: "To Heal. To Teach. To Discover." Follow UH on Facebook @UniversityHospitals and Twitter @UHhospitals. For more information, go to UHhospitals.org.

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Cue-Based Feeding: How to Facilitate Positive Opportunities for Breast and Bottle Feeding

Katy Peck, a speech-language pathologist for Children's Hospital Los Angeles, writes on how cue-based feeding can promote optimal feeding opportunities and improve the care-giver infant relationship

Article ID: 708350
Released: 21-Feb-2019 9:00 AM EST
Source Newsroom: Children's Hospital Los Angeles

Cue-based feeding is a broad term to describe a process by which parents and medical providers can successfully attend to developmental cues to promote optimal feeding opportunities. It is also referred to as infant-led or demand feeding. This approach may be used to heighten the quality of a baby's feed through use of a developmentally supportive model to improve the caregiver-infant relationship during the transition to full oral feeds. When the focus of a feed is led by volume expectations, negative consequences may ensue—such as disinterest, oral aversion and reduced quality of feed—that may compromise safety of swallow.

Infants born premature or with a multitude of underlying diagnoses (respiratory, gastrointestinal, neurological, etc.) are at an elevated risk for negative feeding experiences. Despite the potential challenges experienced by infants with immature oral feeding skills, communication associated with feeding readiness often remains intact.

What does my baby communicate?

Hunger

Readiness to eat (identifiable behaviors and reflexes) – Turn toward the breast or bottle (rooting), sucking, bringing hands to mouth, lip smacking and crying out. A "hunger cry" is considered a late attempt to communicate hunger. Attention to other ways your baby communicates hunger prior to crying out is encouraged.

Desire to stop feeding – Release from nipple, disengagement (loss of eye contact, turning head away), and fussiness.

Positive oral feeding experiences

Physiologic stability – No significant changes in heart rate, breathing or oxygen saturation levels. Signs of increased work breathing include movement of the nostrils or chest, color change and audible breath sounds.

State modulation - No unpredictable rapid transitions indicating poor regulation. For example, your baby may appear engaged one minute and fall asleep the next. This would indicate reduced state control.

Lack of stress signs – If you notice finger splaying, changes in facial expression (e.g., grimacing), saluting, hiccups, sneezing, yawning and gaze aversion, your baby may be communicating displeasure.

Engagement – Joint attention, smile and eye contact during feed.

Two techniques to promote cue-based feeding

1.Skin-to-skin (STS) or kangaroo care

Place your baby on your chest for sustained, direct skin-to-skin contact.

This will provide an optimal setting for your baby to communicate oral feeding readiness.

STS allows a baby to become in sync with the rhythm of the heart and respiratory rate of the mother or father, regulates body temperature, creates less stress, and promotes biologic flexion (arms and legs toward chest with midline orientation).

These experiences enable a baby's brain to organize and focus on interaction and eating.

Rooting toward the breast and placing hands to mouth during STS are cues that the baby is ready to feed.

Crying out may be misinterpreted as a feeding cue; however, this is not always the case, as babies cry for a variety of reasons.

Attention and timely reactions to your baby's oral feeding readiness cues

According to a recent systematic review, "weight gain, time to full oral feedings, and hospital length of stay may be improved with use of cue-based feeding."

Your baby's attempts to communicate may be misinterpreted or overlooked if not understood correctly.

Be assured that as you begin to attend to the subtle efforts your baby makes to signal desire to feed, you will build competence and confidence to attend and react in a timely manner.

As always, if you are experience feeding issues with your baby, please contact your physician to request a feeding and swallowing assessment to be completed by a speech-language pathologist or an occupational therapist.

# # #

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

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

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

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

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

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

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

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Visit **www.GrahamsFoundation.org** to learn more.

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Abstracts from the 99NICU Meetup April, 7-10, 2019 in Copenhagen

Francesco Cardona, MD, MSc and Stefan Johansson, MD, PhD

The abstracts from the 99NICU Meetup are presented below:

Poster Abstracts Table of Contents:

99NICU2019-1

Neonatal outcome after mid-trimester preterm premature rupture of membranes (PPROM): Can standardized perinatal care improve survival?

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Background
Mid trimester premature rupture of membranes (PROM) is commonly associated to a high risk of adverse perinatal outcome in terms of mortality and morbidity. The main factors related to the prognosis are the gestational age at birth, the length of latency period and the development of chorioamnionitis. Studies published in last two decades show survival rates of 52-73% and rates of bronchopulmonary dysplasia (BPD) of 40%, and an increased risk of severe neurological damage and retinopathy of prematurity (ROP).

Methods
A retrospective study was performed in a single centre during the period 2012-2018 inclusive, including all the cases of mid trimester PROM.
Results: 21 cases of PROM who choose to continue the pregnancy after mid trimester PROM were found. Other 13 cases chose elective termination of pregnancy shortly after PROM and were excluded from the analysis.
Of the 21 cases reviewed, 7 cases occurred after an invasive procedure, and there were no deaths in this group. In the 14 cases of spontaneous PROM the mortality rate was 14%. The rate of bron-

chopulmonary dysplasia (BPD) was 25% in the group of PROM occurred after an invasive procedure and 14,2% in the group of spontaneous PROM. There were no cases of severe BPD.

Results

	PPROM not preceded by invasive procedure	PPROM after an invasive procedure
n	14	7
Gestational age at PPROM (w), mean (range)	20,14 (15-23)	17,8 (15-21)
Evolutive Chorioamnionitis (%)	50	0 (0)
GA at birth (w) mean (range)	33,5 (19-40(	37 (30-40)
Minimal amniotic fluid pocket (cm)	0-8	1,5-10
Trend in amount of residual amniotic fluid		
Increase	29%	71%
Stable	64%	29%
Decreasing	7%	0
Days of latency between PPROM and delivery , mean (range)	80 (2-189)	130(63-168)
Neonatal survival	86%	100%
NICU days, mean (range)	7,38 (0-45)	2,28 (0-11)
Days on Invasive mechanical ventilation, mean (range)	0,58 (0-3)	0,14 (0-1)
Days on non-invasive mechanical ventilation, mean (range)	6,25 (0-45)	0,78 (0-3)
BDP in survivors (%)	25	14,2
Early onset sepsis (%)	0	0
Major abnormalities in brain ultrasound (%)	0	0
ROP (%)	0	0

Conclusions
A high-quality collaborative, standardized perinatal care, and a good communication flow between obstetricians and neonatologists improve the survival and quality of life of the babies born after mid trimester PROM and help parents to face one of the most devastating complications of pregnancy.

99NICU2019-2

Impact of the Introduction of Minimally Invasive Surfactant Therapy in Preterm Infants at 25-28 Weeks Gestation

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Background
There is increasing use of nasal continuous positive airway pressure (CPAP) as the primary mode of respiratory support in extremely preterm infants to avoid the adverse effects of mechanical

ventilation. However, these infants are at risk of CPAP failure requiring intubation and surfactant treatment for respiratory distress syndrome (RDS). A technique of providing surfactant without endotracheal intubation via a thin catheter has been described. This provides minimally invasive surfactant therapy (MIST) in preterm infants with RDS, thus avoiding intubation and ventilation.

Methods
Preterm infants born between 25+0 to 28+6 days gestation admitted to neonatal unit in Middlemore Hospital who were stabilised on CPAP from birth were included, those intubated and ventilated within 1 hour after birth were excluded.
PreMIST period consists of infants born from Jan 2010 to Dec 2013; this was the period before introduction of MIST. The MIST period was from Jan 2014 to June 2017 where infants with RDS could be treated with MIST.

Results
There were 90 infants in PreMIST period and 94 infants in MIST period. Mean birthweight was 1053 gms vs 1105 gms (p= 0.11). Mean gestational age was 27.3 weeks vs 27.6 weeks (p=0.093). There was a significant reduction in number of infants requiring ventilation by age 72 hours 21.1% vs 7.4% (p=0.015). There was a significant increase in number of infants treated with surfactant 20% vs 36.2% (p=0.007). The median age of first surfactant therapy reduced from median of 12 hrs to 3 hrs (p=0.006).
There was a trend to reduction in mortality but this was not significant 10% vs 2.1% (p=0.10). There was a non significant reduction in chronic lung disease (CLD) 34.4% vs 27.7% (p=0.63) and CLD/Death 42.2% vs 29.8% (p=0.29). Other morbidities were unchanged.

Conclusions
Introduction of MIST in preterm infants at 25 to 28 weeks gestation has resulted in lower incidence of CPAP failure and earlier age of treatment with surfactant.

99NICU2019-3

Ethical Considerations in NLS (Neonatal Life Support)

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Background
The typical day in a Neonatal Unit is a busy place. Many ethical questions may arise in the background. Starting in the delivery room, when to start and stop resuscitation? Then what was in the best interest of the neonate once in the NICU? Should we consider withdrawing care in some cases? This aim here is to evaluate the limit of neonatal viability by exploring the ethical considerations in neonatal resuscitation and proposing a guideline.

Method
Systematic review of peer-reviewed journals and/ or standard guidelines. Sources were selected using Pubmed, Cochrane , Google Scholar and hospital documentations. Several European/ N. American Countries were reviewed as case studies: England (UK), France, Belgium, Spain, Italy, United States and Canada.

Results
The no clear consensus at the time but more of a grey area where some countries were more conservatives like France and others more proactive such as Denmark. The results are shown in table that gives an overview of practices in countries studied. An updated version using current literature for a more complete view added Sweden and Denmark. Taking into account all ethical considerations, the consensus is that the limit of viability is around 23 weeks in practice.

Conclusions
The important ethical considerations that need to be considerations are informed consent, overtreatment concerns (whether it is adequate to start and stop NLS), quality of life, economic considerations, therapeutic futility, and physical suffering. Even though there is a grey area regarding limits of viability, there is a general consensus that this is at about 23-24 weeks. Recent research have added weight to other factors to consider including: birth weight, gender, maturation or staff prudence that lowers the limits of viability to 22 weeks in some instances.

99NICU2019-4

Successful Non Invasive Oxygenation Treatment of Extremely Low Birth Weight with Early Enteral Feeding In Developing Country

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Case report
Higher levels of care are associated with lower neonatal mortality, particularly among infants with very low birth weight (below 1500 g). In this case, we admitted extremely a LBW infant in the tertiary hospitals in relatively good condition because the critical situation (prematurity-related respiratory distress syndrome) had been treated appropriately in the first and second hospital. A 700-gram female neonate was born at 28 weeks gestation by spontaneous breech delivery presents with grunting and chest retractions.. After 5 days of treatment at the secondary hospital, she has referred to Saiful Anwar Hospital (tertiary public hospital). The patient was diagnosed with respiratory distress syndrome / hyaline membrane disease (improved), apnea of prematurity, and extremely low birth weight. Initial assessment showed that she did not require oxygen support. Medications included: aminophylline injection dosage 6 mg/kg BW) for 2 weeks, tapering off gradually then replaced with caffeine citrate orally; fluconazole injection dosage 6 mg/kg BW) for 1 week. She was feed by using an oral gastric tube because of inappropriate sucking reflex. The Kangaroo method was introduced from the first day of admission. After 3 weeks this patient already had an improved sucking reflex and began to use the bottle and pacifier.

99NICU2019-5

Comparison of breastmilk production from mothers of premature and mature NICU's babies during the first week in our NICU

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Background
The principal goal for infants, especially preterm, is the provision of the mother's own milk (MOM), but on the other hand it is difficult to get MOM for preterm babies due to delay of lactogenesis and mother's stress. Milk production and adequacy, for mothers of

both healthy breastfeeding term infants and non-nursing preterm infants, have been shown to have a significant relationship with milk production 4-6 days after birth.

Methods
This is a descriptive and comparative study of mother's milk production of preterm (<37 weeks) and term (>37 weeks) babies during the first week of life in our NICU during 2018. We documented the milk production from mothers breastmilk expression every 3-4 hours since 4-6 hours after delivery until day 7.

Results
From 181 babies during 2018, we studied 31 preterm and 77 term babies from birth until day 7. The average breastmilk production of the preterm vs term mothers in each expression from day 1-7 were 0,81 vs 1,61 ml; 3 vs 3,65 ml; 6,66 vs 6,94 ml; 21,5 vs 26,6 ml; 34,1 vs 46,4 ml; 45,92 vs 46 ml; 48,88 vs 50,4 ml/x expression.

Conclusions
Expressing for a preterm or unwell baby requires commitment by the mother and effective support from staff. Commencing breast milk expression as soon as possible after birth and at least within the first six hours, followed by frequent, regular and effective breast milk expression to stimulate adequate breast milk production may provide adequate MOM even for preterm babies in the NICU.

99NICU2019-6

Long-term effects of neonatal complications on brain growth at 10 years of age in children born extremely preterm

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Introduction
We have demonstrated reduced brain volumes at term-age in extremely preterm (EPT) infants (born <27 weeks of gestation) with the lowest gestational age, intraventricular hemorrhage I-II (IVH I-II), patent ductus arteriosus (PDA) ligation and mechanical ventilation (MV) > 10 days, compared with the other EPT born infants (Padilla et al., 2015). The long-term impact of these neonatal complications on brain growth during childhood is poorly described. We aim to investigate brain volumetric differences in grey matter, white matter, cerebrospinal fluid between EPT children at 10 years of age who were the most immature and/or had neonatal complications (PDA, IVH I-II, MV) with those who had not.

Methods
Forty-seven EPT children (mean gestational age 25.6 weeks (SD 0.91)) underwent structural magnetic resonance imaging at 10 years of age (mean 9.9 (0.83)). Automatic segmentation of T1-weighted images using age-specific templates in SPM8 was done. We segmented grey matter, white matter, and cerebrospinal fluid (CSF). Intracranial volume was calculated (ICV=all brain tissues). Owing to the fact that variations in CSF volumes could affect the ICV in the EPT children, we also calculated the cerebral parenchyma (CPAR=all brain tissues excluding cerebrospinal fluid). Student's t-test and General Lineal Model Analyses were used for comparisons between groups. Analyses were performed with and without covariates (gestational age and/or gender as appropriate).

Results
Of the 47 children scanned at 10 years of age, 31 (66.6%) EPT children had PDA, 15 (53.6%) had surgical ligation; 14 (33.3%) had IVH I-II; 16 (69.6%) had MV > 10 days, and 25 (53.2%) were the most immature (< 25 weeks of gestation). Even though these children tended to have smaller brain volumes than those without those complications; the differences did not achieve statistical significance (Table 1). The results were not altered when analyses were adjusted for covariates.

Conclusion
Contrary to the neonatal findings, immaturity, PDA, IVH I-II and MV > 10 days were not associated with altered global growth at 10 years of age, indicating that there is a catch-up brain growth during childhood in EPT children with a complicated neonatal course. Nevertheless, this does not rule out the presence of differences in brain organization, which require other methods to be demonstrated.

Reference
Padilla et al. Cereb Cortex 2015; 25:1897-905

99NICU2019-7

Neocosur HIC as an early risk prediction model of severe IVH: how effective is it?

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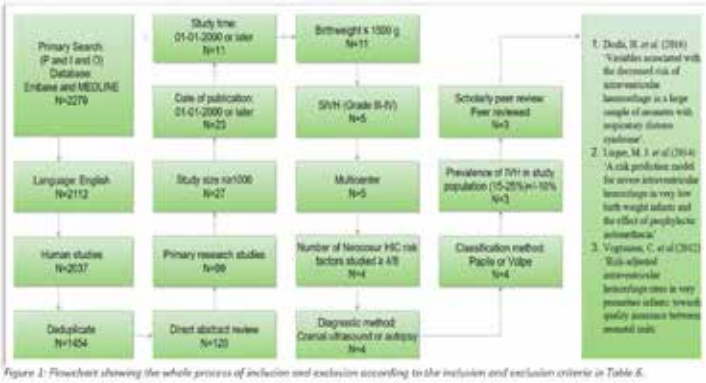
Background
Intraventricular hemorrhage (IVH) is a huge problem in the neonatal care setting accounting for a considerable part of the neonatal morbidity as it occurs in about 25% of very low birth weight infants (VLBWI). Despite a gradual decline in the incidence of most severe grades of IVH, the increased survival of very low birth weight infants has resulted in an increase in the absolute number of infants with IVH. While low gestational age and birth weight were consistent risk factors for IVH in many studies, other risk factors such as amnionitis, being outborn, vaginal delivery, male gender, intubation in the delivery room, surfactant, RDS, pneumothorax, NEC-associated perforation and HFOV were suggested to be associated with an increased incidence of severe IVH.
Neocosur HIC is a web-based SIVH early-risk calculator developed by Luque et al. (2014) and is available at https://www.neocosur.org.

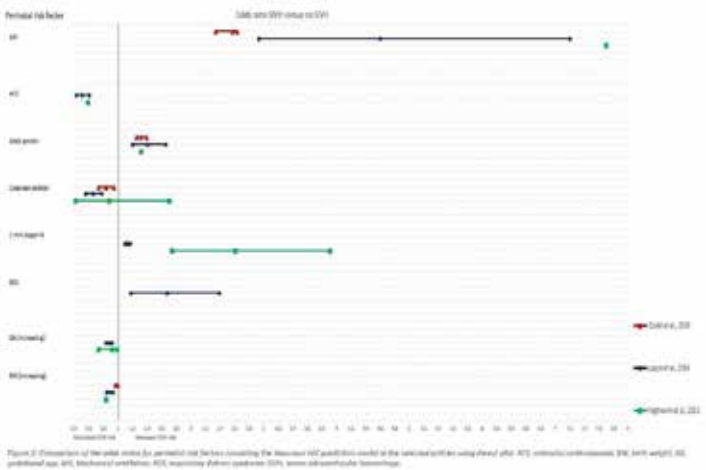
Methods
A systematic review including relevant papers to answer the following question: Is the use of Neocosur HIC model in VLBWI effective in the early identification of patients with SIVH (grade III-IV)?
The process of inclusion and exclusion of relevant papers is summarized in (Figure 1).

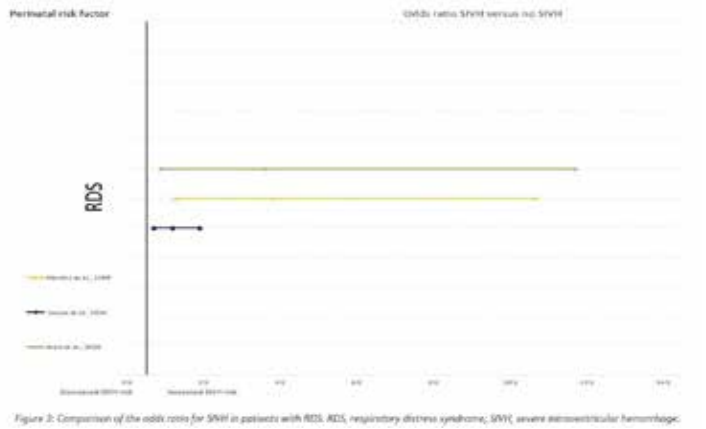
Results
Of the eight factors consisting the Neocosur HIC five factors were shown to be consistently associated with decreased SIVH risk. These are the use of antenatal corticosteroids, caesarean section, female gender, gestational age and birth weight (Figure 2). The other factors were not fully studied in all the three papers included in the review. A comparison of RDS was made with further two other papers (Figure 3).

Conclusions

This review suggests that Neocosur HIC could be useful in the prediction of cases of SIVH as early as 12 hours of age. However, further studies aiming to validate Neocosur HIC as an early SIVH prediction model in VLBWIs are needed.







99NICU2019-8

The Role of continuous Kangaroo Mother Care and intermittent Kangaroo Mother Care for Gain velocity (GWV) and IgA secretory fecal in preterm baby

Kartika Darma Handayani, Devi Emawanti, Risa Etika, Agus Harianto, Martono Tri Utomo, Dina Angelika, Mahendra TA Sampurna

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Background
Prolonged stress in the preterm baby during treatment in an incubator and separation from the mother can suppress the formation of sIgA; this can affect the defense of the immune system of the gastrointestinal mucosa and also influence the growth of the preterm baby.

Aim
Analyzed difference gain velocity and sIgA fecal in preterm baby with continuous Kangaroo Mother Care (KMC) and intermittent KMC.

Methods
Quasi experimental pretest-post test control group design study at Soetomo Hospital Surabaya. Inclusion criteria included gestational age ≤ 34 weeks and birth weight 1500-2000 g. Baby with congenital multiple anomalies, asphyxia, septicemia, gemelli, sick mother as exclusion criteria. This study looked at preterm babies who were divided into 2 groups who received continuous KMC, and another with intermittent KMC. Chi-square, Mann-Whitney and t-test independent samples were used to analyze GWV and fecal discrepancies. Wilcoxon Signed Ranks test to analyze differences in faecal sIgA levels in each group before and after treatment.

Result
The continuous KMC group had return to birth weight 9.2±SD1.25days, faster than the intermittent KMC 11.5±SD2.42days ($p = 0.042$). The sIgA level of the continuous KMC group before treatment not significant different ($p = 0.757$). The high levels of the continuous KMC group after treatment were 1432.0±43.52 mg/gram higher than the intermittent KMC 1375.5±46.98 mg/gram group($p = 0.008$). The continuous KMC group had a rise in sIgA level of 7% after treatment. The intermittent PMK group had a 3% increase in sIgA level after treatment.

Conclusions
Continuous KMC higher GWV than intermittent group. High levels of faecal levels in preterm baby with continuous KMC group were higher than in the intermittent KMC group.

99NICU2019-9

Perinatal Characteristics are Associated with Free Thyroxine Levels of Preterm Infants on Day of Life Thirty

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Background
Hypothyroxinemia is a common form thyroid hormone dysfunction among preterm infants. Data on free thyroxine (FT4) levels beyond first two weeks of life is limited. Objective of the current study is to determine the association between perinatal characteristics and day of life 30 FT4 levels.

Methods
Retrospective analysis of serum thyroid function screening at day of life 30 in preterm infants <30 weeks gestation, admitted to Uni-

versity of Iowa NICU between 07/01/2012 to 06/30/2015. Bivariate analysis and multivariable regression was used to determine whether free thyroxine (FT4, ng/dL) at 30 days of life was associated with demographic/perinatal characteristics of the infant, maternal characteristics, or clinical status/treatment of the infant.

Results
The sample consisted of 280 infants. FT4 concentration ranged from 0.38–1.82 ng/dL (median = 1.12, IQR from 0.97–1.28 ng/dL) with one infant measuring 3.51 ng/dL. Bivariate association of demographic/perinatal infant characteristics with (log-transformed) FT4 found strong associations involving birth weight and gestational age. Five minute Apgar score and sex were also associated to a lesser degree. Once consideration was given to birth weight, gestational age, and infant gender, the association between FT4 and 5-minute Apgar score dropped away. These three variables constituted the baseline multivariable model. After adjusting for the elements in the baseline model, only maternal history of thyroid disease was associated with FT4. Further attempts to supplement the model with clinical characteristics of the infant such as IVH, treatment with hydrocortisone, dopamine failed to yield any significant improvement.

Conclusion
Multivariable regression revealed that gestational age, birth weight, gender and maternal history of thyroid disease are associated with FT4 levels on day of life 30.

99NICU2019-10

Quality Improvement during Invasive Ventilation in newborn infants -experiences from the Karolinska University Hospital

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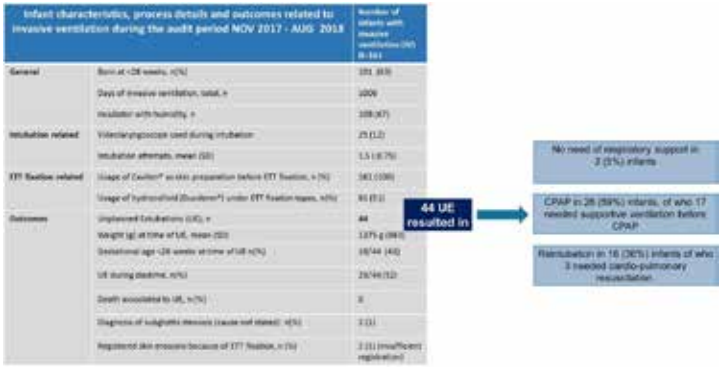
Background
Invasive ventilation management of infants is complicated and securing patient safety is a challenge. The infant population is vulnerable, they are usually not sedated, kangaroo care is prioritized, smallest infants are cared for in incubators with high humidity and furthermore with decreasing use of invasive ventilation, intubations become more rare in the NICU. The aim was to determine quality indicators during invasive ventilation, such as unplanned extubations (UE), for guiding quality improvements in our NICU.

Methods
A multi-disciplinary Quality Improvement (QI) team worked according to the „Clinical Microsystems Quality by Design“ approach. The audit of the QI study executed from Nov 2017-Aug 2018 including: defining and registration of key indicators, analyses of baseline data, implementation of specific actions points with PDSA cycles and evaluation according to the QI method.

Results
The audit period was November 2017- August 2018. The process from intubation to extubation was defined with focus on: methods aiding intubation success, standardizing endotracheal tube (ETT) fixation and infant nursing during invasive ventilation. The overall UE rate was 4.3 per 100 patient-intubated ventilator days (compared to a baseline of 7.2 before audit) Characteristics and main results are shown in Graph 1. During this period the following PDSA cycles were tested: structured ETT nursing controls, staff



educational inputs, focus on ETT fixation during rounds and testing of new standardized ETT fixation methods. The first ETT fixation method did not increase UE rate, but re-fixation was needed daily so it was abandoned and another more successful method implemented, now with decreasing rates of UE. PDSA cycles with focus on methods aiding intubation success are needed and routines on aiding kangaroo care for infants on invasive ventilation.

Conclusions
The QI methods are effective in modifying patient safety during invasive ventilation. Adequate ETT fixation methods are lacking for newborn infants and urgent need is for innovation.

For more information and registration go to https://99nicu.org/meetup

Our Twitter account is @99nicu (https://twitter.com/99nicu). As in previous years, the hashtag will be #99nicuMeetup (https://twitter.com/hashtag/99nicumeetup)

The authors indicate that they have no disclosures

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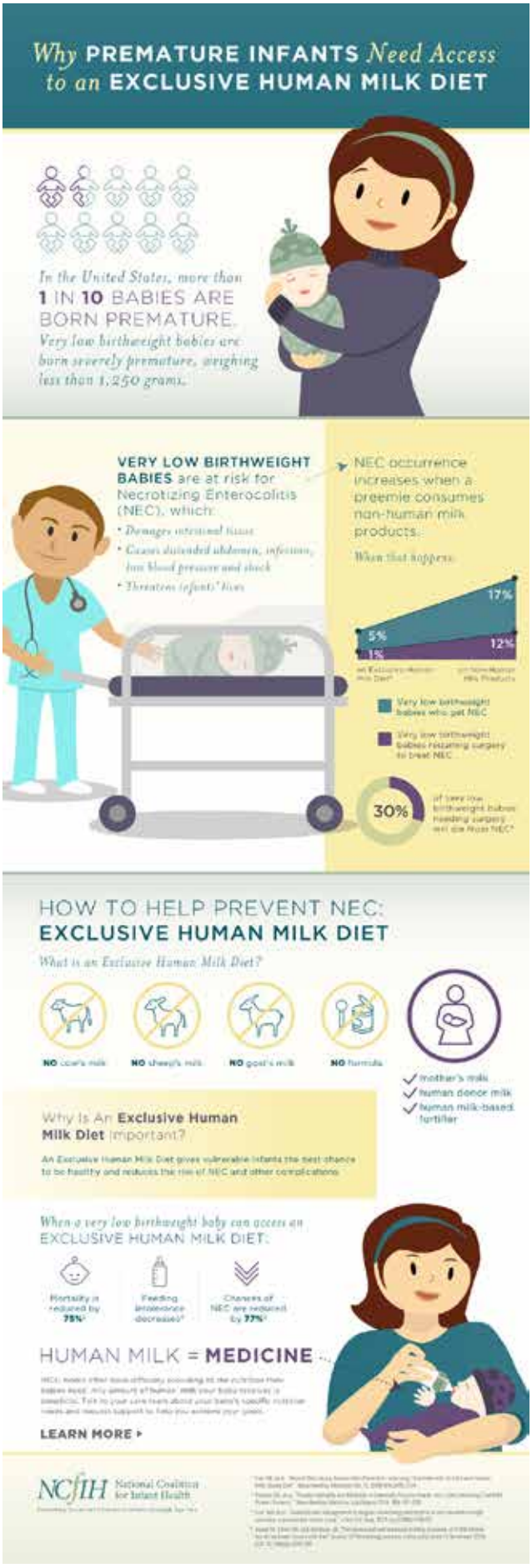

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Perinatal Substance Use

5 ways you can improve care during pregnancy and beyond

Pregnancy presents unique opportunities for patients to make positive changes in their substance use. When you become an informed provider you empower patients to make those changes.

Educate Yourself

Learn more about the pharmacology of substance use. Promote evidence-based care by communicating with patients in a way that separates fact from fiction. Understand the cycles of sobriety and relapse so that you can help patients plan for their recovery. Advise on the risks associated with polysubstance use.

Use the Right Words

Know the difference between substance use, substance misuse, and Substance Use Disorders (SUDs). Recognize that substance use is stigmatized and that stigma is a barrier to seeking care. Reject language that shames. Embrace the principles of Harm Reduction as a way to support any positive change.

Screen Every Patient

Talking about substance use should be a routine part of everyone's medical care. Get comfortable discussing it. Ask questions and listen to what your patients have to say. You may be the first person to ever ask.

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Medication-Assisted Treatment is the Standard of Care during pregnancy, but there are not enough providers. Contact SAMHSA to become an OTP*. Make naloxone available to all your patients who use opioids.

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The Genetics Corner: A Genetics Consultation for Agenesis Cutis Congenita and Methimazole Exposure

Subhadra Ramanathan, M.Sc., M.S. and Robin Clark, MD

Case History:

A genetics consult was requested for a term male infant with cutis aplasia congenita. The pregnancy was complicated by maternal hyperthyroidism, treated with methimazole (10mg/day), until around 12 weeks' gestation, when her endocrinologist changed her medication to propylthiouracil (PTU). All medication was discontinued in the second trimester when she became euthyroid. She also took Buspar, PRN (approximately once a day) for depression until 12 weeks gestation. Other teratogenic exposures were denied.

The baby was delivered in a community hospital at term by vaginal delivery to a 25-year old G2P1 mother. APGAR scores were 91 and 95. BW 2960 gm (20.54th %ile), BL 49.5 cm (42nd%ile), HC 33 cm (13th%ile). The baby was transferred to our facility because of his scalp defect. Head and abdominal ultrasound exams and echocardiogram were normal.

The family history was obtained by phone from the mother who was still at the birth hospital. She reported an area of congenital cutis aplasia of about 1 cm in diameter on her own scalp, but no one else in the family was similarly affected to her knowledge. Both parents are 25 years old. There is a healthy 4-year old sibling. There was no parental consanguinity; father is Caucasian, and mother is Asian.

On physical exam, the baby was alert, responsive and active in ambient air. He had a normal 1.5 cm anterior fontanel and a full thickness 3 x 6 cm scalp defect with irregular borders at the vertex (figure 1).. A cephalohematoma was palpable at the margin of the scalp defect. The frontal bones could be palpated at the anterior edge of the scalp defect and appeared to be intact. The extremities were normal, with normal nails, digits, and creases. There were no other dysmorphic features or congenital anomalies.

Consultant's report:

Aplasia cutis congenita (ACC) is a rare congenital skin defect characterized by focal or extensive absence of the epidermis, dermis, subcutaneous tissue and sometimes bone. Most lesions are localized to the scalp at the vertex, although lesions can appear anywhere on the body. ACC can occur as an isolated anomaly, after focal necrosis related to placental infarction, a dead co-twin (fetus papyraceous) or an intrauterine infection (varicella) (Alexandros B et al., 2017), as a sporadic or familial single gene disorder, or in combination with various anomalies in over 50 multiple congenital anomaly syndromes.

Hereditary forms of ACC can be isolated and nonsyndromic or associated with other anomalies. A family with nonsyndromic autosomal dominant ACC (MIM 107600) in 5 generations had a pathogenic variant in BMS1, a gene involved in skin morphogenesis (Marneros AG et al., 2013). Adams-Oliver syndrome (MIM 100300) comprises a group of autosomal recessive and autosomal dominant disorders of variable severity in which aplasia cutis congenita occurs with transverse terminal limb defects. It is caused by variants in ARHGAP31 and many other genes. In Scalp-Nipple-Ear syndrome, also called Finlay-Marks syndrome (MIM 181270), ACC occurs with breast anomalies (athelia), ear anomalies, nail dystrophy, cutaneous syndactyly, and renal malformations. A heterozygous variant causes this autosomal dominant disorder in KCTD1. In Setleis syndrome (MIM 227260), an autosomal recessive condition caused by variants in TWIST2, the symmetric bitemporal areas of cutis aplasia have been likened to "forceps marks." Recognizable facial features in Setleis syndrome include thin, wrinkled periorbital skin and distichiasis (double eyelashes).

Gestational hyperthyroidism, which occurs in 1-2/1000 pregnancies, confers an increased risk for serious consequences on the exposed neonate. Hyperthyroidism in pregnancy is associated with preeclampsia, preterm labor and delivery, and admission to the NICU. The commonly used antithyroid drugs, methimazole (MMI) and carbimazole (CMZ), a pro-drug of methimazole, are associated with congenital anomalies in exposed fetuses. While propylthiouracil (PTU) has been the preferred agent for the treatment of hyperthyroidism during the first trimester of pregnancy, it is associated with maternal liver failure. More recently PTU-exposed fetuses have been shown to have an increased risk of mild teratogenic effects, primarily preauricular sinuses/cysts/fistulas and urinary tract anomalies.

"More recently PTU-exposed fetuses have been shown to have an increased risk of mild teratogenic effects, primarily preauricular sinuses/cysts/fistulas and urinary tract anomalies."

Methimazole is a thioamide that crosses the placenta. It causes fetal thyroid suppression in both animals and humans, with subsequent fetal hypothyroidism and goiter. Concern about its teratogenicity was first reported in 1972 when Milham & Elledge briefly described gestational exposure to MMI in 2 of the 11 mothers of 12 infants with aplasia cutis (1 affected singleton, one set of concordant affected twins). More severe birth defects have subsequently been reported leading to the description of methimazole/carbimazole embryopathy. Recently, two large series of treated mothers in Japan and Denmark have confirmed an increased risk of 2-3% risk for congenital anomalies after early in utero MMI exposure. These MMI-associated congenital malformations made up about half of the excess cases of congenital anomalies: aplasia cutis congenita, omphalocele, omphalomesenteric duct, choanal atresia, esophageal atresia/ tracheoesophageal fistula, microtia, septal defects, eye, and urinary tract defects. Laurberg and Andersen (2014) noted, in their meta-analysis of 92 publications on the topic, that the period of highest risk for anomalies in MMI/CMZ-exposed pregnancies was 6-10 weeks gestation. Song et al. (2017) evaluated ten studies with over 5000 pregnancies treated with antithyroid medications and reported an almost doubled risk for congenital malformations among MMI/CBZ-exposed pregnancies compared to those exposed to PTU alone (OR 1.90; 95% 1.3-2.78; P=0.001).

This infant had isolated ACC without other associated congenital anomalies. A single gene disorder had to be considered because of the family history of scalp defect in this mother. Genetic testing was ordered with negative results for pathogenic variants on a multigene panel for Adams-Oliver syndrome, with add-on testing for BMS1. A chromosome microarray analysis was also normal.

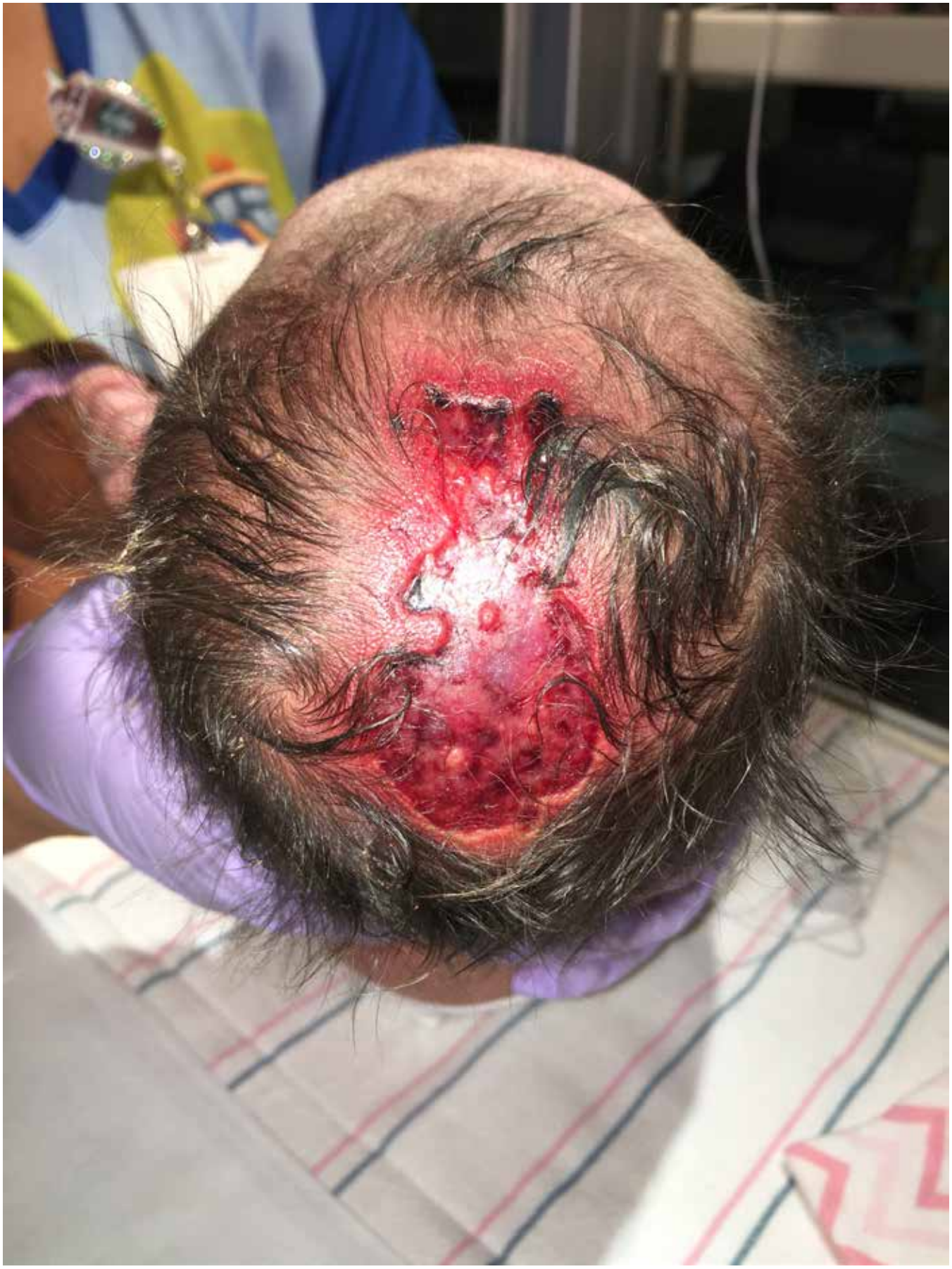

Figure 1: Full thickness scalp defect at vertex 3x6 cm, with irregular borders

We concluded that this infant's ACC was due to his first-trimester exposure to methimazole. However, in his case, it is possible, and perhaps likely, that a permissive genetic background enhanced the teratogenic action of the drug.

Practical applications:

- Examine infants of hyperthyroid mothers for aplasia cutis congenita and other teratogenic effects of antithyroid medications.
- Consider placental, teratogenic, monogenic syndromes and multifactorial disorders in the differential diagnosis of ACC.
- Distinguish isolated from syndromic ACC.
    - Evaluate infants with ACC for associated birth defects. Order echocardiogram, renal/abdominal ultrasound.
- Take your own detailed pregnancy and family history directly from the mother.
    - When you copy and paste the family history from the mother's chart, you risk missing important key information.
- Order appropriate genetic testing when the family history is positive for ACC or when other anomalies are present.
- Counsel women with pregestational hyperthyroidism prior to conception regarding available treatments and their potential adverse effects.
    - When you talk to the mother of your patient, take advantage of the opportunity for preconceptional counseling.
    - Hyperthyroid women should plan their pregnancies in order to avoid MMI/CBZ during the sensitive periods of organogenesis in the first trimester.

References:

1. *Alexandros B, et al. Aplasia cutis congenita: two case reports and discussion of literature. Surg Neurol Int. 2017;8:273.*
2. *Andersen SL, Olsen J, Wu CS, Laurberg P. Birth defects after early pregnancy use of antithyroid drugs: A Danish nationwide study. J Clin Endocrinol Metab. 2013;98(11):4373–4381. PMID 24151287*
3. *Goel H, Dudding T. Carbimazole/methimazole embryopathy in siblings: A possible genetic susceptibility. Birth Defects Res A Clin Mol Teratol. 2013;9(11):755-758.*
4. *Laurberg P, Andersen SL. Therapy of endocrine disease: antithyroid use in early pregnancy and birth defects: time windows of relative safety and high risk. Eur J Endocrinol. 2014;171(1):R13-20. PMID 24662319*
5. *Marneros AG. BMS1 is mutated in aplasia cutis congenita. PLoS Genet. 2013;9(6): e1003573.*
6. *Martinez-Frias ML, et al. Methimazole in animal feed and congenital aplasia cutis. Lancet. 1992; 339:742-743.*
7. *Milham S, Elledge W. Maternal methimazole and congenital defects in children. (letter) Teratology. 1972;5(1):125.*
8. *Song R, Lin H. Chen Y, et al. Effects of methimazole and propylthiouracil exposure during pregnancy on the risk of neonatal congenital malformations: A meta-analysis. PLoS One. 2017;12(7):e0180108. PMID 28671971*
9. *Yoshihara A, Noh J, Yamaguchi T, et al. Treatment of Graves' disease with antithyroid drugs in the first trimester of pregnancy and the prevalence of congenital malformation. J Clin Endocrinol Metab. 2012;97(7):2396–403. PMID 22547422.*

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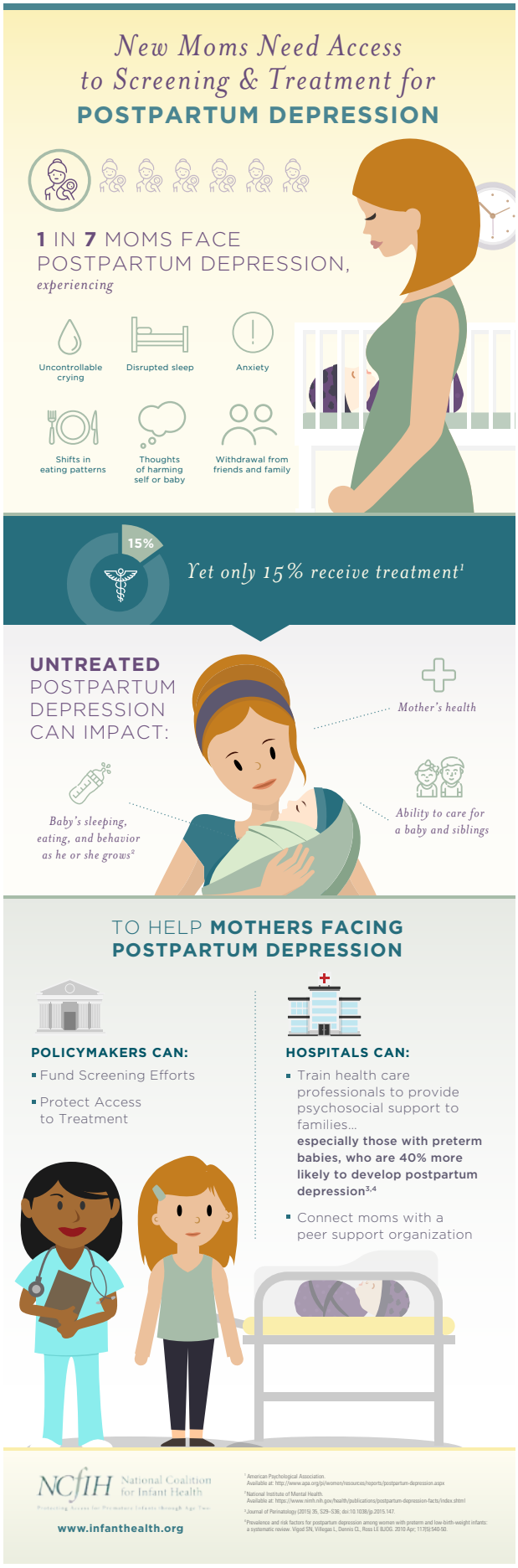

How to Care for a Baby with NAS

Use the Right Words

I was exposed to substances in utero. I am not an addict. And my mother may or may not have a Substance Use Disorder (SUD).

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Mothers and babies need each other. Help my mom and me bond. Whenever possible, provide my care alongside her and teach her how to meet my needs.

Support Rooming-In

Babies like me do best in a calm, quiet, dimly-lit room where we can be close to our caregivers.

Promote Kangaroo Care

Skin-to-skin care helps me stabilize and self-regulate. It helps relieve the autonomic symptoms associated with withdrawal and promotes bonding.

Try Non-Pharmacological Care

Help me self-soothe. Swaddle me snugly in a flexed position that reminds me of the womb. Offer me a pacifier to suck on. Protect my sleep by "clustering" my care.

Support Breastfeeding

Breast milk is important to my gastrointestinal heath and breast feeding is recommended when moms are HIV-negative and receiving medically-supervised care. Help my mother reach her pumping and breastfeeding goals.

Treat My Symptoms

If I am experiencing withdrawal symptoms that make it hard for me to eat, sleep, and be soothed, create a care plan to help me wean comfortably.

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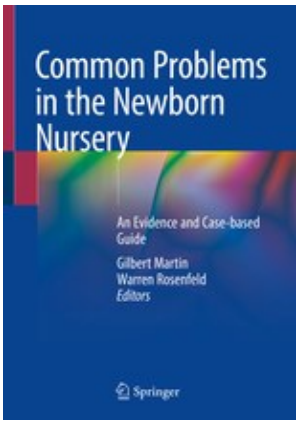

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New Evidence Validates Infant Feeding Connector Concerns

Susan Hepworth and Mitchell Goldstein, MD

NCfIH National Coalition for Infant Health

Protecting Access for Premature Infants through Age Two

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

Tubes deliver food, medicine, and blood or other liquids to tiny patients in neonatal intensive care. Mixing up the various tubes could lead to serious injury, even death. So in the mid-2000s, experts called for a new style of feeding tube connector to reduce tubing misconnections.

In response, the ENFit style connector debuted in 2014. Its "male" feeding tube connectors are only compatible with "female" syringe tubes. While the design reduces the likelihood of tubing mix-ups, it ushered in a new issue.

According to researchers, the ENFit tubing connector "significantly increases the opportunity for inaccurate dosing." These findings support existing concerns. Some health professionals and patient advocates have raised the issue with the product itself, citing safety and workflow problems. Others are apprehensive that it is being forced into use in some places, such as California. Now, there is evidence to support the unease.

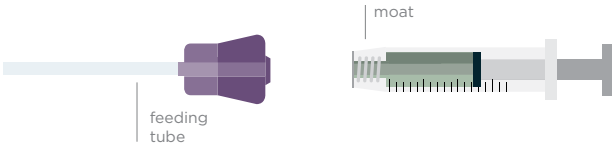
"These findings support existing concerns. Some health professionals and patient advocates have raised the issue with the product itself, citing safety and workflow problems."

Medicine can "hide" in the area around the syringe barrel of the ENFit connector. If this "moat" is not cleared properly, too much medicine can be administered. Even a small amount of excess medicine puts these tiny infants at risk of overdose or adverse drug reactions.

The ENFit design also increases the potential for bacteria to colonize if residual breast milk or formula remains in the moat. This design could introduce infection, which could also have dire consequences.

While peer-reviewed evidence supporting dosing concerns had been lacking, that is no longer the case. After completing 576 tests, researchers at UF Health affirmed dosing inaccuracy. They

A new tubing design meant to eliminate tubing misconnections has introduced new challenges for the NICU population. Pediatric providers must deliver medication in small volumes to tiny patients with high levels of accuracy. The new tubing design, known as ENFit®, could present dosing accuracy and workflow challenges.



DOSING ACCURACY

- The moat, or area around the syringe barrel, is difficult to clear. Medication can hide there, inadvertently increasing the delivered dose when the syringe and feeding tube are connected; patients may receive extra medication.

INFECTION RISK

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

WORKFLOW ISSUES

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

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

Individual hospitals should consider all factors impacting their NICU patients before adopting a new tubing design.

ENFit® is a registered trademark of GEDSA

NCfIH National Coalition for Infant Health

Protecting Access for Premature Infants through Age Two

A collaborative of professional, clinical, community health, and family support organizations focused on the health and safety of premature infants.

infanthealth.org

also commented about the usability of the ENFit connectors and adapters, stating nurses and caregivers need "extensive training" to learn "how to appropriately use" them.(1)

The research shows: Patient safety is on the line. The new findings support calls from the National Coalition for Infant Health and others to ensure hospitals and health care centers are fully informed about the ENFit dosing connectors before using them.

References:

1. *O'Mara K, Gattoline SJ, Campbell CT. Female low dose tip syringes-increased complexity of use may compromise dosing accuracy in paediatric patients. J Clin Pharm Ther. 2019.*

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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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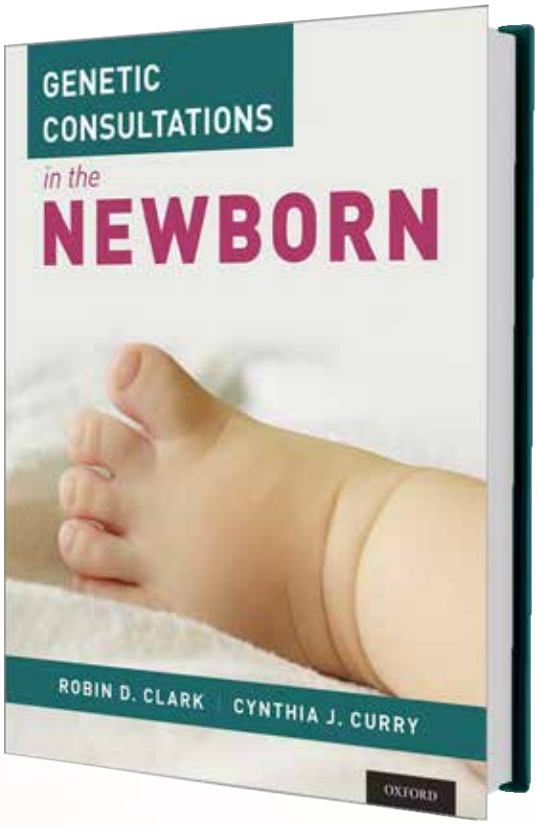

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From The National Perinatal Information Center

Complications of Maternal Hypertension:

Data from NPIC Special Membership Report for Q4, 2017-Q3, 2018

Janet H. Muri, MBA , Sandra A. Boyle, BS and
Carolyn Wood, PhD, RN

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

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

NPIC
National Perinatal Information Center

Background

One of the leading causes of maternal mortality and severe morbidity in pregnancy is hypertensive disease. In 2016, the CDC reported the rate of hypertensive disorders in pregnancy increased 72.5% from 1993-2014, from 528.9 in 1993 to 912.4 in 2014 (per 10,000 delivery hospitalizations). (1)

Health care providers have sought to develop a consensus on the most effective way to manage the care of the pregnant woman with a hypertensive disorder, ultimately improving maternal and neonatal outcomes. Under the direction of the Council on Patient Safety in Women's Health Care, several organizations involved in women's health have come together to establish the Alliance for Innovation on Maternal Health (AIM). AIM is a national data-driven maternal safety and quality initiative based on proven implementation approaches. Patient Safety bundles that focus on readiness, recognition & prevention, response, and reporting/systems learning have been developed for some of the major complications of pregnancy impacting maternal morbidity and mortality, including one on hypertension. (2)

The hypertension bundle review of readiness for every unit includes standardization of protocols for hypertension management, unit education, drills, rapid access to medications and plans to deal with escalation of severe hypertension, including consult and transfer as needed.

Recognition and prevention for every patient addresses the need for standard protocols for measurement and assessment of B/P and urine protein for all pregnant and postpartum women. Early warning signs and investigation of symptoms with lab assessment should be obtained. Maternal education on signs and symptoms of hypertension and preeclampsia should be part of care for prenatal and postpartum women.

Response to severe hypertension/preeclampsia is addressed by standard protocols with checklists and escalation policies. Minimum requirements for the protocol outline specific B/P parameters for notification of providers if systolic B/P =/>160 or diastolic B/P =/> 110 for 2 measurements within 15 minutes. After the second elevated reading, treatment should be initiated as soon as possible, preferably within 60 minutes of verification. (3)

The final component of the bundle, reporting/systems learning, speaks to each unit doing huddles and post-event debriefs, multidisciplinary review of severe cases admitted to ICU and monitoring outcomes and process metrics.

Findings from the NPIC Special Report

The Special Report for the period Q4, 2017-Q3, 2018 focused on the review of all delivery cases coded with hypertension at each member hospital in comparison to their peer subgroup and the Perinatal Center Data Base (PCDB) as a whole. Table 1 below displays the average distribution of the seven categories of hypertension cases for NPIC member hospitals.

Table 1: Overview	Database Average
Total Deliveries	3,685
Total Deliveries with selected Hypertension coding *	597
Percent of total deliveries	16.2%
For Hypertension cases only:	
ALOS	3.8
C-section rate	46.2%
Hypertension Categories (percent of deliveries coded with Hypertension) *	%
• Gestational hypertension	41.2%
• Mild to moderate preeclampsia; Unspecified preeclampsia	19.6%
• Severe preeclampsia	19.5%
• Pre-existing hypertension (Chronic)	18.3%
• Pre-existing hypertension with preeclampsia (Superimposed)	6.5%
• Eclampsia	0.4%
• Unspecified maternal hypertension	4.4%
Codes available upon request at mservices@npic.org	

Maternal Complications: A profile of maternal co-morbidities/complications for cases coded with hypertension was also included and Table 2 shows the average rate of those complications across all member hospitals in the PCDB. The data shows that longer lengths of stay are fairly common for hypertension cases and 2.7% of all cases are readmitted within 42 days. This is more than twice the postpartum readmission rate (1.1%) for all deliveries at member hospitals.

Table 2: Maternal Comorbidities/Complications - Deliveries Coded with Hypertension	Database Average
• Antepartum admission (at least one admission and discharge prior to delivery hospitalization)	3.6%
• Multiple gestation	3.4%
• Early onset of labor (prior to 37 weeks completed gestation)	8.9%
• Placenta abruption	1.6%
• Obesity	24.6%
• Anemia	20.7%
• Gestational diabetes	12.6%
• Long LOS (> 2 days vaginal delivery; > 4 days c-section delivery) *	47.7%
• Postpartum readmission within 42 days of delivery discharge	2.7%
* LOS may include days of care prior to delivery	

Feedback from members also confirmed that a percentage of postpartum readmissions were returning with hypertension diagnoses and had no indication of hypertension during the original delivery discharge. Table 3 below shows that almost 24% of the readmissions within 42 days with a diagnosis of hypertension did not have hypertension coded on their delivery discharge summary.

Table 3: Postpartum readmissions within 42 days	
Average Postpartum Readmissions with primary diagnosis of hypertension and delivery encounter NOT coded with hypertension	11
Percent of total postpartum readmissions within 42 days	23.7%

Neonatal Complications: More than ninety-six percent (96.2%) of the PCDB mother/baby cases are linked, allowing for the identification of neonatal complications associated with cases coded with maternal hypertension. Table 4 profiles a few of these complications with the largest risk being preterm birth and admission to the special care nursery, both drivers of increased cost and utilization.

Table 4: Neonatal Complications associated with Maternal Hypertension	Database Average
Total Deliveries with selected Hypertension coding	597
Total deliveries coded with hypertension linked to an inborn	581
Deliveries coded with hypertension linked to an inborn as a percent of total deliveries coded with hypertension	96.2%
Neonatal Complications (percent of total deliveries coded with hypertension linked to an inborn)	%
• Inborns delivered < 37 completed weeks gestation and/or < 2500 grams	26.5%
• Inborns small for gestational age (SGA)	6.6%
• Inborns admitted to special care nursery	23.8%
• Inborns transferred to another hospital within 1 day of birth (UB04 disp = 02 or 05)	1.0%
• Respiratory Distress Syndrome (RDS)	5.9%

AIM Severe Hypertension in Pregnancy Bundle: Many states and national collaboratives, like NPIC are introducing their hospitals to the Severe Hypertension in Pregnancy Bundle as a way to better identify, respond and manage women with escalating hypertension. In addition to implementing the bundle components with their teams, Severe Maternal Morbidity (SMM) outcome metrics for preeclampsia cases are tracked for each hospital's baseline period and then quarterly, after initial implementation of the bundle components.

The denominator for the AIM Severe Maternal Morbidity (SMM) among Preeclampsia Cases outcome measures includes a subset of hypertension codes. Table 5 shows the NPIC Data Base average for both AIM outcome metrics associated with the Severe

Table 5: AIM Severe Hypertension in Pregnancy Bundle Outcome Measure: Severe Maternal Morbidity among Preeclampsia cases	Database Average
Total Deliveries with selected Hypertension coding	597
AIM Preeclampsia Denominator Cases*	172
AIM Preeclampsia Denominator Cases as a percent of total cases coded with hypertension	26.3%
AIM Severe Maternal Morbidity (SMM) among Preeclampsia cases **	%
• Overall rate	8.9%
• Rate excluding cases coded with blood transfusion as the only severe morbidity	5.0%
Alliance for Innovation on Maternal Health (AIM) measure definitions are available at: https://safehealthcareforeverywoman.org/aim-data/	
* Includes hypertension categories: Severe preeclampsia; Pre-existing hypertension with preeclampsia (Superimposed); and Eclampsia.	

Hypertension in Pregnancy bundle: the overall rate of SMM among preeclampsia cases and the rate excluding cases with blood transfusion coded as the only severe morbidity.

NPIC Trends

The NPIC Trend Data Base icludes hospitals that have been members for the period 2013 - Q3, 2018. For this Special Report, we are focusing on data since the initiation of ICD 10 coding. The analytic period is Q4, 2015-Q3, 2018 (12 quarters). During this period, the Trend Data Base showed a statistically significant increase in all cases coded with hypertension, from 13.5% to 16.7%, a 24% increase in deliveries coded with hypertension. Translating this rate into 1,670 per 10,000 shows a continuing increase over the CDC 2014 rates, a trend of ongoing concern.

Resources

1 *CDC (2016). Hypertensive Disorders 1993-2014. Retrieved from https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy.*

2 *Severe Hypertension in Pregnancy (+AIM) (2018, October 16). Retrieved from https://safehealthcareforeverywoman.org/patient-safety-bundles/severe-hypertension-in-pregnancy/.*

3 *Committee on Obstetric Practice and Society for Maternal –Fetal Medicine. (2018). Low-dose aspirin use during pregnancy. ACOG Committee Opinion No. 743. Obstetrics and*

Gynecology, 132:e44-66.

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RSV AWARENESS:
A National Poll of Parents & Health Care Providers

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

Yet a national poll of parents and specialty health care providers reveals a startling divide in attitudes toward the virus. While both groups acknowledge RSV as a significant concern, the two populations vary widely in their reported ability to meet RSV's threat head-on. Health care providers vigilantly monitor for the virus, which they report seeing regularly in their practices. Parents, however, feel unequipped to protect their young children.

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

KEY FINDINGS

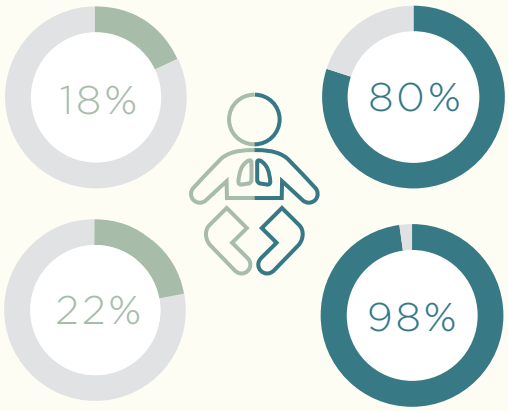
Preparedness

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

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

PARENTS

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



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

SPECIALTY HEALTH CARE PROVIDERS

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

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

Medicolegal Forum: HIPAA: One Click Can End Your Career

Jonathan Fanaroff MD, JD and Gilbert Martin, MD

The physical assault reported by "Empire" actor Jussie Smollett on January 29 made national and international headlines, especially after he was later charged with disorderly conduct in filing a false police report. A lesser reported story but one with important lessons for health care professionals was the firing of more than 50 hospital employees at Northwestern Memorial Hospital, where Smollett was treated after the assault, for improperly accessing Smollet's electronic medical records in violation of the Health Insurance Portability and Accountability Act (HIPAA).

HIPAA was passed in 1996 after Congress decided there was a need for federal standards to protect the privacy of individually identifiable health information. Rules and regulations supporting HIPAA are issued by the federal Department of Health and Human Services (HHS). These regulations, known as the 'Privacy Rule,' require that any health care provider that transmits health information in electronic form take steps to protect all "individually identifiable health information." This information, known as "Protected Health Information" (PHI) includes any information allowing identification of an individual. This includes obvious information such as address, birthday, and social security number, but also less obvious information such as birth weight, hospital room number, or the date of a procedure.

Entities that must follow HIPPA Regulations are called, "covered entities." These covered entities include hospitals, medical offices, health plans, health insurance companies, HMOs, company health plans and government programs that pay for health care.

Many health care professionals mistakenly believe that as long as they do not include the patient's name they can publicly share information about their patients without violating HIPAA, and it has cost them their jobs. For example, an ER nurse in Michigan came home from a shift and posted to Facebook her displeasure at having treated a "cop killer" that day. Even though the posting did not include the patient's name, they were readily identifiable due to ongoing media coverage, and the nurse was terminated.

"Physicians have also been prosecuted for HIPPA violations. Is the U.S. Department of Justice increasing their involvement for violations? Physicians need a wakeup call to understand that HIPPA is more than a privacy and security framework but also is involved with criminal liability."

Physicians have also been prosecuted for HIPPA violations. Is the U.S. Department of Justice increasing their involvement for violations? Physicians need a wakeup call to understand that HIPPA is more than a privacy and security framework but also is involved with criminal liability.

Hospitals do not tolerate HIPAA infractions for several reasons. First, patients appropriately want and expect their health care information to be private, and violations of that privacy can impact where they choose to receive care. Second, there is significant negative publicity associated with privacy violations. Finally, the Health Information Technology for Economic and Clinical Health Act (HITECH), enacted in 2009, sets out increased financial and criminal penalties for HIPAA violations, including years in prison and millions of dollars in fines.

One fired Northwestern employee interviewed for the local CBS news (2CBSChicago – Dana Kozlov – March 7, 2019, at 5:30 pm) admitted to searching for the actor's name but claims she never clicked on his file. "I had told them on several occasions that I did not enter the records and I didn't understand how having those names on the screen is my entering the records," she said. HIPAA rules are clear, however, that even the fact that an individual is receiving care is considered PHI. (1)

It is interesting that one of the benefits of widespread use of electronic medical records (EMRs) is to increase communication between healthcare providers to improve our care of patients and their families. One of the unanticipated consequences was the presentation of personal information which can be easily accessed. We hear daily about these "horror stories" of identity theft.

Every year when we need to update our compliance training, it always deals with facts and information regarding HIPPA. Moaning and groaning ensue. We would rather be seeing patients. Do you feel the same way? Rationalizations abound.

Celebrities have the same right to privacy as anyone else. Additionally, the principle that patients should have an expectation of privacy is not new and did NOT start in 1996 with HIPAA. In fact, part of the Hippocratic oath, which is one of the oldest binding documents in history, states that 'I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know." (2)

References:

1. *Exclusive: Northwestern Hospital Employees Fired For ..,* https://chicago.cbslocal.com/2019/03/07/northwestern-employees-fired-jussie-smol *(accessed April 09, 2019).*
2. *Hu245 Unit 3 Discussion - Unit 3 Discussion Confidentiality..,* https://www.coursehero.com/file/15426350/HU245-Unit-3-Discussion/ *(accessed April 09, 2019).*

The authors have no conflicts of interests to disclose.

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Peer Reviewed

Monthly Clinical Pearl: Safe Sleep in the Neonatal Intensive Care Unit (NICU)

Sherri McMullen, PhD, NNP-BC, Jilliane Krause, MSN. Melissa Benesh, MSN, and Joseph R. Hageman, MD.

Safe infant sleep is important, regardless of where the infant is sleeping, to prevent sudden unexpected infant death (SUID) and sudden infant death syndrome (SIDS). The American Academy of Pediatrics provides a list of interventions to reduce the risk of untimely infant death including sleeping in the supine sleep position, on a firm sleep surface, in a crib or bassinet, avoiding extra blankets or devices including bumpers, stuffed animals etc., dressed in a simple sleeper or wearable sleep blanket, possibly swaddled as well (1).

Other guidelines include the following:

- Breastfeeding is recommended and is associated with a reduced risk of SIDS.
- Infants should be immunized. Evidence suggests that immunization reduces the risk of SIDS by 50 percent.
- Bumper pads should not be used in cribs. There is no evidence that bumper pads prevent injuries, and there is a potential risk of suffocation, strangulation or entrapment.

The report also includes the following recommendations:

- Always place your baby on his or her back for every sleep time.
- Always use a firm sleep surface. Car seats and other sitting devices are not recommended for routine sleep.
- The baby should sleep in the same room as the parents, but not in the same bed (room-sharing without bed-sharing).
- Keep soft objects or loose bedding out of the crib. This includes pillows, blankets, and bumper pads.
- Wedges and positioners should not be used.
- Pregnant women should receive regular prenatal care.
- Do not smoke during pregnancy or after birth.
- Breastfeeding is recommended.
- Offer a pacifier at nap time, and bedtime after breastfeeding is established.
- Avoid covering the infant's head or overheating.
- Do not use home monitors or commercial devices marketed to reduce the risk of SIDS.
- Infants should receive all recommended vaccinations.
- Supervised, awake tummy time is recommended daily to facilitate development and minimize the occurrence of positional plagiocephaly (flat heads).

Parent information will be available at www.healthychildren.org/safesleep starting Oct. 18. But what about safe sleep initiatives in the Neonatal Intensive care unit (NICU)? Here is a quote from Dr. Rachel Moon, one of the pediatricians on the AAP Committee for SIDS Prevention:

"Dr. Moon said. 'There needs to be more education for health care providers and trainees on how to prevent suffocation deaths and to reduce SIDS and other sleep-related infant deaths – our goal is to ultimately eliminate these deaths completely.'"

"It is important for health care professionals, staff in newborn nurseries and neonatal intensive care units, and child care providers to endorse the recommended ways to reduce the risk of SIDS and other sleep-related deaths, starting at birth," Dr. Moon said. "There needs to be more education for health care providers and trainees on how to prevent suffocation deaths and to reduce SIDS and other sleep-related infant deaths – our goal is to ultimately eliminate these deaths completely."

But when is the growing preterm infant stable enough to be placed in the supine position. Let us review a new survey of NICU nursing

staff by Sherri McMullen in this month's Neonatology Today.

References:

1. *American Academy of Pediatrics. Safe Sleep.* https://www.aap.org/en-us/about-the-aap/aap-press-room/pages/AAP-Expands-Guidelines-for-Infant-Sleep-Safety-and-SIDS-Risk-Reduction.aspx.
2. *Moon R and Task force on Sudden Infant Death Syndrome.* https://pediatrics.aappublications.org/content/pediatrics/138/5/e20162940.full.pdf.

The authors have identified no conflicts of interest.

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Clinical Pearls are published monthly.

Submission guidelines for "Clinical Pearls":

1250 word limit not including references or title page.

May begin with a brief case summary or example.

Summarize the pearl for emphasis.

No more than 7 references.

Please send your submissions to:

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Make sure to join us for the CDH Telethon LIVE on April19th, International CDH Awareness Day at www.cdhi.org

Every Friday until the end of Congenital Diaphragmatic Hernia Awareness Month on April 30th, CDH International is holding live drawings on Facebook to give away CDH Awareness shirts.

On May 1st, we will announce the grand prize winner - the person who raises the most money between now and April 30th for CDH will win 2 airline tickets to anywhere in the continental United States.

Our goal with this fundraising drive is to create an easy and fun way to raise money and awareness for Congenital Diaphragmatic Hernia. By creating a fundraiser and sharing your CDH story - or donating to someone else's fundraiser - you are helping us to help the 1000's of children (and adults) who fight Congenital Diaphragmatic Hernia every day.

To Participate:

1. Go to CHERUBS Facebook page (Support) at www.facebook.com/cdhsupport or CDH International's Facebook page (Research) at www.facebook.com/cdhintl
2. Click on the blue button that says "+Raise Money"
3. Set your target amount
4. Set an ending date of April 30th
5. Add your own photos, your own stories or why you want to help
6. Share on social media and Invite friends to donate
7. Invite friends to hold their own fundraisers

That's it! You're now helping 1000's of critically ill children from the comfort of your own phone or computer. How easy is that and for such a great cause?!

Congenital Diaphragmatic Hernia (CDH) is a devastating birth defect that occurs when a baby's diaphragm fails to fully form, allowing abdominal organs to enter the chest cavity and preventing lung growth. CDH strikes 1 in every 2500 babies, which equates to 1 baby every 10 minutes. It is as common as Spina Bifida and Cystic Fibrosis. The cause is unknown. Learn more at www.cdhi.org

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Letters to the Editor

From: Deepakshyam Krishnaraju <Deepak@theneolight.com>
Sent: Friday, April 5, 2019 12:39 PM
To: LomaLindaPublishingCompany@gmail.com
Subject: NeoLight | Neonatology Today

Dear Dr. Goldstein,

Dear Dr. Goldstein, Let me introduce myself - I am Deepak, Co-founder, NeoLight, a MedTech startup focused on developing empathy-driven tech for the newborn care market. We started off with Jaundice and currently have an FDA cleared therapeutic device that'll be the fastest and the most powerful tech to treat the condition. Along with our partners we are developing a next-gen point of care heel prick for bilirubin diagnosis.

NeoLight is driven by innovation and we focused on disseminating our progress and breakthrough via magazines that cater the nurses and neonatologists. Please find one our recent publications attached. I am interested in finding out can NeoLight publish in the edition Neonatology Today. I look forward to hearing from you.

Deepak Shyam Krishnaraju
Research Engineer & Co-founder
NeoLight | empathy-driven innovation

Dear Mr. Krishnaraju,

We will be happy to include announcements in our news and information section. Anyone can submit a manuscript to NT with proper disclosure. We are happy to consider manuscripts from industry. As long as the manuscript is clear, appropriate and evidence based, publication will be considered. However, if the manuscript is merely an advertisement for a specific product, it may be subject to revision so that proprietary information can be expressed in a way that is more balanced. We have worked with several organizations in the commercial space already and would be pleased to consider your submission. As with all manuscripts, there is no charge for publication. Subscriptions to our journal are also free.

We also accept advertisements from Industry. I think you will find that our prices are very competitive.

Please let me know if I you have any further questions. We look forward to hearing from you.

Sincerely,

Mitchell Goldstein, MD
Editor in Chief

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

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

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Erratum (Neonatology Today March, 2018)

Neonatology Today has not identified an erratum affecting the March, 2019 edition. Corrections can be sent directly to Loma-LindaPublishingCompany@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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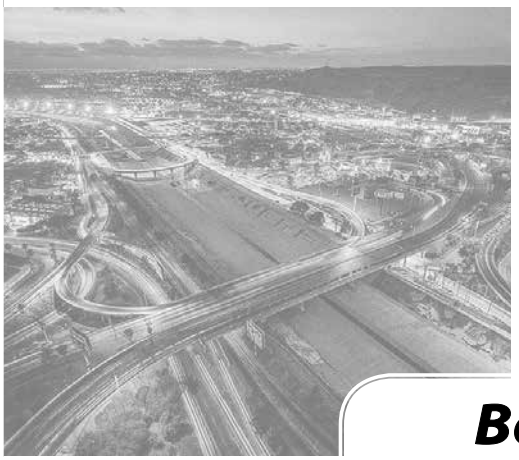
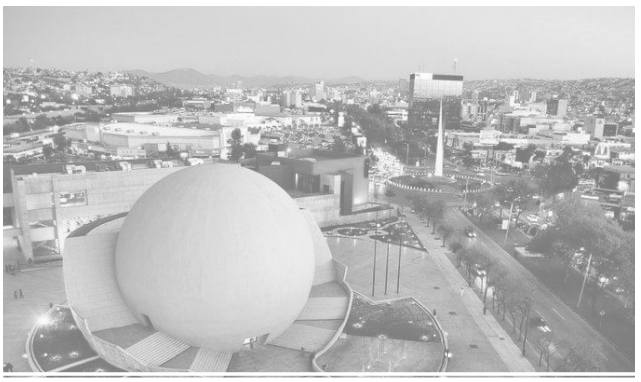
★ Resuscitation Best Practices ★ Respiratory Support: New Approaches
★ Neurology of the Newborn ★ Neonatal Radiology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https://www.pas-meeting.org/

Perinatal Advisory Council, Consulting, Advocacy, and Consultation (PAC-LAC)
June 13, 2019
Los Angeles, CA
https://paclac.org/paclacconference/

Next-Level Perinatal/Neonatal Comfort Care Training
June 19–21, 2019 | 9am – 5pm
Columbia University | New York City
http://mailman.columbia.edu/comfort-care

The 5th annual 2019 iCAN Research & Advocacy Summit
June 23-28, 2019
Kansas City, Missouri
https://www.icanresearch.org/2019-summit

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http://worldneonatology.com/2019/welcome-letter-2

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http://aapexperience.org/

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October 11-13, 2019;
Hospital for Sick Children, Toronto, Ontario, Canada
www.cardiacneuro.org/upcoming/

NANN's 35th Annual Conference
Savannah Convention Center
Savannah, GA
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http://nann.org/education/annual-meeting

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For Additional Meeting Information, visit NeonatologyToday.net and click on the events tab.

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Editorial Board

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.

The topic is again "birds" for this month. Our senior managing editor Larry Tinsley, MD shares a photograph of his cherished pet cockatoo. Literally, this column is going to the birds.

Herbert Vasquez, MD

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Manuscript Submission: Instructions to Authors

1. Manuscripts are solicited by members of the Editorial Board or may be submitted by readers or other interested parties. Neonatology Today welcomes the submission of all academic manuscripts including randomized control trials, case reports, guidelines, best practice analysis, QI/QA, conference abstracts, and other important works. All content is subject to peer review.

2. All material should be emailed to: LomaLindaPublishingCompany@gmail.com in a Microsoft Word, Open Office, or XML format for the textual material and separate files (tif, eps, jpg, gif, ai, psd, or pdf) for each figure. Preferred formats are ai, psd, or pdf. tif and jpg images should have sufficient resolution so as not to have visible pixilation for the intended dimension. In general, if acceptable for publication, submissions will be published within 3 months.

3. There is no charge for submission, publication (regardless of number of graphics and charts), use of color, or length. Published content will be freely available after publication (i.e., open access). There is no charge for your manuscript to be published under open access

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 5,000 words. Abbreviations which are commonplace in neonatology or in the lay literature may be used.

8. References should be included in standard "Vancouver" format. 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

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